

**NORTH CAROLINA
SCHOOL BUS AND
ACTIVITY BUS
SPECIFICATIONS**

Type C – Conventional Bus

April 30, 2004

**North Carolina Department of Public Instruction
School Support Division
Transportation Services**

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SPECIFICATION COMMITTEE MEMBERS

This committee is comprised of NCDPI, NCDOA, NCDMV, and school district representatives charged with the task of revising and issuing the annual specifications for school buses and service vehicles. Goals of the committee are as follows:

1. To specify a school bus which is best suited to ensure the safety of North Carolina public school students and that is durable in construction in order to protect the investment of the taxpayer.
2. To gather feedback from local school transportation staff members from across the state regarding the vehicle specifications.
3. To research and increase familiarity with new technologies pertaining to school bus bodies and chassis among committee members.
4. To modify and revise specifications for school transportation service vehicles.

This document details terms of service for committee representatives. The committee shall consist of members as shown below.

A. Permanent Members (voting)

1. DPI central field transportation consultant (Charles Ball), Chairman
2. DPI western field transportation consultant (Randy Henson)
3. DPI eastern field transportation consultant (James Hawkins)
4. Division of Motor Vehicles – School Bus & Traffic Safety (Floyd Jackson, Keith Whitley)

B. LEA Representatives (voting, 2 year terms)

1. Western Area Representatives -
 Term expiring December 2003: Harold Laflin, Buncombe County
 Term expiring December 2004: Terry Campbell, Iredell County
 Term expiring December 2005: Jeff Garmon, Cabarrus County
2. Central Area Representatives -
 Term expiring December 2003: Todd Naylor, Davie County
 Term expiring December 2004: Billy Smith, Randolph County
 Term expiring December 2005: David Misenheimer, Stanly County
3. Eastern Area Representatives -
 Term expiring December 2003: Jeff Thigpen, Duplin County
 Term expiring December 2003: Tommy Hudson, Edgecombe County
 Term expiring December 2004: David Twiddy, Dare County

C. Ex-Oficio Members (non voting)

Purchasing Engineer, DOA Division of Purchase & Contract – Ralph Edelberg
 Assistant Purchasing Administrator, DOA Division of Purchase & Contract – Cathy Griner
 Section Chief, DPI Transportation Services – Derek Graham

**NORTH CAROLINA TYPE – C
SCHOOL BUS SPECIFICATIONS**

SPECIAL INSTRUCTIONS

BIDS – Sealed bids will be taken on Type – C school buses that are completely assembled, delivered, and serviced according to the specifications contained herein.

CONSTRUCTION - It is the intent of these specifications to describe a Type – C school bus that shall be basically of all steel construction or of some other material which has at least equivalent strength of all steel construction as certified by the bidder. All parts not specifically mentioned, which are necessary in order to provide a complete bus shall be furnished by the successful bidder and shall conform in strength, quality of material and workmanship to which is usually provided by the engineering practice indicated in these specifications. The completed school bus shall meet all Federal Motor Vehicle Safety Standards (FMVSS), requirements of the State of North Carolina, and requirements of the 2000 “National School Transportation Specifications and Procedures” in effect on date of manufacture except as noted. Dealer modification may be required and must be of OEM quality where OEM equipment will not meet specifications.

All parts not specifically mentioned, but necessary to provide a complete school bus, shall be furnished by the contractor and shall conform in strength, quality of materials and workmanship to those provided by engineering practices indicated in these specifications.

PERFORMANCE OF BIDDER – Bidders shall indicate (in detail form) their proposal to meet the following criteria. 1) Ability to render prompt service including production capabilities; 2) Statement including engineering facilities and experience in manufacturing school buses; 3) Ability to manufacture school buses in strict conformity with these specifications and service requirements. Note: Failure to submit this information may subject your bid to rejection.

POST AWARD MEETING – Within 30-days after contract award, and prior to any buses being built, a meeting shall be held with representatives of DPI Transportation Services. This meeting will be held to answer any questions that may arise from the successful bidder. The location of the meeting, which will be within the state of North Carolina, will be determined after contract is awarded. No school/activity buses are to be built prior to this meeting.

SERVICE OUTLETS - Bidders must indicate the extent of their ability to render prompt service by furnishing a list of branch offices and authorized service agencies. These offices/agencies must maintain a complete stock of repair parts that may be secured by ordering by number and at such discount as may be offered herein. It is the responsibility of the bidder to complete the rectification of all recalls in a prompt and timely manner by their personnel on site at our facilities, unless otherwise allowed by DPI Transportation Services.

DOCUMENTS AND PUBLICATIONS - Successful bidders shall furnish the following items for each chassis/body that is purchased:

1. Application for certificate of title.
2. Operator's manual.
3. One (1) Parts and Service/Repair Manual (Total of 104) for body/chassis on CD-ROM per county or a downloadable PDF file containing the required information that can reside on DPI's web site. These files and CD's must contain an index with page numbers. These will be distributed by DPI Transportation Services. Note: Must be able to load CD-ROM on computer hard drive.
4. Manufacturer's Statement of Origin.
5. One build sheet (line-setting ticket) including all parts information relating to the chassis/body, to include all engine information (S/N), transmission information (S/N).

NOTE: Service policies, line setting tickets, parts and service/repair manuals and warranty cards shall be delivered directly to the DEPARTMENT OF PUBLIC INSTRUCTION, RALEIGH, NC. The

service policy, warranty cards, and the line setting ticket shall NOT be left in or with the chassis during shipment. (Exception: For activity bus chassis this information shall be delivered to the using agency.) One application for Certificate of Title for each unit purchased shall be properly filled out for vehicle identification section only.

WARRANTY - Bidder shall warrant for five (5) years/unlimited miles the entire power train (engine, transmission, differential, driveshaft and its bearings, engine electronic controls), water pump, alternator, starter, turbocharger, and all interior and exterior paint. Bidder shall warrant all other chassis items for the manufacturer's standard warranty period. Bidder shall warrant the body and all related items, including air conditioning, for the manufacturer's standard warranty period or two (2) years, whichever is greater.

All warranty periods are to commence on date the respective vehicle is placed in service by the State. DPI will notify bidder of such date. All parts (including related cleaners, fluids, filters etc.), labor, and environmental fees, shall be the responsibility of the bidder. Correction of latent defects, undiscovered during the initial acceptance inspection by the State but appearing before the applicable warranty period has elapsed, will be the full responsibility of the bidder, at no cost to the State or the user. Upon award, bidder will provide the State with original copies of warranties offered in accordance with the above requirements on all chassis and body items, except for those items covered above by the 5-year warranty. By execution of bid, bidder agrees to the 5-year powertrain warranty requirement in its entirety as specified above. By execution of bid, bidder also agrees that sample or specimen warranties which may be included with the bid are provided for informational purposes only and are NOT intended to take exception to any requirement in the warranty section.

REQUESTS FOR ALLOWANCE FOR SUBSTITUTE COMPONENTS - If bidder wishes to substitute a component make and model differing from that respectively specified or referenced herein, bidder is to request allowance for such substitution in writing (such as by letter, fax, or email) to the purchaser no later than 10 days before bid opening. Otherwise it is agreed that bidder will furnish the make and model of component as specified or referenced herein.

COMPONENTS - Bidders shall guarantee that chassis offered are current models, that assembly parts are in production for use in new chassis/body and that their manufacture and sale through dealer source will not be discontinued within ten years. All chassis components shall be the same as those accepted on the pilot model unless prior written approval is obtained from the contract administrator.

INSPECTION - Purchaser and/or their representative shall have inspection privileges during construction of school buses. Final inspection and acceptance will be at the delivery points specified in the contract. School Buses that do not comply with the grade of workmanship or type of materials in conformity with specifications and/or pilot model will not be accepted.

Authorized inspectors and representatives of the State Department of Public Instruction and Department of Administration shall be admitted to any part of the factory of the contractor at any time during normal working hours for the life of the contract. They shall be given all necessary assistance in making any tests deemed necessary to determine compliance with these specifications.

WEATHER PROTECTION - All dash instruments, horn button, ignition switch, etc., of the chassis shall be adequately protected against weather while chassis are in storage or in transit.

PILOT MODEL - A finished and mounted pilot model for each body size (41-P, 53-P, 66-P, and 72-P) shall be available at the manufacturer's assembly plant. Such model shall be subject to inspection of all materials and processes of manufacture and assembly. Pilot model inspections will be required on all configurations. No buses (school or activity) built under these specifications shall be delivered until Pilot Models have been inspected and approved. These inspections and dates will be discussed at "Post Award Meeting".

SERVICE - The complete bus shall be inspected and completely serviced before being placed in-service by the State. This service shall include:

1. Complete lubrication of chassis.
2. Filling of steering, engine, cooling system, transmission, and rear axle to proper fluid capacities.
3. Adjustment of engine and all other mechanical features to assure perfect operation.
4. Inspect, adjust, correct, and replace any parts not in proper operating condition or are not in compliance with specifications.
5. Fill fuel tank with 30 gallons of diesel fuel.

TECHNICAL TRAINING - Successful bidder will be required to furnish training for North Carolina transportation personnel at various locations in the State as requested. This training shall be provided at no additional cost within a twelve-month period beginning at the bid award date. Vendor shall be responsible for producing training coupons for use as described below. Training to be structured as follows:

1. Engine Specific Training – Training to be provided by chassis engine manufacturer and shall consist of at least six (6) hours of training per person. One (1) Engine Specific Training coupon will be issued for every two (2) buses sold under this contract. Each coupon represents training for one (1) person.
2. Chassis Specific Training – Training to be provided by chassis manufacturer and shall consist of at least fourteen (14) hours of training per person. Training shall consist of chassis related items and Allison Electronic (2000 series) Transmission. One (1) Chassis Specific Training coupon will be issued for every two (2) buses sold under this contract. Each coupon represents training for one (1) person.
3. Body Specific Training – Training to be provided by body manufacturer and shall consist of at least twelve (12) hours of training per person. Training shall consist of body-related components and Air Conditioning. One (1) Body Specific Training coupon will be issued for every two (2) buses sold under this contract. Each coupon represents training for one (1) person.

PAYMENT - Payment will be made after each school bus has been accepted by the Local Education Agency (LEA) and by DPI Transportation Services. Payment of invoices will be made at the same rate as buses are completed and delivered to the LEA's. The ordering unit or agency (Capital Outlay Purchases) will make payment within 30-days (interest free) upon acceptance of completed school or activity bus, or receipt of correct invoice, whichever is later.

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MINIMUM REQUIREMENTS OF A TYPE-C SCHOOL BUS CHASSIS**APPROVED ELECTRONIC DIESEL ENGINES
Must meet 2004 EPA Emissions Level Standards**

MAKE	MODEL	HORSEPOWER	TORQUE
Caterpillar	C7	210	520
Cummins	ISB	210	520
International	VT365	215	540
International	DT466	215	540
Mercedes-Benz	MBE900 6.4L	210	520

Approved Chassis Requirements

Basic Pupil Load	<u>41</u>	<u>53</u>	<u>66</u>	<u>72</u>
Manufacturers GVWR	19,000	24,000	24,000	24,000
Wheel base (approximate inches)	165-193	198-219	238-259	258-279
Front Axle Capacity (lbs.)	10,000	10,000	10,000	10,000
Rear Axle Capacity (lbs.)	15,000	19,000	19,000	19,000
Transmission Speeds Forward	5	5	5	5

Approved Brake Sizes

All chassis required shall be equipped with air brakes. Two-piece stamped dust shields required for front and rear brake drums. Technicians must be able to check brake lining condition without removing the dust shield.

	<u>41</u>	<u>54</u>	<u>66</u>	<u>72</u>
Air - Front Outboard Drum	15 x 4	15 x 4	15 x 4	15 x 4
Air - Rear Outboard Drum	16 ½ x 7	16 ½ x 7	16 ½ x 7	16 ½ x 7

DETAIL REQUIREMENTS – TYPE C

CONVENTIONAL SCHOOL BUS CHASSIS

AIR CLEANER - Chassis is to be equipped with a dry, element-type air cleaner, mounted in a location that prevents rainwater from entering and prevents moisture from being trapped in air cleaner assembly. The air cleaner and the element shall meet all appropriate SAE J726 tests, per engine application. All air cleaner assemblies shall be single-stage or dual-stage and equipped with a locking restriction gauge.

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 table for axle capacities). Include cast iron hub assemblies with unitized oil bath seals and 75W-90 (Emgard, Mobil, or equivalent) synthetic lube.

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. Axle shall be equipped with a magnetic fill plug, magnetic drain plug and filled to recommended level with 75W-90 synthetic lubricant (Emgard, Mobil, or equivalent). The required rear axle ratio for school buses with tire size 11R22.5 and equipped with the above listed engines is a 7:17 ratio. The required rear axle ratio for school buses with Flat Floors and tire size 255/70R22.5 is a 6:43 ratio. The required rear axle ratio for activity buses with tire size 11R22.5 and equipped with the above listed engines is a 6:83 ratio. All buses to be equipped with these axle ratios.

NOTE: AT ANY TIME DURING THE FIVE (5) YEAR 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.

BATTERY - Battery case is to be sealed maintenance free. Chassis must be equipped with two or three (2-3) BCI Group 31 batteries with a total of no less than 1900 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 on 53, 66, and 72 passenger units to 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.

NOTE: ANY WIRES PASSING THROUGH THE FRAME RAILS SHALL BE GROMMETED TO PREVENT CHAFING.

BRAKES - The chassis shall be equipped with four wheel brakes. Approved brake shoe dimensions are specified by capacity size on page 10 in Minimum Requirements. Drums to be equipped with two-piece stamped dust shields and technicians must be able to check brake lining condition without removing shield. All brake drums to be outboard mounted to facilitate brake maintenance without disturbing wheel bearings and seals. All brake lining is to be premium grade asbestos free material of FF friction rating.

Air Brakes - Air brakes shall have S-cam type actuation and meet FMVSS 121. Brakes to have cast iron spider. Air reservoirs shall be mounted with the top of tanks approximately one (1) inch below the top of frame rail. Air tanks are to be equipped with manual Berg Lanyard moisture ejector (or equivalent) with

cord of sufficient length to attach to body exterior. Air compressor is to be at least 13.2 CFM with five-ring piston (2 oil and 3 compression), air compressor and air intake is to be routed through engine air cleaner. (Approved compressors – Bendix TF550 and Cummins-Wabco 15.2 CFM). Chassis to be equipped with an air dryer (Bendix AD-9 or equivalent). Automatic slack adjusters (Haldex only) to be supplied on all air brake chassis. Front air chambers to be no less than type 20 Long Stroke (MGM Model CS20L). Rear chamber to be no less than type 30/30 Long Stroke (MGM Model TR 30/30 LP3 or equivalent) and must be mounted on forward side of axle.

Anti-Lock Braking System (ABS) - Bendix or Meritor four channel ABS or equivalent. Front and rear wheel speeds are to be sensed separately. Application of front brakes is to be controlled by application pressure modulator and governed by the wheel approaching lock-up to minimize steering input. Rear brake application pressure modulation is governed by individual wheel speeds to minimize braking effort. System must be activated by the ignition switch and actuated by brake application. System shall include blink code diagnostic capability.

Parking Brakes - Parking brake system shall be designed and constructed to meet the following requirements:

- (1) Parking brake shall hold vehicle stationary or to limit of 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, 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) Buses with air brakes shall have parking brakes of the spring applied and air release type. Control shall be of the pull to apply and push to release type and mounted in manufacturer's standard location. This control shall be clearly marked yellow. All air brake buses shall be equipped with service brake interlock.

BUMPER - The front bumper shall be of heavy duty, straight or wrap around/curved design and constructed of one-fourth (1/4) inch thick channel approximately 11 inches wide. Bumper must extend to outer edges of fenders at bumper top line.

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 1 1/4 x 3/8 inch flat bar or an acceptable equivalent.

ENGINE - Diesel engines will be used in all size chassis. All engines are to have cold cranking ability to zero degrees Fahrenheit (ether assisted system not allowed). Acceptable engines are listed on Minimum Requirements page. Electrical system shall be of the single voltage type.

ELECTRONIC CONTROL MODULE PROGRAM PARAMETERS AND PASSWORD – All ECM program parameters and password shall be discussed and established at the Post Award Meeting.

EXHAUST SYSTEM - A total exhaust system, exhaust pipe, muffler and tail pipe shall be furnished by the chassis manufacturer, pre-engineered to terminate no less than 1 inch past a school bus body rear bumper location, nor positioned no further downward than 3 inches from the rear bumper. Tail pipe shall be deflected downward at the end of the exhaust pipe. Tail pipe should be minimum 16-gauge aluminized steel/stainless steel and shall not be reduced in size after it leaves muffler. Manufacturer drawings shall be provided the North Carolina Department of Public Instruction and the respective body companies, showing exhaust system routing and support bracket locations (upon request). The chassis manufacturer shall provide sufficient tail pipe length to allow body mounting without extension.

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. All connections shall be slip joint connections (no butt connections) using offset band clamps.

Muffler shall be constructed of stainless steel or aluminized materials that meet federal emission guidelines. Exhaust pipe, muffler and tail pipe shall be of the heavy-duty type and of sufficient size to minimize backpressure.

FENDERS AND HOOD - The total spread of outer edges of front fenders, measured at fender line, shall exceed total spread of front tires when front wheels are in straight-ahead position. The fenders shall be properly braced and free from any body attachment. Hood and fenders to be assembled as one unit and of the forward tilt type.

Under the tilt hood, there shall be installed in a convenient accessible location, a waterproof electrical disconnect plug(s) (quick disconnect of all electrical wiring to tilt hood) for all electric lines running to electric accessories mounted on the hood.

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. Routing of all brake lines and/or electrical wiring shall be located within the frame rail flanges. Convuluted tubing or equivalent, to protect lines from chafing and wear, shall protect openings in cross members for such routing.

FUEL TANK - The fuel tank shall conform to FMVSS 301 in construction and mounting. Fuel system to have a fuel filter and water separator (Racor only) between fuel tank and engine mounted on the firewall or frame rail. A separate engine mounted fuel filter is also required. Tank to be equipped with a minimum of two internal baffles. Tank capacity must be at least 60 gallons with aluminized interior. Tank shall be equipped for at least a 93-95% draw. Note: One (1) tank with a 60-gallon capacity is to be provided on all chassis.

ALTERNATOR - 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 270 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 alternator (Leece-Neveille 4870JB).

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.

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 270-ampere capacity. Ammeter and/or voltmeter must give a true reading to show how the charging system is operating.

WIRING HARNESS - All conductors from the alternator to the battery shall be continuous in length and capable of carrying 270 amps. The conductors shall be sized to provide at least a 25 percent greater current carrying capacity than the design output of the alternator. The conductor between the alternator and the battery shall be routed in a manner that will provide the least distance between points of termination. A separate ground conductor from alternator to engine shall be provided. All wiring shall be required to meet Society of Automotive Engineering (SAE) Codes.

ROAD SPEED CONTROL - The electronically controlled engine is to be programmed to establish the maximum road speed stated on order. Note: 45mph on all school bus chassis and 55 mph on activity bus chassis.

HORNS - The chassis shall be equipped with dual horns of manufacturer's standard make and mounted so as not to collect water inside the horn

IGNITION - All chassis shall be equipped with an ignition switch lock, which is set up on the master key system. One key will operate all chassis furnished by any one manufacturer regardless of year model.

LIGHTS - Each chassis shall be equipped with a minimum of two extended life headlights and two turn signal lights. An appropriate size fuse/breaker shall protect turn signal lights. Turn signal shall be wired to operate as hazard warning lights and shall be connected to a variable load flasher. If two flashers are used, both shall be of the heavy-duty variable load type. All lights shall be of the proper intensity and adjustment to meet the standards of the National Bureau of Standards. The headlight switch shall be of ample capacity to handle the load added by the addition of the clearance, marker lights, and strobe lights required on the body. There shall be provided on the inside firewall of the chassis terminals for the connection of the body tail lights, stop lights, backup light and license well light. Turn signal lights shall be wired to operate through the ignition switch.

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

DAYTIME RUNNING LIGHTS - Low beam headlights, tail lights, parking lights, and marker lights operate at full voltage with the ignition switch on and the headlight switch off. The lights shall not engage while the starter is engaged.

INSTRUMENT PANEL - The instrument panel shall be equipped with an ammeter or voltmeter, oil pressure gauge, water temperature gauge, one million mile odometer, vacuum or air pressure gauges, fuel gauge and a high water temperature and low oil pressure light and buzzer. Light indicators will not meet these requirements. All instruments and gauges should be located within 12 inches to the right or left of steering column. The instrument panel shall have lights of sufficient candlepower to illuminate all instruments.

LUBRICATION SYSTEM - Chassis lubricating system shall be of the high-pressure type, with hydraulic type fittings located in accordance with best commercial practice. The fittings are to be of a design that will permit quick attachment of the grease gun.

OIL FILTER - The oil filter shall be of the manufacturer's standard full flow type with a dry capacity of at least one (1) quart. It shall be of the spin on, throwaway type or replaceable element type filter.

BY-PASS OIL FILTER SYSTEM – Chassis shall be equipped with an oil by-pass filtering system that is adequate for the engine sump capacity and separate from the standard full-flow oil filter. The system shall not draw more than 10% of the oil pump's capacity at any given time and be capable of filtering all the oil every ten minutes. The by-pass filter element shall be of the spin-on variety for replacement and disposal purposes. The system shall be certified per SAE J806 to filter particles of one (1) micron at an efficiency rate exceeding 70%. The system shall also remove water and rust. The filter element shall have a life expectancy exceeding 24,000 vehicle miles.



Approved system is AMSOIL Dual-Guard Model BMK-12 system equipped with 2 BE-110 filters. It shall also include a BK-13 Oil Sampling Kit. (See picture for location on left front frame rail).

OPENINGS - All openings in floorboard or firewall between chassis and passenger carrying compartment, such as engine area and/or gearshift selector, shall be sealed. Any insulating or access panels on firewall or in floor shall be adequately fastened at both top and bottom and easily removable on completed bus. Maximum decibel level at driver seat to be no more than 83 d.b.a. when tested in accordance with procedures found in Appendix B of the 1995 National Standards for School Transportation. It is the responsibility of the manufacturer to reduce the interior noise to acceptable levels.

PAINT - All paint shall be unleaded. The hood, fenders and cowl shall be painted with National School Bus Yellow polyurethane paint which meets Federal Standard No. 595a, color 13432. Bumper, frame, driveline and wheels shall be painted with jet-black enamel. The same brand of paint must be used on the body and chassis.

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. Cooling system shall be equipped with an approved water filter. Water filters may be eliminated if Extended Life coolant is supplied. The cooling fan, mechanically belt driven, shall be equipped with a thermostatically controlled air clutch to facilitate ease of operation and maintenance and meet or exceed OEM requirements. Coolant is to be of the Fully Formulated, Non-Organic, heavy-duty type (Fleet-Charge SCA Pre-charged) or Organic acid based, extended life coolant. Coolant shall protect the cooling system to -30 degrees Fahrenheit.

Note: The chassis/body supplier shall fill the cooling system with Fully Formulated, Non-Organic, heavy-duty coolant (Fleet-Charge SCA Pre-charged) or Organic acid based, extended life coolant having a mix of (50%) water and (50%) coolant. Coolant type and additives shall meet all requirements of the respective engine manufacturer and radiator supplier.

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).

SHOCK ABSORBERS - Chassis shall be equipped with heavy-duty, double-action hydraulic shock absorbers front and rear.

SPRINGS – Chassis spring assemblies shall be of ample resiliency under all load conditions and shall conform in capacity to table shown herein. Center spring through bolt shall be of proper size for holes punched in spring leaves.

1. Front springs are to be anchored at the front end and stationary eye to be protected by a wrapper leaf in addition to the main leaf.
2. Spring saddles shall be of suitable cast iron construction.
3. 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 bushings shall be constructed of bronze material. The steering column shall be equipped with tilt feature. Tie rod ends, drag links and kingpins shall be equipped with zerk type grease fittings unless permanently sealed.

TIRES - The chassis shall be equipped with six (6) machine-balanced tires, two on the front and four on the rear. Tires shall be of the tubeless type with full steel belted radial construction (sidewall and tread area). Tires furnished shall be tire manufacturer's top line tires and listed in the tire manufacturer's current published catalog and price list. All tires shall be 11R22.5 in size and at least sixteen- (16) ply rating and load range H with the exception of the flat floor chassis, which will be sized per manufacturer recommendation for the GVW rating. Tires shall be equal in quality to the following named brand, but are not restricted to this brand: (Goodyear G-149/Michelin XZE)

NOTE: Power lift school buses designed to provide a solid platform for the flat floor body configurations must be equipped with P255/70R22.5 radial tires. All wheel rims shall be 22.5-inch ten-stud hub-piloted.

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. Each chassis is to be equipped with a spare wheel/rim. All rims to be painted black.

TRANSMISSION - Chassis shall be equipped with an Allison 2000 series automatic transmission filled with Castrol TranSynd Fluid. Automatic transmission shall have an integral torque converter. Vehicle to be equipped with Pall external transmission filter assembly p/n HZ7434A12TTRFL with electrical differential pressure indicator (M.S. style 3-pin connector). A “change filter” light that is easily viewed by driver will be installed in the dash of the vehicle using Pall FMT-800 light kit (16-ft. lead) with harness and M.S. connector. FMT-800L may also be used (30-ft. lead). The transmission shifter shall be manufacturer’s standard. Within the range selected, ratio changes shall be effected automatically at full engine power if desired and without use of an engine disconnect clutch. Transmission shift control shall have a position lock shift lever for each shift position. It shall have an illuminated range indicator embossed or made of metal and properly fastened. Control shall be located to the right of the steering column (dash mounting preferred).

SERIAL NUMBER LABEL – A fireproof label shall be furnished showing the Vehicle Identification Number, G.V.W. R. and permanently affixed in a location and position for maximum visibility and legibility (location to be approved). Letters and numerals shall be of the cut or embossed (metal) type. The serial letters and numerals should be at least one-fourth inch in height. (See picture for location).



TOW HOOKS - Two heavy-duty tow hooks shall be furnished and factory installed, one on each frame rail at front in an approved manner and capable of towing the fully loaded vehicle.

MINIMUM REQUIREMENTS FOR NORTH CAROLINA TYPE-C SCHOOL BUS BODIES

DIMENSIONS

Body Sizes - The following standards shall govern the sizes of school bus and activity bus Type-C bodies. The maximum overall outside width of the body shall be 96 inches. The height of the body from the top of the finished floor to the underside of the ceiling, at the center of the body, shall be approximately 77-78 inches.

The following table shall govern the body lengths:

<u>Maximum Seating Capacity</u>	<u>Approximate Body Length</u>
41-42	244-268"
53-54	302-319"
65-66	358-376"
71-72	387-402"

Height, Length, Weight Data Plate

A metal data plate including the actual bus height, actual bus length, and actual bus weight shall be included in the vehicle data plate in a location that is easily readable. Note: Actual weight does not refer to G.V.W.R. It means the actual weight of the completed bus full of fuel (60 gal.) and fluids.

BODY CONSTRUCTION

Design Specifications

Welds, rivets, or high strength bolts or a combination of these items in combination with adhesives may be used in connecting parts of the structural body. Bolts shall have a provision (self-locking nuts/lock-washers) to prevent loosening under vibratory loads. All bolts, nuts, washers and screws used throughout the body shall be cadmium or zinc plated, or thoroughly treated in a manner for prevention of rust (ECO 2000 coating or equivalent). Lock washer or locking devices shall be placed on all bolts used for structural purposes.

Gauge of Materials - All gauge numbers used in these specifications refer to the U.S. Standard Gauge Number as published by the American Iron and Steel Institute. The following table lists the Manufacturer's Standard Gauge for Steel Sheets in thickness and equivalents:

<u>Gauge Number</u>	<u>Non-coated Steel</u>	<u>Coated Steel</u>
10	.1345	.1382
12	.1046	.1084
14	.0747	.0785
16	.0598	.0635
18	.0478	.0516
20	.0359	.0396
22	.0299	.0336

The above listed thickness, with the tolerances allowed by the American Iron and Steel Institute, are the minimum thickness acceptable for each given gauge number.

BODY FLOOR

Description - The body floor shall consist of floor panels or floor sections which are no greater in width than the spacing of posts or roof bow frames. The panels shall consist of a steel floor plate(s) stiffened with sills running the full width of the floor. Sills may consist of cold-formed sections of steel or of suitable hot rolled sections. All panels or sections shall be joined so as to form a leak proof and dust proof floor and connected with longitudinal members running the length of the body which are capable of distributing the roof loads from the posts or bow frame to all supporting members.

Loads - The floor shall be designed to support all fixed and changeable loads. Fixed loads shall consist of all parts of the body supported by the floor system. Changeable loads are live loads determined on the basis of 125 pounds per passenger with three passengers per seat. The weights of the passengers and seats may be estimated at 70 pounds per square foot of floor area. To allow for vibration and shock, all loads shall be doubled.

Floor Plate - The floor of the body shall be 14-gauge Galvalume and/or zinc coated steel floor plate or equivalent and shall be covered with a minimum of 5/8-inch, Marine Grade, minimum grade B, 5-ply plywood. Plates shall run the full width of the floor and be supported at all edges. Openings should be made only when required such as wheel housing. All openings to be reinforced so as to maintain the full strength of non-punctured floor and not interfere with floor tracking on raised floor models. The floor plates shall be connected to supporting members so as to function as a part of the sills in carrying loads. Access shall be provided through removable cover that provides access to fuel sending unit.

Floor Sills - All cold formed floor sills are to be 14-gauge or heavier, or the main sill shall be equal to or heavier than a gauge of 10 and each intermediate sill shall be equal to or heavier than a gauge of 16. All sills shall extend the full effective width of the floor without splicing so the floor will support the roof load imposed by the side posts. Sills are not required to extend the full width

of the body in the wheelhouse area, the gas filler area, or where other structural members interfere. However, if sills do not run the full width of the body, they shall be connected to the adjacent sill for continuity of strength or by other approved methods. If two hot rolled sections or plates are used to form a sill, the two sections shall be connected so as to function as a unit with the rest of the floor system without spread or slip.

There shall be a main sill at each post or bow-frame, except in the wheelhouse area, and two intermediate sills. The intermediate sills shall be equal in depth to main sills. The maximum spacing of the sills shall be 10 inches.

The ends of all main sills shall be securely connected, top and bottom, to a longitudinal side rail running the length of the body or other equivalent floor assembly method providing the same level of floor structural integrity. The connections and side rail shall be capable of distributing loads from the posts or bow-frames to all sills.

The bus body's transverse and longitudinal frame members should allow stress to flow evenly throughout the bus body. The manufacturer should substantiate the strength integrity of any joint or gusset connection of these members to prove they are of equal or greater than a continuous constructed member is. If requested, this information shall be furnished to the State for review.

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 as per the 1995 National Standards. All areas of the stepwell except the step treads are to be covered with black sound abatement. The top step riser is to include approximate 2 inch white vinyl lettering on a black metal plate stating "USE HANDRAIL" and "NO TRESPASSING". This plate is to be attached to the top step riser.



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.

Floor Covering - The floor under seat area, including wheel housings and driver's compartment, shall be covered with black, smooth finish rubber covering, at least 1/8-inch thick. The aisle and entrance area shall be covered with black, ribbed pattern rubber at least 3/16-inch thick. The frontal area around the driver compartment is to be covered with black sound abatement. The adhesive for laminating the covering to the floor shall be a water-resistant type of trowel or spray consistency. A rustproof molding strip shall be applied over all edges and joints of the covering. If the chassis is equipped with transmission cover, the cover shall be placed on top of floorboard and securely fastened and sealed.

BODY FRAME

Framing - Where posts or bow frames are not loaded in a plane of symmetry, they shall be braced so as to deflect without twisting. The minimum depth of member shall be at least 1 and 1/2 inches and shall be 16-gauge or equivalent. The maximum spacing shall be 30 inches on centers on all sections except one or two, each of which shall be no greater than 40 inches on center. If oversize section is used, there shall be installed additional roof reinforcement in this section.

The section modulus of the cross section shall be not less than 0.22 (in³).

Note: All bidders shall submit with their proposal complete detailed engineering drawings detailing the size and shape of a cross section of the post or bow frame along with detailed calculations verifying that the section meets requirements.

A roof bow shall be located at each post to form a bow frame or bow frames may be formed in one piece. If side post members and bow frames are not one continuous piece, when framing members are joined the connections shall be such as to develop the full strength of the cross section of the two or more members joined. Roof bows shall not be buckled or distorted out of cross section during the process of bending to the curved shape. Each post shall be connected to a main floor sill, either directly through gussets or indirectly through the side rails. These connections shall consist of fasteners at a minimum of two elevations to effectively anchor the bow frame to the floor systems.

Note: All bidders shall submit with their proposal complete detailed engineering drawings of the joint connection.

Roof Stringers - Two or more roof stringers or longitudinal members equal in strength to roof bows shall be provided to space the roof bows and reinforce the flattest portion of the roof skin. These stringers may be installed between the roof bows or applied externally. They shall extend from the windshield header and when combined with the rear emergency doorposts, are to function as longitudinal members extending from the windshield header to the rear floor body cross member. At all points of contact between stringers or longitudinal members and other structural material, attachment shall be made by welding. Riveting, bolting or structural adhesive bonding may be used in combination with welding. If stringers are applied internally, they shall be fastened to each roof bow so that the joint is equal in strength to the cross section of the weaker member. If stringers are applied externally, all joints must be lapped the full width of the roof bow and attached to each roof bow with four rivets or securely welded.

After the load, as called for in the static load test, has been removed, none of the following defects shall be evident:

1. Failure or separation at the joints where stringers are fastened to the roof bow.
2. Appreciable difference in deflection between adjacent stringers and roof bows.
3. Twisting, buckling or deformation of the stringer cross section or fastening.

Side Stringer(s) - There shall be one or more side stringers or longitudinal members to connect the vertical structural members and to provide impact and penetration resistance in the event of contact with other vehicles or objects.

The side stringer shall be installed in the area between the bottom of the window and the bottom of the seat frame and shall extend completely around the bus body, except for the door openings and body cowl panel.

The formed side stringer to be 16-gauge or equivalent metal, 3 inches wide before forming.

The side stringers or are to be fastened to each vertical structural member, in any one or a combination of the following methods as long as stress continuity of the member is maintained:

1. Installed between the vertical members.
2. Behind the panels but attached to the vertical members.
3. Outside of the external panels.

The fastening method employed shall be such that the strength of the stringer is fully utilized.

The side stringer or longitudinal member may be combined with a rub rail, or be in the form of an additional rub rail, so long as the separate conditions and physical requirements for the longitudinal rub rails are met.

Front Framing - The design shall recognize the weakness at the windshield by provision of frame action to carry lateral loads. The front assembly shall be sufficiently heavy to withstand vibrations transmitted to it through chassis cowl.

Cowl posts shall be 12-gauge and attaching members shall be 14-gauge or two-section, pre-stressed, "clam shell" pillar assemblies may be utilized in lieu of cowl posts. There shall be a roof bow or reinforced header installed over these posts. Windshield or cowl posts must be of sturdy construction and so designed that the posts will not be so wide as to unnecessarily obstruct the driver's view. If cowl posts are made in two sections, the sections should be joined together by overlapping and welding in an approved manner or the sections should have an insert and be welded. The body shall be fastened to the chassis cowl in a waterproof manner.

Rear Framing - The emergency doorposts shall extend from the floor sill to the window header and shall be 14-gauge. There shall be installed on each side of the emergency doorposts an additional post equal in strength to the side posts, which shall extend from the floor sill to the windowsill.

Skirt Reinforcement - There shall be installed at the bottom of the outer paneling a continuous skirt stiffener, equal in strength to a 1-inch by 1/8-inch angle. If body construction is of such a design that this type stiffener cannot be used, an additional 4th guardrail shall be applied externally. Guardrail to be equal in strength and construction to the guardrails required in the Guardrail Section. This stiffener shall be supported by extending posts or bow-frames or by 16-gauge gussets.

Window Framing - Window framing shall be constructed of a 14-gauge formed header or stringer (not a flat strip) with a depth of at least 1 ½ inches perpendicular to the side of the body. This stringer shall extend completely around the bus body. There shall be installed at the windowsill a stringer which extends completely around the body except for the door opening. A continuous internal and external header constructed of a minimum 18 gauge material, extending the full length of the body and attached to each rafter is acceptable. All construction must meet FMVSS.

EXTERIOR PANELING

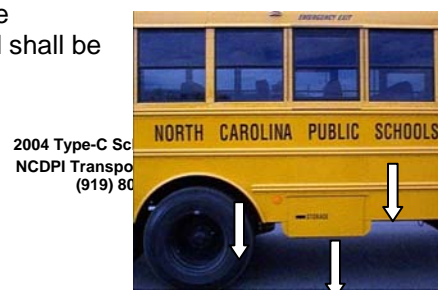
Design - Joints in roof panels should occur only at roof bows, roof stringers and window headers.

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.

Wheel Housing - The wheel housing shall be rigidly reinforced and shall be attached to the floor in such a manner as to prevent any water or dust from entering the body. They shall be designed for easy removal of tires and shall be 16-gauge or heavier. External wheel housing opening shall be equipped with a rubber fenderette that extends past outermost portion of tire.

GUARD RAILS

Number - In addition to the side stringer or rub rail required in the above wheel housing section, 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 windowsill level. When bus is equipped with side emergency door, the guardrails shall extend across door also. 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 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, to be located at posts by lapping the full width of the supporting part of the posts. All guardrails to be cleaned primed and rust proofed underneath before being installed on body. Guardrails shall be installed utilizing Pan Head Carbon Steel Screws/stainless steel sheet metal screws/ or Drive rivets in all attaching positions.

BODY TEST

General - Throughout the construction of the body, there shall be evidence of good workmanship and engineering ability.

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

INTERIOR PANELS

Sheet Metal Lining - The roof section of the body is to be lined entirely with 20-gauge perforated sheet steel. Lining panels to have a minimum of at least 2 inches of unperforated 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 to be 22-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.

All interior lining shall be secured to meet FMVSS 221.

SEATING

Description- Seats shall be forward facing and be spaced with the maximum knee room available within standard body lengths. All seats should be 39" or 30" wide and 15 inches deep. 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 or staggered with a minimum 12-inch center aisle. All material used in the seat cushions and backs shall meet the requirements of FMVSS 302. All seat upholstery material to be of the type known as fire-block. All seats shall meet the requirements of FMVSS 222.

Child Safety Restraint Systems (CSRS) - All North Carolina 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 CR39 or other equivalent – approved prior to submission of bid - will be accepted. NOTE: Approval must be requested no later than 10 days before bid opening.) Seat upholstery material shall meet FMVSS 302 and shall match seat



upholstery material used on all other passenger seats. Any required decals must be placed on the exterior of the bus window and must be clearly visible from the inside of the bus.

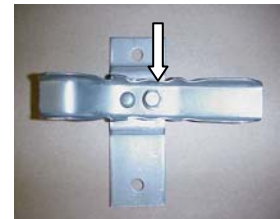
CSRS compliant seats shall be installed in the following locations:

41 – 42 passenger configuration –	1 st Two Rows (total of 8 seating positions)
53 – 54 passenger configuration –	1 st Two Rows (total of 8 seating positions)
65 – 66 passenger configuration –	1 st Two Rows (total of 8 seating positions)
71 – 72 passenger configuration –	1 st Two Rows (total of 8 seating positions)

Belt Cutter - A Tie-Tech belt cutter shall be installed in the Safety Equipment storage box on all school buses. It is to be attached with Velcro on the inside part of the door assembly.



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, excluding plywood base. 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. The cushion pad is to be secured by a positive locking mechanism (see picture for approved 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 upholstery 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. Driver seat shall be *C. E. White ISH-2002 with Integrated 3-point lap and shoulder harness* or other equivalent – approved prior to submission of bid - will be accepted. (NOTE: Approval must be requested no later than 10 days before bid opening.)

Fire Block Upholstery Fabric - The upholstery material used to cover all seat cushions and backs shall conform to requirements of the following product specifications and testing:

The base fabrics shall be undyed and the minimum finished weight per square yard shall be 25 oz., lock stitch knit backing. The breakdown of the material shall be as follows:

Mfg.: Athol or Kevlar Mfg.
 Brand: Proform
 Weight of Film: 38-oz linear yd.
 Finish Weight of Material: 25-oz/sq. yd.

Product Specifications/Testing:
 Grab tensile (lbs.) ASTM-D751
 Tongue tear (lbs.) Fed 191A-51334

Tack tear (lbs.) ASTM D751-79 mod.
 Trapezoid tear (lbs.) ASTM D1117
 Adhesion (lbs./in.) ASTM D751
 Seam breakage - AMC method
 Flex testing (1 hr.) CFFA-10
 Blocking-Fed Standard 191-5872
 Low temperature (-20) #5 roller Fed STD 191A-5872
 Abrasion (Wyzenbeek) Fed standard 191A-5304 240 grit-1000
 Puncture Test 28 lbs.

Flammability Testing:
 FMVSS - 302
 FAR 25.853
 Welt cord reinforced seams
 Boston bag
 National School Bus Standards fire block material

All sewing on cushions and backs to be securely stitched with all seams lock stitched or double stitched with Kevlar thread or equal fire block thread. Seam ends should be backstitched to prevent unraveling. Cushion and backs with welt cord to be of same material as upholstery and properly stitched. The same grade of material and construction shall be used in all activity buses. Seat color is to be blue. Welt of 42-oz. upholstery on passenger seat backs, seat cushions, and barriers shall have same fire blocking properties as seat and barrier upholstery.

ASSIST RAIL AND CRASH BARRIER

Assist Rail - Two 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. The right side assist handle shall be braced to dash or firewall area. Assist handle shall be made from 1 inch OD round stainless architectural tubing or 1 inch OD anodized aluminum.

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. Crash barrier on right side of bus shall have a modesty panel between the stanchion bars of crash barrier from floor level to bottom of crash barrier.

ELECTRICAL SYSTEM

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

Wiring - 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 of fibrous loom, or equivalent covering. All fuse/circuit breaker 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.

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, circuit breakers, flasher units, and door buzzer. The



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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.

(See pictures for approved switch locations)

Relays - There shall be provided two approved constant service, heavy-duty master relays 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, emergency door buzzer and heater and defroster.

The other master relay to supply current for the flashing stoplights, stop arm lights, strobe lights and flashers.

Interior Lighting - Interior lights shall consist of at least four flush mounted ceiling lights and one adequately protected inside stepwell light. All interior lights, including the stepwell light, shall be activated when door is opened and engine switch is on.

LIGHTING NOTE: ALL LIGHTING SYSTEMS SHALL MEET OR EXCEED ALL APPLICABLE FMVSS REQUIREMENTS.

Clearance/Marker Lights LED (light emitting diode) – Combination clearance/marker lights shall be installed per specifications. These lights shall be LED (light emitting diode) with sealed electrical plugs and protective aluminum guards. Front lenses are to be yellow in color and rear lenses are to be red in color. On bodies over 30' in length an amber marker light is to be located midway of the bus body. Lights shall be Truck-Lite 35200Y (yellow) and 35200R (red) or equivalent.

Eight Light Warning Systems LED (light emitting diode) – Each school bus (not activity bus) shall be equipped with four (4) LED-flashing stoplights. Lens shall be at least seven inches in diameter, or if in a shape other than round, a minimum of 38 square inches. The light assembly shall be of LED design. Location of lights and direction of beam are to be approved upon inspection of pilot model. The circuit shall be wired so that one front, one rear, and stop arm light shall flash alternately with the other front, rear, and stop arm light. The switch to operate flasher lights is to be located in the control panel in the closest location to the driver seat and adjacent to the air door switch and will actuate the relay from the ignition switch (location to be approved upon inspection of pilot model). 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 The flasher shall be electronic (Weldon 7000) unless the functionality is provided by an electronic system controller. System shall also include an LED Flicker Circuit Flasher-

For each school bus, (not activity bus), in addition to four red lamps described in the above section, four (4) amber LED- lamps with polycarbonate lens shall be installed as follows: one amber lamp shall be located near each red signal lamp at same level, but closer to vertical centerline of bus. Lens shall be at least seven inches in diameter, or if in a shape other than round, a minimum of 38 square inches. A system of red and amber signal lamps shall be wired so that amber lamps are energized manually, and red lamps, and stop arm are automatically energized (with amber lamps being automatically de-energized) when bus service door is opened. Amber lights must be wired with capability to be deactivated without opening the door

Flashing Stop Arm – Each school bus (not activity bus) shall be equipped with an air operated strobe flashing stop signal. This signal shall be equipped with (2) flashing strobe lights, at least 4 inches in diameter, red in color, and double faced. The blade for the stop arm shall be metal in construction, octagonal in shape, shall be at least 18 inches in diameter, and shall be covered with (Reflectorized Diamond Grade ASTM TYPE 4) sheeting or equivalent. The word “STOP” shall be placed on both sides of the blade in letters 6 inches high. Specialty Model Number 2360 or Transpec Model 8000. The stop arm air supply is to have an independent solenoid valve and regulator. Air line to be metal or nylon with suitable fittings. Assembly shall be installed as recommended by arm manufacturer.

Directional Turn Signals LED (light emitting diode) – Each school and activity 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. If round lights are used, they shall be Truck-Lite Model 91251Y or equivalent. 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. Lights shall be Truck-Lite 21261Y or equivalent.

Stop/Tail Lights LED (light emitting diode) – All buses shall be equipped with four (4) combination stop/tail lights.

1. Each school and activity 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. Round lights shall be Truck-Lite 91252R or equivalent.
2. Each school and activity 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). Round lights shall be Truck-Lite 44002R or equivalent. 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 the tail lamps by the parking lamp circuit. Lights shall be secured with rivets.

Strobe Light - A strobe light is to be mounted on top of the bus body centered above the rear emergency door approximately 12 inches from rear edge of roofline. The lens shall be made of clear glass with an aluminum base. The bulb shall be a replaceable double flash (11 Joules minimum) low amp draw/ high light output bulb. A replaceable remote power pack is to be mounted inside the bus body above the rear door inside the panel area with access provided. The light is to be wired in conjunction with the ignition switch and be activated only when the ignition switch is in the on position. The light shall meet SAE J1318 and J575 standards. Strobe light is to be Specialty Model 205. (See picture for approved light location)



Back-Up Lights LED (light emitting diode) – Each school and activity bus shall be equipped with two (2) white LED (light emitting diode), recessed, 4 inch back-up lights. (Truck-Lite Model 44 or equivalent) Backup lights shall be secured with rivets and wired to the switch on transmission and be activated in reverse gear only. Lights should be mounted in a location to provide the best illumination for the driver when backing the vehicle.

License Plate Lights LED (light emitting diode) – Each school and activity bus shall have **one** (1) LED (light emitting diode) license plate light. This light shall be installed on the left rear of the bus. (Truck-Lite Model 15205 or equivalent)

Backup 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.

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.



Accessory Power Point Receptacle – Panel location to be approved and must be mounted in the driver's area or on a side of the driver's storage compartment on a flat surface.

HEATING AND VENTILATION

Heater - 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 removal. A heavy duty, fresh air, heater shall be provided which uses the hot engine water as a heat source. All heaters shall be plumbed to provide each heater with its own source of hot water. The heat exchange shall be of the coil type and capable of withstanding an internal pressure of 300 psi. 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).

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 2000 National School Transportation Specifications and Procedures is the heater performance test to be used.

All fittings and installation shall be above the floor level of the body. Heater hose shall conform to SAE specifications 20R1 class D2. 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. There shall be installed in the water line, between the heater and the engine water pump, one all brass shutoff. Motors and fans shall be easily accessible and serviceable. Rear heaters shall be installed in all buses with rear lifts. Location of rear heater is to be approved upon inspection of pilot model. All heater cores (front & rear) shall have shutoff valves located at heater core. Cutoff valves to be of the quarter-turn ball valve type (location to be approved upon inspection of pilot model).

Note: The chassis/body supplier shall fill the cooling system with Fully Formulated, Non-Organic, heavy-duty coolant (Fleet-Charge SCA Pre-charged) or Organic acid based, extended life coolant having a mix of (50%) water and (50%) coolant. Coolant type and additives shall meet all requirements of the respective engine manufacturer and radiator supplier.

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 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 1-½ inch thick layer of fiberglass insulation or acceptable 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 unless it is located on the steering wheel. Door control mechanism shall be located overhead of door and concealed behind a removable panel. Door shall seal against a stationary rubber and bottom step edge. An emergency release, properly identified and located inside the body, near the entrance door is required. 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. Service 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 leaves 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 120 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.



Rearscope Lens - All buses shall be equipped with a rearscope prismatic lens and this lens is to be mounted on the rear door, upper glass area with clear RTV silicone. Materials to be a solid acrylic-reversing lens (size 14x14 inches).

Safety Roof Vents - All buses except 41-passenger 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. The 41-passenger bus shall have one roof vent centrally located. 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.

Hinged low profile roof escape hatch shall include an internal and external release mechanism and a buzzer which alerts the driver when the hatch is open. Hatch to be secured with adhesive to eliminate leaking. Specialty Model 9245-0200 or Transpec Model 1975.

WINDOWS AND WINDSHIELD

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.

The minimum number of push out windows (location to be approved upon inspection of pilot model) must be installed in order to meet FMVSS 217. The same number of windows should be installed on each side. All push out windows must be marked with reflective tape which complies with FMVSS 217 and be of the side-hinged design. Instructions to operate emergency exit windows shall be permanently affixed to both the inside and outside of the window glass, and both sets of instructions must be easily readable from the inside of the bus.

The words "EMERGENCY EXIT" to be lettered on inside at top of windows. Glass for window shall be set in an galvanized steel channel or extruded aluminum with black finish and shall furnish ample protection from weather and must be guaranteed against leakage from rain. Window visors are to be provided for all side windows. All side passenger windows shall be tinted glass as per requirements in Glass Section.

Driver's Window - There shall be installed to the left of the driver a window with a sliding ventilator easily operated from the driver's seat. 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 Door Windows - There shall be installed in the rear door, two windows, which are set solid in a suitable and waterproof manner. The upper window shall have a minimum glass area of 400 square inches and the bottom window shall have a glass area of approximately 350 square inches. Rear door glass is to be tinted same as indicated below.

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.

Entrance Door Windows - There shall be installed in each section of the entrance door one or two glasses.

Windshield - The windshield shall be set solid and installed in waterproof manner. It shall be tinted to prevent glare and provide a wide angle of vision.

GLASS

Quality - All glass used in the body shall be of the "Safety Glass" 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 Glass - The glass in windshield shall be heat-absorbent, laminated plate. It shall have a horizontal gradient band starting slightly above the line of the driver's vision and gradually decreasing in light transmission to 20 percent or less at top of windshield.

Window and Door Glass - The glass used in the doors and windows shall be of the AS-2 quality meeting FMVSS 205.

Glass shall be high quality tinted safety glass.

Percentage of light transmission shall be as follows:

Side Windows: 28% - 31% light transmission

Driver's Window: 70% - 73% light transmission

Rear Door Windows: 58%-61% light transmission

Rear Windows: 58%-61% light transmission

Entrance Door Windows: 70% - 73% light transmission

BATTERY CARRIER

Location and Type - 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 sealed against water and dirt and should have a drain shield over top of door. Inside of carrier should be primed and painted with asphalt varnish or acid resistant paint. Battery is to be fastened 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 three (3) BCI Group 31 (batteries with a total of no less than 1900 CCA. Battery door shall be lockable and keyed the same as any other lockable access panels. (All vehicles keyed the same). The word "BATTERY" or "BATTERIES" on the battery compartment door shall identify the location of the battery (ies) in 2-inch lettering.

REAR BUMPER

Size - The rear bumper shall be of pressed steel channel at least .1875 + or - .005 inch in thickness and 8 inches wide (high). It shall be wrapped around the back corners of the bus and it is to extend forward a minimum of 12 inches, measured from the rear most point of the body at the floor line. Rear bumper shall be equipped with 2-inch yellow diagonal Reflexite.

Attachment of Bumper - 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.

ACCESSORIES

Interior Mirror - There shall be securely installed on the windshield header a 6"x30" driver-adjustable convex rearview mirror (Model Tiger 1510) so located as to give the driver a clear view of the entire interior of the bus and the road behind.

Exterior Mirror System - All buses purchased shall be equipped with a mirror system complying with 49 CFR part 471, FMVSS 111 as adopted by the National Highway Traffic Safety Administration.

The 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 Rosco Eurostyle heated, with remote controls and breakaway arms. These are to be attached with overhang mounts.

The Crossover Mirror System - There shall be installed on each front fender of the chassis one heated (quadrispherical) mirror. These mirrors shall be mounted on the front corners of the hood assembly. These mirror brackets shall have sufficient supports (steel plate) located on the inside of the hood to prevent the fasteners from pulling through the hood assembly (Rosco Hawk-Eye Model 2365H).

NOTE: The heating elements in rearview and crossover mirrors must all be controlled by a single switch (not separate switches).

Windshield Wipers - The bus shall be equipped with two heavy-duty electric windshield wipers. The wipers shall be equipped with one (1) or two (2) windshield wiper motors. The design of the wiper shall be such to afford the maximum wiped area and good driver view. If a single wiper motor is used, the system shall meet the requirements of SAE standard J198. Wiper motor(s) shall have a minimum of two (2) speeds with intermitting feature, operated by a single switch. Electric powered windshield washers shall be installed as per FMVSS 104 to operate through "wet" wiper arms, operated by the same switch.

Sun Visor - There shall be installed on the windshield header an interior sun visor compatible with the interior mirror (model Tiger 1522). Visor is to be mounted in a manner that will not interfere with opening and closing of the overhead storage compartment.

License Holder - One license plate holder shall be located on the left rear of the body.

Name Plate - There shall be installed on the inside of each body, a manufacturer's name plate which can be easily read, on which shall be shown the name of the manufacturer, the serial number of body, seating capacity, and date built. Plate to be metal with all information embossed (for fireproofing).

First Aid Kit - There shall be installed a Grade A first aid kit which shall contain the following contents:

- 4-inch bandage compresses 2 pkg.
- 2-inch bandage compresses 2 pkg.
- 1-inch adhesive compress (16 per pkg.) 2 pkg.
- 40-inch triangular bandage with two safety pins 2 pkg.
- Non-latex exam gloves 2 pair (1 medium, 1 large)

First aid kit to be secured in "Safety Equipment Storage Box".

Fire Extinguisher - One 5-pound dry chemical stored pressure type with pressure gauge meeting UL, I.C.C. and U.S. Coast Guard requirements is required. Fire extinguisher shall have an all metal discharge head and valve (no plastic valves). The fire extinguisher is to be secured in "Safety Equipment Storage Box". In addition the fire extinguisher shall be stenciled: Property of North Carolina Public Schools.

Body Fluid Clean-Up Kit - Each bus shall have a removable and moisture-proof body fluid clean-up kit accessible to the driver. It shall be properly mounted and identified as a body fluid clean-up kit. Kit shall contain:

- 1 - 2 oz. package T.I.L.S.C. powder, sanitizes-deodorizes-encapsulates
- 1 - odor reducing mask
- 1 - pr. – non-latex exam gloves (large)
- 2 - antiseptic wipes
- 2 - paper crepe towels
- 1 - scraper
- 1 - plastic disposal bag w/scoop and tie

Body fluid clean-up kit to be secured in the "Safety Equipment Storage Box".

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Overhead Storage Compartment/Video Camera Box - A compartment shall be located over the windshield header. Compartment is to have a hinged door (prop required) and shall be equipped with boxed ends. These ends are to be easily removable for service. In addition, the compartment shall have a box mounted on the inside to accept installation of a 9 -inch long video camera (camera not required). Box shall be securely mounted to the front of the bus – partially or completely recessed – to prevent vibration. The inside video box shall include hinged lockable door with one way glass (approximately 4 inches in diameter) and tray with mechanism to manually raise and lower the camera as required. The storage compartment door shall have a glass installed in such a manner that the video camera when installed views the entire passenger compartment of the vehicle. A series of small slots are required in the compartment door for audio pickup. A wire shall be provided to the camera box, which operates through the ignition switch. An LED indicator light wired through the ignition switch shall be mounted in the storage compartment door above the glass opening. If multiple locks are provided for accessories on the vehicles, they shall be keyed alike.

Safety Equipment Storage Box – Each bus shall be equipped with a safety equipment storage box of sufficient size to house the fire extinguisher, first aid kit, body fluid clean-up kit and road warning triangles. Each item in the box should be easily accessible. It shall also have a locking mechanism that is keyed the same as all lockable compartments. A warning buzzer is required to activate when the key is in the ON position if the compartment is not unlocked. This compartment shall be located in the upper left corner of the bus body and shall not interfere with the driver fan or access to the storage compartment in the front bulkhead. Outside lid of Box is to be lettered in 2” vinyl lettering with the following “ SAFETY EQUIPMENT INSIDE”.



Outside Storage Compartment – An outside storage compartment shall be installed on all configurations of school buses. The location to be on the right side of the body in front of the rear wheels and labeled in letters two inches high “STORAGE.” The storage compartment shall be approximately thirteen inches (13”) high, fifteen (15”) inches deep, and twenty-five inches (25”) wide and be located under the floor in the body skirt. The door and box shall be sealed to minimize water and dust leakage. All doors shall be equipped with locks and keyed the same as all other external locks.



Warning Devices – Each school bus shall contain at least three reflective triangle road-warning devices that are enclosed in a storage box. These shall be mounted in the “Safety Equipment Storage Box” and must meet requirements in FMVSS 125.

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 fiberglass, or painted chrome yellow.

Tow Hooks - Two tow hooks shall be attached to the rear of chassis frame. The hooks shall be located under the rear bumper and are to be attached to the chassis rails independent of the rear bumper.

Fuel Filler Opening Cover - A suitable lockable door of 20-gauge metal 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.

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.

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 28500). 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. Magnetic mount shall be Specialty Model 8101. (Crossing control arm not required on activity buses).

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. It shall have a separate switch with high, low and off positions. The fan shall be a Bergstrom model B-1465, having a metal housing, mounting bracket, fan guard, and blade. (See picture for approved fan location)



Passenger Advisory System – Each school bus shall be equipped with a passenger advisory system that activates when the amber lights are turned on. If the driver attempts to exit the bus without pressing a button mounted in the rear of the vehicle or opening the emergency door, the horn shall be activated immediately. The horn is to sound until the driver deactivates the system with the deactivation switch. Explicit instructions for operating this system shall be installed on the inside lid of the Emergency Equipment Storage Box so that the driver can view it when the lid is open. Instructions shall be on a plastic type material that will adhere to the box lid.

Air Tank Drain Control - Cable operated Berg drain valves mounted on all wet air reservoir tanks. Remote mounted cables are to be located below the body side sheets on one side of the bus.

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

MOUNTING

Chassis Preparation - In preparing the chassis frame for body mounting, rivet heads shall not be removed except on the extreme rear cross member and then only when necessary to move rear cross member to conform to body length. If tail pipe brackets must be removed due to body obstructions, they shall be replaced with new ones of equal strength as supplied by the chassis manufacturer.

Installation - The bid price shall include mounting the body upon the chassis. The body shall be securely attached to each chassis side rail. At the front and rear ends of the body on each chassis side rail there shall be installed a through bolt of not less than seven-sixteenth inch in diameter. Bolts to be grade 5 with S.A.E. threads and lock nut. All attachments shall be made at main body sills. In addition to the above required tie

downs, the following minimum number of approved type tie downs will be required: 41 passenger - 6; 54 passenger - 8; and 66 passenger - 10. Bolts for these attachments shall be not less than 7/16 inch in diameter with S.A.E. threads and lock nuts.

Rubber and fiber inserts, equal to or thicker than chassis rivet heads, shall be securely attached to each body sill and installed at all points of contact between sills and chassis.

At any point where body sill sits on a rivet head, the rubber and fiber insert shall deform so that floor will be smooth.

METAL TREATMENT AND PAINTING

Metal Treatment - All metal used in construction of bus body is to be mill applied zinc-coated, copper bearing steel, aluminum-coated, or treated by an equivalent process before bus is constructed. (Included is such items as structural members, inside and outside panels, floor panels and floor sills; excluded are door handles, grab bar handles, stanchions, interior decorative parts, and other interior plated parts.) All structural members lighter than 12-gauge, wheelbase and step well, are to be mill applied zinc-coated steel or equivalent. All metal parts that are to be painted shall be, in addition to above requirements, chemically cleaned etched, zinc-phosphate coated, and zinc-chromate or epoxy-primed or conditioned by equivalent process. Documentaion to be provided upon request. In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections of structural members, cut edges, punched or drilled hold areas in sheet metal, closed or box sections, non-vented or non-drained areas, and surfaces subjected to abrasion during vehicle operation.

As evidence that above requirements have been met, samples of materials and sections used on construction of bus body, when subjected to Chrysler Chipping Corrosion Testing LP-463PB-52-01 Change A or equal testing system, shall be provided. There shall be no more than 3 mils (across the scribe as a total) of creep back, based on a three panel average. These panels are not to lose more than 10 percent of material by weight when subjected to the 1,000-hour salt spray test. This is provided for in latest revision of ASTM Designation: B117 that is the "Standard Method of Salt Spray (Fog) Testing." Test results shall be provided upon request.

Paint - All paint shall be unleaded. Paint shall meet National Standards for color and should have a finished gloss rating of at least 85 at 60 degrees. The paint shall be covered by a 5 year unlimited mileage warranty against all defects in materials and workmanship.

Exterior - The exterior of the complete bus body shall be painted with two coats of National School Bus Yellow polyurethane as 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. Rear bumper shall be painted black and shall be equipped with 2-inch yellow diagonal Reflexite. Rub rails shall be painted National School Bus Yellow same as bus body.

Interior - 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 two finish coats shall be required.

Floor and Structural Metal - 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.

Activity Buses - Bus manufacturer shall be required to paint chassis, hood and cowl to match final body color. This cost shall be included in bid price. Bus bodies to be painted one solid color with appropriate lettering from manufacturer's selection of standard colors.

Manufacturer Logo - No manufacturer logo or names are permitted on the bus exterior except a small nameplate may be installed on the bus exterior in a location to be approved upon inspection of the pilot model. (Note: includes activity bus body).

LETTERING

Type - Lettering and numbering shall conform to "Series B of Standard Alphabets for Highway Signs".

Vinyl Lettering - The material should be a premium 2-mil high gloss cast vinyl for solvent resistance, fade resistant and withstand severe weather and handling conditions. The vinyl will have permanent acrylic adhesive with an adhesion factor of 4/lbs per square inch and should not lose its shape or adhesion due to extreme temperatures from -40 to 100+ degrees Fahrenheit. The backing paper sheet for the vinyl should be standard #78 lb. Kraft liner.

Interior - Above the windshield or other approved acceptable location; the words "SEATING CAPACITY" shall be in letters at least 1 inches high. The seating capacity will be based upon the number of seats installed and listed as follows:

14 Seats	18 Seats	22 Seats	24 Seats
K-5 (41 Pupils)	K-5 (53 Pupils)	K-5 (66 Pupils)	K-5 (72 Pupils)
6-8 (35 Pupils)	6-8 (44 Pupils)	6-8 (54 Pupils)	6-8 (60 Pupils)
9-12 (28 Pupils)	9-12 (36 Pupils)	9-12 (44 Pupils)	9-12 (48 Pupils)

Note: Any lift-equipped bus must reflect the seating capacities for K-5, 6-8, and 9-12 plus 2 wheelchair positions. Activity Bus capacities must be adjusted for optional seating configurations.

SCHOOL BUS LETTERING

Sides - The words "North Carolina Public Schools" shall be on each side of body in letters 6 inches high. The county number assigned to bus shall be on each side of the bus in an approved place in numerals 6 inches high. The name of the county or school unit to which bus is assigned shall be placed below the words "North Carolina Public Schools" on each side in letters 3 inches high.

Front - On the roof panel of outer visor shall be the words "SCHOOL BUS" in letters not less than 8 inches high. County number assigned to bus shall be on front of body or chassis in an approved location in letters 6 inches high. "SCHOOL BUS" to be on retro-reflective high intensity material (Reflexite or 3M).

Rear - On the rear of the body "SCHOOL BUS" shall be in letters not less than 8 inches high. On or over the emergency door shall be the words "EMERGENCY DOOR" in letters 2 inches high. "SCHOOL BUS" to be on retro-reflective high intensity material (Reflexite or 3M).

County number assigned to bus shall be on rear in an approved location in letters 6 inches high.

Activity Bus Lettering

Sides - The applicable school system name is to be on each side of the body in letters approximately 6 inches high; such to be designated on the purchase order or by the owner.

Front - On the roof panel of outer visor shall be the words "ACTIVITY BUS" in letters 8 inches high. County number assigned to bus shall be on front of body or chassis in an approved location in letters 6 inches high. "ACTIVITY BUS" to be in retro-reflective high intensity or equal material (Reflexite or 3M).

Rear - On the rear of the body, "ACTIVITY BUS" shall be in letters 8 inches high. On or over the emergency door, shall be the words "EMERGENCY DOOR" in letters 2 inches high. "ACTIVITY BUS" to be on retro-reflective high intensity ~~or equal~~ material (Reflexite or 3M). County number assigned to bus shall be on rear in letters 6 inches high.

NOTE: Any particular bus number and/or color lettering will be designated on the purchase order or by the owner. Bus bodies to be painted standard one solid color with appropriate lettering from manufacturer's standard body color selections.

POWER LIFT (when requested)

All lift-equipped buses shall be equipped with Braun L917IB series lift. Lift must meet all ADA regulations.

1. Lifting mechanism shall be able to lift minimum payload of 1000 pounds. Lift to be of the gravity down power-up type.
2. When the platform is in the fully up position, it shall be locked in position mechanically by means other than a support or lug in the door.
3. Controls shall be provided that enables the operator to easily open and close the lift door from inside the bus. The door control mechanism and handle shall be located adjacent to the lift door in a readily accessible location. The handle shall be padded. The lift mechanism must be operable from either inside or outside the bus. There shall be means of operating the lift in the event of power failure.
4. Power lifts shall be so equipped that they may be manually raised in the event of power failure of the power lift mechanism.
5. Lift travel shall allow the lift platform to rest securely on the ground.
6. All edges of the platform shall be designed to protect the wheelchair, wheelchair occupant's feet and operator's feet from being entangled during the raising and lowering process.
7. Platform (minimum size of 32 inches in width and 51 inches in length) shall be fitted on both sides and rear with full width shields (which extend above the floor line of the lift platform).
8. A restraining device shall be affixed to the outer edge (curb end) of the platform that fully extends to ground level.

9. A self-adjusting, skid-resistant plate (ramp) shall be installed on the outer edge of the platform to minimize the incline from the lift platform to the ground level. This plate, if so designated, may also suffice as the restraining device described in the above item. The lift platform must be skid resistant.
10. A circuit breaker or fuse shall be installed between the power source and lift motor.
11. The lift mechanism shall be equipped with adjustable limit switches or by-pass valves to prevent excessive pressure from building in the hydraulic system when the platform reaches the full up position.
12. Extra lights shall be provided in the wheelchair area, over lift mechanism and exterior position (location to be approved upon inspection of pilot model). Doorways in which lifts are installed shall have, when a lift is to be used, illumination sufficient to light the entrance, and on the lift, when deployed at the vehicle floor level or at ground level.
13. All sharp edges in power lift area, including door, shall be properly padded.
14. All buses equipped with a wheelchair lift shall have an additional heater with cutoff in wheel chair area (min. 80,000 BTU on 54, 66 & 72 pass. and min. 50,000 BTU on 42 pass.). Rear heater is to be located on same side and to the rear of the power lift. Quarter turn ball valve cutoff required (location to be approved upon inspection of pilot model).
15. All upholstery material used on seats in buses with lifts shall be of the type known as fire block and shall be blue in color.
16. All buses equipped with a wheelchair lift shall include shoulder belt reinforcement tubing above all passenger windows and between bow frames to allow for mounting of wheelchair occupant securing system shoulder belt anchor in the field (e.g. in a school parking lot, by bus drivers or attendants. Suggested installation procedures for mounting of shoulder belt anchorage shall be provided.
17. All school buses equipped with a power lift shall provide a 30-inch aisle leading from any wheelchair/mobility aid position to at least one emergency door and the lift area.
18. Disability Identification Symbol – Buses with power lifts used for transporting individuals with disabilities shall display below the window line the International Symbol of Accessibility. Such emblems shall be white on blue background, shall be approximately six (6”) inches in size, and shall be of high-intensity reflective material meeting U.S. Department of Transportation’s Federal Highway Administration (FHWA) FP-85 Standards. Location of symbols to be as follows: (1) on the rear center portion of the rear emergency door; (2) on the right and left lettering belt, adjacent to the entrance door; and (3) aft of the stop arm.



19. Support Equipment – Support equipment, not applicable to be housed in the under-skirt storage compartment shall require a securement system that would retain securement when a force of 20G’s is applied in any direction.

Belt Cutter - A belt cutter shall be installed on all lift-equipped school buses (Tie-Tech).

Fire Blanket - Each lift-equipped school bus shall be equipped with an Evac Aid fire blanket. It shall be at least eighteen (18) square feet in size, having a minimum width of 29 inches. The Evac Aid shall be enclosed in a non-metallic enclosure cabinet of no more than five and one half inches (5 ½”) in depth, eight and one half inches (8 ½”) x ten and one half inches (10 ½”) in length and width. It shall be identified on the front as to the contents. The pouch shall be mounted on the left side interior wall in the buffer zone, behind the left rear seat as close to the rear entrance door opening as practical on a horizontal and vertical line no higher than the horizontal metal portion of the seat frame. The blanket and cabinet combined weight shall be less than ten (10) lbs. and shall be attached to the interior wall in a manner that would retain the pouch to the wall when a 20G force is applied to the cabinet in any direction.



Power Lift Door - The door shall be located on the right side (when facing bus from the rear) of the bus. It shall have a minimum horizontal clearance of 42 inches and a minimum vertical clearance of 60 inches. Door shall be hinged on the forward side with an approved type of hinge and open outward meeting FMVSS 217 requirements. Door is to be designed to open and close from inside of the bus. Door release and opening and closing device to be approved upon inspection of pilot model. Latch must be of the same design as the rear emergency door latch. Lift door shall be metal, double wall and shall be provided with suitable weather stripping to prevent leaks.

WHEELCHAIR ANCHORS AND OCCUPANT SECUREMENT SYSTEM

1. The Mobility Aid Securement and Occupancy Restraint System shall be designed, installed and operated to accommodate passengers in a forward facing orientation within the vehicle.
2. For each Mobility Aid Securement System provided, a Type 2, three point occupant restraint system consisting of a lap (pelvic) belt and a shoulder (upper torso) belt complying with all applicable provisions of 49CFR, Part 571, shall be provided for use by mobility aid users.
3. The Occupant Restraint System shall be equipped with a single point, push-button “quick disconnect” for the lap belt and the lower end of the shoulder belt, to provide immediate release of the occupant in the event of an emergency evacuation.
4. The shoulder belt system shall provide a vertical height adjuster with 12 inches of vertical adjustment for proper placement of the shoulder belt.
5. The Mobility Aid Securement System shall utilize four adjustable securement strap assemblies that attach to structural members of the mobility aid at four separate points: two strap assemblies for attachment to the front of the mobility aid, and two strap assemblies for attachment to the rear of the mobility aid.
6. Each front securement strap assembly shall be capable of withstanding a minimum static load force of 5,000 pounds. Each rear securement strap assembly shall be capable of withstanding a minimum static load force of 6,000 pounds.
7. The Mobility Aid Securement System shall utilize positive-locking anchorage and attachment hardware to prohibit accidental or inadvertent release of the system.
8. The Mobility Aid Securement Strap Assemblies shall be composed of a different size or color of material than the Occupant Restraint Belts to provide quick visual identification of the two systems and to distinguish the separate function.
9. Each of the individual securement straps and restraint belt assemblies shall be marked with the manufacturer’s name, part number, month and year of manufacture.
10. The Mobile Aid Securement and Occupant Restraint System shall be subjected to, and successfully pass, a dynamic 30mph/20g force Impact Test per Society of Automotive Engineer’s SAEJ2249 Wheelchair Tiedown and Occupant Restraint Systems for use in Motor Vehicles document. The testing shall be performed by experienced personnel using an impact simulator and proven ability to provide reliable, accurate and repeatable

results. The mobility aid used for testing purposes shall be a powered wheelchair with batteries (or weights to simulate batteries) that weigh a minimum of 150 pounds, or an approved surrogate. A 50th percentile male test dummy, weighing a minimum of 165 pounds, shall be used in the test. Test results shall be provided upon request.

11. A storage container shall be provided for each securement station to allow for clean storage of the system straps and belts when not in use. A separate space within the container shall also be provided to insert detailed operation instructions for use of the entire system.



Occupant Securement

All wheelchair positions shall be equipped with a "Type II" occupant protection and securement system meeting the requirement of FMVSS 209 and 210. The design of the securement system shall reference, as a standard, the Kinedyne four point wheelchair anchorage part number FF630 and the physical dimensions of an Everest & Jennings manual wheelchair, Model T8A200, to determine the seating reference point and the design angle of pull of the torso belt for passenger protection between the average size six (6) year old and fifty (50) percentile male. Adjustable attachment points of the overhead torso belt connectors shall be identified in some manner that a prudent operator would assure achieving the design angle of pull relative to the physical dimensions of the person being transported.

NOTE: All lift-equipped school buses shall be equipped with securement for two (2) wheelchair positions and four integrated CSRS seats (see specifications under SEATING) unless otherwise ordered.

ALTERNATE POWER LIFT SCHOOL BUS (Additional/requirements/specifications and/or modifications)

Body Designed for Flat Floor Configuration - The floor shall be designed to provide a solid platform for the flat floor body configuration that allows the elimination of wheelhouse intrusion.

This floor design shall have been successfully crash tested to provide compliance with FMVSS. In addition, the floor shall be equipped with aluminum button tracks (full length of floor unless CSRS seats prohibit) to provide maximum flexibility in seating and wheelchair positions. Fully seat left side of bus body with 39-inch.

AIR CONDITIONING – Air conditioning shall be provided and installed by OEM on all configurations of North Carolina school buses. Air conditioning should be capable of reducing school bus inside 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 free blow type units. NOTE: Air conditioning is optional on all activity buses.

- 41 - passenger - 52,000 BTU minimum
One compressor
One condenser
- 53 - passenger - 96,000 BTU minimum
Two compressors
Two condensers
- 66 - passenger - 104,000 BTU minimum
Two compressors
Two condensers
- 72 - passenger – 104,000 BTU minimum
Two compressors
Two condensers