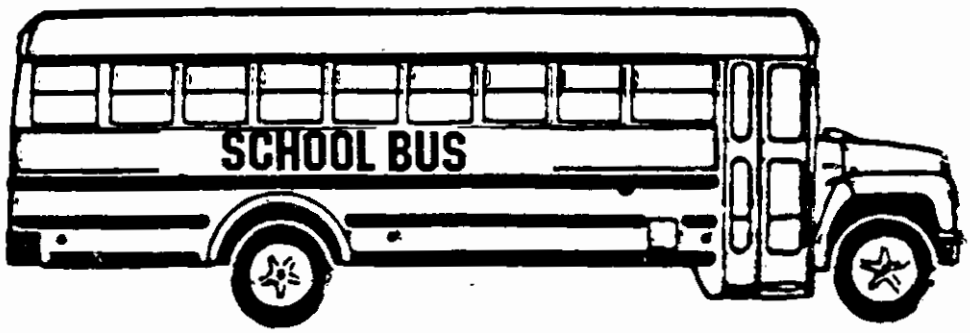
SPECIFICATIONS

STATE OF TEXAS

SCHOOL BUSES

NO. 070 - SB - 92

1992



EFFECTIVE

JANUARY 1, 1992

PREPARED JOINTLY

BY

GENERAL SERVICES COMMISSION

TEXAS EDUCATION AGENCY

DEPARTMENT OF PUBLIC SAFETY

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FIGURES and TABLES

EFFECTIVE DATE:
January 01, 1992

TEXAS SPECIFICATION
No. 070-SB-92
Supersedes No. 070-SB-91

SPECIFICATION

for

TEXAS SCHOOL BUSES

A. GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS

A.1. SCOPE -

1.1 **BUS SIZES** - This school bus specification includes the minimum requirements for fourteen sizes of school buses used by Texas Schools participating in the Foundation School Program. This specification covers the purchase of bus bodies and chassis separately as well as the purchase of complete school buses. The bus sizes shall be designated in terms of passenger capacity (exclusive of the driver) as listed below for regular seating ("CAPACITY" is based upon national height and weight percentile averages as specified in Federal Highway Safety Program Standard No. 17. See Par. B.1.2.):

15* Passenger	19* Passenger	35* Passenger	59* Passenger	71* Passenger(Long WB)
16* Passenger	20* Passenger	47* Passenger	65* Passenger	77*Passenger
18* Passenger	24* Passenger	53* Passenger	71* Passenger (Short WB)	83* Passenger

*NOTE: Seating capacity will be reduced from the above whenever wheelchair positions and/or maximum seat spacing are specified for a given size bus (see Par. A.1.3 and Par. B.1.).

1.2. **BUS TYPES** - Each bus shall have seating arrangements for the capacities designated:

1.2.1. **15-passenger** bus shall be the van conversion or commercial cutaway semi-forward control type.
1.2.2. **16-passenger** bus shall be the commercial cutaway semi-forward control type.
1.2.3. **18-passenger** bus shall be the van conversion type.
1.2.4. **19-passenger** bus shall be the commercial cutaway semi-forward control type.
1.2.5. **20-passenger** bus shall be the stripped chassis semi-forward control type.
1.2.6. **24-passenger** bus shall be the stripped chassis semi-forward control type.
1.2.7. **35-passenger** bus shall be the conventional or semi-forward control type.
1.2.8. **47-passenger** bus shall be the conventional, forward*, or semi-forward control type.
1.2.9. **53-passenger** bus shall be the conventional, forward*, or semi-forward control type.
1.2.10. **59-passenger** bus shall be the conventional, forward*, or semi-forward control type.
1.2.11. **65-passenger** bus shall be the conventional, forward*, or semi-forward control type.
1.2.12. **71-passenger** bus shall be the conventional, forward*, or semi-forward control type.
1.2.13. **77-passenger** bus shall be the conventional, forward*, or semi-forward control type.
1.2.14. **83-passenger** bus shall be the forward control* transit type.

*Diesel only.

1.3. **SPECIAL EDUCATION BUSES** - Special education buses for impaired passengers may contain less than 15 passenger and wheelchair positions combined, but not less than 10 passenger positions combined or they cannot be certified as school buses. These vehicles, used for transporting special education school children, that contain fewer than 10 passenger positions are classified as Multipurpose Passenger Vehicles (MPVs) by the Federal Government. They will be designated by the State of Texas as "school buses" for the purposes of this specification. The State of Texas requires that MPVs used as school buses shall meet the same standards they would meet if built to accommodate 10 or more passengers even though they must be certified as Multipurpose Passenger Vehicles.

A. GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS

A.2. DEFINITIONS -

2.1. **ASHRAE** means American Society of Heating, Refrigeration and Air Conditioning Engineers.
2.2. **ANSI** means American National Standards Institute.
2.3. **ASTM** means American Society for Testing and Materials.
2.4. **BCI** means Battery Council International.
2.5. **Commission** and **GSC** mean General Services Commission.
2.6. **Conventional Bus** means a school bus with all of the engine in front of the windshield and the service or entrance door behind the front wheels.
2.7. **Department of Public Safety** and **DPS** mean Texas Department of Public Safety.
2.8. **Education Agency** and **TEA** mean Texas Education Agency.
2.9. **EPA** means United States Environmental Protection Agency.
2.10. **FMVSS** means Federal Motor Vehicle Safety Standards.
2.11. **Federal Standard No. 17** means Federal Highway Safety Program Standard Number 17.
2.12. **Forward Control Bus** means a school bus with the steering wheel, pedals, instruments, and other driver controls mounted as far forward as possible, usually just behind the windshield. All of the engine is located behind the windshield, either at the front of the bus, or at the rear of the bus, or in between these positions. The service door is located forward of the front axle.
2.13. **Knee Space** means the horizontal distance from the front center of a seat back to the rear center of the seat back (or barrier) immediately ahead, measured at approximately 4 inches above the seat cushion.
2.14. **Manufacturer** means a fabricator of school buses, bodies, chassis, or components.
2.15. **MPV** means a multipurpose passenger vehicle accommodating ten or less people.
2.16. **NSSB** means National Standards for School Buses (formerly National Minimum Standards).
2.17. **SAE** means Society of Automotive Engineers.
2.18. **SBMI** means School Bus Manufacturer's Institute.
2.19. **SCAAN** means a computer analysis of engine performance.
2.20. **Semi-forward Control Bus** means a bus in which part of the engine is beneath and/or behind the windshield and beside the driver's seat.
2.21. **Vendor** means a manufacturer's representative or dealer authorized to make sales and supply parts and services in Texas.
2.22. **VESC** means Vehicle Equipment Safety Commission.

A.3. APPLICABLE SPECIFICATIONS AND STANDARDS -

3.1 **FEDERAL HIGHWAY SAFETY PROGRAM STANDARD** - School bus bodies and chassis shall meet or exceed the minimum requirements of this specification and shall also meet all applicable requirements of the Highway Safety Program Standard No. 17. All requirements of this specification must be met unless they are in conflict with Standard No. 17 as it applies to school buses:

3.1.1. **Federal Highway Safety Program Standard No. 17, Pupil Transportation Safety** - Supt. of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

3.2. **FEDERAL MOTOR VEHICLE SAFETY STANDARDS** - School bus bodies and chassis shall meet or exceed the minimum requirements of this specification and shall also meet all applicable requirements of the **Federal Motor Vehicle Safety Standards (FMVSS)**. All requirements of this specification must be met unless they are in conflict with the FMVSS as they apply to school buses:

3.2.1. **Federal Motor Vehicle Safety Standards (Public Law 89-563)** - Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402:

(1) FMVSS No. 103 - **Windshield Defrosting and Defogging Systems.**
(2) FMVSS No. 105 - **Brakes, Hydraulic Service, Emergency and Parking.**
(3) FMVSS No. 108 - **Lamps, Reflective Devices, and Associated Equipment.**
(4) FMVSS No. 111 - **Rearview Mirrors - Passenger Cars and Multipurpose Passenger Vehicles.**
(5) FMVSS No. 121 - **Air Brake Systems - Buses and Trailers.**
(6) FMVSS No. 125 - **Warning Devices.**
(7) FMVSS No. 205 - **Glazing Materials.**
(8) FMVSS No. 208 - **Occupant Crash Protection.**
(9) FMVSS No. 209 - **Seat Belt Assemblies - Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses.**
(10) FMVSS No. 210 - **Seat Belt Assembly Anchorages.**
(11) FMVSS No. 217 - **Bus Window Retention and Release.**
(12) FMVSS No. 220 - **School Bus Roll-over Protection.**
(13) FMVSS No. 221 - **School Bus Body Joint Strength.**
(14) FMVSS No. 222 - **School Bus Seating and Crash Protection.**
(15) FMVSS No. 301 - **Fuel System Integrity.**
(16) FMVSS No. 302 - **Flammability of Interior Materials - Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses.**

A. GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS

3.3. **NATIONAL STANDARDS FOR SCHOOL BUSES (NSSB)** - School bus bodies and chassis shall also meet or exceed the current National Standards for School Buses (formerly National Minimum Standards) except when those requirements are in conflict with the requirements of this specification. In such cases, the requirements specified herein shall prevail:

3.3.1. **National Standards for School Buses, 1990 Revised Edition**, National Standards Conference (May, 1990), National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

3.4. **OTHER REFERENCES** - References to other specifications, standards, and test methods shall be to those in effect on the date of the Invitation for Bids. The following publications form a part of this specification to the extent specified herein:

3.4.1. **American National Standards Institute, Inc. (ANSI)**, 1430 Broadway, New York, NY 10018:

(1) ANSI Z26.1 - **Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways**, Safety Code for, including Supplement Z26.1a - 1969.

3.4.2. **American Plywood Association**, P.O. Box 11700, Tacoma, Washington 98411:

(1) U.S. Plywood Standard PS 1-83.

3.4.3. **American Society for Testing and Materials (ASTM)**, 1916 Race Street, Philadelphia, PA 19103:

(1) ASTM A 446 - Standard Specification for **Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality.**
(2) ASTM A 525 - Standard Specification for **General Requirements for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process.**
(3) ASTM D 3574 - Standard Specification for **Standard Test Method for Testing Cellular Materials - Slab Bonded and Molded Urethane Foam.**
(4) ASTM B 117 - Standard Specification for **Method of Salt Spray (Fog) Testing.**

3.4.4. **American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE)**, Circulation Department, 345 East 47th Street, New York, NY 10017:

(1) ASHRAE 16-69 - Methods of **Testing for Rating of Room Air Conditioners.**

3.4.5. **Federal Highway Administration, United States Department of Transportation**, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402:

(1) Federal Highway Administration FP-85 - Standard Specifications for **Construction of Roads and Bridges on Federal Highway Projects.**

3.4.6. **Federal Standards** - Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402:

(1) No. 595a - **Colors.**

3.4.7. **Federal Specifications** - Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402:

(1) TT-C-490B - **Cleaning Methods and Pretreatment of Ferrous Surfaces For Organic Coating.**
(2) TT-C-520B - **Coatings Compound, Bituminous, Solvent Type Underbody, (For Motor Vehicles).**
(3) TT-E-489 - **Enamel, Alkyd, Gloss (For Exterior and Interior Surfaces).**
(4) V -T-295D - **Thread, Nylon.**
(5) ZZ-M- 71D - **Matting, Rubber and Vinyl.**

3.4.8. **School Bus Manufacturers' Institute (SBMI), Engineering Committee**, 7508 Ben Avon Road, Bethesda, Maryland 20817:

(1) SBMI Standard No. 001 - Standard Code for **Testing and Rating Automotive Bus Hot Water Heating and Ventilating Equipment.**

3.4.9. **Society of Automotive Engineers, Inc. (SAE)**, 400 Commonwealth Drive, Warrendale, Pennsylvania 15096:

(1) SAE J20e - **Coolant System Hoses.**
(2) SAE J377 - **Performance of Vehicle Traffic Horns.**
(3) SAE J383 - **Motor Vehicle Seat Belt Anchorages - Design Recommendations.**
(4) SAE J514 - **Hydraulic Tube Fittings.**
(5) SAE J516 - **Hydraulic Hose Fittings.**
(6) SAE J517 - **Hydraulic Hose.**
(7) SAE J561 - **Electrical Terminals - Eyelet and Spade Type.**
(8) SAE J588 - **Turn Signal Lamps for use on motor vehicles less than 2032 mm in overall width.**
(9) SAE J639 - **Safety Practices for Mechanical Vapor Compression Refrigeration Equipment or Systems Used to Cool Passenger Compartments of Motor Vehicles.**
(10) SAE J887 - **School Bus Warning Lamps.**
(11) SAE J994b - **Alarm - Backup - Electric - Performance, Test, and Application.**
(11) SAE J1128 - **Low Tension Primary Cable.**
(13) SAE J1133 - **School Bus Stop Arm.**

3.4.10. **STATE OF CALIFORNIA -**

3.4.10.1. **DEPT. OF CONSUMER AFFAIRS**, 3485 Orange Grove Ave., North Highlands, CA 95660.

(1) **California Technical Bulletin 117**, Section A, Part I, Seat Cushion Compression Test.

3.4.11. **STATE OF TEXAS -**

3.4.11.1. **RAILROAD COMMISSION OF TEXAS**, Liquefied Petroleum Gas Division, P.O. Box 12967, Austin TX 78711-2967:

(1) **Regulations for Compressed Natural Gas** (November, 1990),
(2) **Safety Rules-Liquefied Petroleum Gas Division** (Nov., 1990)

3.4.11.2. **TEXAS AIR CONTROL BOARD**, 12124 Park Circle, Austin, TX 78753:

(1) Regulation IV (31 TAC CHAPTER 114), **Control of Pollution from Motor Vehicles** (Rev. Aug. 30, 1991)

3.4.12. **United States Environmental Protection Agency (EPA)**, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460:

(1) EPA - **Noise Emission Standards.**

3.4.13. **Vehicle Equipment Safety Commission (VESC)**, Suite 908, 1030 15th Street, N.W., Washington, D.C. 20005:

(1) VESC - **Regulation 6.**
(2) VESC - **Regulation 10.**

A.4. GENERAL INFORMATION AND REQUIREMENTS -

4.1. **EQUIPMENT INSTALLATION** - Requirements and accessories, either standard or optional, furnished under this specification shall be installed by body, chassis, or product manufacturer except air conditioners, tachographs, tachometers, and wheelchair lifts may be installed by authorized service Representatives. Installation of such items shall conform in strength, quality, and workmanship to the accepted standards of the industry.

4.2. **NEW MODELS** - Each bus body and bus chassis furnished under this specification shall be new school bus of the current year's production or the latest improved model in current production. The bidder represents that all units offered under this specification shall meet or exceed the minimum requirements specified herein.

4.3. **ODOMETER DISCLOSURE STATEMENT** - The Truth in Mileage Act requires the selling dealer to furnish a complete odometer statement to the purchaser. This statement must be complete and shall include mileage accrued at the point of delivery. In addition to the signature of the seller/agent certifying the odometer reading, both the dealership and the name of the agent shall be printed on the Odometer Disclosure Statement. (Completion of the Mileage Statement Portion of the MSO will satisfy this requirement.)

A. GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS

4.4. **SERVICING AND EQUIPPING** - All bus bodies, chassis, or complete school bus units shall be completely assembled, adjusted, and all equipment installed. All parts not specifically mentioned herein which are necessary to provide a complete school bus, bus body, or chassis shall be furnished by the successful bidder and said parts shall conform in strength, quality of materials, and workmanship to recognized industry engineering practices.

4.5. **VENDOR GVWR SELECTION** - The requirements for gross vehicle weight ratings, gross axle weight ratings (front and rear), and tire size and load range for each size chassis are specified in Table Nos. 3-7 and 12-28, and are minimum requirements. These requirements are for small type school bus (15- through 20-passenger), conventional and semi-forward control type school buses (24- through 77-passenger), forward control type school bus (47- through 77-passenger), and a transit type school bus (83-passenger) with standard equipment. **The added weights of optional equipment such as alternative fuel storage tanks, air conditioning, luggage racks, lifts for the physically impaired and other heavy accessories were not considered in establishing the capacity ratings to be certified for the chassis.** If additional optional equipment is ordered, which necessitates increased capacity ratings of either axles, springs, or tires, it is the responsibility of the vendor to furnish them so that proper certification can be made on the vehicle.

NOTE: Par. A.4.5. is not applicable for chassis only which are used by the State of Texas for remounting of bus bodies.

A.5. **BID AWARDS** - The Commission reserves the right to accept or reject any and all bids, in whole or in part, and to waive all technicalities when these actions are determined by the Commission to be in the best interest of the State of Texas. Failure to receive a satisfactory chassis or body bid shall not prohibit the awarding of contracts to others by the Commission, when in the best interest of the State.

A.6. **CERTIFICATION AND COMPLIANCE** -

6.1. **BUS BODY WORK ORDER** - The work order which accompanies the bus body through the production line during the process of manufacture must show the related Commission Purchase Order Number that was issued to the bus body company or the distributor. The work order must also show the appropriate item number of the purchase order or the name of the school. One copy of the work order must accompany the bus to its final destination.

6.2. **CERTIFICATION, ALL BIDDERS - By signing the bid, the bidder certifies** that the equipment being offered meets or exceeds all requirements and conditions of this specification. Failure to comply with all the requirements and conditions of this specification will subject the bid to rejection.

6.3. **CERTIFICATION, SUCCESSFUL BIDDER - The vendor (successful bidder) must certify on the face of the invoice** that the equipment delivered meets or exceeds the requirements and conditions of this specification and that the equipment was manufactured in accordance with this specification. The burden of proof for compliance with this specification shall be the responsibility of the vendor, manufacturer, or both.

6.4. **CHASSIS PRODUCTION ORDER** -

6.4.1. Attachment - One copy of the production order (line setting ticket) listing both standard and optional equipment installed on the chassis must accompany the chassis to which it pertains upon delivery of the chassis to the bus body manufacturer and to the final destination (receiving School District). The copy of this production order should be contained in a waterproof envelope and placed in the glove compartment, or it may be secured by other means which will assure positive attachment to the chassis (see Par. A.6.4.2. below). The production order shall be a printed form and not machine coded.

6.4.2. Alternative Plate - In lieu of the production order, the information required above may be stamped on a metal plate, either on the truck identification plate regularly furnished or on an additional plate. The identification plate(s) shall be attached to the chassis in a conspicuous place and in an accessible position in order that it may be easily read.

6.4.3. Removal/Obliteration - The production order (line setting ticket) or chassis identification plate referred to above shall not be removed from the chassis by the body manufacturer since it is for the information of the receiving school district. The truck identification plate shall not be obliterated when undercoating or paint is applied to the area where the plate is mounted. The plate shall not be mutilated or covered when installing equipment such as the heater, heater hose, or electrical cables.

A. GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS

6.5. **LITERATURE AND DRAWINGS** - Each bidder shall furnish the following:

6.5.1. Drawings - The bidder shall have on file with the Commission, detailed isometric drawings of the bus body showing floor panels, side posts, roof bows, bow-frames, strainers, longitudinal frame members, exterior panels, and front and rear end framing. Each component shall be identified in block form showing (first) the item number, (second) the type of steel, and (third) the decimal thickness of steel used in the construction. (Refer to Table No. 9 for steel requirements on 24-passenger and larger capacity buses.)

6.5.2. Drawings, Number of - On construction items, one drawing will suffice; however, additional drawings shall be furnished on special items and changes or deviations from common construction whenever such change affects any size bus. All drawings submitted will be treated as confidential information. Drawings must be approved by the Commission.

6.5.3. Literature - The bidder shall have on file with the Commission, the latest pamphlets, brochures, and printed literature on the equipment the bidder proposes to furnish to this specification.

6.5.4. Metal Certification - The bidder shall have on file with the Commission, a statement certifying that the metal used in Texas School Buses conforms to the National Standards for School Buses (NSSB). NSSB requires galvanized steel to meet the requirements of the 1,000 hour salt spray test in accordance with ASTM Standard B 117 and shall not lose more than 10% of material by weight.

6.6. **MANUFACTURER'S STATEMENT OF ORIGIN** - The vendor (successful bidder) shall furnish the Commission with the manufacturer's Statement of Origin (**Certificate of Title will not meet this requirement**). The manufacturer's New Vehicle Warranty and major component parts warranties (see Par. A.10.4.) shall be furnished to the receiving school district. (See Par. A.7.6. for Pre-delivery Service requirements.) The **odometer statement** required by law shall include the mileage accrued at the time of delivery to the school district.

6.7. **TEMPORARY LICENSE TAGS** - Temporary (Red) License Tags shall be issued by the vendor for use with each new bus delivered (see Par. B.4.2.).

A.7. **DELIVERY** -

7.1. **DELIVERY PROCEDURE** - The delivery of a bus to any specified destination may be made by any normal delivery procedure which the manufacturer or distributor utilizes (see **NOTE** below). The bus body distributor must guarantee the equipment to be free of damage as a result of the type of delivery. If any damage is caused by or during delivery that can be established within six months after delivery to any school, then the school must be compensated for such damage by the contractor. It shall be the obligation and responsibility of each body manufacturer to check and inspect each chassis delivered to the body manufacturer's plant to ascertain that the chassis is free of any damage which might have occurred as a result of the type of delivery.

NOTE: Under no circumstances shall a bus be used as towing vehicle prior to or during delivery to its destination.

7.2. **DELIVERY ON SCHEDULE** - Delivery on schedule is critical. **The ability to deliver as specified in the Invitation for Bids will be a factor in making awards.** A vendor who fails to make delivery in accordance with terms of the purchase order may be liable for actual damage suffered by the State. The amount of such damages shall be determined by the Commission.

7.3. **DELIVERY TIME** - Buses may be delivered to the receiving school districts only between the hours of 8:00 a.m. and 4:00 p.m. Monday through Friday, excluding holidays. Deliveries at other times are not to be made without at least **24 hours notice** and only then with the **expressed consent and approval** of the receiving school district. The person delivering the bus shall present the Inspection Report Forms to the responsible school personnel **and** obtain that school official's signature **before delivery is considered complete.** (See Par. A.7.6.)

7.4. **LATE DELIVERIES** - Failure by the vendor to deliver buses, caused directly by Natural Disaster, War, Civil Disturbance, Federal Law and Regulations, or labor disputes, which is beyond control of the contractor, will not cause the damages described in Par. A.7.2. above to be assessed.

A. **GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS**

7.5. **LATE DELIVERY NOTIFICATION** - At least 20 days in advance of the final delivery date, the successful, complete unit bidder shall notify the Commission and the receiving school district in writing, when a known delay precludes delivery of a unit on time.

In addition, a vendor who has orders for buses which have not been delivered in accordance with the terms of the purchase order shall submit a monthly report to Purchaser U, Purchasing Division, General Services Commission by the 15th of each month. The report shall contain the following information: (1) purchase order number, (2) school district name, (3) reason for the late delivery, (4) current status and (5) expected delivery date.

7.6. **PRE-DELIVERY SERVICE** - The vendor or the vendor's representative who is responsible for the final delivery shall attach a signed certificate to the bus stating that the following service was performed and that inspection indicates the bus is in good condition and ready for delivery. The following service on the chassis and body shall be performed before the bus is delivered to the receiving school district:

7.6.1. Chassis lubrication, complete.
7.6.2. Check all fluid levels and maintain proper grade and types of fluids.
7.6.3. Clean and wash interior and exterior of bus.
7.6.4. Pre-delivery inspection and service on chassis.

A.8. **INSPECTION** - Inspection shall be by and at the discretion of this Commission or its designated agent and may be performed either at the place of manufacture, at the vendor's facility in Texas, or at the final destination, or a combination of these. The authorized State Inspector shall have access to the manufacturer's plant during all normal working hours in order to make all necessary inspections during the process of manufacture and assembly. This does not preclude the school districts' personnel from making inspections during manufacture or after acceptance of delivery. The school district's personnel are urged to make detailed inspections, especially upon delivery, and report any discrepancy or discrepancies to the Commission. Any such discrepancies found during or after manufacturing shall be immediately corrected to the satisfaction of the Commission, at no charge, by the manufacturer or distributor.

A.9. **TERMS, INVOICING AND PAYMENT** -

9.1 **INVOICE, VENDOR'S** -

9.1.1. **School District's Copies** - The vendor shall submit the invoice to the school district at the address shown on the purchase order. The invoice must certify that the buses delivered meet or exceed the requirements and conditions of this specification. (See Par. A.6.3.)

9.2. **PAYMENTS, DISPUTED** - If the school district believes that there is an error in an invoice submitted for payment, the school district shall notify the vendor who submitted the invoice of the alleged error not later than the 21st day after the date on which the invoice is received. A copy of the notice to the vendor shall be forwarded to the General Services Commission, Purchaser U.

A.10. **WARRANTY AND SERVICE** -

10.1. **CONTRACTOR'S RESPONSIBILITY** - Each successful bidder is ultimately responsible for and must assure the State that any warranty service shall be performed to the satisfaction of the Commission, regardless of whether the successful bidder or the bidder's agent performs the warranty work on school buses (see Par. A.10.4.). If there is a question of whether it is the responsibility of the body or the chassis manufacturer to repair a given defect, then it shall automatically become the prime contractor's and/or successful bidder's responsibility to see that the repair(s) is made to the satisfaction of the receiving school district and this Commission.

10.2. **DEFECTIVE WORKMANSHIP** - In the event that an error is discovered or conclusive proof of defective workmanship and/or materials is found on any body or chassis after acceptance and payment has been made, the successful bidder shall make such repairs as required at the vendor's expense.

10.3. **PENALTIES** - Upon refusal of the prime contractor and/or successful bidder to make satisfactory adjustment(s), the Commission reserves the right to claim and recover from said prime contractor and/or successful bidder by due process of law, such sums as may be sufficient to correct the error or make good the defect in material and/or workmanship.

A. **GENERAL INFORMATION, REQUIREMENTS, AND CONDITIONS**

10.4. **WARRANTY WORK AND GENERAL TERMS OF WARRANTIES** - The Commission's purchase orders for school buses are issued to a single distributor or vendor. This distributor or vendor has the ultimate responsibility of insuring the delivery of a bus that meets Texas specifications in all details and is free of defects in materials and workmanship. In addition, the bus body and chassis are warranted against defects in materials and workmanship by the bus body manufacturing company and the chassis manufacturer, respectively. The warranty on a school bus is thus a dual warranty. The following are general terms of the warranties; however, for specific coverage of any item on a school bus, please refer to the warranty literature provided at time of vehicle delivery.

NOTE: WARRANTY REGISTRATIONS MUST BE COMPLETED AND MAILED TO INITIATE WARRANTY.

10.4.1. Air Conditioner - Basic coverage for chassis and body parts is for 12 months as specified in manufacturer's warranty pamphlet. The air conditioning manufacturer shall have service facilities available in each of the 5 zones within the State of Texas (see Fig. 3). (For service on units provided by chassis manufacturer, contact local chassis dealer; for service on other makes, contact the vendor.)

10.4.2. Automatic Transmission - Basic coverage is for 12 months, 12,000 miles, whichever occurs first, and as more specifically defined in the manufacturer's warranty pamphlet included with delivery of the vehicle. (For service, contact the chassis or transmission dealer, or authorized service outlet as specified in the warranty pamphlet.)

(1) Allison Transmission Division (ATD) transmissions (see below) are warranted for 50,000 miles or 12 months at 100% cost of parts and labor; 50,001 miles to 62,500 miles or 15 months at 80% cost of parts; 62,501 to 75,000 miles or 18 months at 60%; 75,001 to 87,500 miles or 21 months at 40%; and 87,501 to 100,000 miles or 24 months at 20%. An extended warranty is available at extra cost.

10.4.3. Batteries - 12 months or 12,000 miles, whichever occurs first. (For service contact the local dealer as specified in the battery warranty pamphlet.) Battery warranties are included with the chassis warranty.

10.4.4. Bus Body - A minimum of 12 months beginning on the date of delivery to the user. For service contact the vendor identified on the school bus purchase order issued by the Commission.

10.4.5. Bus Chassis - 12 months or 12,000 miles, whichever occurs first, beginning on the date of delivery (see delayed chassis warranty, Par. A.10.4.6., below). For warranty service and repairs on the bus chassis:

10.4.5.1. **First**, contact the chassis dealer recommended by the vendor (as shown on the school bus purchase order issued by the Commission) or any other convenient chassis dealer. If the problems are not satisfactorily resolved,

10.4.5.2. **Second**, call the Zone Service Manager, Representative, or Engineer listed below for assistance (the dealer Principal may be asked to assist in this contact):

CHEVROLET
Conrad Tupper
Light-Duty Fleet Service Manager
713-460-7333

DALLAS ZONE <- **FORD** -> **HOUSTON ZONE**

Don Yegan
Heavy Truck Service Engineer
214-417-6303

Ron Canal
Heavy Truck Service Engineer
713-680-4269

GMC
Ron Martini
Medium-Duty Fleet Zone Service Manager
214-541-5150
1-800-322-7181 Ext. 219

NIC
Ray T. Barton
Regional Service Manager
214-881-3545

10.4.5.3. **Third**, if the problems are still not satisfactorily resolved, notify the vendor by letter with a copy to:

Purchaser "U"
General Services Commission
P. O. Box 13047
Austin, Texas 78711-3047

10.4.5.4. **Last**, if the above action does not resolve the problem, you may use the form provided on Page 115 of this specification to contact the Commission.

10.4.6. Delayed Chassis Warranty - In case the bus is delivered during the summer months and will not be placed in service or used until the start of the fall term, the school district can obtain a delayed warranty by:

10.4.6.1. Making application for the delayed warranty (which is the responsibility of the school district and must be done within 15 working days after the date the bus is delivered or the warranty starts at time of delivery) by,

10.4.6.2. Contacting the local chassis dealer for a delayed starting date for warranty service (i.e., start of school or date bus placed in service). Your local dealer will verify the chassis mileage and record the starting date for bus use.

However, if the bus is used before the starting date, then the delayed warranty date is voided and the warranty date automatically becomes the delivery date.

Any questions should be addressed to your local chassis dealer or to the Specification Section of the Commission.

10.4.7. Diesel Engines, Mid-Range (35-83 passenger) - 5 years or 50,000 miles, whichever occurs first. Extended warranties are available at extra cost. (For service contact the chassis dealer.)

10.4.8. Tires - Tires and tubes are covered by the tire manufacturer's adjustment policies as specified in the manufacturer's pamphlet included with the vehicle delivery.

10.4.9. Wheelchair Lifts - All component parts including frame welds, gear box, and motor are warranted for 12 months and are specifically defined in the manufacturer's pamphlet included with the vehicle delivery. Warranty on wheelchair lifts with frames manufactured of aluminum shall be a minimum of 24 months on frame rails and a minimum of 18 months on gear box and motor; all other components shall be warranted for 12 months (see Par. G.1.5.1.).

B. ORDERING INFORMATION

B.1. GENERAL INFORMATION -

1.1. **PASSENGER CAPACITY** - The definition of passenger capacity, as used in this specification, has reference to seat space (width) allotted for each pupil. Based on National height and weight percentile averages specified in Federal Highway Safety Program Standard No. 17, approximately 13 inches per pupil has been established for designating bus body passenger capacities.

1.2. **REDUCED PASSENGER CAPACITY - REDUCED PASSENGER CAPACITY - THE 13-INCH FIGURE MUST BE CONSIDERED WHEN ORDERING SCHOOL BUSES SINCE PASSENGER CAPACITY MAY BE REDUCED WHEN JUNIOR HIGH, HIGH SCHOOL, OR ADULT PASSENGERS ARE PRIMARY PASSENGERS. AS AN EXAMPLE, FOR LARGER STUDENTS IN WHICH ONLY TWO STUDENTS CAN BE ACCOMMODATED PER SEAT, THEN A 71-PASSENGER SCHOOL BUS MAY ONLY SEAT ABOUT 48 STUDENTS. OTHER CAPACITY BUSES WILL LIKEWISE SEAT FEWER THAN THE STATED CAPACITY. IF THERE IS A QUESTION ABOUT SEATING CAPACITY IN REGULAR OR WHEELCHAIR-EQUIPPED SCHOOL BUSES, PLEASE CONSULT WITH SCHOOL BUS BODY VENDORS OR MANUFACTURERS BEFORE ORDERING.**

B.2. ORDERING - Complete school buses, school bus bodies, or school bus chassis shall be requisitioned using the Requisition Form (or a copy) furnished within this document. In addition to this form, it is necessary to complete the portion of the form immediately following the Requisition section titled "**SCHOOL BUS ALTERNATIVE FUEL PURCHASE CERTIFICATION.**" Please refer to the facsimile requisition/certification form on the pages following the options. More than one bus may be requisitioned on one form provided all are the same size. "Chassis" or "Bodies" only should be ordered on separate requisitions from "complete" school buses:

2.1. **PREPARATION OF THE REQUISITION -**

2.1.1. **COMPLETE UPPER SECTION** - All of the information requested in the upper portion of the requisition form should be completed by the ordering school with the exception of the space provided for the Commission Requisition Number. This space is for Commission use only. Note that automatic or manual transmission must be checked (vendor's choice otherwise). State quantity and the size of buses desired and specify the type (e.g., either Conventional or Forward Control) and the Table number from which the bus is to be ordered. **PLEASE NOTE THAT THE REQUISITION FORM IS VALID FOR THE CURRENT MODEL YEAR ONLY. USE ONLY A CURRENT FORM.**

2.1.2. **SELECT REGULAR OPTIONS** - Select from the list of regular options for the size bus being ordered, the option(s) desired by making a check mark or an "X" next to the number.

2.1.3. **COMPLETE LOWER SECTION** - The certification and approval on the lower portion of the requisition form must be completed before submitting to TEA.

2.1.4. **COMPLETE CERTIFICATION SECTION** - The certification and approval section for the "School Bus Alternative Fuels Purchase Certification" must be completed on EACH Purchase Requisition submitted.

2.2. **SPECIAL OPTIONS** - List, on the back of the requisition, or on a separate sheet of paper with the Requisitioning agency or school district letterhead, any listed special optional equipment required by item number (first check to see if the item is listed in the above Regular Options; if so use that list for ordering). This second sheet should be dated and identified with your School Requisition Number.

2.3. **MAILING ADDRESS** - Mail the Requisition and the Certification Form to:

Texas Education Agency
School Transportation Division
1701 North Congress Avenue
Austin, Texas 78701

B. ORDERING INFORMATION

B.3. SERVICE OR SHOP MANUALS - School districts desiring chassis service or shop manuals may obtain them separately from school buses ordered by corresponding directly with the following manufacturers:

ATD TRANSMISSIONS

Stewart & Stevenson
P. O. Box 1637
Houston, Texas 77251

CHEVROLET MOTOR DIVISION

General Motors Corporation
P. O. Box 40911
Houston, Texas 77040

DODGE DIVISION

Dyment Distribution Service
P. O. Box 360450
Strongville, OH 44136

FORD MOTOR COMPANY

Service Publications
7388 North End Station
Detroit, Michigan 48202
313-455-9052

GMC TRUCK AND COACH DIVISION

Dysart, Service Department
31 Judson
Pontiac, MI 48058

NAVISTAR INTERNATIONAL COMPANY

P.O. Box 655334
Dallas, Texas 75265

FOR SHOP MANUALS AND/OR INFORMATION ON SCHOOL BUS BODY OPTIONS, ETC., CONTACT:

BLUE BIRD/COLLINS

Bridges-Hemphill Enterprises, Inc.
Route 1, Box 409-2
Denton, TX 76201

CARPENTER

Statewide Bus Sales
4000 Irving Blvd.
Dallas, TX 75247

LEWIS

Dallas Bus Sales
3621 Works
Dallas, TX 76218

MID-BUS/VAN-CON/WAYNE GENESIS by AmTRAN

Conwell Smith Sales
P.O. Box 1551
Austin, TX 78767

THOMAS

Longhorn Bus Sales
P.O. Box 20362
Houston, Texas 77225

AmTRAN/WARD

Texas School Bus Center, Inc.
4800 E. Seventh St.
Austin, TX 78702

B.4. TEMPORARY LICENSE TAGS AND EXEMPT LICENSE PLATES -

4.1. EXEMPT LICENSE PLATES - The following forms are required to obtain exempt license plates at the address shown:

4.1.1. Form 130 U, "Application for Title."
4.1.2. Form 62A, "Application for Exempt Plates."
4.1.3. MSO (Manufacturer's Statement of Origin) or Title.

Exempt license plates must be obtained from:

Texas Department of Transportation (TxDOT)
Division of Motor Vehicles
P.O. Box 26480
Chimney Corners Station
Austin, Texas 78755-0480

ATTN.: Special Plates Section

4.2. TEMPORARY LICENSE TAGS - The vendor shall issue with each bus delivered, temporary (Red) license tags (see Par. A.6.7.). THESE TEMPORARY TAGS ARE LEGAL TO USE FOR A PERIOD OF 20 DAYS ONLY.

B. ORDERING INFORMATION

B.5. REGULAR OPTIONS -

15- THROUGH 20-PASSENGER BUSES

REGULAR OPTION NO.	DESCRIPTION
1.	**Air Conditioning**, Standard Cooling (see Par. H.).
	NOTE: Special Requirements - Option 1 requires a minimum 130 ampere alternator and 5/8" nominal thickness plywood installed over the steel floor.
2.	**Air conditioning, extra cooling** (n/a on 77-passenger buses) (See Par. H.1.5.)
3.	**Alternative fuel engines** - (Select from 3A or 3B) The power units (engines) furnished for the respective size and style bus shall be operable on alternative fuels, as determined by the Texas Air Control Board. The power unit shall be the chassis manufacturer's standard or optional engine for the vehicle type, which meets or exceeds the power requirements specified herein, at the engine manufacturer's rated operating speed. The engine may be of a standard production design or retrofitted for alternative fuels only by the engine Original Equipment Manufacturer (OEM) or any duly certified and/or approved manufacturer designated by the OEM, and certified/licensed by the Texas Railroad Commission. The engine shall be of such design and construction that it will give an even flow of power at all engine speeds without undue vibration, strain, or overheating of engine components. The fuel system shall meet all applicable FMVSS and Texas Railroad Commission certification and/or licensing requirements. These vehicles shall be fully operational at delivery to the district without any additional modification or adjustments (see Par. D.5.3.3.). Alternatively fueled engines shall be OEM warranted for a period of not less than five years/50,000 miles, and shall include all engine and emission parts and fuel system components. The engine manufacturer or approved designate, may upgrade engines in the field to improve durability, reliability, or emissions with the approval of the ordering agency.
	3A. **Compressed Natural Gas (CNG)** - The engine shall be capable of operating on compressed natural gas as defined herein. The engine, fuel system, and all components shall meet all applicable FMVSS requirements. The fuel tank(s) shall be constructed of appropriate material for a fuel storage system for Compressed Natural Gas. Minimum mileage range shall be 75 miles or as specified in the Invitation for Bids.
	3B. **Liquefied Petroleum Gas (LPG)** - The engine shall be capable of operating on liquefied petroleum gas as defined herein. The engine, fuel system, and all components shall meet all applicable FMVSS requirements. The fuel tank(s) shall be constructed of appropriate material for a fuel storage system for Liquefied Petroleum Gas. Minimum mileage range shall be 75 miles or as specified in the Invitation for Bids.
4.	**Alternator**, 100 ampere minimum for Type A buses and minimum of 130 ampere for Type B buses (required with option(s) 1 or 35 see Par. F.4.1.2.).
8.	**Diesel Engine** (See Table 3 through 7).
10.	**Door, Powered Service, manufacturer's standard** (n/a on Sedan type doors) (see Par. E.2.15.5.)
11.	**Door, Service**, Automotive Sedan Type (for 18- and 19-passenger buses only; see Fig. 1 and Tables 5 and 6).
12.	**Fuel Tank, Increased Capacity**, conventional fuels (30-gallon minimum capacity; See Par. D.3.3.2.).
13.	**Glazing, Dark Tint, Passenger Side Windows**, Minimum Light Transmittance of 30% and maximum Light Transmittance of 40% (see Par. C.2.19.3.).
14.	**Heater, Rear**, auxiliary (see Par. E.3.6. for size and installation requirements).

B. ORDERING INFORMATION

15. **Knee Spacing** (maximum allowed by FMVSS No. 222; requires deleting one row of seats (5 positions) which will reduce seating capacity. (n/a on 16- and 19-pass. buses)

Regular Seating Capacity	15	16	18	19	20
Rows of Seats	3	3	4/5	3	3
Minimum Knee Space,inches	27	27	27	28	28

16. **Laminated Safety Plate Glass**, AS-2 or better (see Par. C.2.19.2.2.).

19. **Reflective material** - (See Par. C.3.7. for required placement).

20. **School Name Lettering**, both sides of bus (see Par. C.1.4.9.).

23. **Security System Lock, All Doors** (with ignition disconnect on emergency door).

24. **Sound Abatement Insulation** (shall reduce interior noise by 4 dB(A), minimum).

25. **Option deleted**

26. **Strobe Light, Roof-mounted** (see Par. C.3.8.).

27. **Tachograph**, 0-80 mph, 12 volt (with 7-day 4-7/8 inch disc chart and electronic clock/speedometer/recorder; see Par. D.5.6.).

30. **Tool Compartment** (see Par. C.3.11.).

31. **Wheel, Spare**, unmounted (without carrier, tire, or tube; see Par. D.2.6.2.).

35. **Wheelchair Lift, Folding Platform Type, Right Curb Side Mounted** (15-20 pass. buses only; with _____ wheelchair positions. Will reduce seating capacity.)

NOTE: **For Option No. 35 the school district must specify the number of wheelchair positions required on bus.**

36. **Wheelchair Restraints, Webbed-belt Type** (for unusual wheelchairs which cannot otherwise be restrained; see Par. G.3.).

38. **White Roof** (see Par. C.1.4.2.)

39. **Windows, push-out**, additional (for emergency exit), (indicate quantity per side) (see Par. C.2.4.2. for standard requirement.)

B. ORDERING INFORMATION

REGULAR OPTIONS

24- THROUGH 77-PASSENGER BUSES

REGULAR OPTION NO.	DESCRIPTION
1.	**Air Conditioning**, Standard Cooling (see Par. H.).
	NOTE: Special Requirements - Option 1 requires a minimum 130 ampere alternator and 5/8" nominal thickness plywood installed over the steel floor.
2.	**Air conditioning, extra cooling** (n/a on 77-passenger buses) (See Par. H.1.5.)
3.	**Alternative fuel engines** - (Select from 3A or 3B) The power units (engines) furnished for the respective size and style bus shall be operable on alternative fuels, as determined by the Texas Air Control Board. The power unit shall be the chassis manufacturer's standard or optional engine for the vehicle type, which meets or exceeds the power requirements specified herein, at the engine manufacturer's rated operating speed. The engine may be of a standard production design or retrofitted for alternative fuels only by the engine Original Equipment Manufacturer (OEM) or any duly certified and/or approved manufacturer designated by the OEM, and certified/licensed by the Texas Railroad Commission. The engine shall be of such design and construction that it will give an even flow of power at all engine speeds without undue vibration, strain, or overheating of engine components. The fuel system shall meet all applicable FMVSS and Texas Railroad Commission certification and/or licensing requirements. These vehicles shall be fully operational at delivery to the district without any additional modification or adjustments (see Par. F.5.3.3.). Alternatively fueled engines shall be OEM warranted for a period of not less than five years/50,000 miles, and shall include all engine and emission parts and fuel system components. The engine manufacturer or approved designate, may upgrade engines in the field to improve durability, reliability, or emissions with the approval of the ordering agency.
	3A. **Compressed Natural Gas (CNG)** - The engine shall be capable of operating on compressed natural gas as defined herein. The engine, fuel system, and all components shall meet all applicable FMVSS requirements. The fuel tank(s) shall be constructed of appropriate material for a fuel storage system for Compressed Natural Gas. Minimum mileage range shall be 75 miles or as specified in the Invitation for Bids.
	3B. **Liquefied Petroleum Gas (LPG)** - The engine shall be capable of operating on liquefied petroleum gas, as defined herein. The engine, fuel system, and all components shall meet all applicable FMVSS requirements. The fuel tank(s) shall be constructed of appropriate material for a fuel storage system for Liquefied Petroleum Gas. Minimum mileage range shall be 75 miles or as specified in the Invitation for Bids.
4.	**Alternator**, 130 ampere minimum (required with option(s) 1, 35 or 36; see Par. F.4.1.2.)
5.	**Axle, Rear, Two-speed.**
6.	**Brakes, Hydraulic** (for 59-, 65-, 71-, and 77-passenger buses only).
7.	**Chassis, Long Wheelbase** (requires minimum 274-inch wheelbase for 71-passenger conventional bus only; or 157-inch wheelbase for 24-passenger bus only).
8.	**Diesel Engine** (for 24- through 77-passenger buses; see conventional buses in Tables 12 through 28).
9.	**Differential, No-spin.**
10.	**Door, Powered Service, manufacturer's standard** (see Par. E.2.15.5.)
12.	**Fuel Tank, Increased Capacity**, conventional fuel (for 24-passenger buses only; see Par. F.3.3.2.).
13.	**Glazing, Dark Tint, Passenger Side Windows**, Minimum Light Transmittance of 30% and maximum Light Transmittance of 40% (see Par. E.2.19.3.1.).

B. ORDERING INFORMATION

14. **Heater, Rear**, auxiliary (see Par. E.3.6. for size and installation requirements).

15. **Knee Spacing** (maximum allowed by FMVSS no. 222; requires deleting one row (6 positions) of seats which will reduce seating capacity).

Regular Seating Capacity	24	35	47	53	59	65	71-S	71-L	77
Rows of Seats	4	5	7	8	9	10	11	11	12
Minimum Knee Space, inches	27	28	28	27.75	28	27.75	27.5	27.75	27.5

16. **Laminated Safety Plate Glass**, AS-2 or better (see Par. E.2.19.2.2.).

17. **Option deleted**

18. **Mud Flaps, with Brackets, Mounted** (see Par. E.3.10.). **There shall be no advertisement on the mud flaps.**

19. **Reflective material** - (See Par. E.3.11. for required placement.).

20. **School Name Lettering**, both sides of bus (see Par. E.1.4.9.).

21. **Seat Backs, Increased Height** (see Par. E.2.13.1.).

22. **Seat Belts** (for each passenger seating position; see Par. E.3.13.).

23. **Security System Lock, All Doors** (with ignition disconnect on emergency door).

24. **Sound Abatement Insulation** (shall reduce interior noise by 4 dB(A), minimum).

25. **Option deleted**

26. **Strobe Light, Roof-mounted** (see Par. E.3.12.).

27. **Tachograph**, 0-80 mph, 12 volt (with 7-day 4-7/8 inch disc chart and electronic clock/speedometer/recorder; see Par. F.5.9.).

28. **Tachometer** (to indicate engine RPM).

29. **Tires, Mud and Snow Tread** (for Rear Wheels only).

30. **Tool Compartment** (see Par. E.3.17.).

31. **Wheel, Spare**, unmouunted (without carrier, tire, or tube; see Par. F.2.6.2.3.).

32. **Wheel, Spare, Mounted** (with carrier but not tire and tube; carrier not available on 24-passenger bus; see Par. F.2.6.2.2.).

33. **Wheelchair Lift, Folding Platform Type, Front Curb Side Mounted** (for 24-through 71-passenger bus <u>only</u>; see Par. G.).

34. **Wheelchair Lift, Folding Platform Type, Rear Curb Side Mounted.** Same as Option 35 (see 15-20 pass. buses) except floor-mounted on <u>rear</u> curb side of bus (see Par. G.). **This option is recommended only for buses which will have a regular attendant in addition to the driver.**

NOTE: **For Option Nos. 33 and 34, the school district must specify the number of wheelchair positions required on bus.**

36. **Wheelchair Restraints, Webbed-belt Type** (for unusual wheelchairs which cannot otherwise be restrained; see Par. G.3.).

37. **Wheels, Cast Spoke, All Wheels** (see Par. F.2.6.2.1.) 35-77 passenger buses only.

38. **White Roof** (see Par. E.1.4.1.)

39. **Windows, push-out**, additional (for emergency exit), <u>(indicate quantity per side)</u> (see Par. E.2.19.1.5. for <u>standard</u> requirement.)

B. ORDERING INFORMATION

REGULAR OPTIONS

83-PASSENGER BUSES

REGULAR OPTION NO.	DESCRIPTION
1.	**Air Conditioning**, Standard Cooling (see Par. H.).
	NOTE: Special Requirements - Option 1 requires a minimum 130 ampere alternator and 5/8" nominal thickness plywood installed over the steel floor.
2.	**Air conditioning, extra cooling** (n/a on 77-passenger buses) (See Par. H.1.5.)
3.	**Alternative fuel engines** - (Select from 3A or 3B) The power units (engines) furnished for the respective size and style bus shall be operable on alternative fuels, as determined by the Texas Air Control Board. The power unit shall be the chassis manufacturer's standard or optional engine for the vehicle type, which meets or exceeds the power requirements specified herein, at the engine manufacturer's rated operating speed. The engine may be of a standard production design or retrofitted for alternative fuels only by the engine Original Equipment Manufacturer (OEM) or any duly certified and/or approved manufacturer designated by the OEM, and certified/licensed by the Texas Railroad Commission. The engine shall be of such design and construction that it will give an even flow of power at all engine speeds without undue vibration, strain, or overheating of engine components. The fuel system shall meet all applicable FMVSS and Texas Railroad Commission certification and/or licensing requirements. These vehicles shall be fully operational at delivery to the district without any additional modification or adjustments (see Par. F.5.3.3.). Alternatively fueled engines shall be OEM warranted for a period of not less than five years/50,000 miles, and shall include all engine and emission parts and fuel system components. The engine manufacturer or approved designate, may upgrade engines in the field to improve durability, reliability, or emissions with the approval of the ordering agency.
	3A. **Compressed Natural Gas (CNG)** - The engine shall be capable of operating on compressed natural gas as defined herein. The engine, fuel system, and all components shall meet all applicable FMVSS requirements. The fuel tank(s) shall be constructed of appropriate material for a fuel storage system for Compressed Natural Gas. Minimum mileage range shall be 75 miles or as specified in the Invitation for Bids.
	3B. **Liquefied Petroleum Gas (LPG)** - The engine shall be capable of operating on liquefied petroleum gas, as defined herein. The engine, fuel system and all components shall meet all applicable FMVSS requirements. The fuel tank(s) shall be constructed of appropriate material for a fuel storage system for Liquefied Petroleum Gas. Minimum mileage range shall be 75 miles or as specified in the Invitation for Bids.
4.	**Alternator**, 130 ampere minimum (required with option(s) 1, 35 or 36; see Par. F.4.1.2.)
9.	**Differential, No-spin.**
10.	**Door, Powered Service, manufacturer's standard** (see Par. E.2.15.5.)
12.	**Fuel Tank, Increased Capacity**, conventional fuel (90-gallon minimum capacity; see Par. F.3.3.2.).
13.	**Glazing, Dark Tint Passenger Side Windows**, Minimum Light Transmittance of 30% and maximum Light Transmittance of 40% (see Par. E.2.19.3.1.).
14.	**Heater, Rear**, auxiliary (see Par. E.3.6. for size and installation requirements).
15.	**Knee spacing** (maximum allowed by FMVSS No. 222; requires deleting one row (6 positions) of seats which will reduce seating capacity).

Regular Seating Capacity	83
Rows of seats	13
Minimum Knee Space, inches	27

B. ORDERING INFORMATION

16. **Laminated Safety Plate Glass**, AS-2 or better (see Par. E.2.19.2.2.).

17. **Option deleted**

18. **Mud Flaps, with Brackets, Mounted** (see Par. E.3.10.). There shall be no advertisement on the mud flaps.

19. **Reflective material** - (See Par. E.3.11. for required placement.).

20. **School Name Lettering**, both sides of bus (see Par. E.1.4.9.).

21. **Seat Backs, Increased Height** (see Par. E.2.13.1.).

22. **Seat Belts** (for each passenger seating position; see Par. E.3.13.).

23. **Security System Lock, All Doors** (with ignition disconnect on emergency door).

24. **Sound Abatement Insulation** (shall reduce interior noise by 4 dB(A), minimum).

25. **Option deleted**

26. **Strobe Light, Roof-mounted** (see Par. E.3.12.).

27. **Tachograph**, 0-80 mph, 12 volt (with 7-day 4-7/8 inch disc chart and electronic clock/speedometer/recorder; see Par. F.5.9.).

28. **Tachometer** (to indicate engine RPM).

29. **Tires, Mud and Snow Tread** (for Rear Wheels only).

30. **Tool Compartment** (see Par. E.3.17.).

32. **Wheel, Spare, Mounted** (with carrier but not tire and tube; see Par. F.2.6.2.2.).

38. **White Roof** (see Par. E.1.4.1.)

39. **Windows, push-out, additional** (for emergency exit), (indicate quantity per side) (see Par. E.2.19.1.5. for standard requirement.)

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School Bus Purchase Requisition

District Name _____ County-District No. _____

Texas Specification No. 070-SB-92
Effective 1/92 - 12/92

TEXAS EDUCATION AGENCY
Transportation Division
1701 North Congress Avenue
Austin, Texas 78701-1497

SCHOOL REQ. # _____
STATE REQ. # _____

FOR TEA USE ONLY
Approved by: _____
Date: _____

Authority for Data Collection: TEC 11.12 and 21.165
Planned Use of Data: Required information necessary to purchase school buses.
Instructions: For information on bus options, see the current *Texas School Bus Specifications*. The completed form should be submitted as indicated below. For further information contact the Transportation Division at (512) 463-9185.

Section I—Bus Requirements

Quantity: _____
Size: _____—Passenger School Bus
(See Par. B.1.2 for Reduced Passenger Capacities)

Automatic Transmission: ___ Yes ___ No
(For 24 thru 77 passengers)

Type: ___ Conventional
___ Forward Control

Section II—Regular Bus Options: Check all regular bus options to be included.

_____ 1. **Air conditioning,** standard cooling
_____ 2. **Air conditioning,** extra cooling (n/a for 77-83 pass. buses)
_____ 3. **Alternative fuel engines** - (Select from A or B)
_____ 3A. **Compressed Natural Gas (CNG)**
_____ 3B. **Liquefied Petroleum Gas (LPG)**
_____ 4. **Alternator,** increased capacity
_____ 5. **Axle, Rear, Two-speed** (24-71-pass. buses only)
_____ 6. **Brakes, Hydraulic** (59-77-pass. buses only)
_____ 7. **Chassis, Long Wheelbase** conventional 24 and 71 pass. buses only)
_____ 8. **Diesel Engine**
_____ 9. **Differential, No-spin** (24-71 pass. buses only).
_____ 10. **Door, Powered Service** (n/a with automotive type door)
_____ 11. **Door, Service,** Automotive sedan-type, manually operated for 18 and 19 pass. buses only)
_____ 12. **Fuel Tank, Increased Capacity** (15-24 and 83 pass. buses only)
_____ 13. **Glazing, Dark Tint Passenger Side Windows** (min. 30%, max. 40% light transmittance.)
_____ 14. **Heater, Rear** (auxiliary)
_____ 15. **Knee spacing** (maximum; requires deleting one row (6 positions) of seats which will reduce seating capacity).
_____ 16. **Laminated Safety Plate Glass**
_____ 17. **Option Deleted**
_____ 18. **Mud Flaps, with Brackets, Mounted**
_____ 19. **Reflective material**
_____ 20. **School Name Lettering** (*type* EXACTLY as required):
_____
_____ 21. **Seat Backs, Increased Height**
_____ 22. **Seat Belts** (standard on all 15-20 passenger buses)
_____ 23. **Security System Lock, All Doors**
_____ 24. **Sound Abatement Insulation**
_____ 25. **Option Deleted**
_____ 26. **Strobe light, Roof-mounted**
_____ 27. **Tachograph**
_____ 28. **Tachometer** (to indicate engine RPM)
_____ 29. **Tires, Mud and Snow Tread**
_____ 30. **Tool Compartment**
_____ 31. **Wheel, Spare** (without carrier and tire/tube)
_____ 32. **Wheel, Spare, Mounted** (with carrier, but without tire/tube)
_____ 33. **Wheelchair Lift, Folding Platform Type, Front Curb Side Mounted** (24-71 pass. buses *only;* with _____ wheelchair positions. *Will reduce seating capacity.*)
_____ 34. **Wheelchair Lift, Folding Platform Type, Rear Curb Side Mounted** (24-71 pass. buses *only;* with _____ wheelchair positions.*Will reduce seating capacity.)*
_____ 35. **Wheelchair Lift, Folding Platform Type, Right Curb Side Mounted** (15-20 pass. buses *only;* with _____ wheelchair positions. *Will reduce seating capacity.*)
_____ 36. **Wheelchair Restraints, Webbed-belt Type** (15-71 passenger buses only)
_____ 37. **Wheels, Cast Spoke, All Wheels**
_____ 38. **White Roof**
_____ 39. **Windows, push-out,** additional, for emergency exit. Indicate extra number requested, par side _____

NOTES: Discard all previous editions of this form. Use only this form to order 1992 school buses. NA means Not Available/Not Applicable. Return this form with a copy and any attachments to TEA at the address shown above.

Typed Name and Title of **Contact Person**	Mailing Address
Telephone _____	Bus Delivery Address if Different from Above

Typed Name of Superintendent	Date	Telephone	Signature

NOTE: THE SIGNATURE OF THE SUPERINTENDENT AND THE FOLLOWING INFORMATION MUST BE COMPLETE TO PROCESS THIS REQUISITION -
Number of motor vehicles used for transporting school children _____
If more than 50, the alternative fuel certification on the reverse must be completed.

02-03-125 3/92

District Name _____ County-District No. _____

Section III—Special Options:
List any requested additonal options that do not appear in current state specifications

A. _____ F. _____

B. _____ G. _____

C. _____ H. _____

D. _____ I. _____

E. _____ J. _____

ALTERNATIVE FUEL CERTIFICATION

A. ___ This requisition is for the purchase of an alternative fueled school bus with an original equipment manufactured engine. The alterntive fuel is to be _____ (indicate CNG, LPG, electricity or other fuel designated as an alternative fuel in the rules of the Texas Air Control Board).

B. ___ This requisition is for the purchase of a school bus that will be converted to alternative fueled operation. By signature hereon, we certify the anticipated conversion date is _____ days following delivery. We also understand that the conversion must be completed prior to the bus being placed in service, unless undue hardship would result. In the case of potential undue hardship, the Commission may approve use of the vehicle for one or more periods of 90 days following delivery before it is converted to alternative fuel operation.

C. ___ A valid, current waiver, number _____, is on file with the General Services Commission.

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C. 15- THROUGH 20-PASSENGER BODY SPECIFICATIONS

C.1. GENERAL REQUIREMENTS -

1.1. **BODY PHYSICAL REQUIREMENTS** - The physical requirements for 15- through 20-passenger school bus bodies shall conform to the following Table (see Option No. 15 and Par. A.1.3.):

TABLE NO. 1

PHYSICAL REQUIREMENTS

(1) MINIMUM SIZE	(2) OVERALL BODY WIDTH	(3) KNEE SPACINGS	(4) SEAT WIDTH		(5) CENTER AISLE WIDTH	(6) FLOOR-TO-CEILING HEIGHT
Number of Passengers	inches, maximum	inches, minimum	inches, minimum LEFT	RIGHT	inches, minimum	inches, minimum
15	96	24	30*	30**	12	63
16	96	25	30*	30	12	72
18	96	24	30	30**	12	63
19	96	25	39*	26	12	62
20	96	25	39	26	12	72

NOTES: Column (3) Knee space is defined as the horizontal distance from the front center of a seat back to the rear center of the seat back or barrier immediately ahead, measured at approximately 4 inches above the seat cushion.

Column (4) *Left rear seat shall have minimum width of 26 inches. **26" is permitted if 26"/39" combination seating is provided.

Column (6) Floor-to-ceiling height shall be measured in the center of the body between the No. 2 pillar and the last side body pillar ahead of the rear roof slope.

1.1.1. **Interior Width** - 15- through 20-passenger school buses shall have a minimum interior width of 70 inches at the shoulder level of a seated 90 percentile male passenger (see Tables 3-7).

1.2. **BUMPERS, REAR** - The rear bumper shall be either the chassis manufacturer's standard bumper or it shall be furnished by the body manufacturer. It shall be secured to rear chassis frame and it shall be designed so as to prevent "hitching of rides" by obtaining a toe-hold thereon. The bumper shall not be permanently attached to the bus body. The bumper fabricated by the bus body manufacturer shall be of pressed steel channel at least 3/16-inch thick by 8 inches high and shall wrap around the body, extending forward for at least 12 inches on each side. It must be bolted to the chassis frame and braced with material of at least equal impact ratio as the material in the bumper.

1.3. **CEILING** - The ceiling shall be free of all projections likely to cause injury to passengers. (See Table 1 above and Par. C.2.8. for ceiling height requirements.)

1.4. **COLORS AND LETTERING** - A first quality black enamel (Color No. 17038 of Federal Standard No. 595a) or decals shall be used for lettering and trim. The properties of the black enamel shall be equal to those of the finish coat enamel. Pressure-sensitive tape or decals are acceptable for trim or lettering (e.g., **EMERGENCY DOOR, EMERGENCY EXIT, SCHOOL NAME LETTERING**, etc. signs) provided they are made from Faison R 200, 3M Series 180, or approved equal material.

1.4.1. Bumpers - Bumpers for Type A school buses shall be the manufacturer's standard color; bumpers for Type B school buses shall be finished in black (Color No. 17038).

1.4.2. Body Exterior - The exterior of the complete bus except for rub rails shall be finished in school bus yellow (Color No. 13432 of Federal Standard No. 595a). The hood may be coated with non-reflective school bus yellow paint. **When so specified in the Invitation for Bids** (see Option 38), the school bus roof shall be painted white. The white paint on the roof shall extend from the back of the front cap to the front of the rear cap and from a point on each side of the bus which is no lower than the top of the windows and no higher than the start of the roof curvature. The white paint shall be the same quality as the paint on the remainder of the school bus.

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1.4.3. Body Interior - **Unless otherwise specified in the Invitation for Bids**, the interior of the complete bus body shall be finished in the manufacturer's standard color **except** where clear-coated galvanized steel or aluminum is used (see Par. C.2.8.).

1.4.4. Emergency Door Lettering - The rear emergency door exit shall be marked **"EMERGENCY DOOR"** or **"EMERGENCY EXIT,"** both on the outside and on the inside with at least two-inch high lettering placed on top of, or directly above the exit.

1.4.5. Exterior Mirror Backs - The metal backs of all exterior mirrors, **if painted**, shall be finished in lusterless black (Color No. 37038; see Par. C.3.5.3. and Par. C.3.5.5.).

1.4.6. Grilles - Grilles may be painted either the same color as the exterior of the bus body or they may be argent, gray, or a bright finish (chrome, chromed-plastic, or anodized aluminum).

1.4.7. Logos - **No logo, trademark, insignia, or letters shall be placed on bumpers or mud flaps.** A small metal or plastic plate designating body manufacturer's name may be attached to the bus body. A logo of reasonable size, which has been approved by the Specification Section, may be placed on the exterior bus body.

1.4.8. Rub Rails - All rub rails, except the pressed-in type window level rub rails, shall be painted black (Color No. 17038). The pressed-in type rub rails shall be painted either black (Color No. 17038) or school bus yellow (Color No. 13432) at the option of the manufacturer.

1.4.9. School Bus Lettering - The school bus bodies shall have the words **"SCHOOL BUS"** in neat, clearly defined block letters on the front, rear, and on both sides of the bus body using decals or with black paint (Color No. 17038 of Federal Standard No. 595a). The letters shall be 8-inches high and shall have 1-inch wide strokes. The words **"SCHOOL BUS"** shall be at the same level on each side of the bus (i.e., same height above bottom of skirt).

1.4.10. School Name Lettering - **When so specified in the Invitation for Bids** (see Option 20), the school district name shall be provided in black letters on both sides of the bus near the belt line using decals or with black paint. Lettering shall be minimum 5 inches high with minimum 5/8-inch block strokes. Paint, if used, shall be equal in quality to that of the bus body paint; decals shall meet or exceed the requirements in Par. C.1.4. **Maximum number of characters in one line of the name is limited to thirty.** The school district should list in the space provided on the School Bus Requisition Form (see sample form on Page 19), the name to be placed on the bus. Characters should be typed or printed plainly on this form to ensure accurate spelling.

1.4.11. Wheels - Both sides of all wheels, including the spare, shall be finished in the chassis manufacturer's standard color.

1.4.12. Wheel Covers - Wheel covers may be bright metal.

1.5. **INSULATION, NOISE** - Each school bus shall be constructed so that the noise level measured at the ear of the occupant nearest the primary vehicle noise source shall not exceed 85 dBA, when tested in accordance with the procedure given in the Noise Test Procedure of NSSB. (See Option No. 24 for reduced interior noise level package)

1.6. **INSULATION, THERMAL** - The ceilings and sidewalls shall be thermally insulated with a fire-resistant material approved by Underwriters Laboratories Inc. to adequately reduce the noise level and to minimize vibrations. Buses shall have the equivalent of 1-1/2 inches of Fiberglas or other insulation in the ceilings and walls including the interior of hat-shaped bows. Any insulation used shall have a minimum R-factor value of 5.77.

1.7. **LAMPS, SIGNALS, AND WARNING DEVICES** - Each bus shall be furnished with the lamps listed below (see SBMI Standard No. 001):

C. 15- THROUGH 20-PASSENGER BODY SPECIFICATIONS

1.7.1. Alternately Flashing Signal Lamps - Each school bus shall be equipped with eight warning signal lamps, four red and four amber, working in an automatic non-sequential integrated system. The signal lamps shall conform to the design, installation, location and operating requirements in Par. S4.1.4. of FMVSS No. 108:

"S4.1.4. Each school bus shall be equipped with a system of ...:

...(b) Four red signal lamps designed to conform to SAE Standard J887, 'School Bus Red Signal Lamps,' July 1964, and four amber signal lamps designed to conform to that standard, except for their color, and except that their candlepower shall be at least 2-1/2 times that specified for red signal lamps. Both red and amber lamps shall be installed in accordance with SAE Standard J887, except that:

(i) Each amber signal lamps shall be located near each red signal lamp at the same level, but closer to the vertical centerline of the bus; and

(ii) The system shall be wired so that the amber signal lamps are activated only by manual or foot operation, and if activated, are automatically deactivated and the red signal lamps automatically activated when the bus entrance door is opened."

NOTE: The lamps shall be wired independently and not wired through the ignition switch. This will allow removal of the ignition key without affecting operation of the alternately flashing eight warning signal lamps.

1.7.1.1. Band - Each set of amber and red lamps shall have a minimum 3-inch black band around the set and a 3-inch band between the lamps in each set. The color of this band shall be black enamel (Color No. 17038, Black Enamel of Federal Standard 595a). If it is not possible to provide a 3-inch band between the lamps in the set, the manufacturer will then provide a band as wide as possible. Any visor or hood used to shade the lights and improve visibility will not interfere with the intensity and photometric performance of the warning lights (see SMBI Standard No. 001).

1.7.1.2. Mounting - If exterior panels are cut to provide an opening for installation of flush-mounted signal lamps, the lamps must have a closed cell sponge flange gasket with a minimum thickness of 3/16 inch. The gasket shall be the full width of the flange on the lamp. Proper installation of the lamps shall be made in order to prevent seepage of moisture into the opening.

1.7.1.3. Operating Instructions - Complete instructions for the detailed operation of the warning signal lamp system shall be furnished with each school bus.

1.7.2. Backup Lamps - The color, requirements, and mounting of backup lamps shall be in accordance with FMVSS No. 108, **except two backup lamps are required by Texas specifications.**

1.7.3. Identification Lamps - Each bus with an overall width of 80 or more inches shall be furnished with identification lamps installed on the front and rear, three amber lamps in the front and three red lamps in the rear. The lamps shall be installed as close as practicable to the top and vertical centerline with lamp centers spaced not less than six inches or more than twelve inches apart. Each identification lamp shall be the armored flush mounting type for protection of the lens from damage during normal operation. Armored protectors shall in no way interfere with the intended purpose of the lamps. The armored type protectors shall be Grote Manufacturing Company, Madison, Indiana 47250, Model Nos. 45012 and 45013, or KD Lamp Company, 1910 Elm Street, Cincinnati, Ohio 45210, Model Nos. 38469-901 and 40268-301, or approved equal. (See SBMI Standard No. 001 and FMVSS No. 108 for the types and proper location of these lamps.)

Example of an approved equal: Peterson Model - PM 122.

1.7.4. Interior and Stepwell Lamps - A minimum of two interior dome lamps shall be installed to properly and adequately illuminate the entire aisle and emergency passageway. The stepwell shall be illuminated by a separate lamp activated by opening the service door. The stepwell lamp shall have a metal bezel.

1.7.5. License Plate Lamp - The color, requirements, and mounting of the license plate lamp shall be in accordance with FMVSS No. 108.

1.7.6. Operating Units and Flashers - The operating units and flashers for turn-signals and vehicular hazard warning signals shall meet the requirements of FMVSS No. 108.

1.7.7. Tail and Stop Lamps - The quantities, colors, requirements, and mounting of tail and stop lamps shall be in accordance with FMVSS No. 108.

1.7.8. Turn-Signal/Hazard Warning Lamps - The quantities, colors, requirements, and mountings of turn-signal/hazard warning lamps shall be in accordance with FMVSS No. 108.

1.7.9. Warning Devices - Each school bus shall be equipped with three triangular warning devices meeting the requirements of FMVSS No. 125. The devices shall be packed three per metal or heavy-duty plastic box, or they may be individually packed in metal or heavy-duty plastic boxes with the three boxes contained within a carrier. Warning devices shall be securely mounted in the driver's compartment. **Triangular warning devices furnished shall be approved by the Texas Department of Public Safety.**

1.8. **LICENSE PLATE HOLDER** - A license plate holder shall be mounted on the rear of the bus body. The holder shall be designed so that the license plate will receive illumination from the clear lens on the underneath side of the tail light, or by a separate lamp.

1.9. **OPENINGS** - All openings in the floorboard or firewall between chassis and passenger-carrying compartment, such as for gearshift lever, steering column, and auxiliary brake lever, **shall be sealed.** All openings between chassis and passenger-carry compartment made due to alterations by the body manufacturer **must be sealed.**

1.10. **UNDERCOATING** - Undercoating is required to provide for insulation, sound deadening, protection from road minerals, and rust prevention, as applicable, and shall meet the following:

1.10.1. Application - The entire underside of the bus body, including floor members, wheelwells, side panels below the floor level, and all metal fenders or fenders with metal liners shall be coated with 1/8-inch thick material as specified above. The undercoating shall be applied in accordance with the undercoating manufacturer's instructions. **Do not cover up or obliterate the chassis identification plate (see Par. A.6.4.3.).**

1.10.2. Material - Insulating and undercoating materials shall be an asphalt base underbody coating conforming to Federal Specification TT-C-520B, such as R-477-139, manufactured by Daubert Chemical Co., Chicago, Illinois 60638 or Lion Nokorode Emulsion 331 as manufactured by Lion Oil Company, El Dorado, Arkansas 71730, or an approved equal. An example of an approved equal is Tectyl MC121B, manufactured by Ashland Petroleum Company, Box 391, Ashland, Kentucky 41101, applied to a dry film thickness greater than 20 mils.

1.11. **WIRING** - All wiring shall conform to the current standards of the SAE. Wiring shall be arranged as required with each circuit protected by a fuse or circuit breaker. Wiring as arranged in the circuits to manufacturer's specifications are acceptable; however, the addition of another circuit for the alternatively flashing signal lamps shall be provided.

1.11.1. Accessory Wiring - Body-installed accessories shall be wired from the battery through a low voltage solenoid cut-off switch operated by the ignition key except for the eight light warning system and hazard warning lights.

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1.11.2. Color and Number Coding - A system of color and number coding shall be used and an appropriate identifying diagram shall be provided together with the wiring diagram provided by the chassis manufacturer.

The following body interconnecting circuits shall be color coded as noted:

FUNCTION	COLOR
Left Rear Directional Signal	Yellow
Right Rear Directional Signal	Dark Green
Stoplights	Red
Backup Lights	Blue
Taillights	Brown
Ground	White
Ignition Feed, Primary Feed	Black

The color of the cables shall conform to SAE J1128

1.11.3. Fusing - Each circuit, except starting and ignition, shall be fused separately or shall have an adequate circuit breaker. Two extra fuses for each size of fuse installed on the bus by the body manufacturers, shall be conveniently mounted on the bus body.

1.11.4. Main Circuits - The electrical system wiring shall have at least nine main circuits:

(1) Head, tail, stop (brake), and instrument panel lamps.
(2) Clearance and stepwell lamps.
(3) Dome lamps.
(4) Starter motor.
(5) Ignition and emergency door signal.
(6) Turn-signal (directional).
(7) Alternately flashing signal lamps.
(8) Horn.
(9) Heater and defroster.

C.2. CONSTRUCTION -

2.1. **GENERAL REQUIREMENTS** - All Texas school buses, including those with 10,000 lbs GVWR or less, shall conform to the performance requirement of FMVSS 221, "School Bus Body Joint Strength," and restraining barriers conforming to FMVSS 222, "School Bus Passenger Seating - Crash Protection," Sections S.5.2. and S.5.3.

2.1.1. Body-Chassis Attachment -

2.1.1.1. Chassis Manufacturer's Body - The body shall be attached to the chassis frame by the manufacturer's standard clip unless the chassis is provided with the manufacturer's unitized metal floor.

2.1.1.2. Other Bodies - If other than chassis manufacturer's standard metal floor is furnished, the body shall be attached to the chassis by the chassis manufacturer's standard clips and, in addition, the following:

(i) Body-Chassis Insulation - Anti-squeak material in continuous strips or rubber pads shall be permanently and firmly attached to the frame rails or cross members to insulate the chassis from the body.
(ii) U-bolts - A minimum of two U-bolts shall also be used on each frame rail to attach the body to the chassis frame. The four U-bolts shall be fitted with lock washers and nuts and, after the nuts have been securely tightened, the threads of each U-bolt shall extend a minimum of 1/2 inch past the nuts. Minimum diameter of the U-bolt threads shall be 7/16 inch.

NOTE: School buses with floors installed by the body manufacturer and equipped with any combination of wheelchair lift positions and conventional seats shall have a minimum of four U-bolts (2 installed on each frame rail).

2.1.2. Caulking - A flexible, tenacious, high quality caulking compound or adhesive shall be applied to the top of all rub rails, all unwelded metal joints, and to any place where moisture could enter through the exterior panels. This does not include the fresh air intake or heater or drain openings at the bottom of the rub rails. The compound shall be applied to the required areas in a neat and workmanlike manner without voids or skips.

2.1.3. Components - All components shall be of adequate design and shall be of sufficient strength and safety factor to support the entire weight of a complete bus when fully loaded, on its sides or top, without undue damage to the body structure. The body shall have sufficient frame members in the roof structure and corners to provide adequate safety and to resist damage on impact. Construction shall be such as to provide a reasonable dustproof and watertight unit.

2.1.4. Fasteners, Bolts and Rivets - All bolts and rivets used in the manufacture of the school bus body shall be high strength metal. All bolts shall be equipped with lock washers or other acceptable devices to prevent loosening under vibration. All bolts, nuts, and washers except U-bolts, their nuts and washers, shall be parkerized, cadmium-plated, or otherwise rustproofed.

2.1.5. Fasteners, Other - Sheet metal screws or self-tapping bolts of any type shall not be used in the construction of bodies except:

2.1.5.1. Alignment* of doors or in conjunction with rivets, welds, or bolts for compliance with FMVSS No. 221, as applicable, or,

2.1.5.2. Attachment of exterior mirrors in certain cases (see Par. C.3.5.3.),

or,

2.1.5.3. Electrical wire moldings and light fixtures, or

2.1.5.4. Installation of header pads over the doors, or,

2.1.5.5. Installation of rub rails or emergency door handles and latches where it is impossible to use rivets or bolts, nuts, and lock washers and then only when these fasteners are used in conjunction with the manufacturer's standard metal adhesive which is used to meet joint strength requirements, or,

2.1.5.6. Interior panels which must be removed to give accessibility to other interior or concealed components, or,

2.1.5.7. Seat construction (see Par. C.2.12.4.2.), or,

2.1.5.8. Window frames when applied with the metal adhesive.

*When self-tapping bolts are used to align doors, they shall be tack-welded at the head or applied with the metal adhesive and shall not exceed the number of rivets, or bolts, nuts, and washers installed in the door hinges.

2.1.6. Front Body Section - The front body section of the school bus from the windshield forward shall be of the bus body manufacturer's or chassis manufacturer's standard design and shall contain, but not be limited to, the following components:

2.1.6.1. Fenders - Properly braced fenders with the total spread of the outer edges exceeding the total spread of the front tires when the front wheels are in the straight-ahead position.

2.1.6.2. Grille - A sufficiently reinforced grille assembly.

2.1.6.3. Hood - Hood cover with latching mechanism providing access to the forward part of the engine.

2.1.6.4. Lamps - Headlamps and parking/turn-signal lamps as required by FMVSS No. 108.

2.1.7. Steering Wheel Placement - There shall be at least 2 inches clearance between the steering wheel and the cowl, instrument panel, or any other surface.

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2.2. **ACCESS PANELS** - Any panel used for access to the engine radiator or radiator overflow container and installed in the passenger compartment shall have a keyed lock. (This does not include the engine cover.)

2.3. **BODY FRAME** -

2.3.1. Longitudinal Frame Members - The body frame shall contain, as a minimum, the following longitudinal frame members at the locations shown:

2.3.1.1. Rear Corner - The rear corner framing between the floor and roof and between the emergency door posts and the body corner shall be applied horizontally or vertically, or in other combinations, to provide additional impact and penetration resistance equal to that provided by frame members in body side areas. Such structural members shall be securely attached at each end.

2.3.1.2. Roof - Two or more longitudinal members (or roof strainers) shall be provided to connect and space the roof bows and to reinforce the flattest portion of the roof skin. They shall be applied either externally or internally, shall extend from the windshield header, and shall function as continuous longitudinal members. These roof strainers shall be attached to other structural components by means of welding, riveting, or bolting. The completed roof shall meet the requirements of FMVSS No. 220.

2.3.1.3. Shoulder Level - There shall be one longitudinal side strainer (or impact rail) mounted at shoulder level (window sill level) and extending at least from the front post (excluding the front door entrance) to the rear corner reinforcement. This member shall be attached to each vertical structural member. Such strainer shall be a formed (not flat) strip of metal.

2.3.1.4. Window/Seat Frame Area - There shall be one longitudinal side strainer installed in the area between the bottom of the window and the bottom of the seat frame and extending from the front post to the rear corner reinforcement. This strainer may also be used as a means to fasten the angle used for the wall end seat support at the wheelhousing. Such strainer shall be formed and attached to each vertical structural member by huck-bolting, welding, or thread-forming bolts which are tack-welded to prevent bolts from vibrating loose. A backup channel for the exterior rub rails shall be provided and fastened to each vertical structural member. In lieu of a separate backup channel, the seat level longitudinal strainer may serve as a backup channel for the seat level rub rail.

2.4. **EMERGENCY EXITS** - Texas school buses shall be provided with emergency exits as listed below:

2.4.1. Emergency Doors - Buses furnished to this specification shall be equipped with emergency doors meeting the description below. 15- and 18-passenger buses shall be equipped with emergency doors meeting the requirements of either Style 1 (two-door type) or Style 2 (single door type). 16-, 19-, and 20-passenger buses shall be furnished with Style 2 door only; **double rear emergency doors will not be accepted.** Either style emergency door shall be furnished with upper glass panels, permanently closed, set in rubber or sealed against rubber. (See Par. C.2.19.2. for glazing requirements and Par. C.1.4.4. for lettering.) No seat or other object shall be placed in the body that restricts the passageway to the emergency door to less than 12 inches. There shall be no steps leading to the emergency door.

2.4.1.1. Design, Style 1 Emergency Door (Two Door Type - **for 15- and 18-passenger buses only**) - Both of the rear doors shall be for emergency exit use and provided with the following:

2.4.1.1.1. Door Holding Device - A means (device) shall be provided to hold the swing-out type door(s) in the fully opened position.

2.4.1.1.2. Fastening - The two-door emergency exit, located at the rear of the bus, shall be equipped with a fastening device that will secure each door at the top and at the bottom. The fastening device on the first-opened door shall permit opening of the door from both the inside and the outside of the bus. The fastening device shall permit opening of the other door from the inside of the bus. Both fastening devices shall be designed to be quickly released but shall offer protection against accidental release. A suitable instruction sign shall be located on the inside of the door near the fastening device on the first-opened door, to indicate its method of operation. The outside handle when in the closed position, shall extend vertically downward from its pivot center.

2.4.1.1.3. Header Board - The head impact area on the inside at the top of the emergency door shall be protected by an energy-absorbing, padded header board, 3 inches wide and one inch thick, extending the full width of the emergency door to prevent injury when accidentally impacted.

2.4.1.1.4. Latch - Both the key type and/or the inside push-pull type rear cargo door locks, as installed by the original vehicle manufacturer, shall be either completely removed or shall be made inoperable. If made inoperable, precautions shall be taken to assure that the lock mechanism(s) cannot, through vibration or other means, cause the emergency exit door to become locked either from the inside or the outside of the bus.

2.4.1.1.5. Switch - The emergency door shall be equipped with an electrical switch connected to an audible signal automatically operated and located in the driver's compartment which shall indicate the unlatching of this door and the switch shall be enclosed to prevent tampering. Wires leading from the switch shall be concealed in the walls. No cut-off switch shall be installed in the circuit.

2.4.1.2. Design, Style 2 Emergency Door (Single Door Type) -

2.4.1.2.1. Attachment - The emergency door may be hinged on the right or left side of the body, shall open outward, and shall be designed to permit opening from both inside and outside of the bus. It shall be properly sealed against moisture and dust.

2.4.1.2.2. Design - The emergency door shall be located in the center rear of the body and shall have a minimum horizontal opening of 30 inches and a minimum vertical opening of 48 inches measured from the floor level. It shall be properly sealed against moisture and dust.

2.4.1.2.3. Door Holding Device - A means (device) shall be provided to hold the swing-out type door(s) in the fully opened position.

2.4.1.2.4. Header Board - The head impact area on the inside at the top of the emergency door shall be protected by an energy-absorbing, padded header board, 3 inches wide and one inch thick, extending the full width of the emergency door to prevent injury when accidentally impacted.

2.4.1.2.5. Latch - The emergency door shall be equipped with a slide bar rack and pinion (cam) operated latch. The slide bar shall be approximately 1-1/4 inches wide and 3/8-inch thick and shall have a minimum stroke of 1-1/8 inches. The slide bar shall be spring loaded so as to retain the bar in the closed position and have a minimum of one inch of horizontal bearing surface beyond the edge of the door frame when the door lock is in a latched position.

2.4.1.2.6. Latch Handle - The movement of the latch handle through its full arc of operation shall not be obstructed by, or extended into the area behind the rear seats at the emergency door. The handle, when in the closed position, shall meet the requirements of FMVSS No. 217. The design of the latch handle shall allow quick release, but shall offer protection against accidental release. Control of the fastening devices from the driver's seat shall not be permitted. A pull handle shall be installed on the inside of the emergency door so that the door can be securely closed for positive fastening. Provisions for opening from the outside shall consist of a handle (device) designed to prevent "hitching a ride" yet allowing the door to be opened when necessary. The outside handle, when in the closed position, shall extend vertically downward from its pivot center.

2.4.1.2.7. Switch - The emergency door latch shall be equipped with a heavy-duty electric plunger type switch connected to a warning buzzer located in the driver's compartment. The switch shall be enclosed in an adequately protected case, and wires leading from switch shall be concealed in the walls. The switch shall be installed so that the buzzer will sound before the door handle is turned far enough to permit the door to open. The switch shall be Cole-Hersee's No. 9118 having an upset end (knob) on the plunger head.

2.4.2. Side Emergency Exits and Roof Hatches - Texas school buses shall be provided with side emergency exits and roof hatches. These side emergency exits may be either side emergency doors meeting the requirements of Par. C.2.4.1. above (except that they shall be hinged on the forward side) or they may be push-out type side windows meeting the requirements of Par. C.2.19.1.2. and FMVSS No. 217. Single emergency exits shall be installed near the center of each side. **When so specified in the Invitation for Bids (see Option 39)**, additional push-out side windows shall be installed (quantity shall be specified by school district). If more than one emergency exit per side is provided, they shall be as "equally spaced" as practical. Roof hatches shall be the body manufacturer's standard. They shall be equipped with an external and internal handle. Texas school buses shall be provided with <u>minimum</u> side emergency exits and roof hatches as follows:

<u>BUS CAPACITY</u>	<u>MINIMUM REQUIRED EXITS/HATCHES</u>
Up to 22-passengers	1 emergency exit per side and 1 roof hatch
23- thru 65-passengers	1 emergency exit per side and 2 roof hatches
Larger than 66-passengers	2 emergency exits per side and 2 roof hatches

2.5. **FLOORS** - The standard floor construction of the bus body manufacturer shall be used if a steel floor is not furnished with the bus chassis. If the floor is furnished with the chassis, then the floor shall be covered with material as described below:

2.5.1. Installation - Plywood shall be installed in the areas under all seats including the driver's seat. It may be cut to fit around any permanently-attached driver's seat provided by the chassis manufacturer.

2.5.2. Material - The floor shall be covered with plywood securely attached to the existing steel floor. The plywood shall be 5/8-inch nominal thickness, A-C or B-B Exterior grade manufactured in conformance with U.S. Product Standard PS 1-83. CDX interior grade plywood with exterior glue is acceptable when all surfaces including the edges of the wood are covered or sealed against the exterior environment.

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2.6. FLOOR COVERING -

2.6.1. Aisle Material - Floor covering in the aisle shall be the aisle-type, fire-resistant rubber or equivalent, and shall be nonskid, wear-resistant, and ribbed. Minimum overall thickness shall be 3/16 inch measured from tops of ribs. Rubber aisle floor covering shall meet Federal Specification ZZ-M-71D.

2.6.2. Installation - Floor covering (except that on the toeboard) shall be permanently bonded to the floor with waterproof adhesive material and shall not crack when subjected to sudden temperature changes. All seams shall be sealed with waterproof sealer.

2.6.3. Trim - Seams shall be covered with the bus body manufacturer's standard aluminum trim using countersunk flat or oval screws.

2.6.4. Underseat Material - The floor in the underseat area (including wheelwells, and the areas under the driver's seat and wheelchairs) shall be covered with fire-resistant, rubber floor covering or equivalent having minimum overall thickness of 1/8 inch.

2.7. PANELS, EXTERIOR - Exterior panels shall be steel; however, front door farings and front and rear end-caps only may be Fiberglas or heavy-duty plastic.

2.7.1. Attachment and Installation - All exterior panels shall be attached to bow frames and strainers so as to act as an integral part of the structural frame. They shall be installed by lapping and riveting, lapping and bolting, or by flanging and bolting and in such a manner as to form watertight joints.

2.7.2. Joints - Joints shall meet the requirements of FMVSS No. 221.

2.8. PANELS, INTERIOR - All interior wall and ceiling panels shall be steel and of the body manufacturer's standard design except the panels beneath the windows shall be clear-coated galvanized embossed steel meeting ASTM A 446. Also the stepwell and riser panels in the service door entryway shall be clear-coated galvanized steel (embossing not required). Galvalume, aluminized steel, and aluminum over steel panels are acceptable for use beneath the windows and in the entryway. Interior panels made of 0.032-inch, 3105-H14 aluminum may be used in 15- and 18- passenger buses only.

2.8.1. Attachment - All interior panels shall be attached to the frame structure by bolts, rivets, or by any well-designed method utilizing self-locking panels, or locking panel strips. Regardless of the method used, the panels shall be attached so that vibration, rumbling, and popping shall be at a minimum.

2.8.2. Design - Front and rear panels shall be formed to present a smooth, pleasing appearance. If the ceiling is constructed so as to contain lapped joints, the forward panel shall be lapped by the rear panel and all exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges.

2.9. RUB RAILS - Two separate, one-piece continuous rub rails of the type, grade, and thickness of steel specified in Table No. 9 (or approved equal), shall be installed on the body as described below. The minimum finished width of all rub rails shall be 4 inches:

2.9.1. Construction - The rub rails shall be of ample strength to resist impact and to prevent crushing of the bus body and shall be a flanged-formed channel, longitudinally fluted, or corrugated rib surface. Ends shall be (1) smoothly closed, or (2) closed by a rounded or beveled metal end cap which shall be butt- or flash-welded to the rub rail, or (3) closed by a rounded or beveled metal end cap inserted with an approximate one-inch sleeve inside of the rub rail and riveted in position at the top and bottom of the rub rail, or riveted in position at the top and bottom of the rub rail flange, or riveted in the center of the end cap, and sealed in the same manner as the top flange of the rub rails.

2.9.2. Drainage - The bottom edge of each rub rail (except the pressed-in-type which may be used near the window line) shall have provisions for drainage of accumulated moisture. One of the following drainage methods shall be used:

2.9.2.1. Slots - The bottom flange of the rub rail shall have a minimum of one inch by 0.032 inch formed slots spaced on not more than 12-inch centers, or

2.9.2.2. Slots or Holes - One 1/4-inch diameter hole or slot per foot in the lowest part of the rub rail drilled prior to the priming, painting, and installation of the rub rail shall be provided. Holes drilled after rub rail installation or after priming and painting are not acceptable. Formed slots are preferred over drilled or cut holes.

2.9.3. Installation - All rub rails shall be bolted or riveted on top and bottom to each side post and riveted on top and bottom to the exterior paneling between the side posts (see exception in Par. C.2.1.5.5.). Provisions for one-piece rails may be accomplished by butt- or flash-welding. All welds, including those for the end caps, shall be dressed, sanded, and buffed.

Both rub rails shall be installed the full outside length of the body on the right side from the rear of the service door to the point of curvature at the rear of the bus and on the left side from the point of curvature near the outside cowl to the point of curvature at the rear of the bus. When the upper rub rail is extended to the rear of the bus and joining is by lapping or fastening with a sleeve, the joint shall be located at the rearmost body side post or preferably, the second post from the rear. Rub rails are not required on the left (driver's) door if this door is furnished by the chassis manufacturer.

2.9.4. Location - One rub rail shall be installed at or near the floor level, and the other at the seat level, or at the window level, or in between the seat and window level.

2.9.5. Sealing - The top joint of the rub rail shall be sealed with a caulking compound or adhesive as specified in Par. C.2.1.2.

2.10. SEAT BARRIERS - Barriers shall be furnished and installed in accordance with FMVSS No. 222. Barriers shall also be provided with the following:

2.10.1. Handrail - A grab handle or handrail of sufficient length to assist entering and exiting passengers shall be installed on the forward side of the right barrier. The outside surface of this handle shall be stainless steel, polished aluminum, or chrome-plated steel.

2.10.2. Knee Space - Knee space between these barriers and the front of each front passenger seat shall be at least 24 inches for 15- and 18-passenger and 25 inches for 16-, 19-, and 20-passenger buses when measured from the modesty panel to the front of the seat back at the center of the seat approximately 4 inches above the seat cushion.

2.10.3. Upholstery - Barriers shall be covered with upholstery meeting the requirements of Par. C.2.12.5.

2.11. SEATING REQUIREMENTS, DRIVER -

2.11.1. Design - The base of the driver's seat shall be of the adjustable pedestal type or the platform type having an adjustment range of approximately 4 inches "Fore and Aft." The back of the driver's seat shall be heavily padded and form-fitted (Type B, and C only).

2.11.2 Driver's High Back Seat, Optional - When so specified in the Invitation for Bids (or when a GMC/Chevrolet chassis is furnished) a high back driver's seat shall be provided with a minimum seat back adjustment of 15 degrees and with a head restraint to accommodate a 95 percentile adult male (as defined in FMVSS No. 208) and shall meet all of the applicable requirements of Par. C.2.11.1. above (Type B and C only).

2.11.3. Installation - The driver's seat, when installed by the body manufacturer, shall be mounted with bolts, flat washers, lock washers, and nuts except where it is impossible to use bolts and nuts at certain floor points due to main cross members or floor sill interference. Thread-forming or cutting bolts and lock washers may be used at these points.

2.11.4. Seat Belts and Seat Belt Assembly - A Type 2 seat belt assembly conforming to FMVSS No. 209 shall be provided for the driver. The belt assembly shall be equipped with an emergency locking retractor (ELR) for the continuous belt assembly. The location of the seat belt anchorage shall conform to SAE Standard J383 with the driver's seat adjusted to its rearmost position. A Type 2 seat belt with a standard shoulder harness, when provided, does not require a retractor at the stationary fastening bracket; however, this mounting bracket must be within easy reach of the seated driver. The seat belt assembly shall be anchored in such a manner or guided at the seat frame so as to prevent the driver from sliding sideways from under the belt.

2.12. SEATING REQUIREMENTS, PASSENGER - The bus passenger seats shall meet or exceed the knee spacing and crash protection requirements of FMVSS No. 222 and shall conform to the following:

2.12.1. Seat Belts, Passenger - Seat belts conforming to FMVSS Nos. 209 and 210 shall be provided for each passenger position on 15- through 20-passenger school buses, including those with GVWR of more than 10,000 lbs. The seat belts shall meet the following requirements:

2.12.1.1. Colors - The belt assemblies shall be alternately color coded with contrasting colors. All aisle seats on the same side of the bus shall have belts with the same color. Two-position seats shall use two colors; three-position seats may use two or three colors.

2.12.1.2. Design - Seat belts shall have a buckle end and an attaching end which are adjustable to fit passenger sizes as required by FMVSS 208 and 209. Buckles shall be of the plastic-covered push button design. Long and short ends shall be mounted alternately with the short end on the aisle. If possible, the design shall prevent fastening the belts across the aisle.

2.12.2. Seat Cushions - All seat cushion units 30 inches wide or less shall be designed to adequately support two passengers of 120 pounds each. All seat cushions over 30 inches wide shall be designed to adequately support three passengers of 120 pounds each. The seat cushion shall consist of a base, foam cushion, and upholstery meeting the following requirements:

2.12.2.1. Base - The base shall be nominal 1/2-inch thick, interior grade, C-D plywood with exterior grade glue, identification index 32/16, manufactured in conformance with U.S. Product Standard PS 1-83 and identified as to veneer grade and glue bond type by the trademarks of an approved testing agency. Plywood with blue stain in sapwood is not acceptable.

Alternatively, the base may be made of "Donnite" material, manufactured by the Donnite Corporation, Flora & Harrison, Plymouth, Indiana 45563, of equal or better strength and thickness.

2.12.2.2. Foam Cushion - The bus body manufacturer's standard full dimension urethane foam material shall be used for the seat cushion material.

2.12.3. Seat Frames -

2.12.3.1. Design and Material - The seat frames shall be constructed of steel of the type, size, and gauge necessary to meet the seat load deflection requirements of FMVSS No. 222. Seat frames legs shall be two, four, or six pedestal type. The seat backs shall slope backward to provide a comfortable seating angle. Seat backs that are set in a vertical plane or tilt forward are not acceptable.

2.12.3.2. Painting Requirements - The entire seat frame, except that section of the back frame which is padded and upholstered, shall be thoroughly cleaned, primed, and painted. The paint shall have adhesive qualities which will not permit the removal of the paint by means of the thumbnail-scratch method without first chipping a starting place (see also Par. C.1.4.3.).

2.12.4. Seat Installation -

2.12.4.1. Aisle Width - The minimum aisle width between rows of seats shall be 12 inches, except a 30-inch aisle is required if regular seating is provided between the rear emergency door and wheelchair position on wheelchair-equipped buses (see Par. G.1.7.3.).

2.12.4.2. Attachment - Each leg shall be attached to the floor with at least 2 bolts, flat washers, lock washers, and nuts, or approved equal. Where it is impossible to use bolts and nuts at certain floor points due to main cross members or floor sill interference, thread-forming or cutting bolts and lock washers may be used.

2.12.4.3. Knee Spacing - The seats shall provide knee spacing as normally furnished by the manufacturer for this seating capacity but not less than 24 inches for the 15- and 18-passenger buses. (See Par. A.2.13. for the definition of knee space.) Knee spacing for the 16- through 20-passenger bus shall be not less than 24 inches (see Table No. 1 and Option No. 15).

2.12.5. Upholstery - The seat cushion and back units shall be covered on top and four sides with a vinyl resin-coated upholstering material as follows:

2.12.5.1. Material - These materials shall be fire-resistant and shall meet or exceed the Boston Fire Block Test in the National School Bus Standards. They shall be artificial leather.

2.12.5.2. Thread - The upholstery material shall be securely sewn with a thread meeting the requirements of Federal Specification V-T-295d. The thread in the needle and the thread in the looper (bobbin) of double thread machines shall be size F, Type II (Twisted Bonded Multiple Cord), and size E, Type I (Twisted Soft Multiple Cord), respectively. The thread used in the needle and through the looper shall be Size F (Monofilament), Type III, for single thread machines.

2.12.5.3. Welting - There shall be welting on exposed seams of the seat back and cushion.

2.13. SERVICE ENTRYWAY - The entrance door steps shall be designed so that the first step shall not be more than 10 to 14 inches from the ground when the bus is unloaded. Step risers shall not exceed a height of 10 inches. When plywood is used on a steel floor or step, the riser height may be increased by the thickness of the plywood. Steps of adequate width and length shall be fabricated and installed outside or inside the body to meet this requirement. Provisions shall be made to prevent road splash from the wheel from accumulating on steps installed outside the body. The surface of all entrance steps shall have a nonskid material applied. (See Par. C.2.10.1. for handrail installation requirement in the service entryway.)

2.14. SERVICE OR ENTRANCE DOORS - 15- through 20-passenger buses shall be equipped with a service or entrance door which shall be located on the right side near the front of the bus and in direct view of the driver.

NOTE: 15-passenger buses may have either a Style 1 or a Style 2 service door at the manufacturer's option. 16-passenger buses shall have a Style 2 (tall) service door (no option). 18- and 19-passenger buses shall have a Style 2 (tall) service door unless Option No. 11 (for sedan type door) is designated by the ordering school district. 20-passenger buses shall have a Style 2 (tall) service door (no option). (See Table 2 for a comparison of small buses.) This door shall have a positive latching mechanism to eliminate the possibility of an inadvertent door opening during a frontal crash or roll-over.

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2.14.1. Attachment - Style 1 doors shall be attached by the chassis manufacturer's standard method. The hinges for Style 2 service entrance doors shall be attached with rivets or bolts, nuts, and lock washers. Metal screws or self-tapping bolts are not acceptable. Metal screws may be used for alignment of Style 2 doors while installing rivets. Self-tapping bolts may be used for alignment if the bolt heads are tack-welded to the hinges (see Par. C.2.1.5.1.).

2.14.2. Design, Style 1 (Sedan Type) Service Door - This service or entrance door shall be of one piece and shall have a minimum horizontal opening of approximately 28 inches and a minimum vertical opening of approximately 53 inches. The door shall be manually operated. The door control must be the hand lever type, driver-operated, and shall be designed to afford easy release and to prevent accidental opening. When so specified in the Invitation for Bids (see Option 11), 18- and 19-passenger buses shall be furnished with (sedan type) style 1 service doors.

2.14.3. Design, Style 2 (Tall) Service Door - This service or entrance door shall be the two-piece or folding type and shall have a minimum horizontal opening of approximately 24 inches and a minimum vertical opening of approximately 68 inches. The doors shall be operated from controls at or near the bus driver's seated position. The doors shall be either operated manually or when so specified in the Invitation for Bids (see Option 10), actuated electrically or by air pressure or vacuum and shall allow manual opening in case of an emergency. To prevent accidental opening while the bus is in motion, the door opening system shall require at least a 125-pound force applied to its center in order to manually open the door. Both vertical closing edges of the door shall be equipped with rubber or rubberized materials to protect passenger's fingers.

NOTE: Powered Service Doors shall be clearly and concisely marked with operating instructions in case of power failure.

2.14.4. Driver's Visibility - Service or entrance doors shall have lower and upper glass panels (see Par. C.2.14.5.), or, if a sedan-type door, a system of mirrors and glass panels to provide the driver a clear view of entering passengers as well as the passenger landing area. Whichever style of door is used, provision shall be made using either glass panels or mirrors to give the seated driver a view of at least the upper 7-1/2 inches of a 30-inch rod placed upright on the ground at any point along a line one foot outboard from the service door entrance and between the front and rear of the service door.

2.14.5. Glass Panels - Style 2 service or entrance doors shall have glass panels of approved safety glass (see Par. C.2.19.2. for installation requirements). Bottom of each lower glass panel shall be not more than 10 inches from the the top surface of the bottom step. The top of each upper glass panel shall be not more than 6 inches from the top of the door. Type A buses shall have upper glass panels (window) of safety glass with a minimum area of 350 sq. in.

2.14.6. Header Board - The head impact area on the inside top of the service or entrance door shall be protected by an energy-absorbing, padded header board, 3 inches high and 1 inch thick, extending the full width of the opening, to prevent injury when accidentally impacted.

2.15. SIDE DOORS OF CONVERTED VANS - The side doors of converted van shall be made inoperable by one of the following:

2.15.1. Removal - The cargo doors on the side of converted vans shall be removed and the area reinforced and covered with riveted-on exterior and interior paneling.

2.15.2. Side Reinforced - The doors may be left in place but shall be reinforced and made permanently inoperable by means other than the use of rub rails on the outside of the body.

2.16. SKIRT REINFORCEMENT - Side skirts of 15- through 20-passenger buses, if on commercial cutaway or stripped chassis, shall be gusseted or braced, where required, for rigidity and to prevent undue vibration.

2.17. VENTILATION - The bus body shall be equipped with a suitable, controlled ventilation system of sufficient capacity to maintain a satisfactory ratio of outside to inside air under normal operating conditions without opening windows except in warm weather.

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2.18. WHEELHOUSING - The wheelhousing shall be the manufacturer's standard design. (See Par. C.1.10. for undercoating requirements.)

2.19. WINDSHIELD AND WINDOWS -

2.19.1. General Design -

2.19.1.1. Side Windows, Passenger, Standard - There shall be either a standard or a push-out type window for each passenger seat except where it is not possible because of the installation of side emergency exits (see paragraphs C.2.4.2. and C.2.19.1.2.). Standard side windows shall open from the top only and shall operate freely. All side windows except the driver's and the service door window, shall be the split sash type with positive latch. Side windows that can be latched in an uneven position are not acceptable. They shall be furnished with a latching mechanism which will allow each window to be latched in a position not more than six inches from the top. The passenger side windows shall provide an unobstructed opening 22 inches wide and between 9 and 10 inches high.

2.19.1.2. Side Windows, Passenger, Push-out Type - At the manufacturer's option, 15- through 20-passenger buses may be provides with one push-out side window in lieu of an emergency exit on each side (see paragraphs C.2.4.1. and C.2.4.2. and Option 39. These windows shall be hinged at the top and shall be positioned for ease of egress. These push-out windows shall be the body manufacturer's standard push-out passenger windows meeting or exceeding Federal Standards.

NOTE: Push-out windows shall be equipped with an electrical switch connected to an audible signal automatically operated and located in the driver's compartment which shall indicate when the window is pushed out in excess of 1/2 inch. The switch shall be enclosed to prevent tampering. Wires leading from the switch shall be concealed in the walls. No cut-off switch shall be installed in the circuit.

2.19.1.3. Service Door and Emergency Door Windows - The windows of either style emergency door and Style 2 service doors (see Par. C.2.4.1.) shall be furnished with upper glass panels permanently closed and set in rubber or sealed in rubber.

2.19.1.4. Windshield - The maximum width of the windshield center post shall not exceed 2-1/2 inches. There shall be at least 2 inches of clearance between the steering wheel and the windshield, cowl, instrument panel, or any other surface.

2.19.2. Glazing - Glass shall be installed in rubber channel gasket material or approved equivalent material. The glass shall be mounted so that the permanent identification mark is visible from either inside or outside of the bus. All safety glazing materials shall be approved by the Department of Public Safety. All exposed edges of glass shall be banded. The glass shall be as follows:

2.19.2.1. Rear and Other Windows - The glass in the rear (side) windows, and all other windows including the driver's side windows and the emergency door windows, shall be a minimum of 1/8-inch safety plate glass and shall be AS-2 grade or better as specified in ANSI Safety Code Z26.1.

2.19.2.2. Safety Plate Glass - When so specified in the Invitations for Bids (see Option 16), all windows shall be AS-2 grade or better laminated safety plate glass.

2.19.2.3. Side Windows, Passenger - The glass in all passenger side windows (including push-out type emergency exit windows) shall be a minimum of 1/8-inch safety plate glass and shall be AS-2 grade or better, as specified in ANSI Safety Code Z26.1.

2.19.2.4. Windshield - The windshield shall be minimum 7/32-inch thick safety plate glass and shall be heat-absorbent, laminated AS-1 safety glass meeting ANSI Standard Z26.1, as amended.

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2.19.3. Tinting -

2.19.3.1. **Side Windows, Passenger - When so specified in the Invitation for Bids** (see Option No. 13), passenger side windows and push-out type emergency windows only shall be tinted to minimum 30%, maximum 40% light transmittance using AS-3 grade glass or better. This is defined as "dark tinting" and is not permitted on the windshield or any window used for driving purposes.

NOTE: All safety glazing materials shall be approved by the Department of Public Safety.

2.19.3.2. **Windshield** - The windshield shall have a horizontal gradient band (tinted) starting slightly above the driver's line of vision with approximately 90% light transmittance and gradually decreasing to a minimum of 70% light transmittance at the top of the windshield, or the entire windshield shall be tinted to meet the requirements of FMVSS No. 205.

C.3. **ACCESSORIES, REQUIRED AND OPTIONAL** -

3.1. **BACKUP ALARM** - An automatic, audible backup warning alarm meeting the requirements of Type C, 97 dB(A), SAE J994b (except for 12-volt system) shall be installed behind the rear axle.

3.2. **DEFROSTERS** - Defrosting equipment shall keep the windshield, the window to the left of the driver, and the glass in the service door clear of fog, frost, and snow, using heat from the heater and circulation from fans. All defrosting equipment shall meet the requirements of FMVSS No. 103. Any circulating fan used in defogging and installed on the curb side of the bus front shall be mounted on the windshield header so as to protect the fingers, hair, and clothing of entering and departing passengers.

3.3 **EMERGENCY EQUIPMENT** - 15- Through 20-passenger school buses shall be equipped with the following emergency equipment:

3.3.1. **Body Fluid Cleanup Kit** - Each bus shall be provided with a removable and moisture-proof body fluid cleanup kit. It shall be properly mounted and identified as a Body Fluid Cleanup Kit. This kit shall contain as a minimum, the following items mounted in a removable metal or hard plastic kit:

1 - 15 oz. chlorine-type absorbent deodorant material (or equal)
1 - 12 oz. germicidal spray disinfectant
2 - pair disposable latex gloves
4 - 18" x 18" absorbent towels
1 - plastic pick-up spatula
1 - plastic hand broom
1 - plastic dust pan
2 - 14" x 19" disposal bags and ties (waterproof)
2 - adhesive "BIO-HAZARD" labels
1 - 12 oz. deodorant spray
4 - individually wrapped, cold sterilization wipes in foil-lined pouches
2 - paper respiratory masks
1 - metal or hard plastic container identified as "BIO-HAZARD" with black symbol and lettering on orange mountable case.

3.3.2. **Fire Extinguishers** - School buses shall be equipped with a fire extinguisher, as listed below:

3.3.2.1. Standard Fire Extinguisher - Each bus shall be equipped with at least one refillable stored pressure Multipurpose Dry Chemical type (or approved equal) fire extinguisher of minimum 5-pounds capacity, mounted in extinguisher manufacturer's automotive type bracket, and located in driver's compartment in full view of and readily accessible to driver. The fire extinguisher shall bear the Underwriters Laboratory Listing Mark of no less than 2A 10-B:C rating. Extinguishers shall be furnished with a hose, pressure gauge, and metal head.

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3.3.3. **First Aid Kit** - Buses shall have a removable metal first aid kit container mounted in an accessible place within the driver's compartment. The compartment shall be marked to indicate the location of the kit. Number of units and contents for each kit shall be as follows:

2 - 1 in. x 2 1/2 yds. adhesive tape rolls
24 - sterile gauze pads 3 in. x 3 in.
100 - 3/4 in. x 3 in. adhesive bandages
8 - 2 in. bandage compress
10 - 3 in. bandage compress
2 - 2 in. x 6 yds. sterile gauze roller bandages
2 - non-sterile triangular bandage approx. 40 in. x 54 in., 2 safety pins
3 - sterile gauze pads 36 in. x 36 in.
3 - sterile eye pads
1 - rounded end scissors
1 - pair latex gloves
1 - mouth-to-mouth airway

3.4. **HEATERS AND RELATED COMPONENTS** -

3.4.1. Heater, Standard - Each bus shall be equipped with a factory-installed fresh air type heater regularly offered as standard vehicle manufacturer's accessory for this type of vehicle. Controls shall be mounted on the dash.

3.4.2. Heater, Auxiliary - **When so specified in the Invitation for Bids** (see Option No. 14), an auxiliary hot water type heater shall be furnished and installed in the rear of the passenger compartment of the bus. Heated conduits inside the bus shall be insulated or shielded to prevent injury to the driver or passengers.

3.4.3. Bleeder Valves - Any heater(s) installed by the body manufacturer shall have accessible air bleeder valves installed in the return lines.

3.4.4. Service Accessibility - Heater motors, cores, and fans shall be readily accessible for service. Access panels (removable without removing driver's seat) shall be provided as required for maintenance.

3.5. **MIRRORS, EXTERIOR** - Exterior mirrors shall conform to the requirements of FMVSS No. 111. Each 15- through 20-passenger school bus shall be provided with exterior mirrors and brackets as described below:

3.5.1. Mirror System, Crossover - The crossview mirror system shall provide the driver with indirect vision of an area at ground level from the front bumper forward and the entire width of the bus to a point where the driver can see by direct vision. The crossview system shall also provide the driver with indirect vision of the area at ground level around the left and right front corners of the bus to include the tires and service entrance on all types of buses to a point where it overlaps with the rear vision mirror system.

3.5.2. Mirror System, Rearview - The rearview mirror system shall be capable of providing a view along the left and right sides of the bus which will provide the driver with a view of the rear tires at ground level, a minimum of 200 feet to the rear of the bus and at least 12 feet perpendicular to the side of the bus at the rear axle line.

3.5.3. Mounting and Mounting Brackets, Standard - Mirror mounting and backing shall be of steel or a high-impact plastic such as a polycarbonate/polyethylene terephthalate blend, or approved equal. Mounting of all exterior mirrors to the bus body shall be by means of bolts, nuts, and lock washers, where possible; otherwise No. 10 hexagon head sheet metal bolts with star lock washers or No. 10 hexagon head sheet metal screws with serrated surface shall be used. This system of mirrors shall be easily adjustable but be rigidly braced so as to reduce vibration. Each exterior rear vision mirror shall be mounted in the brackets and assemblies shown on Texas General Services Commission Drawings numbered 040-35(1), 040-35(3), 040-35(4), 040-35(5), 040-35(6) and 040-35(7), dated November 15, 1968. The brackets shall be mounted on the left front and right front of the bus body and cowl. The parts, as shown on drawings numbered 040-35(2) and 040-35(3), must be formed to fit the individual configuration of each manufacturer's body and cowl design. Long dimensions of Texas mirror brackets may be adjusted as required to fit the configurations of buses.

3.5.4. Mirror Backing and Mounting, Stainless Steel, Optional - When so specified in the Invitation for Bids, exterior rearview mirror backs and mounting brackets shall meet or exceed all of the applicable requirements of Par C.,3.5.3.; above except the mirror backing and mounting shall be made of stainless steel.

3.5.5. Painting - Brackets and assemblies of all exterior rearview and crossover mirrors shall be cleaned and prepared for painting in accordance with Federal Specification TT-C-490B, Type I or II. The metal backs of stainless steel, aluminum, and chrome-plated exterior and crossover mirrors, if painted, and the backs of all other metal-backed exterior and crossover mirrors shall be finished in black (Color No. 37038 of Federal Standard No. 595a).

3.6. MIRRORS, INTERIOR - A clear-vision interior rearview mirror conforming to FMVSS No. 111, with at least 6" x 16" size vision area, affording a good view of the road to the rear as well as of the passengers, shall be furnished and installed. The mirror shall be made of safety glass and have rounded corners and protected edges.

3.7. REFLECTIVE MATERIAL - When so specified in the Invitation for Bids (see Option 19), buses shall be equipped with reflective material meeting the following requirements. The material shall be automotive engineering grade or better, shall meet the initial reflectance values in DOT FHWA FP-85 and shall retain at least 50% of those values for a minimum of six years. Reflective materials and markings shall be installed in the following location:

3.7.1. Front and/or rear bumper shall be marked diagonally 45° down to centerline of pavement with 2-inch wide strips of non-contrasting reflective material.

3.7.2. Rear of bus body shall be marked with a strip of reflective National School Bus Yellow material no greater than 2 inches in width to be applied to the back of the bus, extending from the left lower corner of the "SCHOOL BUS" lettering, across to left side of the bus, then vertically down to the top of the bumper; across the bus on a line immediately above the bumper to the right side, then vertically up to a point even with the strip placement on the left side, and concluding with a horizontal strip terminating at the lower right corner of the "SCHOOL BUS" lettering.

3.7.3. "SCHOOL BUS" signs shall be marked with reflective National School Bus Yellow material comprising background for lettering of the front and/or rear "SCHOOL BUS" signs.

3.7.4. Side of bus body shall be marked with reflective National School Bus Yellow Material at least 6 inches but not more than 12 inches in width, extending the length of the bus body and located (vertically) as close as practicable to the beltline.

NOTE: See Par.. 3.9.1. for requirements for placement of reflective materials on stop arms.

3.8. STROBE LIGHT, Flashing - When so specified on Invitation for Bids (see Option No. 26), an optional white flashing strobe light meeting the following requirements shall be provided:

3.8.1. Design - The lamp shall have a single clear lens emitting light flashing 360 degrees around a vertical axis. The light source shall be minimum of 50 candlepower and flash 80-120 times per minute. The base of the lamp shall be metal or approved equal and installed by a method which seals out dust and moisture. A manual switch is required for operation and a pilot light to indicate when the light is in operation shall be included. Wiring shall be installed inside the bus walls.

3.8.2. Mounting - The strobe light shall be permanently installed near the centerline on the school bus roof and not more than one-third of the body length forward of the rear edge of the bus roof. It shall not extend above the roof more than approximately 6.5 inches.

3.9. STOP ARM - A school bus stop arm meeting SAE J1133 and the following requirements shall be provided:

C. 15- THROUGH 20-PASSENGER BODY SPECIFICATIONS

3.9.1. Design - The sign shall be octagon-shaped, constructed of zinc-coated steel or aluminum. It shall have a minimum 1/2-inch wide white border and the word "STOP" in white letters at least 6 inches high against a red background on both sides. The letters, border and background shall be of reflective materials meeting DOT FHWA FP-85. Double-faced red, alternately flashing lamps, one each at the top and bottom (visible from each side of the structure) shall be connected to, and flash with the required school bus red flashing signal lamp circuit when the arm is extended. The arm mechanism may be activated by air pressure, electricity, or by vacuum.

3.9.2. Mounting - The stop arm shall be installed on the left side of the school bus near the front cowl section.

3.10. SUN VISOR - An adjustable sun visor with a minimum size of 5 inches by 16 inches shall be installed above the interior windshield on the driver's side. The sun visor shall not interfere with the driver's full view of the rearview mirrors. A right sun visor is manufacturer's option.

3.11. TOOL COMPARTMENT - When so specified in the Invitation for Bids (see Option No. 30), a metal container of adequate strength and capacity shall be provided for storage of tire chains, tow chains, and such tools as may be necessary for minor emergency repairs. This storage container shall be located either inside or outside the passenger compartment and shall be capable of being securely latched. However, if it is located inside the passenger compartment, it shall be provided with a separate cover, and shall be fastened to the floor in the right front or the right rear of the bus. A seat cushion shall not be used as this cover.

3.12 WINDSHIELD WASHERS AND WIPERS -

3.12.1. Washers - A vacuum- or electrical-operated windshield washer shall be furnished and installed. The washer shall have a minimum reservoir capacity of one quart of fluid and shall direct a stream of water into the path of travel of each windshield wiper blade each time the actuating button is operated.

3.12.2. Wipers - Each bus shall be equipped with two, 2-speed or variable speed, electric motor-driven windshield wipers.

C.4. APPROVAL OF NEW BUS BODIES - Procedures for approving a new bus body for 15- through 20-passenger school buses shall be as follows in the order indicated:

4.1. SUBMISSION OF REQUEST - Submit a written request that the body be approved along with the following:

4.1.1. Letter - Letter stating that the body meets or exceeds each and every applicable requirement in Texas Specification No. 070-SB-92.

4.1.2. Literature and drawings - See Par. A.6.5.

4.2. REVIEW OF REQUEST - The Specification Section will review the literature and drawings and advise the vendor or manufacturer by letter of the results of this review. A copy of this letter will be furnished to the School Bus Committee. If this review verifies that the bus body meets or exceeds the requirements of this specification, the vendor or manufacturer shall arrange for the school bus to be brought to Austin, Texas for inspection and evaluation by the Specifications Section and the Texas School Bus Committee.

4.3. INSPECTION AND EVALUATION -

4.3.1. The bus body shall be inspected using the current School Bus Inspection Check List.

4.3.2. The bus body will be evaluated and if found suitable for the intended purpose, the Specification Section will issue a letter to the manufacturer listing the model as approved for the capacities requested. If found not suitable, the Specification Section will issue a letter to the vendor or manufacturer giving the reason(s) for disapproval.

NOTE: Once a bus body is approved for one passenger capacity, other capacities of this same body differing <u>only</u> in length and capacity need not be inspected and evaluated prior to approval. The vendor or manufacturer shall request by letter that these other body lengths/models be approved.

C. 15- THROUGH 20-PASSENGER BODY SPECIFICATIONS

C.5 **COMPARISON OF SMALL BUS BODIES** - Table 2 lists the features of the various body configurations for 15- through 20-passenger school buses. The 24-passenger bus body configurations are included in this Table for reference. (See Fig. 1 for the various chassis types available for these school bus bodies.)

TABLE 2

COMPARISON OF SMALL SCHOOL BUS BODIES

Passenger Capacity	Service Door	Emergency Door	Rear Wheels	Min.* Body Width	Body Sides	Min. Interior Height	Chassis Type	Body Mfg.& Model/Name/No.
15	Sedan	Dual	Single	70"	Sloping	62"	Van	Econo, Reddi-Bus, Van-Con,
15	Tall	Dual or Single	Single	75"	Straight	64"	Van	Bantam, Super Bantam
15	Tall	Dual	Dual	90"	Sloping	72"	Cutaway	Micro-Bird, Minotaur,
15	Tall	Single	Dual	87"	Straight	62"	Cutaway	Bussette
16	Tall	Single	Dual	90"	Straight	72"	Cutaway	Chaperone, Clipper, Micro-Bird, VSS, Bussette
18	Tall	Dual	Single	70"	Sloping	64"	Van	Lewis (Diesel only)
18	Tall	Dual or Single	Single	75"	Straight	64"	Van	Bantam, Super Bantam
18 (with Op. 15)	Sedan	Dual	Single	70"	Sloping	63-1/2"	Van	Bantam, Super Bantam, VanCon, Lewis (Diesel only)
19	Tall	Single	Dual	87"	Straight	72"	Cutaway	Chaperone, Clipper, Micro-bird, Minotaur, VSS
19 (with Op. 11)	Sedan	Single	Dual	87"	Straight	62"	Cutaway	Bussette, Vanguard
20	Tall	Single	Dual	78"	Straight	72"	Stripped	Cadet, Mighty-Mite, Mini-Bird
24	Tall	Single	Dual	90"	Straight	72"	Stripped	Cadet, Mighty-Mite, Mini-Bird

*minimum interior width at shoulder line for the models listed.

Note: Bantam = Collins; Econo = Collins; Reddi-Bus = Lewis; Bussette = MidBus; Micro-Bird = Blue Bird; Super Bantam = Collins; Cadet = Carpenter; Mighty-Mite = Thomas; VSS = Ward; Chaperone = Wayne; Mini-Bird = Blue Bird; Van Con = Van Con; Clipper = Carpenter; Minotaur = Thomas

D. CHASSIS SPECIFICATIONS

D.1. GENERAL REQUIREMENTS -

1.1. **GENERAL SPECIFICATIONS** - The requirements for gross vehicle weight ratings, gross axle weight ratings (front and rear) and tire sizes and load ranges, as specified in Table Nos. 3 through 7 for each size chassis are minimum requirements (see Par. A.4.5.). The requirements are for school buses with standard equipment. The added weights of optional equipment such as alternative fuel storage tanks, air conditioning, luggage racks, lifts for the physically impaired, or other heavy accessories were not considered in establishing the capacity ratings to be certified for the chassis. If additional optional equipment is ordered which necessitates increased capacity ratings of either axles, springs or tires, it is the responsibility of the vendor to furnish them so that proper certification can be made on the vehicle.

1.2. **COLOR** - The chassis shall be painted black (Color 17038); cowl, fenders, and hood shall be painted school bus yellow (Color 13432); and bumpers and wheels shall be painted the chassis manufacturer's standard color.

D.2. AXLES, SUSPENSION, AND RELATED COMPONENTS -

2.1. **AXLE CAPACITIES** - Axle capacities and gross axle weight ratings (GAWRs) shall be as specified in Table Nos. 3 through 7 for each make of vehicle. Increased axle capacities shall be furnished to accommodate optional equipment such as diesel engines or other heavy accessories as required (see paragraphs A.4.5., D.1.1., and G.1.7.2.).

2.2. **BRAKES AND RELATED COMPONENTS** -

2.2.1. Service Brakes - Service brakes shall be manufacturer's standard hydraulic front power disc brakes and rear disc or drum brakes meeting FMVSS No. 105 as applicable to school buses.

2.2.2. Warning, Low Fluid - Hydraulic assist-boosters shall audibly and visually warn of fluid or power loss.

2.3. **HUBODOMETERS** - Each chassis shall be equipped with one hubodometer with standard mounting bracket which shall be calibrated in miles and installed by the manufacturer. The preferred mounting location is on the right rear axle drive wheel. The hubodometer shall be one of the following:

2.3.1. Accu-Trak, Standard Car Truck, Park Ridge, IL 60068.
2.3.2. Engler Instruments, 250 Culver Ave., Jersey City, NJ 07305.
2.3.3. Veeder-Root, Hartford, CT 06102.

2.4. **SHOCK ABSORBERS** - Two front and two rear heavy-duty, double-acting shock absorbers shall be installed.

2.5. **SPRINGS** - The ground ratings for the front and rear springs shall be as specified in Table Nos. 3 through 7 for each make of vehicle (see paragraphs A.4.5., D.1.1., and G.1.7.2.).

2.6. **TIRES AND WHEELS** -

2.6.1. Tires - All standard tires shall be the steel belted radial tubeless type. All tires shall be new and the tread style furnished shall be the tire manufacturer's standard design and the brand normally furnished on regular production orders unless otherwise specified in the Invitation for Bids. All tires shall be "Original Equipment Line Quality." For tire size and load range for each size chassis, see Table Nos. 3 through 7 and the **MAJOR COMPONENTS CHART**.

2.6.2. Wheel, Spare - When so specified in the Invitation for Bids (see Option No. 31), the bus shall have a spare wheel; however carrier and tire/tube for spare wheel will not be provided under this option.

D.3. CHASSIS FRAME AND RELATED COMPONENTS -

3.1. **BUMPERS, FRONT AND REAR** - Front and rear bumpers shall be chassis manufacturer's standard except the rear bumper furnished by body manufacturer shall be of the size and type and attached to frame as described in Par. C.1.2.

D. 15- THROUGH 20- PASSENGER CHASSIS SPECIFICATIONS

3.2. **CHASSIS FRAME SIDE MEMBERS** - Each frame side member shall be of one-piece construction. If the frame side members are extended, such extension shall be designed, furnished, and guaranteed by the installing manufacturer. The installation shall be made by either the chassis or body manufacturer. Extensions of frame lengths are permissible only when such alterations are welded on behind the hanger of the rear spring. This specification does not permit wheelbase extensions. Any welding, heating (for frame straightening or repairs), or the drilling of holes in chassis frame members shall be in accordance with chassis manufacturer's recommendations.

3.3. **FUEL TANKS, CONVENTIONAL FUEL** - Standard and auxiliary fuel tanks shall meet FMVSS No. 301 as applicable to school buses and shall meet the current design objectives of the SBMI. Fuel tanks installed on Texas school buses shall have a minimum "draw" of 83% of capacity.

3.3.1. Fuel Tanks, Standard - The standard fuel tank shall have a minimum capacity of 21 gallons. The tank shall be mounted, filled, and vented entirely outside the body (see Par. D.5.4.3.)

3.3.2. Fuel Tank(s), Auxiliary - **When so specified in the Invitation for Bids**, (see Option No. 12), the bus shall be furnished with a minimum capacity 30-gallon fuel tank or tanks furnished and installed by the chassis manufacturer.

3.4. **FUEL TANK(S), ALTERNATIVE FUEL** - Fuel tank(s) for alternative fuels (see Option 3) shall meet or exceed all of the rules and regulations of the Texas Railroad Commission. Capacity shall be that required to meet the range requirements as specified in Option 3 (also see Par. D.5.3.3.) or as **specified in the Invitation for Bids**.

3.5. **STEERING, POWER** - The bus shall be furnished with the chassis manufacturer's standard power steering which will provide safe and accurate performance at maximum load and speed.

D.4. ELECTRICAL SYSTEM AND RELATED COMPONENTS -

4.1. **ALTERNATORS** - The 12-volt alternators with rectifier shall have the electrical outputs and the minimum charging rates shown below when tested in accordance with SAE rating at the manufacturer's recommended engine speed. These alternators shall be ventilated and voltage controlled and, if necessary, current controlled. Alternators shall be provided as follows:

4.1.1. Alternator, Standard - Type A buses and Type B buses shall a standard alternator with a minimum electrical output of 75 amperes with gasoline or alternative fuel engines (65 amperes with diesel) and 100 amperes, respectively.

4.1.2. Alternators, Other - School buses equipped with the following equipment **shall have** alternators as follows:

4.1.2.1. Air-conditioned Buses - Type A buses and Type B buses equipped with air conditioning shall have alternators with a minimum electrical output of 100 and 130 amperes, respectively.

4.1.2.2. Wheelchair Lift-equipped Buses - Type A buses and Type B buses equipped with wheelchair lifts shall have alternators with a minimum electrical output of 100 and 130 amperes, respectively.

4.1.2.3. Air-conditioned and Wheelchair-equipped buses - Type A buses and Type B buses equipped with <u>both</u> air conditioning and wheelchair lifts shall have alternators with a minimum electrical output of 130 amperes and 160 amperes, respectively.

4.1.3. Alternator, Optional - **When so specified in the Invitation for Bids** (see Option No. 4), Type A buses shall have an alternator with a minimum electrical output of 100 amperes and Type B and C buses shall have an alternator with a minimum electrical output of 130 amperes, respectively.

D. 15- THROUGH 20- PASSENGER CHASSIS SPECIFICATIONS

4.2. **BATTERY AND RELATED COMPONENTS** - The storage battery furnished on each chassis shall have sufficient capacity to supply current for adequate operation of the engine starter, lights, signals, heater, and all other electrical equipment. The batteries for 15- through 20-passenger school buses shall have a potential of 12 volts and meet the following:

4.2.1. Battery, Diesel Engines - The batteries furnished with diesel engines shall be as specified by the chassis manufacturer. When two batteries are provided, they shall both be installed under the hood or one shall be installed under the hood and the other shall be installed in a battery box having outside access. Single batteries shall be installed under the hood.

4.2.2. Battery, Gasoline Engines - The minimum performance level shall be a BCI cold cranking capacity of no less than 360 amperes @ 0°F with a minimum 100-minute reserve capacity.

4.2.3. Battery(s), Alternative fueled vehicles - Dedicated alternative fueled vehicles shall have batteries meeting or exceeding those required for a gasoline engine school bus with comparable horsepower. Batteries for dual fueled buses shall have batteries specified by the conventional fuel used.

4.3. **HORNS** - Each bus shall be equipped with horn or horns of standard make. Each horn shall be capable of producing audible sounds in the frequency range from 250 to 2,000 Hz and at an intensity of between 82 and 102 decibels. The sound level measurements shall be made at a distance of 50 feet directly in front of the vehicle in accordance with SAE J377.

4.4. **INSTRUMENTS AND INSTRUMENT PANEL** - The bus shall be equipped with the following nonglare illuminated instruments (controlled by an independent rheostat*) and gauges mounted for easy maintenance and repairs and clearly visible to the seated driver. Indicator warning lights in lieu of gauges are permissible as shown below:

4.4.1. Ammeter (or Voltmeter) with graduated charge and discharge indications
4.4.2. Fuel Gauge
4.4.3. Glow Plug Indicator Light (for diesel buses with glow plugs only)
4.4.4. Odometer (6 digits, e.g., register to 99,999.9 miles)
4.4.5. Oil Pressure Gauge and/or Warning Light
4.4.6. Speedometer
4.4.7. Vehicle manufacturer's standard Keyed Ignition Switch
4.4.8. Water Temperature Gauge and/or Warning Light.

***NOTE:** If the intensity of the body-installed panel lamps is controlled, then the intensity control shall not be accomplished by the same rheostat that controls the chassis instrument lamps, <u>unless</u> the body company designs and installs the rheostat to accomplish both.

4.5. **LAMPS** - Each bus shall be equipped with at least two clear headlamps meeting the requirements of FMVSS No. 108 and a dimmer switch located at the far left of steering column. Adequate parking lamps operated by a switch in common with the headlamps shall be provided.

4.6. **TURN-SIGNAL AND VEHICULAR WARNING SIGNAL OPERATING UNITS AND FLASHERS** - The operating units and flashers for turn-signals and vehicular hazard warning signals shall meet the requirements of FMVSS No. 108 (see paragraphs C.1.7. and C.1.11.).

4.7 **WIRING** - The chassis manufacturer shall provide a readily accessible terminal strip or plug on the body side of the cowl, or at an accessible location within the engine compartment, with the following minimum terminals for the body connections:

4.7.1. Backup lamps
4.7.2. Instrument panel lights (rheostat controlled by head lamp switch)
4.7.3. Left turn signals
4.7.4. Right turn signals
4.7.5. Stop lamps
4.7.6. Tail lamps

D. 15- THROUGH 20- PASSENGER CHASSIS SPECIFICATIONS

D.5. ENGINE AND RELATED COMPONENTS -

5.1. AIR CLEANER - Each chassis shall be equipped with a factory-installed maximum capacity, replaceable dry element type air cleaner.

5.2. COOLING SYSTEM - The cooling system shall have the manufacturer's largest heavy-duty radiator available for the series and shall be of sufficient capacity to cool the engine at all speeds in all gears. The cooling system fan shall be the heavy-duty reinforced type.

5.3. ENGINES - Approved engines listed in each table for the various size buses are the engines for which the vendor has requested approval and are usually the smallest engine in terms of performance that will meet the requirements listed below. Other approved engines which the vendor may provide with a given chassis will be listed also in an Approved Products List (APL). The APL will be updated as new engines or additional versions of current engines are approved. **Please note that only those engines approved as specified below and listed either in the Texas School Bus Specification or in the Class 070-SB-APL will be acceptable for school buses.**

5.3.1. Diesel Engines - **When so specified in the Invitation for Bids** (see Option No. 8), the 15-, 16-, 18-, 19-, or 20-passenger school bus chassis shall be furnished with a 4-cycle diesel engine.

5.3.2. Gasoline Engines - Engines for the 15- through 20-passenger buses shall be of the gasoline type **unless otherwise specified in the Invitation for Bids.** Approved engines are listed in Tables Nos. 3 through 7 and in the Class 070-SB-APL.

5.3.3. Alternative Fuel Engines - **When so specified in the Invitation for Bids** (See Option No. 3), the 15- through 20 passenger buses shall be equipped with engines operable on alternative fuels.

5.3.4. Power Requirements - Each bus shall be furnished with an engine that meets or exceeds the following **minimum** criteria (see second note at the end of Par. D.5.3.5.8.), when tested at or above the GVWR required for a given bus capacity and with all accessories except air conditioning compressor on and operating:

5.3.4.1. Acceleration from 0 to 50 mph in 60 seconds or less.
5.3.4.2. Gradeability of 1.5% minimum at 50 mph.
5.3.4.3. Gradeability of 5.0% minimum at 25 mph.
5.3.4.4. Startability of 20% minimum.
5.3.4.5. Top speed of 55 mph minimum at the manufacturer's rated rpm for the governed engine.

5.3.5. Approval of New Engines - Procedures for approving new school bus engines for 15- through 20-passenger school buses shall be as follows:

5.3.5.1. Submit to the Specification Section, a letter certifying that the proposed engine meets or exceeds each requirement of Par. D.5.3.3. when installed in the largest size bus for which approval is requested.

5.3.5.2. The Specification Section will review the request and advise the vendor or manufacturer **by letter** that their request for engine approval and their statement on engine performance have been received. Copies will be furnished to the School Bus Committee.

5.3.5.3. If this review verifies that the engine meets the requirements of this specification, and is so stated in the above letter, the vendor or manufacturer shall contact the GSC Purchaser to arrange for testing of the engine in the largest size school bus for which approval is requested. The Purchaser will consult with the TEA Representative and inform the vendor of the name(s) of the school district(s) from which to select a participating school district.

5.3.5.4. The vendor must obtain the cooperation of one of the named school districts in agreeing to test the bus and to provide a report to the GSC Specification Section on the form provided. (See copy of the Form entitled, "Three Month Test of New School Bus Engines," on Page 117.)

5.3.5.5. The vendor or manufacturer shall then contact the GSC Purchaser and TEA School Bus Committee Representative about ordering the school bus with the subject engine.

5.3.5.6. The bus shall be tested for a period of not less than three months during the regular nine-months school term, preferably on a variety of routes and on activity trips.

5.3.5.7. Upon receipt of the school district's report, the Specification Section will make a recommendation at the next meeting of the School Bus Committee that the engine be accepted or rejected.

5.3.5.8. The School Bus Committee will act on this recommendation and, if approved, the engine will be added to the Class 070-SB APL.

NOTES: Once an engine is approved in one horsepower and torque version, other power versions of this same engine need not be tested in a school bus prior to approval. For approval, the vendor or manufacturer shall follow Par. D.5.3.5.1., and, in addition, state the rear axle ratio recommended for the size bus for which approval is requested. Then the engine will be added to the Class 070-SB-APL which will show the gross horsepower and torque as well as the rear axle ratio for the particular application.

THE VALUES OF DISPLACEMENT, HORSEPOWER, AND TORQUE LISTED IN THE FOLLOWING TABLES UNDER EACH MANUFACTURER ARE NOT MINIMUM VALUES AND SHOULD NOT BE CONSTRUED AS SUCH. THE ONLY MINIMUM REQUIREMENTS FOR THE PERFORMANCE OF ENGINES IN 15- THROUGH 20-PASSENGER SCHOOL BUSES IN THE STATE OF TEXAS ARE THE FIVE REQUIREMENTS LISTED IN PAR. D.5.3.4. (There are additional requirements for engines, either implied or specified, separate from the above performance requirements.)

5.4. EXHAUST SYSTEM -

5.4.1. Component Placement - The exhaust pipe, muffler, and tailpipe shall be mounted under the bus and attached to the chassis frame.

5.4.2. Noise Level - The noise level shall neither exceed EPA "Noise Emission Standards" nor 85 dB(A) at the ear of the occupant in the bus nearest the noise source.

5.4.3. Tailpipe Exit - The tailpipe of a gasoline-powered bus shall not exit the side of the bus anywhere within 12 inches of a vertical plane through the center of the fuel filler opening and perpendicular to the side of the bus, unless protected with a metal shield to divert spilled fuel away from tailpipe.

5.5. OIL FILTER - Each chassis shall be equipped with a factory-installed, minimum one-quart capacity oil filter with a replaceable filter element.

5.6. TACHOGRAPH - When so specified in the Invitation for Bids (see Option No. 27), a tachograph containing a combination clock/speedometer/recorder shall be installed on the dashboard. The tachograph shall be Argo Model(s) 1310-6, Veeder-Root Model 1407, or approved equal.

D.6. TRANSMISSION AND RELATED COMPONENTS -

6.1. AUTOMATIC TRANSMISSION, STANDARD - The standard automatic transmission shall be the 3- or 4-forward speed automatic type, and shall be one of the following:

6.1.1. - Chrysler Motor Corporation's "A727 LoadFlite,"
6.1.2. - Ford Motor Company's "SelectShift" or,
6.1.3. - General Motors Corporation's "Turbo Hydramatic."

6.2. DRIVE SHAFT GUARD - Each drive shaft section shall be equipped with protective metal guard or guards to prevent the shaft from whipping through the floor or dropping to the ground when broken.

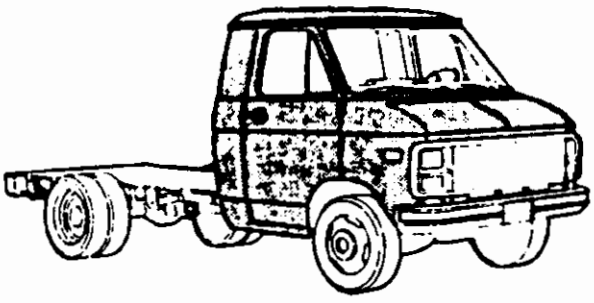
D. 15- THROUGH 20- PASSENGER CHASSIS SPECIFICATIONS

D.7. CHASSIS TYPES - Figure 1 shows the types of chassis available for small school buses.

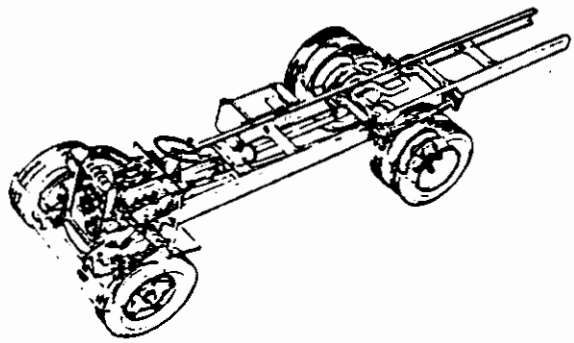
FIGURE 1

VAN

CUTAWAY



STRIPPED CHASSIS



D. 15- THROUGH 20- PASSENGER CHASSIS SPECIFICATIONS

TABLE 3
15-PASSENGER BUS CHASSIS
(SEE PAR. B.1.2. ON REDUCED PASSENGER CAPACITY)

Refer to General Requirements, Page 4

15-Passenger ITEM Rqmts.	1992 Min.	Chev/GMC G31305/G31303	Chev/GMC G31605 (Ext)	Dodge B350	Ford Cutaway E 350**	Ford (Ext) Cutaway E350**
GVWR, lbs	8510	(D) 8600/9200	8600	8510	9600	9000
GAWR, lbs, - Front	3170	3880/4100	3880	3170	3900	3400
- Rear	5340	5360/5360	5360	5340	6084	6195
Axle Capacity, lbs - Front	3600	3900/4100	3900	3600	4600	4600
- Rear	5500	5700/6000	5700	5500	6340	6340
Wheelbase, in	125.0	125.0	146.0	127.6	138.0	138.0
Chassis Length, in	as required	202.2	223.2	222.9	206.8	231.8
Track, in - Front	67.8	68.6/68.6	68.6	67.8	70.0	70.0
- Rear	65.1	67.4/67.4	67.4	65.1	66.0	66.0
Gasoline Engine CID	*	350-V8EFI	350-V8EFI	360-V8	**	**
SAE Gross Horsepower	*	201	201	190	**	**
SAE Gross Torque, lb-ft	*	318	318	292	**	**
Transmission, auto	A3	A4OD	A4OD	A3	A4OD	E4OD
Tires, Steel Belted Radial Size & Load Range		LT225/ 75R16E (D w/ dual)	LT225/ 75R16E	LT225/ 75R16E	LT245/ 75R16E	LT245/ 75R16E
Wheels, Rear	as shown	Single/Dual	Single	Single	Single	Single
Alternator, amperes	75	85	85	75	130	130

*See minimum power requirements in Par. D.5.3.4.
**Furnished with diesel engine only (see Option 8).

Diesel Engine (Option 8)

15-passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC G31605 G31305/G31303	Ford E 350
Engine Displacement, L.	*	6.2N-V8	7.3N-V8
SAE Gross Horsepower	*	164	180
SAE Gross Torque, lb-ft	*	302	345
Alternator, amperes	100	100	100

*See minimum power requirements in Par. D.5.3.4.

Engines listed on this page are approved to meet or exceed power requirements under normal operating conditions. Other engines must be submitted for approval by the School Bus Committee (see Par. D.5.3.4.).

15-PASSENGER BODIES

15-Passenger ITEM	1992 Min. Rqmts.	Blue Bird Micro-Bird	Collins Spr-Bantam/ Econo	Lewis Van-Con Reddi-Bus		MidBus Busette	Ward Vanguard
Interior Headroom, in	63.0	74.0	65.0	65.0	63.5	63.0	74.0
Interior Width: Floor Line, in	72.0	90.5	78.0	75.0	72.0	89.25	90.5
Shoulder Line, in	70.0	90.5	78.0	75.0	70.0	87.42	90.5
Service Door Type	as shown	Tall	Sedan or Tall	Tall	Sedan	Sedan	Tall
Rear Wheels	as shown	Dual	Single	Single	Single	Dual	Dual
Chassis Type	as shown	Cutaway	Cutaway or Van	Van	Van	Cutaway	Cutaway

TABLE 4
16-PASSENGER BUS CHASSIS
(SEE PAR. B.1.2. ON REDUCED PASSENGER CAPACITY.)

Refer to General Requirements, Page 4

16-Passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC G31303	Ford E 350**
GVWR, lbs	10000	10000	10000
GAWR, lbs - Front	3800	3900	3800
- Rear	7200	7200	7810
Axle Capacity, lbs - Front	3900	3900	4600
- Rear	7500	7500	7800
Wheelbase, in	125	125	138
Chassis Length, in	as required	197.6	237.4
Track, in - Front	69.3	69.3	70.0
- Rear	73.2	74.0	73.2
Gasoline Engine CID	*	350-V8EFI	**
SAE Gross Horsepower	*	201	**
SAE Gross Torque, lb-ft	*	318	**
Transmission, Auto	A4	A4OD	E4OD
Tires, Steel Belt Radial Size & Load Range	Tubeless	LT225/ 75R16D	LT225/ 75R16D
Wheels, Rear	Dual	Dual	Dual
Alternator, amperes	85	85	95

*See minimum power requirements in D.5.3.4.
**Furnished with diesel engine only, Option 8.

DIESEL ENGINE (Option 8)

16-Passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC G31303	Ford E 350
Engine Displacement, L.	*	6.2N-V8	7.3N-V8
SAE Gross Horsepower	*	164	180
SAE Gross Torque, lb-ft	*	302	345
Alternator, amperes	100	100	100

*See minimum power requirements in D.5.3.4.

Engines listed on this page are approved to meet or exceed power requirements under normal operating conditions. Other engines must be submitted for approval by the School Bus Committee (see D.5.3.4.)

The following bodies are available on commercial cutaway chassis in this configuration:

16-PASSENGER BODIES
(Wide Body, Straight Side, Style 2 Service Door*)

16-Passenger ITEM	1992 Min. Rqmts.	AmTran/Ward VS516	Blue Bird Micro-Bird	Carpenter SCL	Thomas Minotaur**	Wayne Chaperone
Interior Headroom, in	72	74	74.0	74	72	72.0
Interior Width, in	90	90	90.5	90	90	90.75

*Conventional Bus Door - minimum 68" tall and 24" wide, folds or separates in the middle to open.
**Not available with a diesel engine except as a wheelchair-equipped bus (14-passenger).

TABLE 5
16-PASSENGER BUS CHASSIS
(SEE PAR. B.1.2. ON REDUCED PASSENGER CAPACITY.)

Refer to General Requirements, Page 4

16-Passenger ITEM	1992 Min. Rqmts.	Ford E 350 Cutaway	Chev/GMC G31303
GVWR, lbs	9200	9600	9200
GAWR, lb.- Front	3900	3900	4100
- Rear	5360	6084	5360
Axle Cap., lbs - Front	4600	4600	4700
- Rear	6000	7800	6000
Wheelbase, in	138	138	146
Chassis Length, in			
Engine, CID	*	**	350-V8EFI
SAE Gross HP	*	**	201
SAE Gross Torque, lb-ft	*	**	318
Transmission, Auto	A4	E4OD	A4OD
Tires, Steel Belted Radial	Tubeless		
Size & Load Range	as shown	LT245/ 75R16E	LT225/ 75R16E
Wheels, Rear	Single	Single	Single
Alternator, amperes	100	100	100

*See minimum power requirements in D.5.3.4.
**Furnished with diesel engine only, Option 8.

DIESEL ENGINE (Option 8)

16-Passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC G31303	Ford E 350
Engine Displacement, L.	*	6.2N-V8	7.3N-V8
SAE Gross Horsepower	*	164	180
SAE Gross Torque, lb-ft	*	302	345
Alternator, amperes	100	100	100

*See minimum power requirements in D.5.3.4.

Engines listed on this page are approved to meet or exceed power requirements under normal operating conditions. Other engines must be submitted for approval by the School Bus Committee (see D.5.3.4.)

The following bodies are available on van conversion chassis:

16-PASSENGER BUS BODIES
(With Dual (or Single) Rear Emergency Door)

16-Passenger ITEM	1992 Min. Rqmts.	Collins Super Bantam	Lewis Reddi Bus	Van Con 16-Pass.
Overall Length	220.0	220/246.8	245.0	236.0
Interior Height	63	64	65	63.0
Interior Width	75	75	75	72.0
Entrance Door Height*	53	53/74	70	65.0
Passenger Seats (26"-39" Benches):				
Left Side, rows	4 or 5	4 or 5	5	5
Curb Side, rows	4 or 5	4 or 5	4	5
Knee Space, in	24	24	26	26
Aisle Width, in	13	13	15	15

*Option 11 allows automotive type (Style 1) service doors.

TABLE 6
19-PASSENGER BUS CHASSIS
(SEE PAR. B.1.2. ON REDUCED PASSENGER CAPACITY.)

Refer to General Requirements, Page 4

19-Passenger ITEM	1992 Min. Rqmts.	Chev/GMC G31303	Ford E350 Cutaway
GVWR, lbs	10000	10000	10000
GAWR, lbs - Front	3900	3900	3900
- Rear	7200	7200	7810
Axle Capacity, lbs - Front	3900	3900	4600
- Rear	7500	7500	7800
Wheelbase, in	125	125	138
Chassis Length, in	as required	197.6	232.4
Track, in - Front	69.3	69.3	70.0
- Rear	73.2	74.0	73.2
Gasoline Engine CID	*	350-V8EFI	**
SAE Gross Horsepower	*	201	**
SAE Gross Torque, lb-ft	*	318	**
Transmission, Auto	A4	A4OD	E4OD
Tires, Steel Belted Radial Size & Load Range	Tubeless as shown	LT225/ 75RI6D	LT225/ 75RI6D
Wheels, Rear	Dual	Dual	Dual
Alternator, amperes	85	85	130

*See minimum power requirements in D.5.3.4.
**Furnished with diesel engine only, Option 8.

DIESEL ENGINE (Option 8)

19-Passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC G31303	Ford E350
Engine Displacement, L.	*	6.2N-V8	7.3N
SAE Gross Horsepower	*	164	180
SAE Gross Torque, lb-ft	*	302	345
Alternator, amperes	100	100	100

*See minimum power requirements in D.5.3.4.

Engines listed on this page are approved to meet or exceed power requirements under normal operating conditions. Other engines must be submitted for approval by the School Bus Committee (see D.5.3.4.).

The following bodies are available on commercial cutaway chassis in this configuration:

19-PASSENGER BUS BODIES

19-Passenger ITEM	1992 Min. rqmts.	AmTran/Ward Vanguard*/ VS519	Blue Bird Micro-Bird	Carpenter SCL Clipper	Thomas Minotaur	MidBus Busette	Wayne Chaperone
Interior headroom, in	63	74	74	74	72	63	72
Interior width, in	84	90	90.5	90	90	84.72	90.75
Service door	as shown	sedan*/ tall	tall	tall	tall	sedan*	tall

*Available only with Option 11, Sedan-type Service Door.

TABLE 7
20-PASSENGER BUS CHASSIS
(SEE PAR. B.1.2. ON REDUCED PASSENGER CAPACITY.)

Refer to General Requirements, Page 4

20-Passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC P30842
GVWR, lbs	11500	11500
GAWR, lbs - Front	4400	4400
- Rear	7900	7900
Axle Capacity, lbs - Front	5000	5000
- Rear	7900	7900
Wheelbase, in	125	125
Chassis Length, in	as required	214.8
Track, in - Front	65.2	65.2
- Rear	66.7	66.7
Gasoline Engine CID	*	350-V8EFI
SAE Gross Horsepower	*	201
SAE Gross Torque, lb-ft	*	318
Transmission, Auto	A4OD	A4OD
Tires, Steel Belted Radial	Tubeless	
Size & Load Range	as shown	8R19.5E
Wheels, Rear	Dual	Dual
Alternator, amperes	105	105

*See minimum power requirements in D.5.3.4.

DIESEL ENGINE (Option 8)

20-Passenger ITEM	1992 Min. Rqmts.	Chevrolet/GMC P30842
Engine Displacement, L.	**	6.2N-V8
SAE Gross Horsepower	**	164
SAE Gross Torque, lb-ft	**	302
Alternator, Amperes	100	100

**See minimum power requirements in D.5.3.4.

Engines listed on this page are approved to meet or exceed power requirements under normal operating conditions. Other engines must be submitted for approval by the School Bus Committee (see D.5.3.4.)

The following bodies are available on stripped chassis:

20-PASSENGER BUS BODIES
(Straight Side, Style 2 Service Door*)

20-Passenger ITEM	1992 Min. Rqmts.	Blue Bird Mini-Bird	Carpenter Cadet	Thomas Mighty Mite
Interior Headroom, in	73	77	77	73
Interior Width, in	78	90.5	90	78
Service Door	as shown	Tall	Tall	Tall

*Conventional bus door - minimum 68" tall and 24" wide, folds or separates in the middle to open.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

E.1. GENERAL REQUIREMENTS -

1.1. **BODY PHYSICAL REQUIREMENTS** - Physical requirements for the 24- through 83-passenger school buses shall conform to the following table (see Option No. 15 and Par. A.1.3.):

TABLE NO. 8

PHYSICAL REQUIREMENTS

(1) MINIMUM SIZE	(2) OVERALL BODY WIDTH	(3) ROWS OF SEATS	(4) KNEE SPACINGS	(5) SEAT WIDTH LEFT	(5) SEAT WIDTH RIGHT	(6) CENTER AISLE WIDTH	(7) FLOOR-TO-CEILING HEIGHT
Number of Passengers	inches, Maximum	Each	inches, Minimum	inches, Minimum		inches, Minimum	inches, Minimum
24	96	5	24	39*	26	12	72
35	102	6	25	39*	39	12	72
47	102	8	25	39*	39	12	72
53	102	9	25	39*	39	12	72
59	102	10	25	39*	39	12	72
65	102	11	25	39*	39	12	72
71-S	102	12	24-3/4	39*	39	12	72
71-L	102	12	25	39*	39	12	72
77	102	13	25	39*	39	12	72
83	102	14	24-3/4	39*	39	12	72

NOTES: Column (4) Knee space is defined as the horizontal distance from the front center of a seat back to the rear center of the seat back or barrier immediately ahead, measured at approximately 4 inches above the seat cushion. Knee space may be reduced to 24-3/8 inches, only on those 83-passenger bus seats where it is impossible to achieve 24-3/4 inch space.

Column (5) *Left rear seat shall have minimum width of 26 inches.

Column (6) Floor-to-ceiling height shall be measured in the center of the body between the No. 2 pillar and the last side body pillar ahead of the rear roof slope.

1.1.1. Overall Length - The overall length of a complete school bus shall not exceed 40 feet.

1.2. **BUMPER, REAR** - The rear bumper shall be furnished by the body manufacturer. It shall be secured to rear chassis frame and it shall be designed so as to prevent "hitching of rides" by obtaining a toehold thereon. The bumper shall not be permanently attached to the bus body, but shall wrap around the body, extending forward for at least 12 inches on each side. The bumper shall be of pressed steel channel at least 3/16-inch thick by 8 inches high. It must be bolted to the chassis frame and braced with material of at least equal impact ratio as the material in the bumper.

1.3. **CEILING** - The ceiling shall be free of all projections likely to cause injury to passengers. (See Table above for ceiling height requirements and Par. E.2.9. for other ceiling requirements.)

1.4. **COLORS and LETTERING** - A first quality black enamel (Color No. 17038 of Federal Standard No. 595a) or decals shall be used for lettering and trim. The properties of the black enamel shall be equal to those of the finish coat enamel. Pressure-sensitive tape or decals are acceptable for trim or lettering (e.g., **EMERGENCY DOOR, EMERGENCY EXIT**, etc. signs), provided they are made from FAISON R 200, 3M Series 180, or approved equal material.

1.4.1. Body Exterior - The exterior of the complete bus except for bumpers, rub rails, and wheels shall be finished in school bus yellow (Color No. 13432 of Federal Standard No. 595a). The hood may be coated with non-reflective school bus yellow paint. When so specified in the Invitation for Bids (see Option No. 38), the school bus roof shall be painted white. The paint on the roof shall extend from the back of the front cap to the front of the rear cap and from a point on each side of the bus which is no lower than the top of the windows and no higher than the start of the roof curvature. The paint shall be the same quality as the paint on the remainder of the school bus.

1.4.2. Body Interior - Unless otherwise specified in the Invitation for Bids, the interior of the complete bus body shall be finished in the manufacturer's standard color except where clear-coat galvanized steel is required (see Par. E.2.9.).

1.4.3. Chassis components - Unless otherwise specified in the Invitation for Bids, chassis components such as grilles, frame rails, and wheel covers shall be painted the chassis manufacturer's standard color.

1.4.4. Emergency Door Lettering - The rear emergency door exit shall be marked "EMERGENCY DOOR" or "EMERGENCY EXIT," both on the outside and on the inside with at least two-inch high lettering placed on top of, or directly above the exit.

1.4.5. Exterior Mirror Backs and Brackets - The metal backs of all exterior mirrors, if painted, and all exterior mirror brackets shall be finished in lusterless black (Color No. 37038. see paragraphs E.3.8.2. and E. 3.8.4. for optional stainless steel mirror backs and brackets).

1.4.6. Logos - No logo, trademark, insignia, or letters shall be placed on bumpers or mud flaps. A small metal or plastic plate designating body manufacturer's name may be attached to the bus body. A logo of reasonable size, which has been approved by the Specification Section, may be placed on the exterior bus body.

1.4.7. Rub Rails - All rub rails, except the pressed-in type window level rub rails, shall be painted black (Color No. 17038). The pressed-in type rub rails shall be painted either black (Color No. 17038) or school bus yellow (Color No. 13432) at the option of the manufacturer.

1.4.8. School Bus Lettering - The school bus bodies shall have the words "SCHOOL BUS" in neat, clearly defined block letters on the front, rear, and on both sides of the bus body with black paint (Color No. 17038 of Federal Standard No. 595a). The letters shall be 8 inches high and shall have 1-inch wide strokes. The words "SCHOOL BUS" shall be at the same level on each side of the bus (i.e., same height above bottom of skirt).

1.4.9. School Name Lettering - When so specified in the Invitation for Bids (see Option 20), the school district name shall be provided in black letters on both sides of the bus near the belt line. Lettering shall be minimum 5 inches high with minimum 5/8-inch block strokes. Paint, if used shall be equal in quality to that of the bus body paint; decals shall meet or exceed the requirements in Par. E.1.4. Maximum number of characters in one line of the name is limited to the bus length. The school district should list in the space provided on the School Bus Requisition Form (see sample form on page 19), the name to be placed on the bus. Characters should be typed or printed plainly on this form to ensure accurate spelling.

1.4.10. Wheels - The wheels shall be painted the chassis manufacturer's standard color.

1.5. INSULATION, NOISE - Each school bus shall be constructed so that the noise level measured at the ear of the occupant nearest the primary vehicle noise source shall not exceed 85 dBA, when tested in accordance with the procedure given in the Noise Test Procedure of NSSB. (See Option 24 for reduced interior noise level package.)

1.6. INSULATION, THERMAL - The ceilings and sidewalls shall be thermally insulated with a fire-resistant material approved by Underwriters Laboratories Inc. to adequately reduce the noise level and to minimize vibrations. Buses shall have the equivalent of 1-1/2 inches of Fiberglas or other insulation in the ceilings and walls including the interior of hat-shaped bows. Any insulation used shall have a minimum R-factor value of 5.77.

1.7. LAMPS, SIGNALS, AND WARNING DEVICES - Each bus shall be furnished with the lamps listed below (see SMBI Standard No. 001):

1.7.1. Alternately Flashing Signal Lamps - Each school bus shall be equipped with eight warning signal lamps, four red and four amber, working in an automatic non-sequential integrated system. The signal lamps shall conform to the design, installation location and operating requirements of Paragraph S4.1.4. of FMVSS No. 108:

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

"S4.1.4. Each school bus shall be equipped with a system of ...:

...(b) Four red signal lamps designed to conform to SAE Standard J887, 'School Bus Red Signal Lamps,' July 1964, and four amber signal lamps designed to conform to that standard, except for their color, and except that their candlepower shall be at least 2-1/2 times that specified for red signal lamps. Both red and amber lamps shall be installed in accordance with SAE Standard J887, except that:

(i) Each amber signal lamps shall be located near each red signal lamp at the same level, but closer to the vertical centerline of the bus; and

(ii) The system shall be wired so that the amber signal lamps are activated only by manual or foot operation, and if activated, are automatically deactivated and the red signal lamps automatically activated when the bus entrance door is opened."

NOTE: The lamps shall be wired independently and not wired through the ignition switch. This will allow removal of the ignition key without affecting operation of the alternately flashing eight warning signal lamps.

1.7.1.1. Band - Each set of amber and red lamps shall have a minimum 3-inch black band around the set and a 3-inch band between the lamps in each set. The color of this band shall be black enamel (Color No. 17038, Black Enamel of Federal Standard 595a). If it is not possible to provide a 3-inch band between the lamps in the set, the manufacturer will then provide a band as wide as possible. Any visor or hood used to shade the lights and improve visibility will not interfere with the intensity and photometric performance of the warning lights (see SMBI Standard No. 001).

1.7.1.2. Mounting - If exterior panels are cut to provide an opening for installation of flush-mounted signal lamps, the lamps must have a closed cell sponge flange gasket with a minimum thickness of 3/16 inch. The gasket shall be the full width of the flange on the lamp. Proper installation of the lamps shall be made in order to prevent seepage of moisture into the opening.

1.7.1.3. Operating Instructions - Complete instructions for the detailed operation of the warning signal lamp system shall be furnished with each school bus.

1.7.2. Backup Lamps - The color, requirements, and mounting of backup lamps shall be in accordance with FMVSS No. 108, **except <u>two</u> backup lamps are required by Texas Specifications.**

1.7.3. Clearance, Identification and Side Marker Lamps - Each bus shall be furnished with the lamps listed below. The quantities, colors, requirements, and mountings shall be in accordance with FMVSS No. 108. Each identification, clearance, and side marker lamp installed to indicate school bus height and/or width shall be the armored flush mounting type for protection of lens from damage during normal operstion. The armored protectors shall in no way interfere with the intended purpose of the lamps. The armored type protectors shall be Grote Manufacturing Company, Madison, Indiana 47250, Model Nos. 45012 and 45013, or KD Lamp Company, 1910 Elm Street, Cincinnati, Ohio 45210, Model Nos. 38469-901 and 40268-301, or Weldon Model No. 5050, or approved equal. (See SBMI Standard No. 001 and FMVSS No. 108 for the types and proper location of these lamps.)

Example of an approved equal: Peterson Model - PM122.

1.7.3.1. Clearance Lamps.
1.7.3.2. Identification Lamps.
1.7.3.3. Intermediate Side Marker Lamps **(not required on buses less that 30 feet long).**
1.7.3.4. Side Marker Lamps.

1.7.4. Interior and Stepwell Lamps - Interior lamps shall be installed to properly and adequately illuminate the entire aisle and emergency passageway. The stepwell shall be illuminated with a separate lamp activated by opening the service door. The fixtures shall have white or clear plastic lenses attached to metal receptacles. The stepwell lamp shall also have a metal bezel. The lamps shall be designed for a 12-volt electrical system and shall have installed a minimum 15 candlepower lamp bulb. The fixtures shall be mounted so as to provide adequate illumination of the passenger and driver's compartment. Spacing of the lamp fixtures shall be the option of the bus body manufacturer.

1.7.4.1. Quantity - The quantity of interior lamps required for each bus shall be as listed below:

SCHOOL BUS SIZE (Number of Passengers)	INTERIOR CEILING LAMPS (Minimum Required per Bus)
24 and 35	3
47 and 53	4
59 and 65	5
71, 77, and 83	6

1.7.4.2 Stepwell and interior lamps approved are as follows:

MANUFACTURER	CATALOG NUMBER	
	Dome Lamps	Stepwell Lamps
Arrow Safety Device Co.	043, 036	(Equivalent lamps with metal bezels)
Cardinal Mfg. Co.	1271-G1	
Grote Mfg. Co.	230 (61031)	
K-D Lamp Co.	KD530-12	
Weldon Inc.	8005	

1.7.5. License Plate Lamp - The color, requirements, and mounting of the license plate lamp shall be in accordance with FMVSS No. 108.

1.7.6. Reflex Reflectors and Intermediate Reflex Reflectors - The quantities, colors, requirements, and mounting of reflex and intermediate reflex reflectors shall be in accordance with FMVSS No. 108, except one amber reflex reflector on the front, one amber intermediate reflex reflector on buses 30 feet or longer, and one red reflex reflector on the rear shall be mounted on each side of the bus body. The amber reflex reflectors mounted near the front and on each side of the chassis are required on Texas buses in addition to the reflectors required by FMVSS No. 108.

1.7.7. Tail and Stop Lamps - The quantities, colors, requirements, and mounting of tail and stop lamps shall be in accordance with FMVSS No. 108, except stop lamps shall be 7 inches in diameter and mounted at approximately the belt line level of the bus. A set of minimum 4-inch tail/stop lamps shall be installed below the 7-inch set. Base of lamps shall be metal or durable plastic preferably with screw lens. Lenses shall be secured to lamps by a fastening method which requires a tool to remove the lens. The lamps shall be Grote 78002 or 78102 taillight, KD Lamp Company Models 258-2601 or 258-2605, or approved equal.

Example of an approved equal: Truck-Lite Model 90-91.

1.7.8. Turn-Signal/Hazard Warning Lamps - The quantities, colors, requirements, and mountings of turn-signal/hazard warning lamps shall be in accordance with FMVSS No. 108, except rear turn-signal lamps shall be 7 inches in diameter. The front turn-signal lamps shall be the double-face pedestal type or they shall be of the "wrap-around type" (except single-faced type on forward control buses). They shall be mounted in such a manner so as to be capable of withstanding all normal vibrations. On double-faced pedestals, the front lens shall be amber; the rear lens shall be red or amber, or a shade between red and amber. The operating units and flasher for turn-signals and vehicular hazard warning signals shall meet the requirements of FMVSS No. 108.

1.7.8.1. Installation - If exterior panels are cut to provide an opening for installation of flush-mounted turn-signal lamps, the lamps must have a closed cell sponge flange gasket with a minimum thickness of 3/16 inch. The gasket shall be the full width of the flange on the lamp. Proper installation of the lamp shall be made in order to prevent seepage of moisture into the opening.

1.7.8.2. Wiring - The exposed wiring to the signal lamps shall be enclosed in a one-piece waterproof loom, or equivalent, leading directly from the lamp body to the interior of the bus body. The wiring shall be supported at the lamp body and at intervals of not more than 6 inches until it enters the bus body.

1.7.9. Warning Devices - Each school bus shall be equipped with three triangular warning devices meeting the requirements of FMVSS No. 125. The devices shall be packed three per metal or heavy-duty plastic box, or they may be individually packed in metal or heavy-duty plastic boxes with the three boxes contained within a carrier. Warning devices shall be securely mounted in the driver's compartment. Triangular warning devices furnished shall be approved by the Texas Department of Public Safety.

1.8. LICENSE PLATE HOLDER - A recessed license plate holder shall be mounted on the left rear of the bus body. The recess shall be minimum of 3/8-inch deep at the top and shall be located so that the license plate will receive illumination from the clear lens on the underneath side of the tail light, or by a separate lamp.

1.9. OPENINGS - All openings in the floorboard or firewall between chassis and passenger-carrying compartment, such as for gearshift lever, steering column, and auxiliary brake lever, shall be sealed. All openings between chassis and passenger-carrying compartment made due to alterations by the body manufacturer must be sealed.

1.10. PAINTING -

1.10.1. Preparation and Cleaning -

1.10.1.1. Surface Preparation - The method used in the cleaning and preparation of all surfaces to be primed shall be equal to that specified by Federal Specification TT-C-490B for equivalent use. The final preparation for priming shall include a careful inspection to make certain that all surfaces to be primed will permit optimum adhesion of all paint films.

1.10.1.2. Surface Cleaning - All interior and exterior panels and rub rails to be painted or coated shall be thoroughly cleaned to remove all rust, grease, weld slag, and other foreign material prior to priming. Any welds on the components for the bus body or chassis shall be dressed, sanded, buffed, and thoroughly cleaned to remove any slag and to properly prepare the welds for priming. After proper cleaning, these components shall be thoroughly rinsed. Neither the cleaning process nor the rinses shall impair the zinc phosphate coating of the panels or rub rails.

1.10.2. Primer Coat - After the components have been thoroughly cleaned and prepared as described above, they shall be totally primed and dried. These components may be primed and dried either prior to or after installation. All components such as rivet or bolt heads and damaged areas shall be thoroughly cleaned and primed.

NOTES: Components of the body frame system need not be primed, except for welds. All processes and methods used in the priming operation shall be in accordance with the best recognized industrial practices. Primers shall be those recommended by the paint manufacturer supplying the finish coat enamels. Primers may be any color.

Clear-coated panels are required below the passenger windows and in the stepwell (see Par. E.2.9.).

1.10.3. Finish Coat - After all interior and exterior panels and rub rails have been prepared, cleaned, and primed as specified above, they shall be finished with a first quality baking enamel, applied and baked according to the paint manufacturer's instructions. These enamels, when applied over the paint manufacturer's recommended primer, shall have properties equal to or better than those specified by Federal Specification TT-E-489F, Class B. Both interior and exterior enamel finish coats shall have a minimum dry film thickness of 2 mils, when tested with a "dry film thickness gauge" (such as the "Elcometer Dry Film Thickness Gage," Gardner Laboratory, Inc., Bethesda, Maryland 20014) conforming to Federal Specification TT-C-490B. All processes and methods used in the enamel finish coat operation shall be in accordance with the best recognized industrial practices. **In no instance shall the enamel finish coat be applied over an unprimed surface.**

NOTE: Alternate methods for preparing metal surfaces and painting procedures will be considered on an individual basis. Manufacturers shall submit their procedural data to the Specification Section of the Commission for approval where methods are used that differ from those specified above.

1.11. **UNDERCOATING** - Undercoating is required to provide for insulation, sound deadening, protection from road minerals, and rust prevention, as applicable, and shall meet the following:

1.11.1. Application - The entire underside of the bus body, including floor members, wheelwells, side panels below the floor level, and all metal fenders or fenders with metal liners shall be coated with 1/8-inch thick material as specified above. The undercoating shall be applied in accordance with the undercoating manufacturer's instructions. **Do not cover up or obliterate the chassis identification plate (see Par. A.6.4.3.).**

1.11.2. Material - Insulating and undercoating materials shall be an asphalt base underbody coating conforming to Federal Specification TT-C-520B, such as R-477-139, manufactured by Daubert Chemical Co., Chicago, Illinois 60638 or Lion Nokorode Emulsion 331 as manufactured by Lion Oil Company, El Dorado, Arkansas 71730, or an approved equal. An example of an approved equal is Tectyl MC121B, manufactured by Ashland Petroleum Company, Box 391, Ashland, Kentucky 41101, applied to a dry film thickness greater than 20 mils.

1.12. **WIRING** - All wiring shall conform to the current standards of the SAE. All connections shall be made by soldering or by an industry-approved connector. All wires shall be insulated and shall be enclosed in a fibrous loom, or equal, for protection from external damage and short circuits. The wires shall be securely attached to the body and chassis at interval of 24 inches or less.

1.12.1. Accessory Wiring - Body-installed accessories shall be wired from the battery through a low voltage solenoid cut-off switch operated by the ignition key except for the eight light warning system and hazard warning lights.

1.12.2. Color and Number Coding - A system of color and number coding shall be used and an appropriate identifying diagram shall be provided together with the wiring diagram provided by the chassis manufacturer.

The following body interconnecting circuits shall be color coded as noted:

FUNCTION	COLOR
Left Rear Directional Signal	Yellow
Right Rear Directional Signal	Dark Green
Stoplights	Red
Backup Lights	Blue
Taillights	Brown
Ground	White
Ignition Feed, Primary Feed	Black

The color of the cables shall conform to SAE J1128

1.12.3. Fusing - Each circuit, except starting and ignition, shall be fused separately or shall have an adequate circuit breaker. Two extra fuses for each size of fuse installed on the bus by the body manufacturers, shall be conveniently mounted on the bus body.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

1.12.4. Main Circuits - The electrical system wiring shall have at least nine main circuits:

(1) Head, tail, stop (brake), and instrument panel lamps.
(2) Clearance and stepwell lamps.
(3) Dome lamps.
(4) Starter motor.
(5) Ignition and emergency door signal.
(6) Turn-signal (directional).
(7) Alternately flashing signal lamps.
(8) Horn.
(9) Heater and defroster.

E.2. CONSTRUCTION -

2.1. **GENERAL REQUIREMENTS** - 24- through 83-passenger school buses shall meet or exceed the bus body joint strength requirements of FMVSS No. 221. The bodies shall be reasonably dustproof and watertight. The main steel components are listed below and their requirements are listed in Table 9. They shall be constructed of Type 1 steel except as noted there:

2.1.1. Components - The main structural components of the body shall consist of:

2.1.1.1. **The Body Frame System** - posts, bow frames, strainers, front and rear framing, longitudinal frame members, and emergency door posts.

2.1.1.2. **The Exterior Paneling** - side panels, rub rails, service doors, emergency doors, skirts, roof panels, window jambs (post caps), window sills, and front and rear panels including front cowl.

2.1.1.3. **The Floor System** - floor panels, main cross members, auxiliary cross members, wheelhousing, steps, and stepwell bracing.

2.1.1.4. **The Interior Paneling** - side and ceiling panels.

2.1.2. Body-Chassis Attachment - The body shall be attached to the chassis frame by means of U-bolts with 7/16" diameter threads and a minimum 10,000 lbs tensile pull strength per arm, and the manufacturer's standard clips to prevent slippage between the chassis frame and the bus body. The U-bolts shall be fitted with lock washers and nuts and, after the nuts have been securely tightened, the threads of each U-bolt shall extend a minimum of 1/2 inch past the nuts. Each bus shall be furnished with the following as indicated:

2.1.2.1. Body-Chassis Insulation - Anti-squeak material in continuous strips or rubber pads shall be permanently and firmly attached to the frame rails or cross members to insulate chassis from the body.

2.1.2.2. Other Fastening Devices - All other main cross members (not attached by U-bolts) on all sizes of bodies shall be attached to the chassis with the manufacturer's standard fastening devices where possible. Shear bolts or other equally effective devices approved by the Specification Section of the Commission, may be used in addition to U-bolts and standard clips to eliminate slippage.

2.1.2.3. U-Bolt - Bus bodies shall be attached to the chassis with U-bolts. The number used and their placement shall be as follows:

BUS SIZE*	NO. OF U-BOLTS, Min*	PLACEMENT
24	4 (2 on each frame rail)	1/3 and 2/3 length of bus
35, 47, & 53	6 (3 on each frame rail)	1 at each end; one in center
59, 65, 71, 77, & 83	8 (4 on each frame rail)	1 at each end; one about one-third and one about two-thirds of length of bus.

*NOTE: School buses equipped with any combination of wheelchair lift positions and conventional seats shall have as a minimum, the number of U-bolts as if the bus were equipped with <u>all</u> conventional seating (e.g., a 71-passenger school bus body equipped with any combination of wheelchair positions and conventional seats shall have at least 8 U-bolts (four installed on each frame rail).

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

TABLE NO. 9

STEEL COMPONENTS
NOMINAL METAL THICKNESSES AND ZINC COATING DESIGNATIONS

ITEM NUMBER	COMPONENTS	THICKNESS, in	METAL ZINC-COATING DESIGNATION
1	Bows, Frames	.0635	G60
2	Bows, Roof	.0635	G60
3	Cowl, Front	.0635	G60
4	Doors, Emergency and Service:		G60
4a	Exterior Panel	.0396	G60
4b	Interior Panel	.0336	G60
5	Door Posts:		
5a	Emergency Door	.0785	G60
6	Floor Panels	.0785	G60
7	Longitudinal Frame Members:		
7a	Floor Line	.0635	G60
7b	Seat Line	.0635	G60
7c	Belt Line	.0635	G60
7d	Window Header Line	.0635	G60
8	Panels, Exterior:		
8a	Front	.0396	G60
8b	Rear	.0396	G60
8c	Roof	.0396	G60 or A60
8d	Side	.0396	G60 or A60
8e	Skirts	.0396	G60
9	Panels, Interior:		
9a	Headlining	.0336	G60 or A60
9b	Front Lap	.0336	G60 or A60
9c	Rear Lap	.0336	G60 or A60
9d	Lower (below windows	.0336	G60 or A60*
10	Posts, Side	.0635	G60
11	Rub Rails:		
11a	Skirt Line	.0635	G60
11b	Floor Line	.0635	G60
11c	Seat Line	.0635	G60
11d	Window Line	.0396	G60
12	Wheel Housing	.0635	G60
13	Window Sills	.0396	G60**

*NOTE: Lower interior embossed panels (Item No. 9d) and stepwell wall panels shall be clear-coated galvanized steel, ASTM designation A446-76, or Galvalume, aluminized steel, or aluminum over steel.

**NOTE: It is mandatory that all components listed in Table No. 9 be of the following types of steel, unless otherwise specified, and except Item No. 13 may be of aluminum alloy 6063-T6 having a minimum thickness of 0.062 inch. Any and all other metal components not listed in Table No. 9 may also be zinc-coated steel:

TYPE I (Regular) - ASTM Specification A525, coating designation G60, as specified, mill zinc-coated steel. Coated steel, except components not to be primed and painted, shall have a smooth minimized spangle surface which has been zinc phosphate treated by the steel mill or by the bus body manufacturer.

TYPE II (Alloyed) - ASTM Specification A525, coating designation A60, mill zinc-coated steel which has been zinc phosphate treated by the steel mill or by the bus manufacturer.

Standard ANCI tolerances allowed for metal thickness requirements.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

2.1.3. Body-Cowl Attachment - Buses equipped with chassis manufacturer's cowl shall be furnished with the body securely attached to the rear face of the chassis cowl with a minimum of 9 bolts, nuts, and lock washers. On all such buses the junction between cowl and body shall be sealed to form a gastight and watertight seam. The sealant used shall be either the best grade of molded or extruded rubber weather stripping or a good quality, pressure applied, silicone elastomer sealant.

2.1.4. Bus Body Length - The bus body shall extend to, or farther than, the end of the chassis frame so that all main cross members and auxiliary cross members will rest upon the chassis frame. The distance from the end of the chassis frame and the rear of the body shall not exceed 6 inches.

2.1.5. Caulking - A flexible, tenacious, high quality caulking compound or adhesive shall be applied to the top of all rub rails, all unwelded metal joints, and to any place where moisture could enter through the exterior panels. This does not include the fresh air intake or heater or drain openings at the bottom of the rub rails. The compound shall be applied to the required areas in a neat and workmanlike manner without voids or skips.

2.1.6. Chassis Frame Alterations - The body manufacturer shall not in any manner alter the 24- through 83-passenger chassis frame except to cut off the rear portion of the frame where necessary to weld bumper braces, and to lengthen the frame in order to comply with the requirements of Par. F.3.1. None of the rivets in the chassis frame shall be cut flush with the frame or removed. The body manufacturer may alter the chassis frame to adapt standard chassis to forward control. (Any change must have body manufacturer's warranty.)

2.1.7. Exhaust Pipe Extension - The body manufacturer shall furnish and install an exhaust pipe extension when necessary in order to insure compliance with the chassis requirements of the exhaust system (see Par. F.5.5.). The tail pipe shall not extend beyond the rear bumper.

2.1.8. Fasteners, Bolts and Rivets - All bolts and rivets used in the manufacture of the school bus body shall be high strength metal. All bolts shall be equipped with lock washers or other acceptable devices to prevent loosening under vibration. All bolts, nuts, and washers except U-bolts, their nuts and washers, shall be parkerized, cadmium-plated, or otherwise rustproofed.

2.1.9. Fasteners, Other - Sheet metal screws or self-tapping bolts of any type shall not be used in the construction of bodies except:

2.1.9.1. Alignment* of doors or in conjunction with rivets, welds, or bolts for compliance with FMVSS No. 221, as applicable, or,
2.1.9.2. Attachment of exterior mirrors in certain cases (see Par. E.3.8.5.), or,
2.1.9.3. Electrical wire moldings and light fixtures
2.1.9.4. Installation of header pads over the doors, or
2.1.9.5. Installation of rub rails or emergency door handles and latches where it is impossible to use rivets or bolts, nuts, and lock washers and then only when these fasteners are used in conjunction with the manufacturer's standard metal adhesive which is used to meet joint strength requirements, or,
2.1.9.6. Interior panels which must be removed to give accessibility to other interior or concealed components, or,
2.1.9.7. Seat construction (See Par. E.2.13.5.2.), or,
2.1.9.8. Window frames when applied with the metal adhesive.

*When self-tapping bolts are used to align doors, they shall be tack-welded at the head or applied with the metal adhesive and shall not exceed the number of rivets, or bolts, nuts, and washers installed in the door hinges.

2.1.10. Front Body Section, Semi-forward Control Bodies - On semi-forward control 24-through 71-passenger buses, the front body section of the school bus from the windshield forward shall be of the bus body manufacturer's standard design and shall contain, but not be limited to, the following components:

2.1.10.1. Fenders - Properly braced fenders with the total spread of the outer edges exceeding the total spread of the front tires when the front wheels are in the straight-ahead position.

2.1.10.2. Grille - A sufficiently reinforced grille assembly.

2.1.10.3. Hood - Hood cover with latching mechanism providing access to the forward part of the engine.

2.1.10.4. Lamps - Headlamps and parking/turn-signal lamps as required by FMVSS No. 108.

2.1.11. Fuel Filler Opening - The body manufacturer will provide an opening in the body panel of sufficient size to allow easy access and entry of fuel nozzle to the fuel tank filler neck opening. This opening in the panel must be so positioned that the filler neck, when viewed at right angles from the side, is approximately centered in the cut-out. This opening shall be provided with a hinged cover so designed and constructed to remain open when fueling is in progress and remain in a totally closed position at all other times (see Par. E.2.10.3.1.).

2.1.12. Identification Plate - Each body shall bear in a prominent place a permanently attached plate showing the name of the manufacturer and the body serial number (see Par. A.6.4.2.).

2.1.13. Steering Wheel Placement - There shall be at least 2 inches clearance between the steering wheel and the cowl, instrument panel, or any other surface.

2.1.14. Wood - The use of wood shall be limited to the construction of passenger seats, seat backs, or header pads, and the bottom of any tool compartment or to insulate floors.

2.2. **ACCESS PANELS** - Any panel used for access to the engine radiator or radiator overflow container and installed in the passenger compartment shall have a keyed lock. (This does not include the engine cover.)

2.3 **BATTERY COMPARTMENT** - If the battery is mounted on the chassis frame (which is required on diesel-powered buses), the bus body manufacturer shall provide a battery compartment beneath the floor of the bus body. This compartment shall be a skirt type container, reinforced and equipped with a pullout receptacle and an outside access door. The battery compartment shall provide complete weather protection for the battery as well as total access for servicing (see Par. F.4.2.4.). Battery cables of sufficient length shall be provided to accommodate the mounting of the battery in this compartment, and the body manufacturer shall mount the battery in the compartment. This compartment is not available on rear engine buses.

2.4. **BODY FRAME** - The complete body frame shall be formed, welded, riveted, or lock bolted, assembled and constructed in accordance with recognized engineering practices within the bus body industry.

2.4.1. Design - The frame shall have a formed shape with a minimum cross sectional depth of 1-1/8 inches. Frame members, running from one side main cross member to the other side main cross member, may be continuous bow frames, or they may consist of side posts and roof bows. If side posts and roof bows are used, every pair of side posts must be connected by a roof bow to form the equivalent of a continuous bow frame. The side posts shall be set on not more than 30-inch centers, except that one side post and bow or one bow frame may be set on a maximum of 38-3/4 center, or three bow frame sections not exceeding 36-1/2 inches may be used in any one body (up to four 38-3/4 inch body frame sections may be used for Forward Control Rear Engine buses ONLY). Each of the side posts or bow frames shall be securely welded, riveted, or lock bolted to the floor system at each main cross member or to the longitudinal frame member which is located at the floor line. Each side post and/or bow frame must also be attached, as specified above, to the remaining longitudinal frame members.

2.4.2. Front Frame Section - The front frame shall be a unitized framework of formed sections designed with the necessary stress members required to withstand the torsional stresses set up by or in the chassis. The corner posts shall extend from the bottom of the body to the windshield header and shall not cause or produce a "blind spot" for the driver. The front assembly shall be securely attached to the floor system by lock bolting, welding, or riveting and shall be securely bolted to the chassis cowl in such a manner as to not to cause undue strain (see Par. E.2.4.1.).

2.4.3. Longitudinal Frame Members - The body frame shall have not less than four individual side longitudinal frame members extending the full length of the body (except as interrupted by side posts or when cut for an opening for the wheelhousing). One each shall be located at the floor line, the seat line, the belt line, and at the window header line. The belt line longitudinal member may be replaced by an exterior rub rail, i.e., an extra rub rail in the belt line area. This rub rail shall meet requirements specified under RUB RAILS, Par. E.2.10.

2.4.4. Material - The body frame system (see Par. E.2.1.1.) shall be of the type, grade, and thickness of steel specified in Table No. 9 or approved equal, and shall meet the requirements of FMVSS No. 220.

2.4.5. Rear Frame Section - The rear frame shall consist of a formed sill, two posts (one on either side of the emergency door, extending from the sill to the roof bow and intersected by a rear header at the proper point), and suitable strainers to form a rigid framework. This framework shall be assembled and attached to the floor system by welding, riveting, or lock bolting.

2.5. EMERGENCY EXITS - Texas school buses shall be provided with emergency exits as listed below:

2.5.1. EMERGENCY DOORS - The emergency door shall be of the type, grade, and thickness of steel specified in Table No. 9 or approved equal. Emergency doors on buses furnished to this specification shall be equipped with doors meeting the requirements below. Emergency doors shall be furnished with upper glass panels, permanently closed, set in rubber or sealed against rubber. (See Par. E.2.19.2. for glazing requirements and Par. E.1.4.4. for lettering.) No seat or other object shall be placed in the body that restricts the passageway to the emergency door to less than 12 inches. There shall be no steps leading to the emergency door.

2.5.1.1. Attachment - The hinges for the emergency doors shall be attached with rivets or bolts, nuts, and lock washers. Metal screws or self-tapping bolts are not acceptable. Metal screws may be used for alignment of doors while installing rivets. Self-tapping bolts may be used for alignment if the bolts heads are tack-welded to the hinges (see Par. E.2.1.9.1.).

2.5.1.2. Design - The emergency door on all except rear-engine buses* shall be located in the center of the rear of the body and shall have a minimum horizontal opening of 30 inches and a minimum vertical opening of 48 inches measured from the floor level. The door shall be hinged on the right side of the body (forward side for rear engine buses), shall open outward, and shall be designed to permit opening from both inside and outside of the bus. It shall be properly sealed against moisture and dust.

*A left rear emergency door meeting the requirements of FMVSS No. 217, shall be provided on rear engine buses.

2.5.1.3. Door Holding Device - A means (device) shall be provided to hold the swing-out type door(s) in the fully opened position (90° minimum).

2.5.1.4. Glass Panels - The glass in the emergency door shall have an area of not less that 299 square inches and shall be set solid in a waterproof manner (see Par. E.2.19.1.1.). The installation of glass in the lower portion of the door is required and shall meet the same requirements (lower glass panels not required in the emergency doors of rear engine buses). The lower glass panels shall be the body manufacturer's standard size. These glass panels shall be installed securely to prevent removal by hand.

2.5.1.5. Header Board - The head impact area on the inside at the top of the emergency door shall be protected by an energy-absorbing, padded header board, 3 inches wide and one inch thick, extending the full width of the emergency door to prevent injury when accidentally impacted.

2.5.1.6. Latch - The emergency door shall be equipped with a slide bar rack and pinion (cam) operated latch. The slide bar shall be approximately 1-1/4 inches wide and 3/8-inch thick and shall have a minimum stroke of 1-1/8 inches. The slide bar shall be spring loaded so as to retain the bar in the closed position and have a minimum of one inch of horizontal bearing surface beyond the edge of the door frame when the door lock is in a latched position.

2.5.1.7. Latch Handle - The movement of the lock handle through its full arc of operation shall not be obstructed by, or extended into the area behind the rear seats at the emergency door. The handle, when in the closed position, shall meet the requirements of FMVSS No. 217. The design of the latch handle shall allow quick release, but shall offer protection against accidental release. Control of the fastening devices from the driver's seat shall not be permitted. A pull handle shall be installed on the inside of the emergency door so that the door can be securely closed for positive fastening. Provisions for opening from the outside shall consist of a handle (device) designed to prevent "hitching a ride" yet allowing the door to be opened when necessary. The outside handle, when in the closed position, shall extend vertically downward from its pivot center.

2.5.1.8. Switch - The emergency door latch shall be equipped with a heavy-duty electric plunger-type switch connected to a warning buzzer located in the driver's compartment. The switch shall be enclosed in an adequately protected case, and wires leading from the switch shall be concealed in the walls. The switch shall be mounted plumb, parallel, and perpendicular to the striker plate of the lock slide bar. The switch shall be installed so that the buzzer will sound before the door handle is turned far enough to permit the door to open. The switch shall be Cole-Hersee's No. 9118, having an upset end (knob) on the plunger head.

2.5.2. Side Emergency Exits and Roof Hatches - Texas school buses shall be provided with side emergency exits and roof hatches. These side emergency exits may be either side emergency doors meeting the requirements of Par. E.2.5.1. above (except that they shall be hinged on the forward side) or they may be push-out type side windows meeting the requirements of Par. E.2.19.1.5. and FMVSS No. 217. Single emergency exits shall be installed near the center of each side, except that on Type D buses, they shall be installed near the center of each side, but in the rear portion in accordance with Federal Standards. When so specified in the Invitation for Bids (see Option 39), additional push-out windows shall be furnished (quantity shall be specified by school district). Two or more emergency exits per side shall be as "equally spaced" as practical. Roof hatches shall be the body manufacturer's standard. They shall be equipped with an external and internal handle. Texas school buses shall be provided with <u>minimum</u> side emergency exits and roof hatches as follows:

<u>BUS CAPACITY</u>	<u>MINIMUM REQUIRED EXITS/HATCHES</u>
Up to 22-passengers	1 emergency exit per side and 1 roof hatch
23- thru 65-passengers	1 emergency exit per side and 2 roof hatches
Larger than 66-passengers	2 emergency exits per side and 2 roof hatches

2.6. **FLOORS** - The floor system (see Par. E.2.1.1.3.) shall be of the type, grade, and thickness of steel specified in Table No. 9 or approved equal (see Par. E.3.1. for requirements for access port to fuel sending unit).

2.6.1. Construction and Installation - The floor panels shall run the full width of the floor and shall be supported on all outside edges by a longitudinal frame member. The floor panels shall be welded, riveted, or bolted to the main and auxiliary cross members and shall be joined so as to form a leakproof and dustproof floor. The main and auxiliary cross members shall extend the full interior width of the floor panels. The side posts or bow frames shall be securely welded, riveted, or bolted to the floor system and to the longitudinal frame members or gussets.

2.6.2. Cross Members - The cross members shall be spaced not more than 10 inches center-to-center. The floor panels and cross members shall be designed so as to completely and adequately support all fixed and changeable loads under all operating conditions without deformation of the underbody structure, strains to body, or fractures of member joints. The design and strength of the understructure shall be sufficient to eliminate the necessity of installing outriggers attached to the chassis except at the front entrance. The undersurface of the entire floor structure, including wheelhousing and stepwell, shall be sprayed with material at least 1/8-inch thick conforming to that specified in Par. E.1.11.

2.6.3. Insulation - When air conditioning is ordered (see Option No. 1 and Par. E.1.2.) the floor shall be covered with 5/8-inch nominal thickness A-C or B-B exterior grade plywood manufactured in accordance with U.S. Product Standard PS 1-83. CDX interior grade plywood with exterior glue is acceptable when all surfaces including the edges of the wood are covered or sealed against the exterior environment. See Par. C.2.5.1. for plywood installation requirements.

2.7. FLOOR COVERING -

2.7.1. Aisle Material - Floor covering in the aisle shall be the aisle type, fire-resistant rubber or equivalent, and shall be nonskid, wear-resistant, and ribbed. Minimum overall thickness shall be 3/16 inches when measured from tops of the ribs. Rubber aisle floor covering shall meet Federal Specification ZZ-M-71D.

2.7.2. Installation - Floor covering (except that on the toeboard) shall be permanently bonded to the floor with waterproof adhesive material and shall not crack when subjected to sudden temperature changes. All seams shall be sealed with waterproof sealer.

2.7.3. Trim - Seams shall be covered with extruded aluminum metal strips of a minimum 3/16 inches high and 1 inch wide that shall be installed on each side of the aisle, the full length of the aisle, so as to secure both the edges of the aisle covering and adjoining edges of the underseat covering. Each aisle strip shall consist of not more than three pieces of the metal stripping. The strips shall be secured to the flooring with flush-mounted flat or low profile oval head screws; holes for the screws shall be countersunk. The screws shall be placed not more than 9-inches apart for the full length of the metal strips except that the ends of each piece of stripping shall have screws placed at not more than 3/4 inches from each end. Screws may be placed 9-1/2 inches apart only to avoid interference with floor sill members.

2.7.4. Underseat Material - The floor in the underseat area (including wheelwells, and the areas under the driver's seat, wheelchairs, and toeboard except transmission inspection plate) shall be covered with fire-resistant rubber floor covering or equivalent having minimum overall thickness of 1/8 inches. Floor covering on toeboard shall be held in place by trim strip or molding.

2.8. PANELS, EXTERIOR -

2.8.1. Attachment and Installation - All exterior panels shall be attached to bow frames and strainers so as to act as an integral part of the structural frame. They shall be installed by lapping and riveting, lapping and bolting, or by flanging and bolting and in such a manner as to form watertight joints. The exterior side panels shall be installed either vertically or longitudinally. Vertical panels shall be one-piece and shall extend from the window line to or below the floor line. Longitudinal panels shall be installed starting at or below the floor line and extending upward to the window line with each ascending panel overlapping the preceding panel. Rub rails shall not be considered as part of the paneling for covering the side except for pressed-in window rails.

2.8.2. Design - The front and rear exterior panels shall be formed into the desired contours to give a smooth, pleasing appearance to the bus. The front and rear exterior roof panels shall be of not more than three pieces welded or riveted together to form a continuous piece over the front and rear frame.

2.8.3. Joints - Joints shall meet the requirements of FMVSS No. 221.

2.8.4. Material - All exterior panels (see Par E.2.1.1.2.) shall be of the type, grade, and thickness of steel specified in Table No. 9 or approved equal.

2.8.5. Undercoating - All exterior panels shall be completely sprayed on the inside of the main exposed surfaces, and shall featheredge to the edge of the attaching members, with 1/16-inch thick material conforming to that specified in Par. E.1.11. The spraying shall be done after the panels are installed.

2.9. **PANELS, INTERIOR** - All interior wall and ceiling panels shall be steel and of the body manufacturer's standard design except the panels beneath the windows shall be clear-coated galvanized embossed steel meeting ASTM A 446. Also the stepwell and riser panels in the service door entryway shall be clear-coated galvanized steel (embossing not required). Galvalume, aluminized steel, and aluminum over steel panels are acceptable for use beneath the windows and in the entryway.

2.9.1. Attachment - All interior panels shall be attached to the frame structure by bolts, rivets, or by any well-designed method utilizing self-locking panels, or locking panel strips. Regardless of the method used, the panels shall be attached so that vibration, rumbling, and popping will be at a minimum.

2.9.2. Design - Front and rear panels shall be formed to present a smooth, pleasing appearance. If the ceiling is constructed so as to contain lapped joints, the forward panel shall be lapped by the rear panel and all exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges.

2.10. **RUB RAILS** - Four separate, one-piece, continuous rub rails of the type, grade, and thickness of steel specified in Table No. 9 (or approved equal), shall be installed on the body as described below. The minimum finished width of all rub rails shall be 4 inches:

2.10.1. Construction - The rub rails shall be of ample strength to resist impact and to prevent crushing of the bus body and shall be a flanged-formed channel, longitudinally fluted or corrugated rib surface. Ends shall be (1) smoothly closed, or (2) closed by a rounded end cap which shall be butt- or flash-welded to the rub rail, or (3) closed by a rounded end cap inserted with an approximate one-inch sleeve inside of the rub rail, riveted in position at the top and bottom of the rub rail flange, and sealed in the same manner as the top flange of the rub rails.

2.10.2. Drainage - The bottom edge of each rub rail (except the pressed-in-type which may be used near the window line) shall have provisions for drainage of accumulated moisture. One of the following drainage methods shall be used:

2.10.2.1. Slots - The bottom flange of the rub rail shall have a minimum of one inch by 0.32 inch formed slots spaced on not more than 12-inch centers, or

2.10.2.2. Slots or Slots - One 1/4-inch diameter slot or hole per foot in the lowest part of the rub rail drilled prior to the priming, painting, and installation of the rub rail shall be provided. Holes drilled after rub rail installation or after priming and painting are not acceptable. Formed slots are preferred over drilled or cut holes.

2.10.3. Installation - All rub rails shall be bolted or riveted on top and bottom to each side post and riveted on top and bottom to the exterior paneling between the side posts (see exception in Par. E.2.1.9.5.). Provisions for one-piece rails may be accomplished by butt- or flash-welding. All welds, including those for the end caps, shall be dressed, sanded, and buffed. These rub rails shall be installed on both sides of the bus body as follows:

2.10.3.1. Floor and Skirt Level - The floor and skirt level rub rails and the additional rub rail furnished in lieu of one longitudinal frame member shall be installed the full outside length of the body (except at wheelhousings) on the right side from the service door to the rear corner radius and on the left side from the point of curvature near the outside cowl to the rear corner radius. One of the floor level rails may be cut to provide an opening for the gas tank filler neck only if fuel tank furnished to meet FMVSS No. 301-75 requires the opening to be enlarged, or to meet the requirements in E.2.1.11.

2.10.3.2. Seat Level - The seat level rub rail shall be installed from the service door completely around the bus body (except for emergency door and rear engine bus) to the point of curvature near the outside cowl on left side. The rails may be two-piece with the joint being near the rear side of the bus body. The rail extension shall be joined to the continuous side rail by one of the following (1) butt welding, (2) jogged lapped by not less than one inch and riveted, or (3) butted with a sleeve riveted over the joint. When joining is by lapping or fastening with a sleeve, the joint must be made at the rearmost body side post or preferably, the second post from the rear.

2.10.3.3. Window Level - The window level rub rail shall be installed the full outside length of the body on the right side from the service door to the rear corner radius and on the left side from the point of curvature near the outside cowl to the rear corner radius. The splice, if necessary, shall be located at the body post behind the rear wheelhouse, by lapping the full width of the supporting part of the post.

2.10.4. Location - One rub rail shall be installed at the skirt level, one at or near the floor, one at or near the seat level, and one near the window line. One additional rub rail may be furnished in lieu of one longitudinal frame member (see Par. E.2.4.3.).

2.10.5. Sealing - The top joint of the rub rail shall be sealed with a caulking compound or adhesive as specified in Par. E.2.1.5.

2.11. **SEAT BARRIERS** - Seat barriers shall be furnished and installed in accordance with FMVSS No. 222. The front barriers shall not infringe upon the area required for safety and operating equipment.

2.11.1. Handrail - A grab handle or handrail of sufficient length to assist entering and exiting passengers shall be installed on the forward side of the right barrier. The outside surface of this handle shall be stainless steel, polished aluminum, or chrome-plated steel. (see Par. C.2.14.4.)

2.11.2. Knee Space - Knee space between these barriers and the front of each front passenger seat shall be at least 24 inches for 24-passenger bus, at least 24-3/4 inches for the 71S- and 83-passenger buses, and at least 25 inches for all other 35- through 77-passenger buses when measured from the modesty panel to the front of the seat back at the center of the seat approximately 4 inches above the seat cushion.

2.11.3. Upholstery - Barriers shall be covered with upholstery meeting the requirements of Par. C.2.12.3.6.

2.12. **SEATING REQUIREMENTS, DRIVER** -

2.12.1. Design - The base of the driver's seat shall be of the adjustable pedestal type or the platform type having an adjustment range of approximately 4 inches "Fore and Aft," and a separate minimum one-inch vertical adjustment. The back of the driver's seat shall be heavily padded and form-fitted.

2.12.2. Driver's High Back Seat, Optional - When so specified in the Invitation for Bids, a high back driver's seat shall be provided with a minimum seat back adjustment of 15 degrees and with a head restraint to accommodate a 95 percentile adult male (as defined in FMVSS No. 208) and shall meet all of the applicable requirements of Par. E.2.12.1. above.

2.12.3. Driver's Seat Access - There shall be unrestricted access to the driver's seated position from either the aisle or the right service door without the operator having to climb over the engine cover or any other object. The minimum space between the driver's seat (in the rearmost position) and the engine cover or other object (except seat belt anchorage) at the floor and at the seat level shall be not less than 6 inches.

2.12.4. Installation - The pedestal or platform shall be mounted with bolts, flat washers, look washers, and nuts except where it is impossible to use bolts and nuts at certain floor points due to main cross members or floor sill interference. Thread-forming or cutting bolts and lock washers may be used at these points.

2.12.5. Seat Belts and Seat Belt Assembly - A Type 2 seat belt assembly conforming to FMVSS No. 209 shall be provided for the driver. The belt assembly shall be equipped with at least one reel-type emergency locking retractor (ELR) for the continuous belt assembly. The location of the seat belt anchorage shall conform to SAE Standard J383 with the driver's seat adjusted to its rearmost position. The anchored ends of the belt assembly shall be fitted with a minimum 6-inch semi-rigid plastic boot which will prevent that portion of the belt between the buckle and the retractor reel from contacting the floor and to keep the belt from hitting the feet of the passengers in the front seat directly behind the driver. The seat belt assembly shall be anchored in such a manner or guided at the seat frame so as to prevent the driver from sliding sideways from under the belt.

2.13. SEATING REQUIREMENTS, PASSENGER - The bus passenger seats shall meet or exceed the knee spacing and crash protection requirements of FMVSS No. 222 and shall conform to the following:

2.13.1. Seat Back Heights - When so specified in the Invitation for Bids (see Option 21), seat back heights shall be increased 4 inches over the seat back heights required by FMVSS No. 222.

NOTE: Seat backs with this option will have heights of approximately 28 inches.

2.13.2. Seat Belts, Passenger, Optional - (see Par. E.3.13.).

2.13.3. Seat Cushions - All 26-inch and all 39-inch seat cushions shall be designed to adequately support, respectively, two and three passenger of 120 pounds each. All seat cushion materials shall meet or exceed the requirements of FMVSS No. 302 and/or California Technical Bulletin 117. The seat cushion shall be either of one-piece construction or may be constructed of more than one piece at the manufacturer's option. The seat cushion unit shall consist of a base, a one- or two-piece polyurethane foam cushion, and upholstery, meeting the following requirements:

2.13.3.1. Base - The base shall be nominal 1/2-inch thick, interior grade, C-D plywood with exterior grade glue, identification index 32/16, manufactured in conformance with U.S. Product Standard PS 1-83 and identified as to veneer grade and glue bond type by the trademarks of an approved testing agency. Plywood with blue stain in sapwood is not acceptable.

Alternatively, the base may be made of "Donnite" material, manufactured by the Donnite Corporation, Flora & Harrison, Plymouth, Indiana 45563, of equal or better strength and thickness.

2.13.3.2. Foam Cushion Assembly, One-Piece Polyurethane Foam -

(i) Construction - The seat cushion dimensions shall be in accordance with the nominal dimensional requirements as shown in Fig. 2.

(ii) Design - The one-piece foam cushion shall be solid polyurethane foam conforming to the physical requirements in Table No. 10 (rebonded or molded polyurethane foams are not acceptable for seat cushion).

TABLE NO. 10

ONE-PIECE CUSHION
PHYSICAL PROPERTIES
(ASTM D 3574)

ITEM	ONE-PIECE SEAT CUSHION
Density, lbs/cubic foot, Min	1.8
Load Deflection, 4" thick @ 25% Indentation, Min	90
Indentation Load, Ratio, 65%/25%, Min	2.3
Compression Set, 50% Deflection (22 hrs @ 158°F), Max.	20
Tensile Strength, lbs/square inch. Min	10
Tensile Elongation, %, Min	150
Tear Resistance, lbs/inch, Min	1.5

2.13.3.3. Foam Cushion Assembly, Two-piece Polyurethane -

(i) Construction - The seat cushion assembly shall be fabricated in accordance with the nominal dimensional requirements as shown in Fig. 2. In the two-piece assembly, the top 1-1/2 inches of the cushion shall be of one continuous foam piece. All parts of the seat cushion and the seat stiffeners shall be securely cemented or otherwise bonded together to form the seat cushion assembly shown in Fig. 2.

(ii) Design - The two-piece foam cushion assembly shall be constructed of unfilled polyurethane foam conforming to the physical requirements in Table No. 11 (rebonded polyurethane foams are not acceptable for seat cushion or seat stiffeners):

TABLE NO. 11

TWO-PIECE CUSHION ASSEMBLY
PHYSICAL PROPERTIES
(ASTM D 3574)

ITEM	SEAT CUSHION	SEAT STIFFENERS
Density, lbs/cubic foot, Min	1.8	2.4
Load Deflection, 4" thick @ 25% Indentation Min	52 ±5	80
Indentation Load, Ratio, 65%/25%, Min	2.3	2.5
Compression Set, 50% Deflection (22 hrs @ 158°F), Max.	10	20
Tensile Strength, lbs/square inch, Min	10	12
Tensile Elongation, %, Min	150	75
Tear Resistance, lbs/inch, Min	1.5	1.5

2.13.4. Seat Frames -

2.13.4.1. Design and Material - The seat frames shall be constructed of steel of the type, size, and gauge necessary to meet the seat load deflection requirements of FMVSS No. 222. Seat frames legs shall be two, four, or six pedestal type. The seat backs shall slope backward to provide a comfortable seating angle. Seat backs that are set in a vertical plane or tilt forward are not acceptable.

2.13.4.2. Painting Requirements - The entire seat frame, except that section of the back frame which is padded and upholstered, shall be thoroughly cleaned, primed, and painted. The paint shall have adhesive qualities which will not permit the removal of the paint by means of the thumbnail-scratch method without first chipping a starting place (see also Par E.1.10.).

2.13.5. Seat Installation -

2.13.5.1. Aisle Width - The minimum aisle width between rows of seats shall be 12 inches except a 30-inch aisle is required if regular seating is provided between the rear emergency door and any wheelchair positions on wheelchair-equipped buses (see Par. G.1.7.3.).

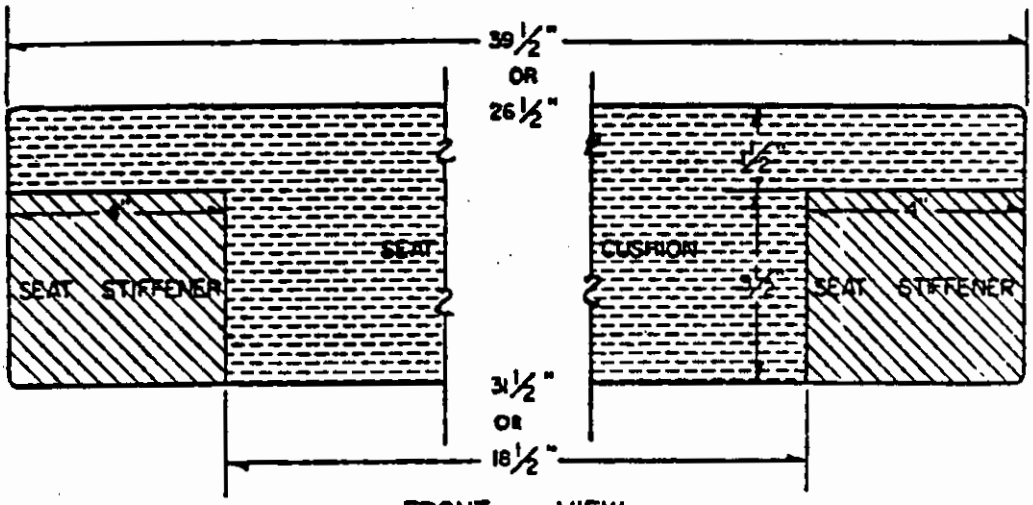
2.13.5.2. Attachment - Each leg shall be attached to the floor with at least 2 bolts, flat washers, lock washers, and nuts, or approved equal. Where it is impossible to use bolts and nuts at certain floor points due to main cross members or floor sill interference, thread-forming or cutting bolts and lock washers may be used.

2.13.5.3. Knee Spacing - Allowing for manufacturing tolerances, Texas requires the maximum allowable knee space on buses consistent with the overall standard body lengths (see Par. A.2.13. for the definition of knee spacing and Option No. 15 for increased knee space on all 24- through 71-passenger buses). These minima are generally not less than the following (see Table No. 8):

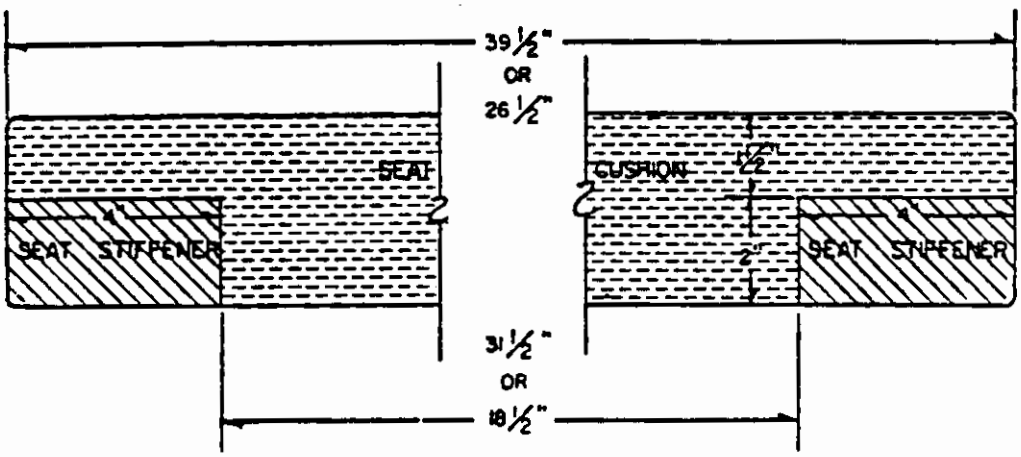
(i) 24 inches for the 24-passenger bus
(ii) 24 3/4 inches for the short wheelbase 71- and the 83-passenger buses.
(iii) 25 inches for all other 35- through 77-passenger buses.

FIGURE 2

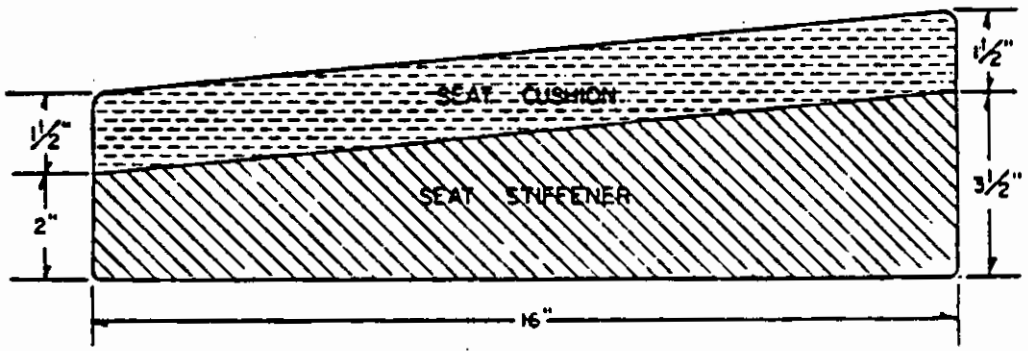
SEAT CUSHION ASSEMBLY



FRONT VIEW



REAR VIEW



SIDE VIEW

2.13.6. Upholstery - The seat cushion and back units shall be covered on top and four sides with a vinyl resin-coated upholstering material as follows:

2.13.6.1. Material - These materials shall be fire-resistant and shall meet or exceed the Boston Fire Block Test in the National School Bus Standards. They shall be artificial leather.

2.13.6.2. Thread - The upholstery material shall be securely sewn with a thread meeting the requirements of Federal Specification V-T-295d. The thread in the needle and the thread in the looper (bobbin) of double thread machines shall be size F, Type II (Twisted Bonded Multiple Cord), and size E, Type I (Twisted Soft Multiple Cord), respectively. The thread used in the needle and through the looper shall be Size F (Monofilament), Type III, for single thread machines.

2.13.6.3. Welting - There shall be welting on exposed seams of the seat back and cushion.

2.14. SERVICE ENTRYWAY -

2.14.1. Design of Steps - The entrance door steps shall be designed so that the first step shall be not less than 10 inches and not more than 14 inches for Type A, B, and C buses and not less than 12 inches and not more than 16 inches for Type D buses, from the ground when the bus is unloaded. Service door entrance may be equipped with two-step or three-step entrance. Risers in each case shall not exceed a height of 10 inches. When plywood is used on a steel floor or step, the riser height may be increased by the thickness of the plywood. (See Par. E.2.6.3. for material requirements.) The stepwell shall not protrude beyond the side body line and shall be fully enclosed to prevent accumulation of ice, snow, and dust.

2.14.2. Entryway Access - There shall be a minimum of 12 inches of unrestricted access from the service door to the center aisle.

2.14.3. Floor Material - All steps and the floor line platform area shall be covered with 3/16-inch rubber metal-backed treads with at least 1-1/2 inch white nosing as an integral piece without any joint. A three-inch white rubber step edge with metal back may be substituted in the floor line platform area. Step tread minimum overall thickness shall be 3/16-inch ribbed design similar to the ribbed design of the aisle rubber. Metal back of tread, minimum 24-gauge cold rolled steel, shall be permanently bonded to ribbed rubber. Grooved design shall be such that said grooves run at 90-degree angle to long dimension of step tread. The rubber portion of the step trends shall have the following characteristics:

2.14.3.1. Show a Durometer or equivalent hardness of 85 to 95.

2.14.3.2. Special compounding for good abrasion resistance and high coefficient of friction.

2.14.3.3. Sufficient flexibility so that it can be bent around a 1/2-inch mandrel both at 130°F and 20°F without breaking, cracking, or crazing.

2.14.4. Handrails - A grab handle not less than 20 inches in length shall be provided and placed in an unobstructed location inside the doorway. The outside surface of this handle shall be stainless steel, polished aluminum, or chrome-plated steel (see Par. C.2.11.1.).

2.15. SERVICE OR ENTRANCE DOORS - The service door shall be of the type, grade, and thickness of steel specified in Table No. 9 or approved equal:

2.15.1. Attachment - The hinges for the service or entrance doors shall be attached with rivets or bolts, nuts, and lock washers. **Metal screws or self-tapping bolts are not acceptable.** Metal screws may be used for alignment of doors while installing rivets. Self-tapping bolts may be used for alignment if the bolts heads are tack-welded to the hinges (see Par. E.2.1.9.1.).

2.15.2. Design - The service doors may be the folding type (i.e., open in the middle) or the folding (or jackknife) type. These doors shall have a minimum horizontal opening of approximately 24 inches and a minimum vertical opening of about 68 inches. The service door shall have upper and lower glass panels (see Par. E.2.15.3. below) to permit the driver to see entering passengers as well as the passenger landing area. These glass panels shall be set in rubber. Vertical closing edge or edges of these doors shall be equipped with rubber or rubberized material to protect passengers' fingers. There shall be no door on the left of the driver. This door shall have a positive latching mechanism to eliminate the possibility of an inadvertent door opening during a frontal collision or roll-over.

2.15.3. Glass Panels - Service or entrance doors shall have glass panels of approved safety glass (see Par. E.2.19.2. for installation requirements). Bottom of each lower glass panel shall be not more than 10 inches from the the top surface of the bottom step. The top of each upper glass panel shall be not more than 6 inches from the top of the door.

2.15.4. Header Board - The head impact area on the inside top of the service or entrance door shall be protected by an energy-absorbing, padded header board, 3 inches high and 1 inch thick, extending the full width of the opening, to prevent injury when accidentally impacted.

2.15.5. Location and Operation -

2.15.5.1. Conventional Bus Doors - The entrance doors for conventional buses shall be operated manually, or **when so specified in the Invitation for Bids (see Option I0)**, actuated electrically, or by air pressure or vacuum and shall allow manual opening in case of an emergency. The door control shall be the hand lever type, driver-operated, and shall be designed to afford easy release and to prevent accidental opening. The two-piece or folding type service door shall be located on the right side near the front of the bus in direct view of the driver.

2.15.5.2. Forward Control Bus Doors - The doors on forward control buses shall be operated either manually or actuated electrically or by air pressure or vacuum, and shall allow manual opening in case of an emergency. If manually operated, the door control shall be the hand lever type, driver-operated, and shall be designed to afford easy release and to prevent accidental opening. The service door shall be located on the right side near the front of the bus. At least two-thirds of its opening width shall be ahead of the point opposite the back of the driver's seat. **When so specified in the Invitation for Bids (see Option 10)**, doors shall be operated by means of electric, air pressure or vacuum, at the manufacturer's option.

2.15.5.3. Semi-forward Control Bus Doors - On semi-forward control buses, the entrance doors shall be operated from controls at or near the bus driver's seated position. The doors shall be operated manually, or actuated electrically or by air pressure or vacuum and shall allow manual opening in case of an emergency. To prevent accidental opening while the bus is in motion, the system shall require at least a 125-pound force applied to its center in order to manually open the door. **When so specified in the Invitation for Bids (see Option 10)**, doors shall be operated by means of electric, air pressure or vacuum, at the manufacturer's option.

NOTE: Powered Service Doors shall be clearly and concisely marked with operating instructions in case of a power failure.

2.16. **SKIRT REINFORCEMENTS** - Side skirts shall be gusseted or braced on not more than 30-inch centers and wherever required for rigidity and to prevent vibration. **If the body sections are authorized to be longer than 30 inches, no more than three sections of skirt reinforcement shall be on centers up to a maximum of 36 inches, or no more than one section shall be on centers up to a maximum of 38-3/4 inches.**

2.17. **VENTILATION** - The bus body shall be equipped with a suitable, controlled ventilation system of sufficient capacity to maintain a satisfactory ratio of outside to inside air under normal operating conditions without opening windows except in warm weather. A static-type, nonclosable exhaust ventilator shall be installed in the low-pressure area of roof.

2.18. **WHEELHOUSING** - The wheelhousing shall be of the type, grade, and thickness of steel specified in Table No. 9 or approved equal. The wheelhousing shall be constructed of a maximum of three pieces and of arched design and shall be attached in such a manner so as to form a waterproof and dustproof seam. The size of the wheelhousing shall be such that tire chains will have proper clearance. The edges inside the bus shall be rounded to prevent injury to the passengers. The wheelhousing shall be such that when attached to the body, the strength of the resulting structure shall be equivalent to or greater than that section of body that has been removed to receive the wheelhousing. (See Par. E.1.11. for undercoating requirements.)

2.19. **WINDSHIELD AND WINDOWS** -

2.19.1. General Design -

2.19.1.1. Emergency Door Windows - The emergency door shall be furnished with an upper and lower glass panels (see Par. E.2.5.1.4.) permanently closed, and set in rubber or sealed against rubber.

2.19.1.2. Rear Window - Rear windows (not emergency door windows)* shall be installed on each side of the rear emergency door. Each rear window glass shall have a minimum area of 140 square inches and shall be set solid in a waterproof manner. These windows shall be installed securely to prevent removal by hand.

*A rear "push-out" window, meeting the requirements of FMVSS No. 217, shall be provided on rear engine buses.

2.19.1.3. Side Window, Driver's - The driver's window shall be a 2-piece window of either of the following types:

(i) Two-piece sliding-sash type - This type will be acceptable only when the bus is equipped with an adequate air scoop to draw outside air into the driver's compartment. When the driver's ventilation is drawn through the heater system, this air shall be shielded from the heat sources and a hot water cut-off valve shall be provided in the driver's compartment.

(ii) Other Type - This type of window shall have the front part opening either in or out and rear part lowering and raising by use of a regulating handle.

2.19.1.4. Side Windows, Passenger, Standard - There shall be either a standard or a push-out type window for each passenger seat except where it is not possible because of the installation of side emergency exits (see paragraphs E.2.5.2. and E.2.19.1.5.). Standard side windows shall open from the top only and shall operate freely. All side windows except the driver's and the service door window, shall be the split sash type with positive latch. **Side windows that can be latched in an uneven position are not acceptable.** They shall be furnished with a latching mechanism which will allow each window to be latched in a position not more than six inches from the top. The passenger side windows shall provide an unobstructed opening 22 inches wide and between 9 and 10 inches high.

NOTE: 77-passenger and 83-passenger rear-engine buses may have one less set of passenger windows than rows of seats.

2.19.1.5. Side Windows, Passenger, Push-out Type - At the manufacturer's option, 24-passenger buses may be provided with one push-out side window in lieu of an emergency exit on each side and 35- through 83-passenger buses may be provided with two push-out side windows in lieu of two emergency exits on each side (see paragraphs E.2.5.1. and E.2.5.2. and Option 39). These windows shall be hinged at the top and shall be positioned for ease of egress. These push-out windows shall be the body manufacturer's standard push-out passenger windows meeting or exceeding Federal Standards.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

NOTE: Push-out windows shall be equipped with an electrical switch connected to an audible signal automatically operated and located in the driver's compartment which shall indicate when the window is pushed out in excess of 1/2-inch. The switch shall be enclosed to prevent tampering. Wires leading from the switch shall be concealed in the walls. No cut-off switch shall be installed in the circuit.

2.19.1.6. Windshield - The maximum width of the windshield center post shall not exceed 2-1/2 inches. There shall be at least 2 inches of clearance between the steering wheel and the windshield, cowl, instrument panel, or any other surface.

2.19.2. Glazing - Glass shall be installed in rubber channel gasket material or approved equivalent material. The glass shall be mounted so that the permanent identification mark is visible from either inside or outside of the bus. **All safety glazing materials shall be approved by the Department of Public Safety.** All exposed edges of glass shall be banded. The glass shall be as follows:

2.19.2.1. Rear and Other Windows - The glass in all other window including the driver's side windows, emergency door windows, and rear (side) windows shall be a minimum of 1/8-inch safety plate glass and shall be AS-2 grade or better as specified in ANSI Safety Code Z26.1.

2.19.2.2. Safety Plate Glass - When so specified in the Invitation for Bids (see Option 16), all windows shall have AS-2 grade or better grade laminated safety plate glass.

2.19.2.3. Side Windows, Passenger - The glass in all passenger side windows (including push-out type emergency exit windows) shall be a minimum of 1/8-inch safety plate glass and shall be AS-2 grade or better, as specified in ANSI Safety Code Z26.1 (see Par. E.2.19.2.4.).

2.19.2.4. Windshield - The windshield shall be minimum 7/32-inch thick safety plate glass and shall be heat-absorbent, laminated AS-1 safety glass meeting ANSI Standard Z26.1, as amended.

2.19.3. Tinting -

2.19.3.1. Side Windows, Passenger - When so specified in the Invitation for Bids (see Option 16), passenger side windows only shall be tinted to minimum 30%, maximum 40% light transmittance using AS-3 grade glass or better. This is defined as "dark tinting" and is not permitted on the windshield or any window used for driving purposes.

NOTE: All safety glazing materials shall be approved by the Department of Public Safety.

2.19.3.2. Windshield - The windshield shall have a horizontal gradient band (tinted) starting slightly above the driver's line of vision with approximately 90% light transmittance and gradually decreasing to a minimum of 70% light transmittance at the top of the windshield, or the entire windshield shall be tinted to meet the requirements of FMVSS No. 205.

E.3. ACCESSORIES, REQUIRED AND OPTIONAL -

3.1. **ACCESS PORT** - An access port with cover plate shall be installed above the fuel sending unit. It shall be of sufficient size to service fuel sending units and fuel pumps installed in the fuel tank. An access port is not required on the 24-passenger bus or on buses with front-mounted wheelchair lifts (see G.1.7.3.).

3.2. **BACKUP ALARM** - An automatic, audible backup warning alarm meeting the requirements of Type C, 97 dB(A), SAE J994b (except for 12-volt system) shall be installed behind the rear axle.

3.3. **DEFROSTERS** - Defrosting equipment shall keep the windshield, the window to the left of the driver, and the glass in the service door clear of fog, frost, and snow, using heat from the heater and circulation from fans. All defrosting equipment shall meet the requirements of FMVSS No. 103. Any circulating fan used in defogging and installed on the curb side of the bus front shall be mounted on the windshield header so as to protect the fingers, hair, and clothing of entering and departing passengers.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

3.4. EMERGENCY EQUIPMENT - 24- through 83-passenger school buses shall be equipped with the following emergency equipment:

3.4.1. Body Fluid Cleanup Kit - Each bus shall be provided with a removable and moisture-proof body fluid cleanup kit. It shall be properly mounted and identified as a Body Fluid Cleanup Kit. This kit shall contain as a minimum, the following items mounted in a removable metal or hard plastic kit:

1 - 15 oz. chlorine-type absorbent deodorant material (or equal)
1 - 12 oz. germicidal spray disinfectant
2 - pair disposable latex gloves
4 - 18" x 18" absorbent towels
1 - plastic pick-up spatula
1 - plastic hand broom
1 - plastic dust pan
2 - 14" x 19" disposal bags and ties (waterproof)
2 - adhesive "BIO-HAZARD" labels
1 - 12 oz. deodorant spray
4 - individually wrapped, cold sterilization wipes in foil-lined pouches
2 - paper respiratory masks
1 - metal or hard plastic container identified as "BIO-HAZARD" with black symbol and lettering on orange mountable case

3.4.2. Fire Extinguishers - School buses shall be equipped with a fire extinguisher, as listed below:

3.4.2.1. Standard Fire Extinguishers - Each bus shall be equipped with at least one refillable stored pressure Multipurpose Dry Chemical type (or approved equal) fire extinguisher of minimum 5-pounds capacity, mounted in an extinguisher manufacturer's automotive type bracket, and located in the driver's compartment in full view of and readily accessible to the driver. The fire extinguisher shall bear the Underwriters Laboratory Listing Mark of not less than 2A 20-B:C rating. Extinguishers shall be furnished with a hose, pressure gauge, and metal head.

3.4.3. First Aid Kit - Buses shall have a removable metal first aid kit container mounted in an accessible place within the driver's compartment. The compartment shall be marked to indicate the location of the kit. Number of units and contents for each kit shall be as follows:

2 - 1 in x 2 1/2 yds. adhesive tape rolls
24 - sterile gauze pads 3 in x 3 in
100 - 3/4 in x 3 in adhesive bandages
8 - 2 in bandage compress
10 - 3 in bandage compress
2 - 2 in x 6 yds. sterile gauze roller bandages
2 - nonsterile triangular bandage approx. 40 in x 54 in, 2 safety pins
3 - sterile gauze pads 36 in x 36 in
3 - sterile eye pads
1 - rounded end scissors
1 - pair latex gloves
1 - mouth-to-mouth airway

3.6. HEATERS AND RELATED COMPONENTS -

3.6.1. Bleeder Valves - Any heater(s) installed by the body manufacturer shall have accessible air bleeder valves installed in the return lines.

3.6.2. Heater, Standard - Each bus shall be equipped with a heavy-duty combination fresh air and recirculating air heater(s). The heater(s) shall be a hot water type. The Btu/hr. rating shall be in accordance with Standard SBMI No. 001. These standard heaters shall have minimum free flow output ratings as follows:

3.6.2.1. 24- and 35-passenger Buses - 45,000 Btu/hr.

3.6.2.2. 47-passenger and Larger Buses - 80,000 Btu/hr.

3.6.3. Heater, Auxiliary - When so specified in the Invitation for Bids (see Option 14), a second recirculating heater shall be furnished. It shall be mounted near the rear of the bus and in such a manner so as not to interfere with the securing of seats to the floor, as specified in Par. E.2.13.5.2. The Btu/hr. rating shall be in accordance with SBMI Standard No. 001. Heated conduits inside the buses shall be insulated or shielded to prevent injury to the driver or passengers. The heater shall have a minimum output rating (recirculating air rating - not fresh air intake rating) as follows:

3.6.3.1. 24- and 35-passenger Buses - 40,000 Btu/hr.

3.6.3.2. 47-passenger and Larger Buses - 60,000 Btu/hr.

NOTE: Auxiliary heaters on diesel-powered buses shall be furnished with a water circulating pump.

3.6.4. Installation - The standard heater shall be installed near the front of the bus body with the controls readily accessible to the driver; the auxiliary heater shall be installed near the rear of the bus. Heater hose connections shall be installed above the floor of the bus body and through the firewall to the engine compartment. Heated conduits inside the bus shall be insulated or shielded to prevent injury to the driver or passengers. The length of the hot water hoses shall be as short as possible consistent with good installation practices; however, the hoses shall not be installed in such a manner so as to interfere with normal engine maintenance operations, such as the removal of the engine air cleaner. The hoses shall not dangle or rub against the chassis or sharp edges and shall not interfere with or restrict the operation of any motor function, such as the spark advance of an automatic distributor. Heater hose shall conform to SAE 20R3, Class C, as defined in SAE Standard J20e. Each heater installation shall include two all brass shutoff valves or cocks. Installation of the shutoff valves or cocks shall be as close as possible to the water pump and motor block outlets. The hoses shall be adequately supported to guard against excessive wear due to vibration. These cutoff valves or cocks shall be installed as follows:

3.6.4.1. One between the heater hose connection and the water pump outlet,

and

3.6.4.2. One between the heater hose connection and the engine block.

3.6.5. Service Accessibility - Heater motors, cores, and fans shall be readily accessible for service. Access panels (removable without removing driver's seat) shall be provided as required for maintenance.

3.7. LUGGAGE RACK - Option deleted.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

3.8. **MIRRORS, EXTERIOR** - Exterior mirrors shall conform to the requirements of FMVSS No. 111. Each school bus shall be provided with exterior mirrors and brackets as described below:

3.8.1. Mirror System, Crossover - The crossview mirror system shall provide the driver with indirect vision of an area at ground level from the front bumper forward and the entire width of the bus to a point where the driver can see by direct vision. The crossview system shall also provide the driver with indirect vision of the area at ground level around the left and right front corners of the bus to include the tires and service entrance on all types of buses to a point where it overlaps with the rear vision mirror system.

3.8.2. Mounting and Mounting Brackets, Standard - Mirror mounting and backing shall be of steel or a high-impact plastic such as a polycarbonate/polyethylene terephthalate blend, or approved equal. Mounting of all exterior mirrors to the bus body shall be by means of bolts, nuts, and lock washers, where possible; otherwise No. 10 hexagon head sheet metal bolts with star lock washers or No. 10 hexagon head sheet metal screws with serrated surface shall be used. This system of mirrors shall be easily adjustable but be rigidly braced so as to reduce vibration. Each exterior rear vision mirror shall be mounted in the brackets and assemblies shown on Texas General Services Commission Drawings Numbered 040-35(1), 040-35(3), 040-35(4), 040-35(5), 040-35(6) and 040-35(7), dated November 15, 1968. The brackets shall be mounted on the left front and right front of the bus body and cowl. The parts, as shown on Drawings Numbered 040-35(2) and 040-35(3), must be formed to fit the individual configuration of each manufacturer's body and cowl design. Long dimensions of Texas mirror brackets may be adjusted as required to fit the configurations of buses.

3.8.3. Mirror Backing and Mounting, Stainless Steel, Optional - **When so specified in the Invitation for Bids**, exterior rearview mirror backs and mounting brackets shall meet or exceed all of the applicable requirements of Par. E.3.8.3. above except the mirror backing and mounting shall be made of stainless steel.

3.8.4. Painting - Brackets and assemblies of all exterior rearview and crossover mirrors shall be cleaned and prepared for painting in accordance with Federal Specification TT-C-490B, Type I or II. The metal backs of stainless steel, aluminum, and chrome-plated exterior and crossover mirrors, if painted, and the backs of all other metal-backed exterior and crossover mirrors shall be finished in black (Color No. 37038 of Federal Standard No. 595a).

3.8.5. Rearview Mirror system - the rearview mirror system shall be capable of providing a view along the left and right sides of the bus which will provide the driver with a view of the rear tires at ground level, a minimum of 200 feet to the rear of the bus and at least 12 feet perpendicular to the side of the bus at the rear axle line.

3.9. **MIRRORS, INTERIOR** - A clear-vision, interior rearview mirror conforming to FMVSS No. 111, with at least 6" x 30" size vision area, affording a good view of the road to the rear as well as of the passengers, shall be furnished and installed. The mirror shall be made of safety glass and have rounded corners and protected edges.

3.10. **MUD FLAPS - When so specified in the Invitation for Bids** (see Option 18), mud flaps of durable, heavy-duty rubberized construction, complete with brackets, shall be installed behind each set of rear wheels. The mud flaps shall be comparable in size to the width of rear wheelhousing and shall reach within approximately 8 inches of the ground when the bus is empty. They shall be mounted at a distance from the wheels that will permit free access to spring hangers for lubrication, and to prevent their being pulled off when the bus is moving in reverse. **There shall be no advertisement on the mud flaps.**

3.11. **REFLECTIVE MATERIAL - When so specified in the Invitation for Bids** (see Option 19), buses shall be equipped with reflective material meeting the following requirements. The material shall be automotive engineering grade or better, shall meet the initial reflectance values in DOT FHWA FP-85 and shall retain at least 50% of those values for a minimum of six years. Reflective materials and markings shall be installed in the following locations:

3.11.1. Front and/or rear bumper shall be marked diagonally 45° down to centerline of pavement with 2-inch wide strips of non-contrasting reflective material.

3.11.2. Rear of bus body shall be marked with a strip of reflective National School Bus Yellow material no greater than 2 inches in width to be applied to the back of the bus, extending from the left lower corner of the "SCHOOL BUS" lettering, across to left side of the bus; then vertically down to the top of the bumper, across the bus on a line immediately above the bumper to the right side, then vertically up to a point even with the strip placement on the left side, and concluding with a horizontal strip terminating at the lower right corner of the "SCHOOL BUS" lettering.

3.11.3. "SCHOOL BUS" signs shall be marked with reflective National School Bus Yellow material comprising background for lettering of the front and/or rear "SCHOOL BUS" signs.

3.11.4. Side of bus body shall be marked with reflective National School Bus Yellow Material at least 6 inches but not more than 12 inches in width, extending the length of the bus body and located (vertically) as close as practicable to the beltline.

NOTE: See Par.. 3.15.1. for requirements for placement of reflective materials on Stop arms.

3.12. **STROBE LIGHT, Flashing - When so specified on Invitation for Bids** (see Option 26), an optional white flashing strobe light meeting the following requirements shall be provided:

3.12.1. Design - The lamp shall have a single clear lens emitting light revolving 360 degrees around a vertical axis. The light source shall be minimum of 50 candlepower and flash 80-120 times per minute. The base of the lamp shall be metal or approved equal and installed by a method which seals out dust and moisture. A manual switch is required for operation and a pilot light to indicate when the light is in operation shall be included. Wiring shall be installed inside the bus walls.

3.12.2. Mounting - The strobe light shall be permanently installed near the centerline on the school bus roof not more than one-third of the body length forward from the rear edge of the bus roof. It shall not extend above the roof more than approximately 6.5 inches.

3.13. **SEAT BELTS, PASSENGER - When so specified in the Invitation for Bids** (see Option 22), seat belts conforming to FMVSS Nos. 209 and 210 shall be provided for each passenger position. The seat belts shall meet the following requirements:

3.13.1. Colors - The belt assemblies shall be alternately color coded with contrasting colors. All aisle seats on the same side of the bus shall have belts with the same color. Two-position seats shall use two colors; three-position seats may use two or three colors.

3.13.2. Design - Seat belts shall have a buckle end and an attaching end which are adjustable to fit passenger sizes as required by FMVSS Nos. 208 and 209 (except lights and buzzers are not required). Buckles shall be of the plastic-covered push button design. Long and short ends shall be mounted alternately with the short end on the aisle. If possible, the design shall prevent fastening the belts across the aisle.

3.14. **STIRRUP STEPS** - There shall be one stirrup step and a suitably located handle on each side of the bus body front for easy accessibility in cleaning the windshield and lamps. The stirrup step on forward-control buses shall be on or in the bumper. Stirrup steps are not required on the 24-passenger bus unless necessary to clean windshield and windows.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

3.15. **STOP ARM** - A school bus stop arm meeting SAE J1133 and the following requirements shall be provided:

3.15.1. Design - The sign shall be octagon-shaped, constructed of zinc-coated steel or aluminum. It shall have a minimum 1/2-inch wide white border and the word "STOP" in white letters at least 6 inches high against a red background on both sides. The letters, border and background shall be of reflective materials meeting DOT FHWA FP-85. Double-faced red, alternately flashing lamps, one each at the top and bottom (visible from each side of the structure) shall be connected to, and flash with the required school bus red flashing signal lamp circuit when the arm is extended. The arm mechanism may be activated by air pressure, electricity, or by vacuum.

3.15.2. Mounting - The stop arm shall be installed on the left side of the school bus near the front cowl section.

3.16. **SUN VISOR** - A two-post, adjustable sun visor with a minimum size of 6 by 30 inches and a minimum thickness of 1/8 inches and constructed of tinted Plexiglas shall be furnished on each bus. Means shall be provided for tension adjustment. It shall be installed above the interior windshield on the driver's side or it may be mounted to the inside rearview mirror at each end using lock type nuts. If this type of mounting is used, the mirror shall have an adjustable reinforcing bracket at each end to reduce any vibration distortion caused by the weight of the sun visor.

3.17 **TOOL COMPARTMENT - When so specified in the Invitation for Bids** (see Option No. 30), a metal container of adequate strength and capacity shall be provided for storage of tire chains, tow chains, and such tools as may be necessary for minor emergency repairs. This storage container shall be located either inside or outside the passenger compartment and shall be capable of being securely latched. However, if it is located inside the passenger compartment, it shall be provided with a separate cover, and shall be fastened to the floor in the right front or the right rear of the bus. A seat cushion shall not be used as this cover.

3.18. **WINDSHIELD WASHERS AND WIPERS** -

3.18.1. Washers - A vacuum-, electric-, or air-operated windshield washer shall be furnished and installed. The washer shall have a minimum reservoir capacity of one quart of liquid and shall direct a stream of water into the path of travel of each windshield wiper blade each time the actuating button is operated.

3.18.2. Wipers - Each bus shall be equipped with two, 2-speed electric motor-driven heavy-duty windshield wipers. The arms and blades shall be of sufficient size to provide clear vision for the driver during a heavy rain. The motors furnished shall be guaranteed to operate the wipers under all driving conditions and shall be American Bosch Model WWC, or approved equal.

E.4. **APPROVAL OF NEW BUS BODIES** - Procedures for approving a new bus body for 24- through 83-passenger school buses shall be as follows in the order indicated:

4.1. **SUBMISSION OF REQUEST** - Submit a written request that the body be approved along with the following:

4.1.1. Letter - Letter stating that the body meets or exceeds each and every applicable requirement in Texas specification No. 070-SB-92.

4.1.2. Literature and drawings - See Par. A.6.5.

4.2. **REVIEW OF REQUEST** - The Specification Section will review the literature and drawings and advise the vendor or manufacturer by letter of the results of this review. A copy of this letter will be furnished to the School Bus Committee. If this review verifies that the bus body meets or exceeds the requirements of this specification, the vendor or manufacturer shall arrange for the school bus to be brought to Austin, Texas for inspection and evaluation by the Specifications Section and the Texas School Bus Committee.

E. 24- THROUGH 83-PASSENGER BODY SPECIFICATIONS

4.3. INSPECTION AND EVALUATION -

4.3.1. The bus body shall be inspected using the current School Bus Inspection Check List.

4.3.2. The bus body will be evaluated and if found suitable for the intended purpose, the Specification Section will issue a letter to the manufacturer listing the model as approved for the capacities requested. If found not suitable, the Specification Section will issue a letter to the vendor or manufacturer giving the reason(s) for disapproval.

NOTE: Once a bus body is approved for one passenger capacity, other capacities of this same body differing only in length and capacity need not be inspected and evaluated prior to approval. The vendor or manufacturer shall request by letter that these other body lengths/models be approved.

F. 24- THROUGH 83-PASSENGER CHASSIS SPECIFICATIONS

F.1. GENERAL REQUIREMENTS -

1.1. **GENERAL SPECIFICATIONS** - The requirements for gross vehicle weight ratings, gross axle weight ratings (front and rear) and tire sizes and load ranges, as specified in Table Nos. 12 through 28 for each size chassis are **minimum** requirements (see Par. A.4.5.). The requirements are for school buses with standard equipment. **The added weights of optional equipment such as alternative fuel storage tanks, air conditioning, luggage racks, lifts for the physically impaired or other heavy accessories were not considered in establishing the capacity ratings to be certified for the chassis. If additional optional equipment is ordered which necessitates increased capacity ratings of either axles, springs or tires, it is the responsibility of the vendor to furnish them so that proper certification can be made on the vehicle.**

1.2. **COLOR** - The chassis, including bumpers and wheels shall be painted black (Color 17038); cowl, fenders, and hood shall be painted school bus yellow (Color 13432).

F.2. AXLES, SUSPENSION, AND RELATED COMPONENTS -

2.1. **AXLES** -

2.1.1. Axle Capacities - Axle capacities and gross axle weight ratings (GAWRs) shall be as specified in Table Nos. 12 through 28 for each make of vehicle. Increased axle capacities shall be furnished to accommodate optional equipment such as diesel engines or other heavy accessories as required (see paragraphs A.4.5., F.1.1., and G.1.7.2.).

2.1.2. Rear Axle Ratios - Rear axle ratios shall be compatible with the required engines and gradeability requirements for school buses driven at governed top rated road speeds of 55 MPH minimum (see Par. F.5.3.4.).

2.2. **BRAKES AND RELATED COMPONENTS** -

2.2.1. Air Brakes and Associated Equipment - Each 59-, 65-, 71-, 77- and 83-passenger chassis shall be equipped with full air brake and parking brake systems as standard equipment. Full air brake systems shall meet the requirements of FMVSS No. 121 as applicable to school buses. The following equipment shall be furnished as follows:

2.2.1.1. Air Compressor - The air compressor on 83-passenger buses shall have a minimum 12 cu. ft. capacity. Other sizes of buses equipped with air brakes shall have an air compressor of sufficient capacity to provide adequate air pressure for the air brake system.

2.2.1.2. Air Tanks - The air tank(s) for 83-passenger buses shall be equipped with automatic valves to drain condensation from the tanks.

2.2.1.3. Automatic Moisture Ejectors - Automatic moisture ejectors shall be furnished and installed.

2.2.1.4. Automatic Slack Adjusters - Four automatic slack adjusters shall be furnished and installed, two at the front and two at the rear.

2.2.2. Hydraulic Brakes - The 24-, 35-, 47- and 53- passenger school bus chassis shall have as standard, hydraulic service brakes, emergency stopping system, and parking brakes meeting the requirements of FMVSS No. 105-83. **If so specified in the Invitation for Bids** (see Option 6), the 59-, 65-, 71-, and 77-passenger school buses shall be equipped with hydraulic brakes.

F. 24- THROUGH 83-PASSENGER CHASSIS SPECIFICATIONS

2.3. **HUBODOMETERS** - Each chassis shall be equipped with one hubodometer with standard mounting bracket which shall be calibrated in miles and installed by the manufacturer. The preferred mounting location is on the right rear axle drive wheel. The hubodometer shall be one of the following:

2.3.1. Accu-Trak, Standard Car Truck, Park Ridge, IL 60068.
2.3.2. Engler Instruments, 250 Culver Ave., Jersey City, NJ 07305.
2.3.3. Veeder-Root, Hartford, CT 06102.

2.4. **SHOCK ABSORBERS** - Two front heavy-duty, double-acting shock absorbers shall be installed.

2.5. **SPRINGS** - Springs or suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain the loaded bus without evidence of overload. Springs or suspension assemblies shall be designed to carry their proportional share of the gross vehicle weight as shown in Tables Nos. 12 through 28. Rear springs shall be of the progressive type. If leaf type front springs are used, stationary eyes shall be protected by a fullwrapper leaf in addition to the main leaf.

2.6. **TIRES AND WHEELS** -

2.6.1. Tires - All standard tires shall be the steel belted radial tubeless type. All tires shall be new and the tread style furnished shall be the tire manufacturer's standard design and the brand normally furnished on regular production orders. All tires shall be "Original Equipment Line Quality." Schools may order Mud and Snow tread design tires (see Option No. 29). For tire size and load range for each size chassis, see Table Nos. 12 through 28 and the **MAJOR COMPONENTS CHART**.

2.6.2. Wheels - Each chassis shall be equipped with 6 standard steel disc type wheels. When so specified in the Invitation for Bids (see Options 31, 32 and 37), the following optional wheels and carrier shall be furnished on the chassis as indicated:

2.6.2.1. Wheels, Chassis, Cast Spoke (All Wheels) - (for 35- through 77-passenger bus).

2.6.2.2. Wheel, Spare, Mounted (with Carrier but <u>not</u> tire (or tube); for 35- through 83-passenger only; see Option No. 32).

NOTE: Carrier <u>not</u> available for 24-passenger bus; spare wheel <u>only</u> is available on this option.

2.6.2.3. Wheel, Spare, Unmounted (without Carrier, Tire, or Tube) - (for 24- through 77-passenger buses; see Option No. 31).

F.3. CHASSIS FRAME AND RELATED COMPONENTS -

3.1. **BUMPER, FRONT** - The front bumper shall be furnished by the chassis manufacturer and must extend to the outer edges of the body at the bumper top line (to assure maximum fender protection). The front bumper shall be heavy duty transit type, not less than 3/16 inches by 9-1/2 inch steel (9-3/4 inches for the 83-passenger bus). It must be of sufficient strength to permit pushing a vehicle of equal gross weight without permanent distortion to the bumper, chassis, or body. The bumper shall be painted black (color No. 17038).

3.2. **CHASSIS FRAME SIDE MEMBERS** - Each frame side member shall be of one-piece construction. If the frame side members are extended, such extension shall be designed, furnished, and guaranteed by the installing manufacturer. The installation shall be made by either the chassis or body manufacturer. Extensions of frame lengths are permissible only when such alterations are welded on behind the hanger of the rear spring. This specification does not permit wheelbase extensions. Any welding, heating (for frame straightening or repairs), or the drilling of holes in chassis frame members shall be in accordance with chassis manufacturer's recommendations.

3.3. **FUEL TANKS, CONVENTIONAL FUEL** - Standard and auxiliary fuel tanks shall meet FMVSS No. 301-75 as applicable to school buses and shall meet the current design objectives of the SBMI. Fuel tanks installed on Texas school buses shall have a minimum "draw" of 83% of capacity.

F. 24- THROUGH 83-PASSENGER CHASSIS SPECIFICATIONS

3.3.1. Fuel Tank(s), Standard - The standard fuel tank for 47- through 83-passenger school buses shall have a minimum capacity of 60 gallons, except the 47- and 53-passenger forward control bus may have a minimum capacity of 35 gallons. The 24- and the 35-passenger buses shall have fuel tanks with minimum capacities of 20 and 30 gallons, respectively. The tank(s) shall be mounted, filled, and vented entirely outside the body (see Par. F.5.5.3.).

3.3.2. Fuel Tank(s), Auxiliary - **When so specified in the Invitation for Bids** (see Option 12), the 24- and the 83-passenger buses shall be furnished with minimum capacity fuel tank or tanks of 30 and 90 gallons, respectively. The auxiliary fuel tank for the 24-passenger bus shall be furnished and installed by the chassis manufacturer. 35- through 77-passenger buses do not have auxiliary fuel tanks available.

3.3.3. Material - Each tank (including auxiliary fuel tanks) shall be constructed of 16-gauge terneplate or equivalent and shall be equipped with baffles. Each tank may be mounted on either the right or left side of the chassis.

3.4. **FUEL TANKS, ALTERNATIVE FUEL** - Fuel tank(s) for alternative fuels (see Option 3) shall meet or exceed all of the rules and regulations of the Texas Railroad Commission. Capacity shall be that required to meet the range requirements of the Option or as **specified in the Invitation for Bids.**

3.5. **HOOD, TILTING** - A forward-tilting hood, giving access to the engine compartment shall be furnished on conventional bus chassis (except 24- and 83-passenger buses).

3.6. **STEERING, POWER** - The bus shall be furnished with the chassis manufacturer's standard power steering which will provide safe and accurate performance at maximum load and speed. The mechanism must provide for easy adjustment for lost motion unless the unit doesn't require adjustment due to design. No changes shall be made in the power steering apparatus which are not approved by the chassis manufacturer.

F.4. ELECTRICAL SYSTEM AND RELATED COMPONENTS -

4.1. **ALTERNATORS** - The 12-volt alternators with rectifier shall have the electrical outputs and the minimum charging rates shown below when tested in accordance with SAE rating at the manufacturer's recommended engine speed. These alternators shall be ventilated and voltage controlled and, if necessary, current controlled. Dual belt drive or a single serpentine belt shall be used with the alternators provided on the 35- through 83-passenger buses:

4.1.1. Alternator, Standard - The 24- through 83-passenger buses shall have a standard alternator with a minimum electrical output of 100 amperes.

4.1.2. Alternator, Optional - **When so specified in the Invitation for Bids** (see Option 4), the 24- through 83-passenger chassis shall have an alternator with a minimum electrical output of 130 amperes.

4.1.3. Alternators, Other - School buses equipped with the following equipment shall have alternators meeting the following requirements:

4.1.3.1. Air-conditioned Buses - Buses equipped with air conditioning shall have alternators with a minimum electrical output of 130 amperes.

4.1.3.2. Wheelchair Lift-equipped Buses - Buses equipped with wheelchair lifts shall have alternators with a minimum electrical output of 130 amperes.

4.1.3.3. Air-conditioned and Wheelchair-equipped buses - Buses equipped with both air conditioning and wheelchair lifts shall have alternators with a minimum electrical output of 160 amperes.

4.2. **BATTERY AND RELATED COMPONENTS** - The storage batteries furnished on each chassis shall have sufficient capacity to supply current for adequate operation of the engine starter, lights, signals, heater, and all other electrical equipment. The batteries for 24- through 83-passenger school buses shall have an potential of 6 or 12 volts and meet the following:

4.2.1. Battery, Diesel Engines - Batteries shall be single or dual 12 volt or dual 6 volt as specified by the chassis manufacturer. The minimum performance level shall be a BCI cold cranking capacity (CCA) of not less than 450 amperes @ 0°F with a minimum 130-minute reserve capacity except for the 24-passenger bus which shall have a minimum 360 CCA and 100-minute reserve capacity.

4.2.2. Battery, Gasoline Engines - Batteries shall be 12 volts with a minimum performance level of BCI cold cranking capacity (CCA) of not less than 360 amperes @ 0°F with a minimum 100-minute reserve capacity.

4.2.3. Battery(s), Alternative fueled vehicles - Dedicated alternative fueled vehicles shall have batteries meeting or exceeding those required for a gasoline engine school bus with comparable horsepower. Batteries for dual fueled buses shall have batteries specified by the conventional fuel used.

4.2.4. Battery Cables - The battery cables shall be one piece and of sufficient length to allow pull out or lift out of the battery for servicing or removal and arranged so as to prevent damage to the battery posts when removed.

4.2.5. Mounting - The preferred battery mounting location for gasoline-powered buses is outside the body shell under the hood in an adequate carrier and readily accessible for maintenance and removal from above or outside. (See Par. E.2.6. for requirements of diesel-powered buses and other battery mounting locations.)

4.3. **HORNS** - Each bus shall be equipped with horn or horns of standard make. Each horn shall be capable of producing audible sounds in the frequency range from 250 to 2,000 Hz and at an intensity between 82 and 102 decibels. The sound level measurements shall be made at a distance of 50 feet directly in front of the vehicle in accordance with SAE J377.

4.4. **INSTRUMENTS AND INSTRUMENT PANEL** - The bus shall be equipped with the following nonglare illuminated instruments (controlled by an independent rheostat*), and gauges mounted for easy maintenance and repair and clearly visible to the seated driver. **Indicator warning lights in lieu of gauges are not acceptable.**

4.4.1. Air Pressure Gauge (where air brakes are used)
4.4.2. Ammeter (or Voltmeter) with graduated charge and discharge indications
4.4.3. Fuel Gauge
4.4.4. Glow Plug Indicator Light (for diesel buses with glow plugs only)
4.4.5. High Beam Headlamp Indicator
4.4.6. Odometer (6 digits, i.e., register to 99,999.9 miles)
4.4.7. Oil Pressure Gauge
4.4.8. Speedometer
4.4.9. Vehicle manufacturer's standard keyed ignition switch
4.4.10. Water temperature gauge

***NOTE:** If the intensity of the body-installed panel lamps is controlled, then the intensity control shall not be accomplished by the same rheostat that controls the chassis instrument lamps, <u>unless</u> the body company designs and installs the rheostat to accomplish both.

4.5. **LAMPS** - Each bus shall be equipped with at least two clear headlamps meeting the requirements of FMVSS No. 108 and a dimmer switch located on or near the steering column. Adequate parking lamps operated by a switch in common with the headlamps shall be provided.

4.6. **WIRING** - The chassis manufacturer shall provide a readily accessible terminal strip or plug on the body side of the cowl, or at an accessible location within the engine compartment, with the following minimum terminals for the body connections:

4.6.1. Backup Lamps
4.6.2. Instrument Panel Lights (rheostat controlled by head lamp switch)
4.6.3. Left Turn signals
4.6.4. Right turn signals
4.6.5. Stop lamps
4.6.6. Tail lamps

F.5. **ENGINE AND RELATED COMPONENTS** -

5.1. **AIR CLEANER** - Each chassis shall be equipped with a factory-installed maximum capacity, heavy-duty replaceable dry element type air cleaner.

5.2. **COOLING SYSTEM** - The cooling system radiator shall be heavy-duty with increased capacity to cool the engine at all speeds in all gears. The cooling system fan shall be the heavy-duty reinforced type with a fan clutch. Thin pressed fan blades are not acceptable.

F. 24- THROUGH 83-PASSENGER CHASSIS SPECIFICATIONS

5.3. **ENGINES** - Approved engines listed in each table for the various size buses are the engines for which the vendor has requested approval and are usually the smallest engine in terms of performance that will meet the requirements listed below. Other approved engines which the vendor may provide with a given chassis will be listed also in an Approved Products List (APL). The APL will be updated as new engines or additional versions of current engines are approved. **Please note that only those engines approved as specified below and listed either in the Texas School Bus Specification or in the Class 070-SB-APL will be acceptable for school buses.**

5.3.1. Diesel Engines - **When so specified in the Invitation for Bids** (see Option 8), a bus chassis having a gasoline engine listed as standard, shall be furnished with a 4-cycle diesel engine. (Diesel engines are standard for 47- through 77-passenger and the 83-passenger forward control buses).

5.3.2. Gasoline Engines - Engines for the 24- through 71-passenger conventional (and semi-forward control) and the 77-passenger school buses shall be of the gasoline type **unless otherwise specified in the Invitation for Bids.** Approved engines are listed in Table Nos. 12 through 28 and in the Class 070-SB APL.

5.3.3. Alternative Fuel Engines - **When so specified in the Invitation for Bids** (see Option 3), the 24- through 83 passenger buses shall be equipped with engines capable of operating on alternative fuels.

5.3.4. Power Requirements - Each bus shall be furnished with an engine that meets or exceeds the following **minimum** criteria (see second note at the end of Par. F.5.3.5.8.), when tested at or above the GVWR required for a given bus capacity and with all accessories except air conditioning compressor on and operating:

5.3.4.1. Acceleration from 0 to 50 mph in 60 seconds or less.
5.3.4.2. Gradeability of 1.5% minimum at 50 mph.
5.3.4.3. Gradeability of 5.0% minimum at 25 mph.
5.3.4.4. Startability of 20% minimum.
5.3.4.5. Top speed of 55 mph minimum at the manufacturer's rated rpm for the governed engine.

5.3.5. Approval of New Engines - Procedures for approving new school bus engines for 24- through 83- passenger school buses shall be as follows:

5.3.5.1. Submit to the Specification Section, a recent computer SCAAN (not the typed results of a SCAAN) showing that the proposed engine meets or exceeds each requirement of Par. F.5.3.4. under the following conditions:

(i) Air resistance coefficient = 0.550 or relative drag coefficient of 88--whichever the manufacturer uses.
(ii) **All** engine accessories on and operating **including** fan clutch, alternator, power steering pump, air compressor, and any other powered accessory except air conditioning compressors.
(iii) GVWR equal to or greater than that of the largest bus for which approval is requested.
(iv) Minimal frontal area of 75 square feet, or actual frontal area, if different.
(v) Other parameters shall be of the manufacturer's standard values for the coefficient of friction on smooth concrete, driveline efficiency, etc.
(vi) Radial tires of the size specified in the table for the particular bus capacity.
(vii) Transmission, chassis manufacturer's standard automatic, or AT-545, MT-643 transmission, as applicable (see Par. F.6.).

5.3.5.2. The Specification Section will review the SCAAN and advise the vendor or manufacturer **by letter** of the results of this review. Copies will be furnished to the School Bus Committee.

5.3.5.3. If this review verifies that the engine meets the requirements of this specification, and is so stated in the above letter, the vendor or manufacturer shall contact the GSC Purchaser to arrange for testing of the engine in the largest size school bus for which approval is requested. The Purchaser will consult with the TEA Representative and inform the vendor of the name(s) of the school district(s) from which to select a participant.