WEST VIRGINIA
SECRETARY OF STATE
JOE MANCHIN III
ADMINISTRATIVE LAW DIVISION

Form #5

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OFFICE WEST VIRGINIA SECRETARY OF STATE

NOTICE OF AGENCY ADOPTION OF A PROCEDURAL OR INTERPRETIVE RULE OR A LEGISLATIVE RULE EXEMPT FROM LEGISLATIVE REVIEW

AGENCY: West Virginia Board of Education TITLE NUMBER: 126

CITE AUTHORITY: W. Va. Constitution, Article XII, §2 and W.Va. Code §18-2-5 and §18-5-13

RULE TYPE: PROCEDURAL _____ INTERPRETIVE _____

EXEMPT LEGISLATIVE RULE X

CITE STATUTE(s) GRANTING EXEMPTION FROM LEGISLATIVE REVIEW
W.Va. Code §§29A-3B-1, et seq.; *W.Va. Board of Education v. Hechler*, 180 W.Va. 451; 376 S.E.2d 839 (1988).

AMENDMENT TO AN EXISTING RULE: YES X NO _____

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 89

TITLE OF RULE BEING AMENDED: West Virginia Minimum Requirements for Design and Equipment of School Buses (4334)

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED: _____

TITLE OF RULE BEING PROPOSED: _____

THE ABOVE RULE IS HEREBY ADOPTED AND FILED WITH THE SECRETARY OF STATE. THE EFFECTIVE DATE OF THIS RULE IS September 11, 2004.

Steven L. Paine
Deputy State Superintendent of Schools

$13.80

EXECUTIVE SUMMARY
WEST VIRGINIA DEPARTMENT OF EDUCATION

Policy Number and Title: **Policy 4334, West Virginia Minimum Requirements for Design and Equipment of School Buses**

Background: In accordance with Policy 4334, this revision of the present requirements, revised in 2002, brings them into compliance with new federal standards, and technological developments that have been made available since the last revision. Recommendations for this revision are made by the State Executive Director of School Transportation with assistance and cooperation of county superintendents, county transportation directors, county maintenance personnel and representatives from manufacturers of school bus chassis and bodies.

Purpose: The revision is to update and make corrections, deletions or additions to West Virginia Minimum Requirements for Design and Equipment of School Buses to meet or exceed federal highway safety standards and national standards for school buses now in effect.

Impact: The revision of the minimum requirements will update components and construction of school buses which will contribute to the safety, welfare and comfort of those transported.

Summary Comments No comments were received.

126CSR89

TITLE 126
LEGISLATIVE RULE
BOARD OF EDUCATION

SERIES 89
WEST VIRGINIA MINIMUM REQUIREMENTS FOR DESIGN AND EQUIPMENT OF SCHOOL BUSES (4334)

§126-89-1. General.

1.1. Scope. -- This legislative rule provides that the components and construction of school buses be reviewed and updated periodically.

1.2. Authority. -- West Virginia Constitution, Article XII, §2 and W.Va. Code §18-2-5 and §18-5-13.

1.3. Filing Date. – August 12, 2004

1.4. Effective Date. – September 11, 2004

1.5. Repeal of former rules. -- None. This is a revision of the rule formerly filed in 2002.

§126-89-2. Incorporation by Reference.

2.1. A copy of the *West Virginia Minimum Requirements for Design and Equipment of School Buses* is attached. Copies may be obtained in the Office of the Secretary of State and in the West Virginia Department of Education, Division of Administrative Services.

2.2. Summary of rules and regulations.

2.2.1. The West Virginia Department of Education has responsibility to establish *West Virginia Minimum Requirements for Design and Equipment of School Buses* for the transportation of pupils in compliance with Chapter 18, Article 5, Section 13, Subsection 6, of the West Virginia Code. The Department of Education endeavors to carefully consider the selection of components and construction procedures which contribute to the safety, welfare and comfort of those being transported. The school buses are designed and equipped to extend educational opportunities to nearly all segments of society.

2.2.2. Student transportation is an integral part of a comprehensive educational program and a very significant part of the challenge to provide a thorough and efficient

system of education.

2.2.3. The revision of the *West Virginia Minimum Requirements for Design and Equipment of School Buses* updates and makes corrections, deletions or additions to meet or exceed current federal highway safety standards and national standards for school buses.

MINIMUM REQUIREMENTS FOR DESIGN AND EQUIPMENT OF SCHOOL BUSES

2004 REVISED EDITION

NOTE: Equivalency - Permission to use a device or material as an "equivalent" to that called for in the "requirements" must be requested in writing by the manufacturer or owner. Any item supplied as an "equivalent" must have prior approval, in writing, from the State Executive Director of School Transportation.

New Products - During the first year of production, new products will be subjected to the experimental and field test evaluation procedures with written evaluation provided to the State Executive Director of School Transportation.

Changes - Any changes in design or equipment by counties after receipt of the school bus must have prior approval in writing from the State Executive Director of School Transportation

SCHOOL BUS CHASSIS

AIR CLEANER

The engine intake air cleaner shall be dry element type and properly installed by the chassis manufacturer to meet engine specifications. Diesel chassis manufacturer shall provide air restriction indicator device. EXCEPTION: Type AI, D and B vehicles under 35 passengers, Type D vehicles with engine in rear are required to have an air restriction indicator mounted in the engine compartment, clearly visible from the rear of the bus.

AXLES OR OTHER TYPES OF SUSPENSION

A. The front and rear axles including suspension assemblies, and all frame to ground components, shall have a gross axle weight rating at ground at least equal to that portion of the load as would be imposed by the chassis manufacturer's maximum gross vehicle weight rating. In no case shall capacities be less than those listed below:

MINIMUM GROSS AXLE WEIGHT RATING

TYPE	PUPIL CAPACITY Mfg. Rated	FRONT GAWR SUSPENSION/AXLE Or Other Front Suspension	REAR GAWR SUSPENSION/AXLE Or Other Rear Suspension
AI, D	10-16	3,400	5,300
	17-24	3,850	7,000
B	16-23	4,000	7,900
	24-34	4,500	11,000
	35-36	5,000	12,000
	47-53	6,000	15,000
	59-60	7,000	17,000
	65-66	9,000	17,000
	71-76	9,000	19,000
	77	9,000	21,000
AI+C	16-23	4,000	7,900
	24-34	4,500	11,000
	35-36	5,000	12,000
	47-53	6,000	15,000
	59-60	7,000	17,000
	65-66	9,000	17,000
	71-76	9,000	19,000
	77	9,000	21,000
Transit (Front Engine)			
	47-54	12,000	15,000
	59-65	12,000	17,000
	71-72	12,000	19,000
	77-78	13,000	19,000
	83-90	13,000	21,000
Transit (Rear Engine)			
	47-54	9,000	19,000
	59-65	9,000	19,000
	71-72	9,000	22,000
	77-78	10,000	22,000
	83-90	12,000	22,000

B. All vehicles shall be equipped with appropriate GAWR axles or suspension

systems and tires by chassis manufacturer.

C. Front axle shall be heavy duty bus type and equipped with grease packed wheel bearings. Oil bath wheel bearings are optional.

D. Chassis shall be equipped with device to prevent rear axle lubricant from contacting brake components.

BRAKES

A. A braking system including service brake and parking brake, shall be provided.

B. Buses using air or vacuum in the operation of the brake system shall be equipped with warning signals, readily audible and visible to the operator, that will give a continuous warning when the air pressure available in the system for braking is 60 psi (pounds per square inch) or less, or the vacuum in the system available for braking is eight inches of mercury or less. An illuminated gauge that will indicate to the operator the air pressure in pounds per square inch or the inches of mercury vacuum available for the operation of the brakes shall be provided.

1. Air brakes shall be installed on all chassis, 35 passengers and above. EXCEPTION: Electric Powered Vehicle.

2. All air-operated brake systems shall:

   a. Have automatic front wheel limiting valves when necessary to provide a balanced system, without premature front axle lockup on wet or slippery roads.

   b. Have S-Cam type on all wheels incorporating long stroke brake chamber.

   c. Be equipped with shoe to drum clearance sensing automatic slack adjusters. The same brand of slack adjuster shall be used on all four wheels.

   d. Have at least 12 CFM air compressor, mounted on the ATA-TMC mounting bracket.

   e. Be protected by a desiccant type air dryer, with integral purge volume and integral discharge line turbo cutoff feature.

f. Be equipped with a spring-loaded parking and emergency brake. A manual control, clearly identified, shall be within easy reach of the operator, in addition to a modulated control through the brake treadle valve.

g. Have at least 6" X 16 ½" brake blocks on a 17,000 pound axle.

3. Vacuum-assist brake systems shall have a reservoir used exclusively for brakes that shall be adequate to ensure loss in vacuum at full stroke application of not more than 30 percent with the engine not running. (Exception A1)

4. Any brake system dry reservoir shall be safeguarded by a check valve or equivalent device, that in the event of failure or leakage in its connection to the source of compressed air or vacuum, the stored dry air or vacuum shall not be depleted by the leakage or failure.

C. Buses using a hydraulic assist-booster in the operation of the brake system shall:

1. be equipped with warning signals, readily audible and visible to the operator, that will provide continuous warning in the event of a loss of fluid flow from the primary source, or loss of electric source powering the back-up system.

2. be equipped with source of hydraulic pressure, automatically initiated upon loss of power from primary source, and operating independently of the primary power source.

D. All brake lines, power and booster-assist lines shall be protected from excessive heat and vibration, and be installed to prevent chafing.

E. All brake systems shall be designed to permit visual inspection of brake lining wear without removal of any chassis components.

F. Disc type brakes installed by chassis manufacturers are permissible.

G. Retarders are approved. Installation of such retarders must be made by, or under the supervision of manufacturer.

H. When antilock brakes are used, a four channel system must be installed.

BRAKE, PARKING

A. All chassis, equipped with hydraulic brakes, shall be equipped with Orschelin type hand brake lever, easily accessible from the operator's seat. EXCEPTION: Type A and B vehicles under 35 passengers - manufacturer's standard.

B. Parking brake, when applied, shall remain in applied position despite exhaustion of source of energy used for application or leakage of any kind.

BUMPER, FRONT

A. A one piece steel front bumper shall be furnished by chassis manufacturer as part of the chassis on Type A, B, and C vehicles unless energy absorbing or other bumper options necessitate installation by the body manufacturer. When Type D chassis are supplied to a body company by a chassis manufacturer, the body company shall supply the front bumper as part of the body installation.

B. Unless energy absorbing bumper is used, the front bumper shall be of pressed steel channel or equivalent material at least 3/16" thick and not less than 8" wide (high) and shall extend beyond forward-most part of the body, grille, hood, and fenders and shall extend to outer edges of the fenders at the bumper's top line.

C. Front bumper shall extend beyond forward-most part of body, grille, hood and fenders and shall extend to outer edge of fenders at bumper top line.

BUMPER, REAR

See page 21-22.

CERTIFICATION

Chassis manufacturer shall certify to the State Executive Director of School Transportation that product meets all applicable federal requirements. Chassis seller shall certify to the State Executive Director of School Transportation that product meets all state requirements.

CLUTCH

Clutch shall be equipped with a neutral safety switch and torque capacity shall not be less than the maximum net torque output of the engine.

COLOR

A. Chassis, including front bumper, shall be black. (Grille may be manufacturer's standard.)

B. Hood, cowl, and fenders shall be National School Bus Glossy Yellow. (SBMI-008) EXCEPTION: Hood may be painted low-luster yellow.

DIFFERENTIAL

A. Manufacturer's traction control device is permissible. A operator controlled traction differential may be supplied on rear axles of 19,000 pound capacity or greater.

B. Purchaser shall specify differential ratios when order is submitted to chassis dealer.

C. Speed will not exceed 70 miles per hour.

DRIVE SHAFT

A. Torque capacity of the drive shaft assembly shall exceed maximum engine torque as developed through lowest transmission gear reduction.

B. Each drive shaft section shall be protected by a metal guard or guards around circumference of drive shaft to prevent whipping through the floor or dropping to the ground if broken.

ELECTRICAL SYSTEM

A. Battery

1. Diesel Power: Two Group 31 batteries with minimum of 1250 CCA total or one Group 8D-900 with 430 reserve minutes measured per SAE 2-537H at 24 ampere rate. Two Group 8D-900 batteries are optional. EXCEPTION: Type B vehicles under 35 passengers shall have a dual battery system of a minimum of 500-CCA per each battery.

2. Battery cables of sufficient length without splices shall be provided by the chassis manufacturer.

   a. All cables shall conform to SAE Standard J541 with respect to electrical resistance.

   b. All cable assemblies shall conform to American Trucking Association-Truck Maintenance Council (ATA-TMC) RP105.

   c. Manufacturer shall assure continuous ground integrity.

3. Batteries for Type B, C and D vehicles shall be mounted in the body skirt by the body manufacturer. In this case the chassis manufacturer shall temporarily mount the battery on the chassis frame, with proper cables of appropriate length for mounting in final location by body manufacturer. All cables, mounting, etc., shall conform to the SBMI Design Objectives Booklet, May 1990 edition. Body manufacturer will

be responsible for final cable and connections between batteries. EXCEPTION: Type D vehicles, rear engine, may have batteries mounted in engine compartment.

4. All batteries will be utilized during engine starting.

B. Alternator

1. Type AI and II below 35 passenger vehicles shall have a minimum 100 amperes hot rated per hour alternator. On buses equipped with power lift, alternator minimum shall be 100 amperes. Minimum charging rate at manufacturer's recommended engine idle speed shall be 45% of alternator capacity.

2. Type B vehicles less than 35 passengers, shall have a minimum 105 amperes hot rated per hour alternator with a minimum charging rate of 50 amperes at manufacturer's recommended engine idle speed.

3. All Type AI, B, C and D vehicles 35 passengers and above shall have an alternator with a minimum charging rate of at least 140 amperes hot rated (in accordance with SAE rating) with a minimum charging rate of 50 amperes at manufacturer's recommended engine idle speed (12 volt system), and shall be ventilated and voltage controlled and, if necessary, current-controlled. Alternator shall have at least a 7/8 inch diameter shaft, shall be mounted on a bracket that conforms to ATA-TMC RP101, heavy duty truck alternator mounting and be accessible from top side of engine compartment for servicing.

4. Belt drive shall be capable of handling the rated capacity of the alternator with no detrimental effect on other driven components.

5. For estimated electrical current draw see Appendix B.

C. Lights and Signals - See pages 31-34.

1. USA daytime running lights are required and will not be activated until engine is started.

2. Will not operate with the ignition key in the accessory position.

D. Wiring

1. All wiring shall conform to current applicable recommended practices of the Society of Automotive Engineers, with the capability of carrying a 10% overload without damage to wiring circuits.

   All wiring shall use a standard color coding and each chassis shall be delivered with a wiring diagram that coincides with the wiring of the chassis.

2. Chassis manufacturer shall install a readily accessible terminal so that body and chassis electrical load can be recorded through the chassis

ammeter without dismantling or disassembling chassis component(s).

3. Chassis voltmeter and wiring shall be compatible with generating capacity. Type AI, D and B vehicles under 35 passengers may have ammeter in lieu of voltmeter.

4. In addition to the main 100 amperes body circuit terminal, chassis manufacturer shall provide the following terminals for body connections:

   a. Tail lights.

   b. Right turn signal.

   c. Left turn signal.

   d. Stop lights.

   e. Back-up lights.

   f. Instrument panel lights. (Rheostat controlled)

   g. Ignition circuit.

   h. Strobe light.

EXHAUST SYSTEM

A. Exhaust pipe, muffler and tailpipe shall be outside the bus body and attached to the chassis, with hangers designed to accommodate expansion and contraction of the system without damage to the system or hanger(s).

B. Tailpipe shall be constructed of a corrosion-resistant tubing material at least equal in strength and durability to 16 gauge steel tubing.

C. Tailpipe shall extend to, but not beyond, the body limits on the left side of bus, behind the operator's compartment, as follows:

Type AI & D Vehicles,	Manufacturer's standard
Type B Vehicles (under 35 passengers) and Type D Rear Engine Vehicles	Manufacturer's standard
Type AI & B Vehicles 35 passengers and above, and Type C & D Vehicles (47 passengers and up)	No more than 18" left rear wheels

EXCEPTION: The exhaust system on vehicles designed for the transportation of special education pupils shall be routed to the left of the right frame rail to allow for the installation of a lift on the right side of the vehicle. Federal standards may be

met by exhaust exiting at the rear of bus to allow for luggage compartments.

D. Size of tailpipe shall not be reduced after it leaves the muffler.

E. Muffler shall be constructed of aluminized or equivalent corrosion-resistant material.

FENDERS, FRONT

A. Type A and B vehicles shall be manufacturer's standard.

B. Type C vehicles.

1. Rubber fender extenders shall be provided. Unless fender design prevents spray from tires to the windshield and mirrors and deletion is approved by the State Executive Director of School Transportation.

2. Front fenders shall be properly braced and free from any body attachment. Adequate clearance shall be maintained between tires and fenders so that contact will not occur under any condition.

3. A fiberglass tilt hood shall be provided with wiring quick-disconnect in engine compartment, located at or near the radiator cradle. All electrical wiring between the fiberglass hood and the engine compartment shall pass through a common waterproof disconnect device to facilitate removal and/or replacement of the hood.

4. Mud flaps shall be furnished by body manufacturer.

5. Fender/bumper design must prevent direct road spray between fender and front bumper, or a flap must be installed to prevent such spray.

FRAME

A. Frame or equivalent shall have design and strength characteristics to correspond at least to standard practice for trucks of same general load characteristics which are used for highway service.

B. Any secondary manufacturer that modifies the original chassis frame shall guarantee the performance of workmanship and materials resulting from such modification.

C. Any frame modification shall not be for the purpose of extending the wheelbase.

D. Holes in top or bottom flanges of frame side rail shall not be permitted except as provided in original chassis frame. There shall be no welding to frame side rails except by chassis or body manufacturers.

E. Frame lengths shall be provided in accordance with SBMI Design Objectives, May 1990 edition.

F. Frame rails less than 50,000 PSI must be reenforced to prevent cracking. EXCEPTION: Type AI & D vehicles.

FUEL TANK

A. Fuel tank shall have a minimum capacity of 60 gallons with a 55 gallon actual draw, on all buses 47 passengers and above. It shall be filled and vented outside of the body. Construction will prevent the spillage or drainage of fuel on any part of the exhaust system. EXCEPTION: Type A vehicles - Fuel tank shall be manufacturer's standard. Type B vehicles under 35 passengers - Fuel tank shall be not less than 30 gallon, with 25 gallon actual draw. Otherwise shall meet requirements of Type C and D vehicles.

B. No portion of the fuel system located to the rear of the engine compartment, except the filler tube, shall extend above the top of the chassis frame rail. EXCEPTION: Type A and B vehicles under 35 passengers.

C. Fuel lines shall be mounted to obtain maximum protection from the chassis frame. Engine supply line shall be taken from top of tank.

D. Fuel filter with replaceable element shall be installed between fuel tank and injector pump. Flexible gasoline-and-oil-proof connection shall be provided at engine end of fuel line.

E. Drain plug of at least 1/4" pipe thread shall be located in center of bottom of tank. EXCEPTION: Type A and B vehicles under 35 passengers.

F. Fill-pipe cap shall be designed to minimize spillage of fuel when bus turns corner in either direction. If venting of fuel tank is done other than through fill-pipe cap, cap shall be of non-vented type. (See provision for fuel systems in current Motor Carrier Safety Regulations.)

G. Fuel tank installation shall be in accordance with Federal Motor Vehicle Safety Standards, (hereafter FMVSS) 301 and 303. EXCEPTION: On vehicles constructed with a power lift, the fuel tank may be mounted on left chassis frame rail or behind rear wheel.

H. A port shall be provided in the fuel tank for auxiliary equipment.

FUEL, ALTERNATE

A. Alternate fuels are permissible provided they have been adequately tested for installation and use, both in the vehicle and in storage facilities, and meet all federal, state and industry safety requirements, regulations and standards.

B. Compressed Natural Gas (CNG) - See Appendix D.

GOVERNOR

A. Chassis engine shall be provided with an Engine RPM Governor. EXCEPTION: Type A and B vehicles under 35 passengers.

B. If chassis is powered by diesel engine, or engine is remotely located from operator, a tachometer shall be installed so engine speed may be known to the operator. EXCEPTION: Type A and B vehicles under 35 passengers.

HEATING SYSTEM, PROVISION FOR

A. The chassis engine shall have plugged openings for the purpose of supplying hot water for the bus heater system. The opening shall be suitable for attaching 3/4" pipe thread/hose connector. The engine shall be capable of supplying water having a temperature of at least 170 degrees F, at a flow rate of 50 pounds per minute at the return end of 30 feet of one inch diameter automotive hot water heater hose. (SBMI Standard #001 - Standard Code for Testing and Rating Automotive Bus Hot Water Heating Ventilating Equipment.) EXCEPTION: Type AI & II vehicles.

B. SAE 20R3 - Class D2 hose shall be used throughout the bus heating systems. Engine cooling system hose shall meet applicable SAE Standard.

C. Chassis manufacturers shall supply "heater bibb" connection for bus body supply and return lines. Connection will accept one inch inside diameter hose.

D. Chassis manufacturers shall supply clear firewall bulkhead area to insure body manufacturer's ability to comply with this section.

HORN(S)

A. Bus shall be equipped with dual horns of standard make, capable of producing complex sound in bands of audio frequencies between 250 and 2000 cycles per second with a sound level of 110 db at three feet, per SAE Standard J-377. (Measurement shall be made with meter set at flat response - C weighting.)

B. Air horns are permissible.

INSTRUMENTS AND INSTRUMENT PANEL

A. Lights in lieu of gauges are not acceptable. Chassis shall be equipped with the following instruments and gauges:

1. Speedometer.

2. Odometer which will give accrued mileage including tenths of miles.

3. Voltmeter with graduated scale to 16 volts. EXCEPTION: Ammeter may be substituted on Type AI, D and B vehicles under 35 passengers.

4. Oil pressure gauge with red warning light to warn of low pressure. If equipped with low oil pressure warning buzzer, the buzzer shall only be activated when ignition switch is in "ON" position.

5. Water temperature gauge, with red warning light to indicate overheating.

6. Fuel gauge.

7. Upper beam head light indicator.

8. Brake indicator gauge (air or vacuum). Light indicator in lieu of gauge is permissible on vehicles equipped with hydraulic-assist power brake.

9. Turn signal indicator.

10. Automatic transmission temperature gauge. EXCEPTION: Type AI, D and B vehicles under 35 passengers.

11. Tachometer. EXCEPTION: Type AI, D and B vehicles under 35 passengers.

I2. Glow plug indicator light where appropriate.

B. All instruments shall be easily accessible for maintenance and repair.

C. Instruments and gauges shall be mounted on instrument panel clearly visible to operator while in normal seated position in accordance with SBMI Design Objectives, May 1990 edition.

D. Instrument panel shall have lights of sufficient candlepower to illuminate all instruments and gauges, and shift selector indicator for automatic transmission.

E. Radiator shall be so equipped as to provide a visual fluid level inspection without removal of the radiator cap. The fluid level indicator must be positioned as to afford easy visibility from ground level.

LENGTH, OVERALL

Overall length shall not exceed 40 feet.

OIL FILTER

Oil filter or replaceable element or cartridge type shall be provided, and shall be connected by flexible oil lines if it is not of built-in or engine-mounted design. Oil filter shall have a capacity of approximately one quart.

OPENINGS

All openings in floorboard or fire wall between chassis and passenger carrying compartment, such as gear shift lever and parking brake lever, shall be sealed.

PASSENGER LOAD

A. GVW is the sum of the chassis weight, plus the body weight, plus the operator's weight, plus total seated pupil weight.

1. For purposes of calculation, the operator's weight is 150 pounds.

2. For purposes of calculation, the pupil's weight is 120 pounds.

B. Actual GVW shall not exceed the chassis manufacturer's gross vehicle weight rating (GVWR) for the chassis.

POWER AND GRADEABILITY

A. Gross vehicle weight (GVW) shall not exceed 185 pounds per certified net published horsepower of the engine at the manufacturer's recommended maximum number of revolutions per minute.

B. The following chart presents the minimum horsepower and/or torque requirements for engines to be used in chassis accommodating bus bodies of the respective capacities.

DIESEL POWER

Passenger Capacity	Minimum Gross Horsepower
Under 35	130 HP
35 - 47	160 HP
48 - 78	185 HP
79 - 84	205 HP
85 - 90	235 HP

1. All Type AI and B vehicles, 35 passengers and above, and Type C and D vehicles shall be equipped with positive locking hand throttle, or a fast idle control device.

2. All engines shall be equipped with an automatic engine cooling fan. Automatic shutters may be used and coordinated to cycle properly with automatic fan.

3. An engine block heater of 1000 watts minimum shall be provided. A recessed and covered receptacle for the block heater shall be mounted in the front bumper. EXCEPTION: Type AI, D and B vehicles under 35 passengers, manufacturer's standard. Type D vehicles, rear engine - receptacle shall be located in the rear. Type D vehicles, front engine - receptacle may be mounted to the bus body in front of the service door.

4. Electrical key shut down shall be required.

5. An original equipment, manufacturer's installed closed combustion fuel fired heater is permissible in lieu of a block heater if approved by an independent certified testing laboratory and with approval of the State Executive Director of School Transportation.

6. All available warranty information must be provided to the purchaser.

7. Noise acoustical abatement package is recommended. EXCEPTION: Rear engine vehicles.

SHOCK ABSORBERS

Buses shall be equipped with front and rear double-action shock absorbers compatible with manufacturer's rated axle capacity, at each wheel location.

SPRINGS/SUSPENSION

A. Air suspension systems are standard on rear axle only. EXCEPTION: Type AI, D and B vehicles under 35 passengers, unless offered by chassis manufacturer.

B. Capacity of springs or suspension assemblies shall be equal to or exceed axle rating, except when otherwise specified in bid invitation.

C. Rear springs are permissible, they shall be of progressive type.

D. If leaf-type springs are used, stationary eyes shall be protected by full wrapper leaf.

E. Wrapper leaves on rear springs are permissible.

F. Clearance between springs and tire, and between tires, shall provide ample space for use of tripleside dual chains.

STEERING GEAR

A. All chassis shall be equipped with heavy duty power steering of integral type with integral valves. Design shall provide a means of lubrication for all wear points, if wear points are not permanently lubricated.

B. Steering mechanism shall provide for easy adjustment for lost motion.

C. No changes shall be made in steering apparatus which are not approved by chassis manufacturer.

D. There shall be clearance of at least 2" between steering wheel and cowl instrument panel, windshield, or any other surface.

E. All chassis accommodating 35 passenger bodies and above shall be equipped with a tilt steering wheel having a minimum diameter of eighteen (18) inches.

TIRES AND RIMS

A. Standard profile tubeless tires, and rims of proper size with load ratings that equal or exceed axle ratings in these requirements shall be provided. In no case shall the tire and rim sizes be less than those shown in the following:

STANDARD PROFILE TIRES

PASSENGER CAPACITY		SIZE	LOAD RANGE (PLY)	RIM SIZE
Type AI	16 - 34	225 x 75R16	D(8)	6.00
Type B	16 - 34	8 x R19.5	D(8)	6.00
Type AI & B & C	35 - 54	9 x R22.5	F(12)	6.75
	55 - 60	10 x R22.5	G(14)	7.50
	61 - 77	11 x R22.5	G(14)	8.25
Type D	47 - 60	10 x R22.5	G(14)	7.50
	61 - 90	11 x R22.5	G(14)	8.25

B. Low profile tubeless radial tires are permissible as an option. In no case shall the tire and rim sizes be less than those shown in the following:

LOW PROFILE TIRES

PASSENGER CAPACITY		SIZE	LOAD RANGE (PLY)	RIM SIZE
Type AI	16 - 34	LT 215/85R16	D(8)	6.00
Type B	16 - 34	225/70R19.5	F(12)	6.00

Type AI & B & C	35 - 66	255/80R22.5 265/75R22.5	G(14)	7.50
	67 Up	275/80R22.5 295/75R22.5	G(14)	8.25
Type D	47-54	275/80R22.5 295/75R22.5	G(14)	8.25
	59-72	275/80R22.5 295/75R22.5	G(14)	8.25
	77-90	275/80R22.5 295/75R22.5	H(16)	8.25

C. Dual rear tires shall be provided.

D. First line steel belted radial tires are required.

E. Mud and snow tires on rear axle are permissible.

F. Hub piloted wheels are standard . Stud piloted disk or cast spoke wheels are optional.

TOW HOOKS

Front tow hooks shall be installed by chassis manufacturer and shall be at least 200 degrees spiral, have a minimum inside diameter of 2 ½ inches and mounted parallel to bus frame rail. EXCEPTION: Type B vehicles under 35 passengers.

TRANSMISSION

A. An automatic transmission shall be standard on all vehicles 35 passengers and over. A manual transmission is an approved option. An automatic transmission shall be standard on all Type AII and B vehicles under 35 passengers and all Type D vehicles. A manual transmission is an approved option on Type D vehicles.

B. All automatic transmissions shall be equipped with an external oil filter and a transmission temperature gauge shall be installed on the instrument panel. EXCEPTION: Type AII and B vehicles under 35 passengers and all vehicles equipped with a MD3060 transmission.

C. Automatic transmissions shall be equivalent to either the AT-545 four speed for buses of 35 to 64 passenger capacity inclusive or the MT-643 four speed, for buses of 65 to 90 passenger capacity. The Allison MD3060 transmission is permissible for chassis of 65 to 90 passenger capacity.

D. Manual-type transmission shall be synchromesh except in first and reverse

gears. Its design shall provide not less than five forward speeds and one reverse speed for all buses of 35 passenger capacity and above. A choice of transmissions will be available for matching power train ratios for fuel efficiency. (Use of six-speed or seven speed transmission is recommended on vehicles of 65 passenger capacity and above.)

E. All transmissions, on vehicles equipped with hydraulic brakes, shall be equipped with heavy duty, positive locking hand brake equivalent to the Orschelin brake. EXCEPTION: Type A and B vehicles under 35 passengers, manufacturer's standard.

F. A retarder, integrated within an automatic transmission, is permissible.

TURNING RADIUS

A. Chassis with a wheelbase of 264" or less shall have a right and left turning radius of not more than 42 ½ feet, curb to curb measurement.

B. Chassis with a wheelbase of 265" or more shall have a right and left turning radius of not more than 44 ½ feet, curb to curb measurement.

UNDERCOATING

Chassis manufacturer shall coat undersides of all metal components with rust-proofing compound which meets or exceeds U. S. Department of Defense Specification MIL-C-62218A, using modified test procedures as defined under "Undercoating" of body requirements.

WEIGHT DISTRIBUTION

Weight distribution of fully loaded bus on level surface shall not exceed the manufacturer's gross axle weight rating on any axle.

APPROXIMATE WEIGHTS OF SCHOOL BUSES *

PASSENGER CAPACITY	CURB WEIGHT	LOADED WEIGHT
35/36	11,480 pounds	15,830 pounds
47/48	12,875 pounds	18,665 pounds
53/54	13,570 pounds	20,080 pounds
59/60	14,905 pounds	22,135 pounds
65/66	15,755 pounds	23,705 pounds

71/72 - Type C	16,475 pounds	25,145 pounds
71/72 - Type D	19,794 pounds	28,584 pounds
77/78 - Type C	17,483 pounds	26,843 pounds
77/78 - Type D	20,569 pounds	30,077 pounds
83/84	21,379 pounds	31,609 pounds
89/90	21,379 pounds	32,329 pounds

* Information for West Virginia bridge and road restrictions.

SCHOOL BUS BODY

AISLE

A. Minimum clearance of all aisles shall be 12".

B. The seat backs shall be slanted sufficiently to give aisle clearance of 15" at tops of seat backs.

BATTERY

A. Battery/batteries shall be furnished by chassis manufacturer.

B. When battery/batteries is/are mounted as described in Electrical System, 1, battery/batteries, of chassis requirements, the body manufacturer shall securely attach battery/batteries on a slide-out tray in a closed, vented compartment in the body skirt, whereby battery/batteries may be exposed to outside for convenient servicing. Cable length and routing, including travel of tray, shall permit the battery/batteries to slide completely outside of body limits for convenient removal and installation. Battery compartment door or cover shall be hinged at front or top, and secured by adequate and conveniently operated latch or fastener. (Battery tray shall have a safety stop to prevent dropping battery at outer extremity of tray travel.) Battery/batteries may be located in the engine compartment in rear engine buses. (When two Group D batteries are used, connecting cables shall permit either or both battery tray(s) to slide to the full "OUT" position without damage to, or disconnecting, cables. Body manufacturer shall be responsible for final cable and connections between batteries. A lock for the battery/batteries compartment door(s) is permissible. EXCEPTION: Type A.

BUMPER, FRONT

See page 7.

BUMPER, REAR

A. Bumper shall be of pressed steel channel at least 3/16" thick 9 ½ " wide (high) and of sufficient strength to permit pushing fully loaded bus by another vehicle without permanent distortion. EXCEPTION: Bumper for Type A vehicles may be 8" wide (high).

B. Bumper shall be wrapped around back corners of the bus, and shall extend forward at least 12", measured from rear-most point of body at floor line.

C. Bumper shall be attached to chassis frame in such a manner that it may be easily removed, and braced to develop full strength of bumper section from rear or side impact, and shall be attached to prevent hitching of rides, or permanent distortion when rear of bus is lifted by attaching lifting device to

bumper.

D. Bumper shall extend at least 1" beyond rear-most part of body surface, measured at floor line. EXCEPTION: Type AI, D vehicles.

CEILING

See Insulation and Interior, pages 30-31.

CHAINS

A. Automatic tire chains are permissible.

B. See Wheel Housings, page 41.

CHILD REMINDER SYSTEM

Alarm device that requires the operator to walk to the rear of the bus and press a deactivation device within 30 to 60 seconds or the bus horn will begin blowing. A pre-warning device and mechanics service feature shall be included.

COLOR

A. The school bus body shall be painted uniform "National School Bus Glossy Yellow - Color Standard SAMI-008," in compliance with 1995 National Standards.

B. Primer shall be 3/4 - 1 mil and 1 ½ - 2 mils of yellow paint.

C. Reflective material shall be installed on the bus. Material shall be automotive engineering grade or better, meeting initial reflectance values in FHA FP-85 and retaining at least 50% of those values for a minimum of six years. Reflective materials and markings shall include any or all of the following:

1. "SCHOOL BUS" Signs: shall be marked with reflective National School Bus Glossy Yellow material comprising background for lettering of the front and rear "SCHOOL BUS" signs.

2. Sides of bus body - shall be marked with reflective National School Bus Glossy Yellow material at least 1 3/4" but not more than 2" in width, extending the length of the bus body and located (vertically) as close as practicable to the floor line. Emergency window exits shall be marked with no greater than 1 3/4" in width strip of reflective National School Bus Glossy Yellow material. Top, bottom and each side shall be outlined.

3. White colored roof areas are permissible.

4. Reflective material color on roof shall match roof color.

CONSTRUCTION

A. Construction shall be of prime commercial quality steel or other material with strength at least equivalent to all steel as certified by body manufacturer. Fiberglass or other composite materials are acceptable provided the construction meets all federal standards and the manufacturer certifies the materials to be of durable construction.

B. Construction shall provide reasonably dustproof and water-tight unit.

C. Floor shall be of prime commercial quality steel of at least 14 gauge or other material equivalent in strength to 14 gauge steel. (Type AI, D, van conversion, manufacturer's standard.) Floor shall be covered with approximately 19/32" thickness plywood, at least five ply, and shall equal or exceed properties of exterior type douglas fir plywood, C-D Grade, as specified in standard issued by Department of Commerce. (Commercial Standard CS45-60, Douglas Fir Plywood: A Recorded Voluntary Standard at the Trade as amended.)

   Floor shall be level from front to back and from side to side, except in wheel housing, toeboard and operator's seat platform areas.

D. All openings between chassis and passenger-carrying compartment made due to alterations by body manufacturer must be sealed. See Openings, page 16.

E. Floor Covering, see pages 26-27.

F. Type AII vehicle bodies shall be equipped with restraining barriers conforming to FMVSS 222 "School Bus Passenger Seating - Crash Protection."

DOORS

A. Service Door

1. Service door shall be under control of operator, and designed to afford easy release and prevent accidental opening. When hand lever is used, no part shall come together to shear or crush fingers.

2. Service door shall be located on right side of bus opposite operator and within direct view of operator.

3. Service door shall have minimum horizontal opening of 24" and minimum vertical opening of 68". Type AII vehicles shall have a minimum opening area of 1200 square inches.

4. Service door shall be an outward opening door equipped with a grab handle on the outside of the door. Type A does not require a grab handle.

5. There shall be no door to left of the operator on Type C and D vehicles. Type AI and II and B vehicles under 35 passengers may be equipped with chassis manufacturer's standard door.

6. All doors shall be equipped with padding at the top edge of each door opening. Pad shall be at least 3" wide and 1" thick and extend the full width of the door opening.

7. Power operated service door is required. EXCEPTION: A1-A2 exception

8. Service door shall be equipped with a vandal lock. Exception: Type AI & II van cutaway with lockable operator side door.

B. Emergency Door

All buses must comply with FMVSS 217.

1. A vandal lock shall be installed on all emergency doors. It shall be wired into the ignition and/or starting circuit to prevent starting of the engine with the door locked and must meet the requirements of FMVSS 217.

ELECTRICAL SYSTEM

A. Battery - See pages 8-9 and page 21.

B. Alternator - See page 9.

C. Lights and Signals - See page 9.

D. Wiring - See pages 9-10.

EMERGENCY EXITS

All emergency exits must comply with FMVSS 217.

A. Type A, B, C, and D vehicles shall be equipped with the following number of emergency exits:

0 to 53 Passengers = 1 roof hatch

54 and up Passengers = 2 roof hatches

Emergency exit windows shall be "staggered" (not directly across from each other) when possible.

B. Body shall be equipped with roof safety hatches that combine the following functions in each unit:

1. Multi-position, fresh air ventilation without static vents.

2. No alarms are required on roof hatches.

3. Release handle(s) permitting operation as emergency exit(s), accessible inside and outside the vehicle.

4. Reflective material around roof hatches shall match roof color.

5. Buses that have a center seam shall have one unit on the right side and one unit on the left side.

C. Each emergency exit shall comply with FMVSS 217. These emergency exits are in addition to the rear emergency door or exit.

In addition to the audible warning required on emergency doors by FMVSS 217 additional emergency exits may be likewise protected.

FIRE EXTINGUISHER

A. Each bus shall be equipped with at least one pressurized, dry chemical-type fire extinguisher of total metal construction, refillable, securely mounted with spring steel friction fit bracket. A pressure gauge shall be mounted on the extinguisher to be easily read without removing the extinguisher from its mounted position.

B. The fire extinguisher shall be of a type approved by the Underwriters Laboratories, Inc., with a total rating of not less than 2A-10-BC. The operating mechanism shall be sealed with a type of seal which will not interfere with use of the fire extinguisher.

FIRST AID KIT

A. Bus shall have a removable, moisture and dustproof first aid kit mounted in full view in an accessible place within the operator's compartment. This place shall be properly identified.

B. The minimum requirement is a 35 unit kit with contents as follows:

Bandage Compress, (sterile gauze pads) 4"	5 units
Bandage Compress, (sterile gauze pads) 2"	6 units
Adhesive Absorbent Bandage (adhesive tape) 1"	5 units
Triangular Bandage, 40"	4 units
Gauze Bandage, 4"	5 units
Absorbent-Gauze Compress	6 units
Wire Splints	1 unit
Non Latex Gloves	1 Unit
Kindergarten Scissors	1 unit
Mouth-to-Mouth Airway (plastic breathing shield)	1 unit

C. Mounting bracket shall be able to sustain a 20 G force load in any direction except upward.

D. Body fluid clean-up kit.

1. Each bus shall carry a Grade A metal or rigid plastic kit, mounted in an accessible place and identified as a body fluid clean-up kit with a directions-for-use sheet attached to the inside cover.

2. The kit shall be moisture resistant.

3. Contents shall include but not be limited to the following items:

a. One pair non latex gloves.

b. One pick-up spatula or scoop.

c. One face mask.

d. Infectious liquid spill control powder.

e. Anti-microbial hand wipes - individually wrapped.

f. Germicidal disinfectant wipes tuberculocidal.

g. Plastic bag with tie.

FLOOR

See Construction, pages 23.

FLOOR COVERING

A. Floor covering shall be of high quality, heavy duty, fire-resistant material and shall meet Federal Specifications ZZ-M-71b. Covering shall have a smooth sanded back with burlap removed.

B. Floor covering shall be permanently bonded to the floor and must not blister, crack or grow with reasonable use and maintenance. Bonding of adhesive material shall be waterproof and shall be of type recommended by the manufacturer of floor covering material. All seams or joints in flooring shall be neat and sealed with waterproof sealer.

C. Floor covering, including aisle area, shall be ribbed, non-skid type. Minimum overall thickness shall be 0.187".

D. Covering for under seat area, top of wheel housing, operator's compartment and toeboard shall be smooth non-skid type and shall have a minimum thickness overall of 0.125". Covering shall be securely bonded to contour of wheel housing.

E. Cove molding shall be used along side walls and rear corners. Metal or equivalent aisle joint strips shall be used to protect joints of flooring. However, painstaking care must be exercised to assure joints are properly fitted and sealed prior to fitting strips or molding to floor. Aisle strips shall be so shaped that the edges of same shall be drawn and held firmly to the flooring material. Welded seams are permissible.

F. Floor construction shall provide a properly sealed opening that measures a minimum of 6" X 6" for access to fuel gauge sending unit and/or in-tank fuel pump for all buses 35 passenger and above.

G. Floor covering shall not be black in color. EXCEPTION: Molded wheel housing covers.

FUEL PORT DOOR

A. Body manufacturer shall furnish a fuel port door on vehicles 35 passengers and above, and Type C and D vehicles.

B. All diesel powered vehicles shall have a fuel door labeled "Diesel" within six inches of the door.

C. Locking device for door optional.

HEATERS

A. School bus heating systems shall meet the following performance standards:

1. Provide evenly distributed heat throughout the bus body.

2. Provide defrosting for windshield and entrance door.

B. Heaters shall have capabilities of providing evenly distributed heat creating a temperature rise to 50 degrees Fahrenheit inside body shell when soaked in ambient temperature of 0 degrees Fahrenheit for 15 hours.

C. All 65 passenger and above bus bodies must be equipped with a heater booster pump. If a parallel system, booster pump shall be located in the return line.

D. Heater water flow shall be controlled by the installation of bulkhead mounted water shutoff valves. Water shutoff valves and bulkhead mounts shall require approval by the Office of School Transportation. Valves shall have minimum unrestricted 3/4" internal port. Heater hose entrance through firewall or floor shall be through prior approved bulkhead fittings. Chassis manufacturer must provide a clear area to facilitate body manufacturers installation. EXCEPTION: Type All and D vehicles, located at or near the engine.

NOTE: BODY MANUFACTURER - shall work with chassis manufacturer to determine location requirements for the firewall mounted bulkhead fitting.

CHASSIS MANUFACTURER - shall be responsible for installation of hose bibbs accessible to body company for attachment of body company's one-inch inside diameter heater hose.

E. Switching for heaters shall provide independent switching for each motor.

F. Hose between heaters shall be protected by metal raceway or conduit.

G. Heater performance shall be measured:

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

2. Temperature must rise to 50 degrees Fahrenheit inside (when soaked in ambient temperature of 0 degrees Fahrenheit for 15 hours) in 20 minutes when 170 degrees Fahrenheit hot water is applied at the rate of three gallons per minute at a maximum of six psi pressure.

3. Maximum current flow for heaters including defrosters shall not exceed 45 amperes.

H. Heater cores installed in school buses shall meet the following standards:

1. Static Pressure Test - 150 psi

2. Cycle Test - 20-50 psi hydraulic surge pressure 450,000 cycles minimum.

3. Core Flow Restriction - Total heater system flow restriction shall be measured at a flow rate of three (3) gallons/minute at a maximum of six (6) psi pressure when measuring heater performance.

I. Defrosters - Shall be included in the total electrical load for heaters and meet the following criteria:

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

2. Shall be directional to provide operator capability of defrosting in drive view area first.

3. Shall provide means of defrosting service door glass independent of windshield.

4. Defroster system shall have capability of mixing minimum 50% outside fresh air with defrosting air.

5. Defroster system shall meet SAE Standard J381-J382 performance requirement.

6. At least two auxiliary fans, six inches in diameter shall be installed, suspended from above, one at each side of the windshield, where they

can be adjusted for maximum effectiveness. Fan blades shall be covered with a protective cage. Each fan shall be controlled by a separate switch. Exception: Type AI & II vehicles shall use one fan. Location, manufacturer's standard.

7. Auxiliary fans are not to be considered as part of the primary defrosting and defogging system

NOTE: All manufacturers shall demonstrate the capabilities of their heating and defrosting system at the time of pilot model inspection and by certified letter to the State Executive Director of School Transportation.

J. Heater Lines and Hose

1. Heater lines (pipe) shall be a minimum of 3/4" inside diameter.

2. All hose must be 1". EXCEPTION: Type AI & II vehicles.

3. Hose clamps shall be "collar screw type."

4. Hose shall be adequately supported to guard against excessive wear due to vibration.

5. Hose shall not dangle or rub against sharp edges, nor interfere with or restrict the operation of any engine function.

6. All hose shall conform to SAE 20R3 - Class D2.

7. Heater cores and lines on the interior of bus shall be shielded to prevent scalding of passengers.

8. Any heater line or hose routed outside of bus body shall be insulated for the entire length of hose exposed to outside temperature.

K. There shall be a water flow regulating valve installed for convenient operation by the operator. EXCEPTION: Type AI & II and D vehicles - located at or near the engine.

L. An accessible service entrance to heaters shall be provided by an outside removable body panel or removable heater cover. Type C vehicles shall provide access to heater components on operator's side through outside access panel, if not readily accessible from interior of bus.

M. Each heater shall be attached to a separate circuit breaker.

HEIGHT, INSIDE

Inside body height shall be 72" or more, measured from the finished floor to the ceiling at any point on longitudinal center line from front vertical to rear vertical bow. Inside body height of Type AII vehicles shall be 62" or more.

HORN(S)

A. If air horns are used, they shall be mounted above operator's window or under the floor on left side of bus.

B. All buses shall be equipped with audible electrical warning device, automatically actuated when bus is in reverse gear. Device shall be of 109db, meeting SAE-J9946. Device shall be mounted behind rear axle, between frame rails, and shall emit intermittent sound.

IDENTIFICATION

A. Body shall bear words "SCHOOL BUS" in black letters at least 8" high on both front and rear of body. Lettering shall be placed as high as possible without impairment of its visibility. Lettering shall conform to "Series B" of Standard Alphabet for Highway Signs. Decals or vinyl lettering are permissible. "SCHOOL BUS" signs shall be marked with reflective National School Bus Glossy Yellow comprising background for lettering of the front and/or rear "SCHOOL BUS" signs.

B. Every bus shall be lettered "..... COUNTY SCHOOLS", on both sides of bus, and numbered on both sides and rear. Numbers on both sides shall be near front, in line with lettering. Lettering and numbering on sides of bus shall be at least 6" high. Decals or vinyl lettering are permissible.

C. The number of the bus shall be 5" in height, in white or yellow, displayed on either the front bumper or the crossing arm.

INSULATION

A. Ceiling, walls, and bulkhead or bow cavities shall be fully insulated with proper material applied inside of outside panels by spray to deaden the sound and to reduce vibrations to a minimum.

B. Ceiling and walls shall be fully insulated with fiberglass or equivalent having a thickness of 1 ½". EXCEPTION: Fiberglass insulation of 2" thickness may be used where it can be accommodated without being depressed. However, special attention must be given this factor of tolerance. Such thermal insulation shall be fire-resistant material of type approved by Underwriters Laboratories, Inc.

C. Noise abatement/acoustical package is permissible.

INTERIOR

A. Interior of bus shall be free of all unnecessary projections likely to cause injury. This requires inner lining on ceilings and walls. If ceiling is constructed so as to contain lapped joints, forward panel shall be lapped by rear panel and exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges.

B. Cowl shall not be modified, or accessories installed, to interfere with operator's visibility of gauges on instrument panel.

C. Flammability of interior materials shall meet FMVSS 302.

D. Interior color of seats, panels, head bumpers, and floor covering shall not be black.

E. Every school bus shall be constructed so that the noise level taken at the ear of the occupant nearest to the primary vehicle noise source shall not exceed 85 dBA when tested according to the procedure found in the Noise Test Procedure - National Minimum Requirements.

LIGHTS AND SIGNALS

A. All lights, including installation shall conform to current standards and recommendations of SAE, West Virginia Motor Vehicle Law and FMVSS 108. Light emitting diodes (LED) lights and Lexan lens lights are permissible.

B. Head Lights

USA Daytime Running Lights will not activate until the engine is started. Head and tail lights shall be combined on a single circuit, served by a separate circuit breaker field effect transitors, (hereafter FIT). There shall be no other electrical load added to the head light circuit.

C. Clearance and Side-Marker Lights

Clearance, side-marker, and identification lights shall be armored type, combined in a circuit controlled by the same switch.

D. Tail and Stop (Brake) Lights

1. Manufacturer standard.

E. Back-Up Lights

Two back-up lights are required, one on each side of rear door. Bulb shall be 32 candlepower, with white lens and/or reflector capable of lighting roadway and objects to rear of bus for safe backing, during darkness.

NOTE: System must meet SAE J593 JUN 87 Standard.

F. License plate light shall be LED light emitting diodes, (hereafter LED.)

G. Interior Lights

1. Interior lights shall include two rows of dome lights installed on two circuits so that lights in front half and lights in rear half of bus are on separate circuits.

2. A stepwell light which adequately illuminates stepwell shall be provided. It shall be connected in the clearance light circuit and activated when the service door is opened.

H. School Bus Alternately Flashing Signal Lights

- School bus red signal lights are alternately flashing lights mounted horizontally both front and rear, intended to identify a vehicle as a school bus and to inform other users of the highway that such vehicle is stopped on highway to take on or discharge school children.

- School bus yellow signal lights are alternately flashing lights mounted horizontally both front and rear, intended to identify a vehicle as a school bus and to inform other users of the highway that such vehicle is preparing to stop on the highway to take on or discharge school children.

1. Each school bus shall be equipped with a system consisting of four red signal lights designed to conform to SAE Standard J887, and four amber signal lights designed to that standard except for color, and except that their candlepower shall be at least 2 ½ times that specified for red signal lights. This system, stop arm, and crossing arm shall be wired through a master switch, but NOT through vehicle ignition switch.

2. Both red and amber signal lights shall be installed in accordance with SAE Standard J887, except that each amber signal light shall be located near each red signal light, at the same level, but closer to the vertical centerline of the bus. Shields over lights, painted black, with a minimum depth of 4" shall be furnished.

3. The system shall be wired so that the amber signal lights are activated only by hand operation and, if activated, are automatically deactivated, and red signal lights are automatically activated when the bus entrance door is opened.

4. The flashing mechanism shall be capable of carrying the full current load of the signal system in continuous operation.

5. Right and left signal lights shall flash alternately. Each signal light shall flash not less than 60 flashes per minute. The "ON" period shall be long enough to permit bulb filament to come up to full brightness.

6. There shall be a red pilot light which shall go on when the respective amber or red systems are actuated. The pilot light shall either go out or flash at an altered rate in the event the system is not functioning normally.

7. Signal light system shall operate as follows:

   a. With master switch on, entrance door closed, depress hand switch. Red pilot light and amber signals shall go on.

b. Open entrance door. Red pilot light and amber signal lights shall go off, and red pilot light and red signal lights shall go on. Stop arm, if air, vacuum, or electrically powered, shall automatically extend.

c. Close entrance door. Red pilot light and signal lights shall go off, and stop arm, if air, vacuum, or electrically powered, shall retract immediately.

d. Open entrance door without depressing hand switch. Red pilot light and red signal lights shall go on. Stop arm, if air, vacuum, or electrically powered, shall automatically extend.

e. With master switch off, depressing hand switch shall not actuate the amber signal system, nor shall opening entrance door actuate the red signal system and stop arm.

f. The signal light system shall operate with the vehicle ignition switch in either the on or off position.

8. Installation Requirements

a. Each flashing signal light shall be mounted with its axis substantially parallel to longitudinal axis of vehicle.

b. Front and rear alternately flashing signal lights shall be spaced as far apart laterally as practicable.

c. Alternately flashing signal lights shall be mounted at the front above the windshield and at the rear so that the lower edge of lens is not lower than top line of the side window.

d. Vertical and lateral vision of the front and rear alternately flashing warning lights shall not be obstructed by any part of the body or lighthouse insofar as standard bus body construction shall permit.

e. Area around each light, minimum of 1" outward shall be painted black.

f. A separate fuse or circuit breaker, adequate to prevent damage to the system in the event of a dead short, shall be provided between the power source and the master switch.

g. All wiring from alternately flashing signal lights to the door switch shall be at least 14 gauge and must meet SAE requirements.

I. Roof Mounted Strobe Light

A strobe light, white in color, shall be mounted on the roof of the school bus. The light shall be a maximum of 6 1/2" in height, located on the center line of the roof four to six feet from the rear of the bus, and rear of the roof hatch. The strobe light shall be a double flashing Class 1, with a high/low intensity feature, minimum of 10 joules.

J. Turn Signal Lights

1. Manufacturer standard.

2. Type AI, B, C and D vehicles shall have an armored light, recessed on right side behind service door and on left side behind stop arm signal, wired in the turn signal circuit.

K. Emergency Warning Device

Each school bus shall be supplied with a minimum of at least three reflectorized triangle road warning devices in a container supplied but not mounted by the body manufacturer.

L. Exterior skirt mounted landing light at entrance door.

METAL TREATMENT

A. All metal used in construction of bus body shall be zinc coated, aluminum-coated, or treated by equivalent process before bus is constructed. Excluded are such items as door handles, grab handles, interior decorative parts, and other interior plated parts.

B. All metal parts that will be painted shall be, in addition to other requirements, chemically cleaned, etched, zinc phosphate coated, and zinc chromate or epoxy primed or conditioned by equivalent process.

C. In providing for these requirements, particular attention shall be given lapped surfaces, welded connections of structural members, cut edges, punched or drilled hole areas in sheet metal, closed or box sections, unvented or undrained areas, and surfaces subjected to abrasion during vehicle operation.

D. As evidence that above requirements have been met, samples of materials and sections used in construction of bus body, when subjected to 1000-hour salt spray test as provided for in latest revision of ASTM designation; B-117 "Standard Method of Salt Spray (Fog) Testing", shall not lose more than 10% of material by weight.

MIRRORS

A. Interior Mirror

Interior mirror shall be either clear view laminated glass or clear view glass bonded to a backing which retains the glass in the event of breakage. Mirror shall be a minimum of 6" x 30". EXCEPTION: Type AI & II vehicles may be 6" x 16".

B. Exterior Mirrors

1. Two heated adjustable operator exterior side-view mirrors shall be provided, one on the left and one on the right of the operator. The

brackets used for the mirror system shall minimize mirror vibration and give the operator an unobstructed view of all exterior mirrors. Mirror glass to be heated by means of a self regulating heater. Body manufacturer to provide dash mounted on-off switch. Type D vehicles will view the operators side mirror through the operators side window.

The exterior side view mirror system shall provide a field of view from behind the entrance door to a minimum of 200 feet to the rear of the bus. The mirror system shall also make the area from the top of the side windows to the ground on either side of the bus clearly visible to the school bus operator. The ground will be visible 12 feet to each side of the bus. Mirrors will be warranted for the same period of time, as the bus body and shall be warranty by the mirror manufacturer.

2. Crossview Mirror System - Shall provide the operator with indirect observation of all areas not under direct observation in front of as well as to both sides of the bus to a point where the view overlaps the side view mirror system. All crossview mirrors shall be heated.

3. Crossview main support arm will mount as closely to the most forward and outer fender surface, mirror main arm will pivot for proper viewing of crossover mirror. Two brace arms will be provided, brace arms will not interfere with main support arm adjustment.

4. All exterior mirrors, as a system, must conform to FMVSS 111.

MOUNTING

Body to chassis mounting shall:

A. Provide adequate body to chassis insulation with permanently installed insulators.

MUD FLAPS

A. Mud flaps or guards are required and shall be provided by the body manufacturer for both front and rear wheels. They shall be constructed of heavy duty multi-ply mud flap material.

B. Front mud flaps or guards shall be of adequate size to protect body areas vulnerable to road debris from wheels, and mounted to be free of wheel movement at all times.

C. Rear mud flaps or guards shall be comparable in size to width of rear wheel housing, and shall reach within approximately 9" of the ground when bus is empty. They shall be mounted at a distance from the wheels that will permit free access to spring hangers for lubrication and maintenance, and to prevent their being pulled off while vehicle is in reverse motion, or damaged by tire chains.

OVERALL LENGTH

Overall length of bus shall not exceed 40 feet.

OVERALL WIDTH

Overall width of bus shall not exceed 102", excluding authorized safety equipment.

PUBLIC ADDRESS SYSTEMS

Public address systems and combination radio and tape players on school buses are permissible for directing and disciplining passengers. Inside speakers shall be recessed, or flush mount. Speaker electrical terminals shall be installed or insulated to prevent grounding. No speaker, except FM 2-Way radio speaker, shall be forward of the passenger area.

RADIO SYSTEMS

Two-way radio communication is recommended.

A. Mobile Unit Recommendations

1. FM-UHF 450-470 MHZ with capability of transmitting and receiving on at least three channels.

2. Units shall be equipped with tone squelch (CTCSS).

3. Transmit power shall be no less than 25 watts and transmitter should meet EIA RS-152B standards.

4. Receiver sensitivity shall be no less than .25uV (12dBSINAD) and receiver should meet EIA RS-204C standards.

B. Base/Control Station Configuration - Should be compatible with recommended equipment and designed as required to cover specified service area.

RUB RAILS

A. There shall be at least three black rub rails located as follows:

1. One at seat level.

2. One at floor level.

3. One at bottom of body skirt. EXCEPTION: Type AII vehicles.

B. Rub rails shall extend from the rear of the entrance door completely around the bus to point of curvature near outside cowl on left side. At least one rub rail will

extend around rear of bus. EXCEPTION: Type D vehicles with rear engine.

C. Rub rails shall be one piece except where broken by emergency door, wheel housings, battery box, access panels, corner of bus, etc. All ends shall be capped.

D. Rub rails shall be overlapped at body corners and securely attached at least twice to each body post and upright structural member within their length.

E. Rub rails shall be 4" or more in width, of 16 gauge steel or suitable material of equivalent strength, and constructed in corrugated or ribbed fashion.

F. Rub rails shall be applied outside body or outside body posts. Pressed-in or snap-on rails do not satisfy this requirement.

SEAT BELT FOR OPERATOR

A type 2 lap belt/shoulder harness seat belt shall be provided for the operator. The assembly shall be equipped with an emergency locking retractor (ELR) for the continuous belt system. The lap portion of the belt shall be guided or anchored where practical so as to prevent the operator from sliding laterally. Adjustable upper anchorage for the shoulder harness is required. A seat integrated shoulder restraint system is permissible.

SEATS

A. All seats shall have minimum depth of 15".

B. In determining seating capacity of bus, allowable rump width shall be:

1. 13" where 3-3 seating plan is used.

2. 15" where 3-2 seating plan is used.

C. All seats shall be forward-facing and anchorage shall comply with FMVSS 207, 210, and 222.

D. All passenger seat cushions shall be attached positively to front rail of seat frame so that seat may be tilted forward for cleaning bus, but seat will not be loose from frame rail. Rear seat cushion shall be attached to the rear seat frame with a swivel fastener device.

E. Rear-most seat shall retain maximum allowable rump room.

F. No bus shall be equipped with jump seats or portable seats.

G. Forward-most pupil seat on right side of bus shall be located to not interfere with operator's vision, not farther forward than guard rail behind operator, or rear of operator's seat when adjusted to its rear-most position.

H. A modesty panel will be provided under the right front crash barrier that will

permit flow of heat from stepwell heater but will not allow passengers to crawl into the stepwell area.

I. All restraining barriers and passenger seats shall meet the criteria contained in FMVSS 302.

1. Seat cushions shall be a thickness that will not depress more than 80% when a pupil weight of 360 pounds is applied, and it shall have rapid and adequate recovery. These cushions shall be high enough in the back to provide the proper joint with the seat back. These cushions shall have a mid-cushion height of approximately 5".

2. The seat cushion shall have a ½ " thick moisture-resistant plywood base or approved equal.

J. Operator's seat shall be of the high-back type air ride with a minimum seat back adjustment of 15 degrees and with a head restraint to accommodate a 95 percentile adult male (95 percentile adult male as defined in FMVSS 208). The operator's seat shall be secured with nuts, bolts, and washers or flanged-headed nuts. EXCEPTION: Type A and B vehicles under 35 passengers.

K. Minimum distance between steering wheel and back rest of operator's seat shall be 11". Operator's seat shall be cloth covered insert type and bolted to floor and shall have vertical adjustments, with fore-and-aft adjustment of not less than 4".

STEPS

A. First step at service door shall be not less than 12" and not more than 16" from ground, based on standard chassis specifications.

B. Service door entrance shall be equipped with three-step stepwell. Risers in each case shall be approximately equal. When plywood floor is used on steel, differential may be increased by thickness of plywood used.

1. A skidplate in front of stepwell is required on all Type D vehicles.

C. Steps shall be enclosed to prevent accumulation of ice and snow.

D. All steps, including floor line platform area, shall be covered with 3/16" rubber floor covering or other material equal in wear resistance and abrasion resistance to top grade rubber.

1. Metal back of tread, minimum 24 gauge cold roll steel, shall be permanently bonded.

2. Three-sixteenth inch ribbed step tread shall have a 1 ½" white nosing as integral piece without any joint.

E. Steps shall not protrude beyond side body line when entrance door is closed.

F. Stainless steel grab handle, sufficiently anchored, not less than 20" in length, designed with smooth contour to prevent catching of belts or articles of clothing shall be provided on the rearward side of the service door entrance. EXCEPTION: Type A vehicles.

STIRRUP STEPS

There shall be at least one folding stirrup step or recessed foothold and suitably located non-corrosive handles on each side of the front of the body for easy accessibility for cleaning the windshield and lights, except when windshield and lights are easily accessible from the ground. EXCEPTION: Type AI & II vehicles. A step, in lieu of the stirrup steps, is permitted in or on the front bumper.

STOP SIGNAL ARM AND CROSSING CONTROL ARM

A. There shall be a stop signal arm installed on the left outside of the body which shall be equipped with a wind guard. Arm shall be of an octagonal shape with white letters and border, a red background, and be of reflective material. Two alternately LED , visible from both sides of the sign, meeting the requirements for gaseous discharge light container in SAE J1133, as amended shall be provided. The stop signal arm shall be vacuum, electric or air operated. The stop signal arm shall be capable of instantly reversing directions at anytime during its cycle and immediately returning to the open or closed position in response to the operators command through the operation of the door.

B. A solid piece crossing control arm, mounted to the right front bumper of the bus, shall be required. The device shall be air powered as standard, with electric or vacuum power as an option. The crossing control arm shall be wired in conjunction with the stop signal arm and the alternately flashing signal light. It shall meet the requirements of FMVSS 131. Crossing arm shall be equipped with an electromagnetic device to hold the arm to the bumper when the arm is not activated.

STORAGE COMPARTMENT

Metal compartment of adequate strength and capacity for storage of tire chains, tow chains, and such tools as may be necessary for minor repairs shall be provided. Such storage compartment shall be located outside passenger compartment. The dimensions of this compartment shall be approximately 25" long, 16" wide and 12" high, mounted in right side of body skirt below floor located in front of rear axle assembly properly drained. EXCEPTION: Type AII vehicles.

A door with locks keyed alike, as well as a proper latch, shall be provided. Such compartment shall be constructed of highly non-corrosive metal, and provision for drainage of water resulting from snow and ice on tire chains shall be provided. EXCEPTION: Special Education bus compartment may be on left or right.

SUN SHIELD

Interior adjustable, transparent, tinted sun shield approximately 6" x 30" shall be

provided. Sun shield must be capable of being turned to an angle of 180 degrees when not in use. EXCEPTION: Type A and B vehicles under 35 passengers, manufacturer's standard.

TAILPIPE

Chassis manufacturers shall furnish an exhaust system with tailpipe of sufficient length to exit the rear of the bus or at the left side of the bus body no more than 18" forward of the front edge of the rear wheel house opening. If designed to exit at the rear of the bus, the tailpipe shall extend at least five inches beyond the end of the chassis frame. If designed to exit to the side of the bus, the tailpipe shall extend at least 48.5" (51.5" if the body is to be 102" wide) outboard from the chassis centerline. Tailpipe shall not extend beyond rear bumper. See page 10-11, Exhaust Systems.

TOW HOOKS

A. Chassis manufacturer shall provide front tow hooks on Type C vehicles.

B. Body manufacturers shall provide rear tow hooks on all vehicles.

C. Tow hooks shall be at least 200 degrees spiral, have an inside diameter of approximately 2 ½ inches, and be mounted parallel to frame rail. EXCEPTION: Type AII vehicles shall be equipped with tow hooks adequate for towing vehicle.

UNDERCOATING

A. Entire underside of bus body, including floor sections, cross member, and below floor line side panels, shall be coated with rust-proofing compound for which compound manufacturer has issued notarized certification of compliance to bus body builder that compound meets or exceeds all performance requirements of United States Department of Defense Specification MIL-C-62218A using modified test procedures* for following requirements:

1. Salt spray resistance - pass test modified to 5% salt and 1000 hours.

2. Abrasion resistance - pass.

3. Fire resistance - pass.

* Test panels are to be prepared in accordance with paragraph 4-6.12 of TT-C-520b with modified procedure requiring that tests be made on a 48 hour air cured film at thickness recommended by compound manufacturer.

B. Undercoating compound shall be applied with suitable airless or conventional spray equipment to recommended film thickness and shall show no evidence of voids in cured film.

VENTILATION

A. Body shall be equipped with suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.

B. Static-type non-closable exhaust ventilation shall be installed in low-pressure area of roof.

C. Air conditioning which meets all applicable federal standards is an approved option.

WHEEL HOUSINGS

A. Wheel housings shall be of full open type.

B. Wheel house openings shall allow for easy tire removal and service.

C. Wheel housings shall be designed to support seat and passenger loads, and shall be attached to floor sheets in such manner to prevent any dust or water from entering the body.

D. Inside height of wheel housings above floor line shall not exceed 12".

E. Wheel housing shall provide clearance for dual wheels as established by National Association of Chain Manufacturers.

F. Rubber fenders that adequately protect sides of body from tire spray shall be provided.

WIDTH

See page 36, Overall Width.

WINDSHIELD AND WINDOWS

A. All glass in windshield, windows, and doors shall be of approved safety glass (current Safety Code for Safety Glazing Motor Vehicles Operating on Land Highways Z-26.1) so mounted that permanent mark is visible, and of sufficient quality to prevent distortion of view in any direction. All glazing materials shall comply with FMVSS-205 and FMVSS-219.

B. Windshield shall have horizontal gradient band starting slightly above operator's line of vision and gradually decreasing in light transmission to 20% or less at top of windshield. EXCEPTION: Type AI & II, B and D vehicles may use tinted windshield if gradient band is not available.

C. All buses are required to be equipped with split-sash windows.

D. Glass in all side and rear windows shall be of AS-3 grade or better, as specified by American Standards Association, Code Z-26.1.

E. Each full window shall provide unobstructed emergency opening of 9" high and 22" wide, obtained by lowering of window.

F. Latch shall be designed to latch positively and securely, with ease of release that would enable pupils to open in an emergency.

G. Window drip rail which does not interfere with size of window opening shall be furnished.

H. The operator's window shall be of sliding type. Double glazing is strongly recommended. EXCEPTION: Type AI & II vehicles, manufacturer's standard.

WINDSHIELD WASHERS

A. A windshield washer reservoir shall be furnished, and shall be at least three (3) quart capacity unless space restrictions limit size of container. A collapsible bag is not acceptable except on Type A vehicles.

B. Solvent shall be directed onto windshield through jets in the wiper arm. EXCEPTION: Type AII vehicles.

WINDSHIELD WIPERS

Bus shall be equipped with two intermittent-speed wipers. Windshield wipers shall be powered by motors on all vehicles.(Must meet SAE standard J198)

WIRING

A. All wiring and lights shall conform to current SAE standards and FMVSS 108.

B. Chassis to body current shall be controlled through a continuous duty solenoid of at least 105 ampere capacity.

C. Circuits

1. Wiring shall be arranged into at least the following circuits:

a. Head, tail, stop (brake) and instrument panel lights.

b. Clearance, stepwell and body control panel. Stepwell light shall be activated when service door handle is in the unlatched position. Control panel lights shall be on separate rheostat from instrument panel lights.

c. Dome lights.

d. Starter motor.

e. Ignition, emergency door signal and continuous duty solenoid or an electronic control system (ECS).

f. Turn signal lights.

g. Alternately flashing red signal lights.

h. Horns.

I. Heater #1.

j. Heater #2.

k. Heater #3.

l. Electric wipers.

m. Strobe light.

n. Crossing arm.

2. Any of the above combination circuits may be subdivided into additional independent circuits.

3. Heaters and defrosters shall require at least one additional independent circuit for each heater.

4. Whenever possible, all other electrical functions (such as electric-type windshield wipers) shall be provided with independent and properly protected circuits.

5. Each body circuit shall be color coded, and a diagram of the circuits shall be attached to the body in a readily accessible location.

6. All accessories, excluding lights, such as heaters, defrosters, etc., shall be wired to a continuous heavy duty solenoid or electronic control system (ECS) (minimum 105 ampere) activated or energized through the ignition switch and can be tested through the accessory side of the ignition switch.

D. A separate circuit breaker (FET) shall be provided for each circuit except starter motor and ignition circuits.

E. All wires within body shall be insulated and protected by covering of fibrous loom (or equivalent) which will protect them from external damage and minimize danger from short circuits. Wires shall be properly held in place by appropriate fasteners at intervals necessary to avoid possible damage to wire insulation. Whenever wires pass through body member, additional protection in form of appropriate type of insert shall be provided.

F. All wiring, switches and electrical connections shall be capable of carrying 10% more current than required in the circuit without evidence of overheating or damage.

NOTE: All available warranty information must be provided to the purchaser and to the State Executive Director of School Transportation.

TRAINING REQUIREMENTS

IN THE EVENT MAJOR CHANGES ARE MADE IN SYSTEMS OR SUBSYSTEMS, THE SUCCESSFUL BIDDER MAY BE REQUIRED TO PROVIDE TRAINING FOR COUNTY SCHOOL BUS MECHANICS AND SUPERVISORS.

SUCH TRAINING, IF REQUIRED, WILL BE SPECIFIED IN INVITATIONS TO BID, AND WILL INDICATE THE TYPE, EXTENT AND LOCATION OF CLASSES TO BE CONDUCTED.

SPECIAL TRANSPORTATION VEHICLE

INTRODUCTION TO SPECIAL EDUCATION

SCHOOL BUS OR MPV

The specifications in this section are intended to be supplementary to specifications in the chassis and body sections. In general, special transportation buses must meet all the requirements of the preceding sections, plus those listed in this section. Since it is recognized by the entire industry that the field of transportation for exceptional students is characterized by special needs for individual cases, and by a rapidly emerging technology for meeting those needs, a flexible, common-sense approach to the adoption and enforcement of specifications for these vehicles is prudent.

By federal regulations, buses, including school buses, are defined as vehicles designed to carry ten or more passengers. Vehicles with less than ten passenger positions (including the operator) cannot be certified as buses. For this reason, the federal vehicle classification Multipurpose Passenger Vehicle, or MPV, must be used by manufacturers in some cases for these vehicles in lieu of the classification school bus. In determining passenger capacity, wheelchair positions are counted as passenger positions. This classification system while requiring compliance with a different set of federal standards for school buses does not preclude the use of National School Bus Glossy Yellow paint or school bus warning light systems.

GENERAL REQUIREMENTS

I. Vehicles constructed for transporting students with special transportation needs shall comply with current FMVSS 222 and U126CSR89, West Virginia Board of Education Policy 4334, *Minimum Requirements for Design and Equipment of School Buses.*

II. Bodies may, at the option of the manufacturer, incorporate a section approximately 35", or 9" in addition to the standard 28" section if necessary to provide maximum utilization of space for seats and wheelchairs. Proper bracing shall be added as specified in the body standards.

III. Any school bus that is used specifically for the transportation of students who are confined to a wheelchair and/or other mechanical restraining devices prohibiting their use of the regular service entrance, shall be equipped with a power lift.

IV. Lift shall be located on the right side of the body, in no way attached to the exterior sides of the bus but confined within the perimeter of the school bus body when not extended. (Rear emergency door lift may be installed only with written permission from the State Executive Director of School Transportation.)

V. A vehicle equipped with a power lift must contain adequate space and proper restraining devices for a minimum of one wheelchair bound passenger.

VI. Each securement system location shall have a minimum clear floor area of 30" x 48". Additional floor area may be required for some applications. Consultation between the user and the manufacturer is recommended to ensure adequate area is provided.

AISLE

Aisle leading to emergency door from wheelchair area shall be of sufficient width to permit passage of wheelchairs (30" minimum).

FASTENING DEVICES

A. Belt Cutter - Bus shall contain a belt cutter for use in emergencies, including evacuations. Belt cutter should be designed to eliminate the possibility of the operator or others being cut during use, and should be secured in a location of safekeeping such as a first-aid kit.

B. Wheelchair Restraints

1. Each mobile seating device must be in a forward facing direction secured with a four point tie-down system with two tie-downs at the rear and two tie-downs at the front of the device.

2. The wheelchair securement system including all hardware (attachment bolts, track, etc.) shall have been successfully tested to meet minimum impact forces of a 20 G, 30 MPH deceleration to simulate a frontal impact on the transport vehicle per Society of Automotive Engineers (SAE) J2249, Wheelchair Tiedowns and Occupant Restraint Systems for Use in Motor Vehicles.

3. All attachments of the securing system to the mobile seating device and to the floor track or equivalent shall be a "positive" attachment type which prohibits the possible accidental disengagement of the mobile seating device from the secured mode.

4. All attachments or coupling systems which are designed to be connected and disconnected frequently must be operable by an adult person without the use of tools or other mechanical assistance.

5. All hardware and components of the securement system must be free of sharp or jagged areas and be made of corrosion resistant material or treated to resist corrosion.

6. All tie-downs used in the securement system for a mobile seating device must be identical in construction thereby eliminating the possibility that tie-downs might be installed in the wrong location.

7. All permanently attached anchor receptacles must provide multiple position attachment, commonly described as "track".

8. All tie-downs used in the securement system for a mobile seating device must be capable of adjustment in useful length of from 18"

minimum to 34" maximum in order to provide sufficient flexibility to fit a majority of possible applications.

9. All tie-downs used in mobile seating devices must be manufactured using synthetic fiber woven webbing capable of being cut to release the mobile seating device in case of an emergency condition which would preclude using the normal release function of the tie-downs.

10. All securement straps for mobile seating devices must be marked indicating that they meet the requirements of SAE J2249.

C. Occupant Restraints

1. An occupant restraint must be included as part of each securement system. The occupant securement must consist of a pelvic restraint and an upper torso restraint.

2. The occupant restraint system including all hardware (attachment bolts, track, etc.) shall have been successfully tested in combination with a mobile seating device securement system to meet minimum impact forces of 20 G., 30 MPH deceleration to simulate a frontal impact on the transport vehicle per SAE J2249.

3. All occupant restraint system attachments or coupling hardware must be a "positive" attachment type which prohibit the possible accidental disengagement of the restraint system.

4. All attachment or coupling systems designed to be connected and disconnected frequently must be operable by an adult person without the use of tools or other mechanical assistance.

5. The mobile seating device restraint should be independent of the occupant restraint and designed so that the weight of the wheelchair is not absorbed by the occupant.

6. Adjustment devices, quick release buckles and webbing, used in the construction of the occupant restraint system must meet requirements of applicable sections of FMVSS 209 and 222.

7. The pelvic restraint must be easily adjusted to fit a range of occupant sizes and contain a quick release buckle. The upper torso restraint must be adjustable to fit a range of occupant sizes and be easily attached and disengaged from the pelvic restraint.

D. The manufacturer of the restraint systems must supply detailed instructions regarding the installation and use of the system, including mounting of attachment hardware or track, suggested angles for attaching tie-downs and proper placement and positioning of the occupant restraint.

E. Padding or elimination of projections of structure or other similar elements must be considered in areas adjacent to the securement area of the mobile

seating device.

F. Restraining Devices - Seat frames shall be equipped with attachments or devices to which belts, restraining harnesses, or other devices may be attached. Attachment framework or anchorage devices, if installed, shall conform with FMVSS 210.

GLAZING

Tinted glass may be installed in all doors, windows and windshield. Tinted plastic, that complies with all applicable standards, may be installed in windows to the rear of the operator's compartment.

HEATERS

A. Bus bodies shall have a minimum of one heat exchanger in rear section of bus.

B. Bodies may also be equipped with an auxiliary, diesel fuel fired/air or coolant heater.

1. All auxiliary heaters must comply with Federal Motor Vehicle Standard 301 and be approved by an independent certified testing laboratory.

2. All auxiliary heaters shall utilize a low pressure, single fuel line system drawing fuel directly from the existing bus fuel tank.

3. All auxiliary heaters shall be equipped with a resettable dual overheat cut-out.

4. All auxiliary heaters shall have both low voltage cut-out and high voltage cut-out.

5. Auxiliary coolant heaters on Type C and D vehicles shall have a high thrust circulation pump.

6. Auxiliary coolant heaters on Type C and D vehicles shall have a dual ignition system, utilizing both electronic spark and glow plug.

7. Auxiliary coolant heaters on Type C and D vehicles shall be equipped with a high-temperature automatic monitoring switch with a temperature range of 178 degrees Fahrenheit to 194 degrees Fahrenheit for passenger comfort.

8. Auxiliary coolant heaters shall provide the following heat output requirements:

a. Type A Vehicles - Minimum 17,000 BTU.

b. Type B Vehicles, under 35 passengers - Minimum 24,000 BTU.

c. Type B Vehicles, 35 passengers and above, Type C and D Vehicles -

Minimum 41,000 BTU.

C. See Heaters, pages 27-29.

POWER LIFT

A. Lifting mechanism shall be able to lift minimum pay load of 800 pounds.

B. When the platform is in the fully up position, it shall be locked in position mechanically or hydraulically by means other than a support, or lug in the door.

C. Lift structure must have adequate padding or barriers for passenger protection. (The lift platform is exempt from being padded.) The lift structure shall be located behind the rear axle unless approved by the State Executive Director of School Transportation.

D. Lift control device to be mounted on the lift door in an accessible location provided by the manufacturer. There shall be a means of preventing the lift platform from falling while in operation due to a power failure.

E. Power lifts shall be so equipped that they may be manually operated in the event of power failure or failure of the power lift mechanism. Lift shall operate with key in "OFF" position.

F. Lift travel shall allow the lift platform to rest securely on the ground. Full and smooth deployment through the full range of travel. The lift platform shall be 32" x 42" minimum of clear and usable space.

G. The front and sides of the platform shall be designed to restrain wheelchair during the raising and lowering process.

H. Platforms on lifts shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross-sectional diameter between 1 1/4" and 1 ½" or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than 1/8". Handrails shall be placed to provide a minimum 1 ½" knuckle clearance from the nearest adjacent surface. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

I. A restraining device shall be affixed between the hand rails on each side of the lift platform to prohibit the wheelchair and occupant from rolling off the platform when the lift is in any position other than fully extended to ground level.

J. A self-adjusting, skid-resistant plate, a minimum of 3" in height shall be

installed on the outer edge of the platform to minimize the incline from the lift platform to the ground level. This plate, if so designed, may also suffice as the restraining device described in I., of the preceding paragraph. The lift platform must be skid-resistant.

K. A circuit breaker (FET), minimum of 100 amperes, shall be installed between power source and lift motor if electrical power is used.

L. The lift mechanism shall be equipped with switches or by-pass valves to prevent excessive pressure from building in the system when the platform reaches the full up or down position. If lift is not powered down a mechanism shall be installed to prevent a rapid descent to ground level. A lift cut off switch shall be provided in the bus operator area for buses equipped with a wheelchair lift.

M. An actuating switch shall be installed in the circuit to prevent the lift mechanism from operating when doors are closed.

N. When floor section is cut away for lift, a covered chain shall be installed to protect lift opening when lift is in lowered position.

O. The lift manufacturer shall provide upon request, proof of product liability insurance in the amount of $2,000,000.

P. The lift manufacturer shall provide service seminars for maintenance and service personnel.

REGULAR SERVICE ENTRANCE DOOR

A. Entrance shall have three step risers of equal height, with the first no less than 12" or more than 16" above ground level. (Outward opening doors are permissible, if necessary to meet this requirement.) EXCEPTION: Type AII and B vehicles under 35 passengers may use two step risers if riser does not exceed 9" in height.

RESTRAINING DEVICES, PASSENGER SEATS

Seat frames shall be equipped with attachments or devices to which belts, restraining harnesses, or other devices may be attached. Attachment framework or anchorage devices, if installed, shall conform with FMVSS 210.

SEATING ARRANGEMENTS

Flexibility in seat size and spacing to accommodate special devices shall be permitted due to the constant changing of passenger requirements. All seating shall be forward facing.

SPECIAL SERVICE ENTRANCE

A. Bus bodies may have a special service entrance constructed in the body to accommodate a wheelchair lift for the loading and unloading of passengers.

B. The curb side opening may extend below the floor through the bottom of the body skirt. If such opening is used, reinforcements shall be installed at the front and rear of the floor opening to support the floor and give it the same strength as the floor throughout the bus.

C. The opening, with doors open, shall be of sufficient width to allow the passage of wheelchairs. The minimum clear opening shall be 40" in width, and 56" inches in height. Entrance shall be of sufficient width and depth to accommodate various mechanical lifts and related accessories as well as the lifting platform.

D. A drip molding shall be installed above the opening to effectively divert water from entrance.

E. Door posts and headers for entrance shall be reinforced sufficiently to provide support and strength equivalent to the areas of the side of the bus not used for service doors.

SPECIAL SERVICE ENTRANCE DOORS

A. A single door may be used if the width of the door opening does not exceed 44".

B. Two doors shall be used if any single door opening would have to exceed 44".

C. All doors shall open outwardly.

D. All doors shall have flat folding, positive fastening, devices to hold doors in the open position.

E. All doors shall be weather sealed. On buses with double doors, they shall be so constructed that a flange on the forward door overlaps the edge of the rear door when closed.

F. When manually operated dual doors are provided, the rear door shall have at least a one point fastening device to the header.

1. The forward mounted door shall have at least three-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door.

2. These locking devices shall afford maximum safety when the doors are in the closed position.

3. The door and hinge mechanism shall be of a strength that will provide for the same type of use as that of a standard entrance door.

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

H. Each door shall have windows set in rubber compatible within one inch of the lower line of adjacent sash.

I. Door(s) shall be equipped with a device that will actuate a flashing visible signal located in the operator's compartment when door(s) is not securely latched or open in any position other than locked and ignition is in "ON" position.

J. A switch shall be installed so that the lifting mechanism will not operate when the lift platform door(s) is closed.

K. When frame mounted power lift is used, door panels shall extend to bottom of body skirt.

L. A light or lights shall be located in the special service door area to illuminate the platform and approach area when lift is in the "FULL-DOWN" position.

APPENDIX A

HIGHWAY SAFETY PROGRAM STANDARD NO. 17

Pupil Transportation Safety

I. SCOPE

This standard establishes minimum requirements for a state highway safety program for pupil transportation safety; including the identification, operation, and maintenance of school buses; training of personnel; and administration.

II. PURPOSE

The purpose of this standard is to reduce, to the greatest extent possible, the danger of death or injury to school children while they are being transported to and from school.

III. DEFINITIONS

"Type 1 school vehicle" means any motor vehicle with motive power, except a trailer, used to carry more than 16 pupils to and from school. This definition includes vehicles that are at any time used to carry school children and school personnel exclusively, and does not include vehicles that only carry school children along with other passengers as part of the operations of a common carrier.

"Type 2 school vehicle" means any motor vehicle used to carry 16 or less pupils to or from school. This does not include private motor vehicles used to carry members of the owner's household.

IV. REQUIREMENTS

Each state, in cooperation with its school districts and its political subdivisions, shall have a comprehensive pupil transportation safety program to assure that school vehicles are operated and maintained so as to achieve the highest possible level of safety.

ADMINISTRATION

A. There shall be a single state agency having primary administrative responsibility for pupil transportation, and employing at least one full-time professional to carry out its responsibilities for pupil transportation.

B. The responsible state agency shall develop an operating system for collecting and reporting information needed to improve the safety of school vehicle operation, in accordance with Safety Program Standard No. 10, "Traffic Records," § 204.4.

IDENTIFICATION

Each state shall establish and maintain compliance with the following requirements for identification and equipment of school vehicles. The use of stop arms is at the option of the state.

A. Type 1 school vehicles shall:

1. be identified with the words "SCHOOL BUS" printed in letters not less than 8" high, located between the warning lights as high as possible without impairing visibility of the lettering from both front and rear of the vehicle;

2. be painted National School Bus Glossy Yellow, in accordance with the colorimetric specifications of Federal Standard No. 595a, Color 13432, except that the hood shall be either that color or lusterless black, matching Federal Standard No. 595a, Color 37038;

3. have bumpers of glossy black, matching Federal Standard No. 595a, Color 17038; unless, for increased night visibility, they are covered with a retroflective material;

4. be equipped with a system of signal lights that conforms to the school bus requirements of Federal Motor Vehicle Safety Standard 108, 49 CFR 571.21; and

5. have a system of mirrors that will give the seated operator a view of the roadway to each side of the bus, and of the area immediately in front of the front bumper, in accordance with the following procedure: When a rod, 20" long, is placed upright on the ground at any point along a traverse line 1 foot forward of the forward-most point of a school bus, and extending the width of the bus, at least 7 ½" of the length of the rod shall be visible to the operator, either by direct view or by means of an indirect visibility system.

B. Any school vehicle meeting the identification requirements of A. 1-4 (above) that is permanently converted for use wholly for purposes other than transporting pupils to or from school shall be painted a color other than National School Bus Glossy Yellow, and shall have the stop arms and equipment required by section A. 1-4 (above) removed.

C. Type 1 school vehicles operated on a public highway and transporting primarily passengers other than school pupils shall have the words "SCHOOL BUS" covered, removed, or otherwise concealed, and the stop arms and equipment required by section A. 4 (above) shall not be operable through the usual controls.

D. Type 2 school vehicles shall either:

1. Comply with all the requirements for Type 1 school vehicles; or

2. Be of a color other than National School Bus Glossy Yellow, have none of the equipment specified (Identification - A. 4) and not have the words "SCHOOL BUS" in any location on the exterior of the vehicle, or in any interior location visible to a motorist.

The state shall establish conditions under which one or the other of the above two specifications for Type 2 vehicles shall apply.

OPERATION

Each state shall establish and maintain compliance with the following requirements for operating school vehicles:

A. Personnel

1. Each state shall develop a plan for selecting, training, and supervising persons whose primary duties involve transporting school pupils, in order to assure that such persons will attain a high degree of competence in, and knowledge of, their duties.

2. Every person who drives a Type 1 or Type 2 school vehicle occupied by school pupils shall, as a minimum:

   a. have a valid state operator's license to operate such a vehicle(s);

   b. meet all special physical, mental, and moral requirements established by the state agency having primary responsibility for pupil transportation; and

   c. be qualified as a operator under the Motor Carrier Safety Regulations of the Federal Highway Administration 49 CFR 391, if he or her employer is subject to those regulations.

B. Pupil Instruction

At least twice during each school year, each pupil who is transported in a school vehicle shall be instructed in safe riding practices, and participate in emergency evacuation drills.

C. Vehicle Operation

1. Each state shall develop plans for minimizing highway use hazards to school vehicle occupants, other highway users, pedestrians, and property, including but not limited to:

   a. careful planning an annual review of routes for safety hazards;

   b. planning routes to assure maximum use of buses, and avoid standees;

c. providing loading and unloading zones off the main traveled part of highways, wherever it is practicable to do so;

d. establishing restricted loading and unloading areas for school buses at, or near schools;

e. requiring the operator of a vehicle meeting or overtaking a school bus that is stopped on a highway to take on or discharge pupils, and on which the red warning signals specified (Identification - A. 4) are in operation, to stop his vehicle before it reaches the school bus and not proceed until the warning signals are deactivated; and

f. prohibiting, by legislation or regulation, operation of any vehicle displaying the words "SCHOOL BUS," unless it meets the equipment and identification requirements of this standard.

2. Use of flashing warning signal lights while loading or unloading pupils shall be at the option of the state. Use of red warning signal lights for any other purpose, and at any time other than when the school vehicle is stopped to load or discharge passengers shall be prohibited.

3. When vehicles are equipped with stop arms, such devices shall be operated only in conjunction with red signal lights.

4. Seating

a. Seating shall be provided that will permit each occupant to sit in a seat in a plan view lateral location, intended by the manufacturers to provide seating accommodation for a person at least as large as a 5th percentile adult female, as defined in 49 CFR 57.3.

b. Bus routing and seating plans shall be coordinated so as to eliminate standees when a school vehicle is in motion.

c. There shall be no auxiliary seating accommodations such as temporary or folding jump seats in school vehicles.

d. Operators of school buses equipped with lap belts shall be required to wear them whenever the vehicle is in motion.

e. Passengers in Type 2 school vehicles equipped with lap belts shall be required to wear them whenever the vehicle is in motion.

VEHICLE MAINTENANCE

Each state shall establish and maintain compliance with the following requirements for vehicle maintenance:

A. School vehicles shall be maintained in safe operating conditions through a systematic preventive maintenance program.

B. All school vehicles shall be inspected at least semiannually, in accordance with Highway Safety Program manual Vol. 1, published by the U. S. Department of Transportation January 1969. School vehicles subject to the Motor Carrier Safety Regulations of the Federal Highway Administration shall be inspected and maintained in accordance with those regulations (49 CFR Parts 393 and 396).

C. School vehicle operators shall be required to perform daily pretrip inspections of their vehicles, and to report promptly and in writing any defects or deficiencies discovered that may affect the safety of the vehicle's operation or result in its mechanical breakdown. Pretrip inspection and condition reports for school vehicles subject to the Motor Carrier Safety Regulations of the Federal Highway Administration shall be performed in accordance with those regulations (49 CFR 392.7, 392.8, and 396.7).

V. PROGRAM EVALUATION

The pupil transportation safety program shall be evaluated at least annually by the state agency having primary administrative responsibility for pupil transportation. The National Highway Traffic Safety Administration shall be furnished a summary of each evaluation.

APPENDIX B

ELECTRICAL CURRENT DRAW

PROCEDURE FOR DETERMINING VEHICLE ELECTRICAL LOAD VALUE

The vehicle electrical load shall be the minimum electrical load value as determined from the applicable SBMI Current Draw Table included in this Appendix, with the following exceptions:

* 1. The SBMI minimum electrical load value shall increase by a total of the current draw (in amperes) of all components ordered in excess of the SBMI current draw table.

* 2. The SBMI approved minimum electrical load value may reduced by a total of the current draw (in amperes) for any item omitted from the vehicles ordered.

* A chassis supplier shall consider these exceptions only when annotations for bids (or quotations) indicate a revised minimum electrical load value.

SBMI CURRENT DRAW TABLE FOR TYPE A VEHICLES

CONSTANT LOADS		ACTUAL CURRENT DRAW (AMPS.) PER UNIT		NO. OF UNITS		TOTAL CURRENT DRAW (AMPS.)
1.	Chassis-Mounted Components*	40.0	X	1	=	40.0
2.	Tail Lights	0.6	X	2	=	1.2
3.	Clearance Lights	0.3	X	4	=	1.2
4.	Identification (cluster)	0.3	X	6	=	1.8
5.	Body Instrument Panel	0.3	X	1	=	0.3
6.	Under Seat Heater, Large +	12.2	X	1	=	12.2
7.	Under Seat Heater, Small	6.1	X	1	=	6.1

INTERMITTENT LOADS

(Values of current draw shown are 35% of actual)

8.	Flashing Warning Signal System (lights and motor)	2.2	X	2	=	4.4
9.	Stepwell and Dome Lights	0.3	X	5	=	1.5
10.	Stop (brake) Lights	0.7	X	2	=	1.4
11.	Directional Signals	0.7	X	2	=	1.4
12.	Back Up Lights	0.7	X	2	=	1.4

SBMI APPROVED MINIMUM ELECTRICAL LOADS VALUE 60.7

*Includes Cab Heater Defroster System, Windshield Wiper/Washer System, etc. Not included in total electrical load value.

SBMI CURRENT DRAW TABLE FOR TYPE B, C AND D VEHICLES

CONSTANT LOADS		ACTUAL CURRENT DRAW (AMPS.) PER UNIT		NO. OF UNITS		TOTAL CURRENT DRAW (AMPS.)
1.	Chassis-Mounted Components (industry average)	15.0	X	1	=	15.0
2.	Tail Lights	0.6	X	2	=	1.2
3.	Clearance Lights	0.3	X	4	=	1.2
4.	Identification (cluster)	0.3	X	6	=	1.8
5.	Intermediate Marker Lights	0.3	X	2	=	0.6
6.	Body Instrument Panel	0.3	X	1	=	0.3
7.	Illuminated School Bus (destination) Sign	4.1	X	1	=	4.1
8.	Radio and/or P.A. System	1.0	X	1	=	1.0
9.	Windshield Wiper Motor	6.0	X	2	=	12.0
10.	Primary Front Heater	24.0	X	1	=	24.0
11.	Primary Windshield Defroster	9.5	X	1	=	9.5
12.	Supplementary Front Heater	9.5	X	1	=	9.5
13.	Supplementary Windshield Defroster	9.5	X	1	=	9.5

14.	Under Seat Heater, Large	12.2	X	1	=	12.2
15.	Under Seat Heater, Small*	6.1	X	1	=	6.1
16.	Defroster Fan	3.0	X	1	=	3.0

INTERMITTENT LOADS (Values of Current Draw Shown are 35% of Actual)

17.	Flashing Warning Signal System (lights and motor)	2.2	X	2	=	4.4
18.	Stepwell and Dome Lights	0.3	X	7	=	2.1
19.	Stop (brake) Lights	0.7	X	4	=	2.8
20.	Directional Signals	0.7	X	3	=	2.1
21.	Back-up Lights	0.7	X	2	=	1.4
22.	Windshield Washers	0.9	X	1	=	0.9

SBMI APPROVED MINIMUM ELECTRICAL LOADS VALUE

23. 18.6

*Not included in Total Electrical Load Value

APPENDIX C

SCHOOL BUS TYPE

DEFINITIONS

TYPE A

A Type "A" school bus is a conversion or body constructed upon a van-type compact truck or a front-section vehicle, with a gross weight rating of 10,000 pounds or less, designed for carrying more than ten persons. This definition shall include two classification: Type A-I, with a Gross Vehicle Weight Rating (GVWR) over 10,000 pounds; and Type A-II, with a GVWR of 10,000 pounds and under.

TYPE B

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

TYPE C

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

TYPE D

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

APPENDIX D

SPECIFICATIONS FOR COMPRESSED NATURAL GAS (CNG) BUSES

CNG - FUEL CONVERSION

Conversion and maintenance is to be performed only under the supervision of an individual who has satisfactorily completed a training program provided by a CNG original equipment manufacturer. A training program shall involve the mechanics of installation, maintenance, repair, trouble shooting and safety procedures.

CNG VESSELS ON SCHOOL BUS

A. Each CNG fuel supply vessel shall be constructed and inspected in accordance with ANSI/NFPA 52-1992 standards and shall have a rated service pressure of not less than 3000 psi at 70 degrees Fahrenheit. The fuel supply vessel shall not be filled beyond the working pressure stamped on the vessel neck and displayed on a label near the filler connection; corrected for the ambient temperature at time of filling as prescribed by ANSI/NFPA 52-1992 Edition, Sec. 2-4.1.1, 2-4.2, 2-4.4, and 2-4.5.

B. Shall be fitted with ANSI/NFPA 52-1992, Sec. 2-5 and 2-9 and ANSI/AGA NGV2-1992, Sec. 1-10, approved vessel valves with an approved fused burst disc for the DOT approved vessel.

C. Vessel valves shall be protected by guards or expanded steel grating of 3/16" minimum.

D. Steel vessels must have protective paint coating.

MOUNTING VESSELS TO SCHOOL BUS

All safety devices that may discharge shall be vented to the outside of the vehicle as follows:

A. Fuel supply vessels installed within a closed compartment shall be vented to the outside of the vehicle with a flexible bag. Such bag shall be constructed of material that is non-flammable or self-extinguishing. The bag shall be shielded or installed in a protected location to prevent damage from unsecured objects and abrasion.

B. The vent or vents for the bag shall have an opening area of not less than three square inches, and shall not exit into the wheel well.

C. Bolts - 5/8" diameter grade eight bolts shall be used for brackets holding vessels to main frame, body or channel iron.

D. There shall be a minimum of two bolts per bracket assembly. Nuts with suitable locking washers, aircraft type steel locking nuts or nuts with safety wire capability shall be used.

E. If channel iron is used minimum specifications are 4" x 5/16".

F. Channel iron to be attached to main frame with body clights or U-bolts and 5/8" bolts, grade eight steel.

G. Vessels are to be installed with as much road clearance as practicable, but not lower than the center line of the drive axle. If CNG vessels are mounted inboard of frame rails in the vicinity of the drive shaft, protective drive shaft loops shall be installed within 12" of the universal joints.

FUEL LINES

Fuel lines shall be permanently secured at intervals of not more than two feet with aviation type clights, and:

A. Shall be placed in such a manner as to minimize the possibility of damage due to vibrations, strains or wear.

B. Any fuel line passing through, under or over a structural member shall be protected by rubber grommets or tubing. Loops in the fuel lines shall be provided at appropriate stress points.

C. All fuel lines shall meet or exceed SAE heavy duty hydraulic brake line specifications with a minimum working pressure of 3600 psi and a maximum burst pressure of at least 10,000 psi, hydrostatically tested.

D. An automatic natural gas shutoff valve or solenoid shall be provided as an integral part of the regulator package assembly.

E. A manual shutoff valve shall be installed between the vessels and the regulator. This shut-off valve shall be readily accessible to the operator, be protected from rocks and other forms of debris, and be on the curb side of the bus where possible. Such shut-off valve shall be clearly marked with reflective material. If access is gained by cutting a hole in the side of the bus, suitable protective material shall be placed around the edge of the hole. Wherever possible, the manual shut-off valve should be located as close as possible to the CNG vessels.

F. Vapor hose from regulator to mixer shall have a rating of at least 20 psi and be wire or fiber reinforced and flame tested.

G. First stage regulator shall have an inlet rating of at least 3000 psi and a pressure safety factor of at least four.

VEHICLE REFUELING CONNECTION

A. The fueling systems shall be equipped with a backflow check valve that will prevent the return flow of gas from vessel(s) to the filling connection.

B. All school buses shall be fitted with a refueling interlock system to prevent the bus from being moved on its own power during a refueling operation.

C. The fueling connection shall meet the standards of ANSI/NFPA 52-1992, Sec. 2-11.1 through 2-11.4.

D. The filler hose vent valve on the refueling probe shall be directed away from the operator.

REFUELING

A. Shall be done only by trained operators and personnel.

B. Engine must be shut off during refueling.

C. No source of ignition or flame within 20 feet during refueling.

FITTINGS

All fittings or attachments shall be inspected monthly for leaks, wear, tightness or undue stress as applicable, and records maintained of the same. Soap water solution or portable leak detectors are recommended for CNG fittings.

LABELING REQUIRED

A. CNG vessel area labels showing CNG vessel I.D., hydrostatic test data and CNG vessel master manual shut-off valve location.

B. Engine compartment labels to include CNG warning and instructions to mechanics including the following:

1. CNG fueled vehicle.
2. System service pressure.
3. Installers name or company.
4. Vessel retest date(s) or expiration.
5. Total vessel water volume in gallons (liters).

CNG EQUIPMENT

Manufacturers wishing to deal in CNG equipment in West Virginia must meet all applicable federal and state requirements.

LIMIT OF FLAMMABILITY

Natural gas introduced into any system covered by this standard shall have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 of the lower limit of flammability.

FORM HD 201
10-66)

FISCAL NOTE WORKSHEET
(Submit 4 Copies)

HD NO _____ DRAFT NO _____ BILL NO_____ RESOLUTION NO _____

SUBJECT West Virginia Minimum Requirements for Design & Equipment of School Buses

FUND General

SOURCE OF REVENUE: ☐ GENERAL FUND ☐ SPECIAL ☐ OTHER (SPECIFY) _____

COST OF ESTIMATE BASED ON: ☐ AN ORIGINAL ESTIMATE ☐ BUDGET BILL ☐ OTHER (SPECIFY) _____

INCOME ESTIMATE BASED ON: ☐ AN ORIGINAL ESTIMATE ☐ BUDGET BILL ☐ OTHER (SPECIFY) _____

SHOW OVER-ALL EFFECT IN ITEMS 1 AND 2 & GIVE EXPLANATION OF BREAKDOWN BY FISCAL YEAR INCLUDING LONG-RANGE EFFECT

EFFECT OF PROPOSAL	ANNUAL INCREASE	ANNUAL DECREASE	FISCAL YEAR CURRENT	FISCAL YEAR NEXT	FISCAL YEAR THEREAFTER
1. ESTIMATED TOTAL COST	$ 0	$	$	$	$
PERSONAL SERVICES CURRENT EXPENSES REPAIRS/ALTERATIONS EQUIPMENT OTHER	$	$	$	$	$
2. ESTIMATED TOTAL REVENUES	$ 0	$	$	$	$

3. EXPLANATION OF ABOVE ESTIMATES (INCLUDING LONG-RANGE EFFECT):

Assumptions:

No additional cost for implementation

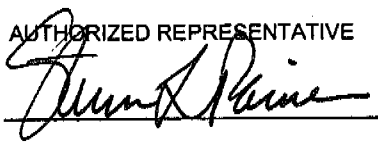
DATE

5/4/04

AGENCY

Department of Education

AUTHORIZED REPRESENTATIVE



POLICY 4334: WEST VIRGINIA MINIMUM REQUIREMENTS FOR DESIGN AND EQUIPMENT OF SCHOOL BUSES
COMMENT LOG
JUNE 14 - JULY 15, 2004

ACTION
N: No Response
NA: Not Accepted
A: Accepted

TYPE
- Negative
+ Positive
o Neutral

Date	Individual/Organization	Comments	Action/Type	Rationale
		No comments were received.		