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. -- September 14, 2007.

1.4. Effective Date. -- October 15, 2007.

1.5. Repeal of former rules. -- This legislative rule amends West Virginia 126CSR89, West Virginia Board of Education Policy 4334, "West Virginia Minimum Requirements for Design and Equipment of School Buses," filed February 9, 2006 and effective March 13, 2006.

§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 Board 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 West Virginia 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.

§126-89-3. Severability.

3.1. If any provision of this rule or application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this rule.

MINIMUM REQUIREMENTS FOR DESIGN AND EQUIPMENT OF SCHOOL BUSES

2007 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

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 oil bath (synthetic lubricant) wheel bearings. EXCEPTION: Type A buses.

BRAKES

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

B. Buses using an air-operated braking 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. 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. ABS automatic traction control system should be standard on units with air brakes.

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

   b. Use the same brand of automatic slack adjuster on all four wheels.

   c. Have at least 12 CFM air compressor.

   d. Be protected by a desiccant type air dryer, with a spin-on replaceable filter.

   e. Be equipped with an engine 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. A parking brake interlocking valve shall be used on all C and D school buses. This valve is to cause the brake to remain engaged until released by the driver pressing the foot brake pedal and disengaging the parking brake valve at the same time.

   f. Have at least 7" X 16 ½” brake blocks.

3. 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. Exhaust and engine brakes, and retarders are an approved option for Type C and D school buses. Installation must be made by, or under the supervision of the vehicle manufacturer.

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

BRAKE, PARKING

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

BUMPERS

All bumpers are to comply with National Congress on School Transportation Specifications.

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.

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. An 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: Three Group 31 batteries with minimum of 1950 CCA total or two 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. Buses shall be equipped with a body battery disconnect switch to allow the electrical source on the bus body to be turned off in case of an electrical short and when bus is not in use. 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 185 amperes (A/C and lift buses 200 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 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. Lamps and Signals - See pages 26-29.

1. USA daytime running lamps are required and will not be activated until engine is started and/or parking brake is released.

2. Lamps and signals 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 ampmeter 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 lamps.

b. Right turn signal.

c. Left turn signal.

d. Stop lamps.

e. Back-up lamps.

f. Instrument panel lamps. (Rheostat controlled)

g. Ignition circuit.

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 no more than 1" (one inch) beyond bumper.

Type A Vehicles,	Manufacturer's standard
Type B Vehicles (under 35 passengers) and Type D Rear Engine Vehicles	Manufacturer's standard
Type AI and B Vehicles 35 passengers and above, and Type C and D (FE) Vehicles (47 passengers and up)	Manufacturer's standard

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 waterproof disconnect device(s) 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 reinforced to prevent cracking. EXCEPTION: Type AI and 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 C.

C. Fuel - Bio Diesel (B5) meeting ASTM D6751 specifications.

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 and 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.

C. Optional covers should be utilized to keep moisture out of horns.

INSTRUMENTS AND INSTRUMENT PANEL

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

1. Speedometer.

2. Odometer or trip meter 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 lamp 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 lamp to indicate overheating.

6. Fuel gauge.

7. Upper beam head lamp indicator.

8. Brake indicator gauge (air). Lamp 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.

l2. Glow plug indicator lamp 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.

D. Instrument panel shall have lamps 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.

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.

   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/Torque
Under 35	130 HP/420
35 - 46	175HP/520
47 - 64	190HP/520
65 - 77	210HP/520
78 - 83	225HP/620
84 - 90	245HP/620

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. Warranty for the engine shall be 5 years/100,000 miles. 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 triple side 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 and 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 -89	11 x R22.5	G(14)	8.25
	90- up	11 x R22.5	H(16)	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) SIZE	RIM
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	255/70R22.5 265/75R22.5	H(16)	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 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 2 inches and mounted parallel to bus frame rail. EXCEPTION: Type B vehicles under 35 passengers.

TRANSMISSION

A. Automatic transmissions shall be equivalent to either the Allison2500 PTS—5 or 6 speed for buses of 35 to 76 passenger capacity inclusive or the 3000 PTS -5 or 6 speed for buses of 77 to 90 passenger capacity. Minimum fluid requirements for the automatic transmission 35 passenger and above is to be Transynd or TES 295 approved fluids synthetic fluids. Warranty for the transmission should be 5 yrs / unlimited mileage

B. 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 2 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 2 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.

BUMPERS

See page 5.

CEILING

See Insulation and Interior, pages 25-26.

CHAINS

A. Automatic tire chains are permissible.

B. See Wheel Housings, page 44-45.

CHILD REMINDER SYSTEM

Alarm device that requires the operator to walk to the rear of the bus and operate 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" in compliance with National Congress on School Transportation Specifications.

B. Primer shall be 3/4 - 1 mil and 1 2 - 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.

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 certify the materials to be of durable construction.

B. Construction shall provide reasonably dust proof 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 pressed wood or marine grade 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, toe board 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 22.

F. Construction shall meet the National School Transportation Specifications (NSTS) for the Side Intrusion Test.

G. Bus body shall meet NSTS for the Colorado Rack Test.

DOORS

A. Service Door

1. Service door shall be under control of operator, and designed to afford easy release and prevent accidental opening. On Type A buses, when hand lever is used, no part shall come together to shear or crush fingers. A power operated service door is required on Type B, C, and D buses.

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 vehicle 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. Service door shall be equipped with a vandal lock. EXCEPTION: Type AI and II van cutaway with lockable operator side door.

B. Emergency Door

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.

ELECTRICAL SYSTEM

A. Battery - See pages 6 and 7.

B. Alternator - See pages 6 and 7.

C. Lamps and Signals - See page 7.

D. Wiring - See page 7.

EMERGENCY EXITS

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

B. Each emergency exit shall comply with FMVSS 217 and NSTS .

FASTENING DEVICES

A. Belt Cutter – Each bus shall be equipped with a durable webbing cutter having a full width handgrip and a protected, replaceable or non-corrodible blade. The required belt cutter shall be mounted in a location accessible to the seated driver in an easily detachable manner.

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 dust proof 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 section on Construction.

FLOOR COVERING

A. Floor covering shall be of high quality, heavy duty elastomeric material with a rating of self-extinguishing (a burn rate of 0.1 mm or less) when tested in accordance with FMVSS302, paragraph S4.3 (b) meeting current NSTP. Floor covering shall have a smooth back.

B. Floor covering shall be permanently bonded to the sub -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 sealed with waterproof sealer.

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

D. Floor 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 seam one piece construction is permissible.

F. Floor construction shall provide a properly sealed opening 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 "ULSD fuel" 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.

3. A mid-body heater of 50K BTU for buses that carry 65 passengers and up with the exception of special buses used for handicapped passengers.

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 rear engine transit type 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 water shutoff valves in an accessible location under the hood. Water shutoff valves 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 fittings. Chassis manufacturer must provide a clear area to facilitate body manufacturer's installation. EXCEPTION: Type A-II and D vehicles, located at or near the engine.

E. Each heater is to be independently controlled by a switch.

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 one auxiliary fan, six inches in diameter shall be installed, suspended from above on the driver's side of the windshield., and can be adjusted for maximum effectiveness. The fan blade shall be covered with a protective cage. Each fan shall be controlled by a separate switch.

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 constant tension type clamp.

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 and 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 or an FET.

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 112db, meeting SAE-J99. Device shall be mounted behind rear axle, between frame rails, and shall emit intermittent sound. Variable sound is permitted.

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.

B. Ceiling and walls shall be fully insulated with a thermal insulation that is fire resistant, UL approved, with a minimum R-value of 5.5. Insulation shall be installed so as to prevent sagging.

C. Additional interior noise abatement /acoustical package are permissible over and above.

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.

F. Full length acoustical ceiling shall be provided.

LAMPS AND SIGNALS

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

B. Head Lamps

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

C. Clearance and Side-Marker Lamps

Clearance, side-marker, and identification lamps shall be protected or flush mounted and combined in a circuit controlled by the same switch.

D. Tail and Stop (Brake) Lamps

Manufacturer standard.

E. Back-Up Lamps

Must meet FMVSS number 108.

F. Interior Lamps

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

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

G. School Bus Alternately Flashing Signal Lamps

a. The bus shall be equipped with two red lamps at the rear of the vehicle and two red lamps at the front of the vehicle, in addition to the four red lamps, four amber lamps shall be installed, so that 1 amber lamp is located near each red signal lamp the same level but closer to the vertical centerline of the bus. The system of red and amber signal lamps shall be wired so that amber lamps are energized manually. The red lamps are automatically energized and amber lamps are automatically de-energized when stop signal arms are extended or when the bus entrance door is opened. An amber pilot lamp and a red pilot lamp shall be installed adjacent to the driver controls for the flashing signal lamp to indicate to the driver which

lamp system is activated.

b. Red lamps shall flash any time stop signal arm is extended.

c. All flashers for alternately flashing red and amber signal lamps shall be enclosed in the body of a readily accessible location.

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

2. Shields over lamps, painted black are permitted.

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

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

5. Signal lamp system shall operate as follows:

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

b. Open entrance door. Amber pilot lamp and amber signal lamps shall go off, and red pilot lamp and red signal lamps shall go on. Stop arm, if air or electrically powered, shall automatically extend.

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

d. Open entrance door without depressing hand switch. Red pilot lamp and red signal lamps shall go on. Stop arm, if air 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 lamp system shall operate with the vehicle ignition switch in either the on or off position.

6. Installation Requirements

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

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

c. Alternately flashing signal lamps 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 lamps shall not be obstructed by any part of the body or lamphouse insofar as standard bus body construction shall permit.

e. Area around each lamp shall have readily visible black border for contrast purposes.

f. A separate fuse, circuit breaker, or FET 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.

H. Roof Mounted Strobe Lamp

A strobe lamp, white in color, shall be mounted on the roof of the school bus. The lamp shall be a maximum of 5" 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 lamp shall be a double flashing Class 2, with a minimum of 10 joules.

I. Turn Signal Lamps

1. Shall meet the NSTS standard.

2. Type AI, B, C and D vehicles shall have a protected lamp mounted on right side behind service door and on left side behind stop arm signal, wired in the turn signal circuit.

J. Emergency Warning Device

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

K. Exterior skirt mounted landing lamp at entrance door.

Fog lamps installed by original bus manufacturer are permissible.

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 and II vehicles may be 6" x 16".

B. Exterior Mirrors

1. All exterior mirrors, are to be heated and must conform to FMVSS 111.

2. Remote controlled external rear view mirrors are permissible.

MOUNTING

Body to chassis mounting shall:

A. Meet the NSTS standards. 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 heir being pulled off while vehicle is in reverse motion, or damaged by tire chains.

OVERALL LENGTH

Overall length of bus shall not exceed 45 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 internal speakers other than the driver's communication system may be installed within 4 feet of the driver's seat back in its rearmost upright position..

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 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 belt shall be provided for the operator. On buses where the driver's seat and upper anchorage for the shoulder belt are both attached to the body structure, a driver's seat with an integrated Type 2 lap/shoulder belt may be substituted. On buses where the driver's seat and upper anchorage for the shoulder belt are separately attached to both body and chassis structures (i.e., one attached to the chassis and the other attached to the body), a driver's seat with an integrated Type 2 lap/shoulder belt should be used. The assembly shall be equipped with an emergency locking retractor for the continuous belt system. On all buses except Type A that are equipped with a standard chassis manufacturer's driver's seat, the lap portion of the belt system shall be guided or anchored to prevent the driver from sliding sideways under the belt system. The lap/shoulder belt shall be designed to allow for easy adjustment in order to fit properly and to effectively protect drivers varying in size from 5th percentile adult female to 95th percentile adult male.

SEATS

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

B. All seating height shall conform to the National Congress on School Transportation Standard. Seat back height shall be 24" from the seat reference point.

C. All seats must comply with all other requirements of FMVSS no. 222.

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

E. Integrated child safety seats are permissible.

F. 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.

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

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

I. 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). It shall have an adjustment clip on the integrate 3-point belt that will adjust to any size driver. The seat shall have a lumbar support. EXCEPTION: Type A and

B vehicles under 35 passengers.

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

STEPS

A. The first step at the entrance door shall be not less than 10 inches and not more than 14 inches from the ground when measured from the top surface of the step to the ground, based on standard chassis specifications, except that on Type D vehicles, the first step at the entrance door shall be 12 inches to 16 inches from the ground. An auxiliary step may be provided to compensate fro the increase in ground to first step clearance. The auxiliary step is not required to be enclosed.

B. Step risers shall not exceed a height of 10 inches. EXCEPTION: When plywood is used on a steel

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

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

E. All steps, floor or step, the riser height may be increased by the thickness of the plywood including floor line platform area, shall be covered with 3/16" skid resistant pebble type elastomeric floor covering or other material equal in wear resistance and abrasion resistance to top grade rubber."

1. Step covering shall be permanently bonded to steel or a durable backing material that is resistant to corrosion. Metal back of tread, minimum 24 gauge cold roll steel, shall be permanently bonded.

2. The step tread shall have a 1.5" white nosing that contrasts in color by at least 70% measured in accordance with the contrasting color specification in 36CFR, Part 1192, ADA of the current National School Transportation Specification and Procedure and is an integral piece without any joint extending to the leading edge of the nosing turndown. The vertical surface of the nose shall be smooth**.**

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

G. 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.

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 flashing, high intensity, red strobe lamps (LED are permissible) visible from both sides of the sign shall be provided. The stop signal arm shall be 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. The crossing control arm shall be wired in conjunction with the stop signal arm and the alternately flashing signal lamp. Crossing arm shall be equipped with an electromagnetic or other 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 are not required to meet this standard.

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.

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.

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.

D. At least one auxiliary fan shall be installed, suspended from above at the driver’s side of the windshield, where it can be adjusted for maximum effectiveness. The fan blade shall be covered with a protective cage. The fan shall be controlled by a separate switch. Location must adhere to manufacturer's standard.

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 installation and use of tire chains on single or dual power-driving wheels.

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

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 lamp transmission to 20% or less at top of windshield. EXCEPTION: Type AI and 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 [but not more than 13 inches high] and 22" wide, obtained by lowering of window. One window on each side of the bus may be less than 22 inches wide.

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 and 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 intermittent-speed wipers. Windshield wipers shall be powered by motor(s) on all vehicles. (Must meet SAE standard J198)

WIRING

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

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

C. All wiring shall have an ample capacity of exceeding design load of at least 25 percent.

D. Body wiring diagram, sized to be easily read, shall be furnished with each bus body or affixed to an area convenient to the electrical assessory control panel.

E. Each wire passing through metal openings shall be protected by a grommet.

F. Wires not enclosed within the body shall be fastened securely at intervals of not more than 18 inches. All joints shall be soldered or joined by equally effective connectors which shall be water and corrosion resistant.

G. Circuits

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

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

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

c. Dome lamps.

d. Starter motor.

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

f. Turn signal lamps.

g. Alternately flashing red signal lamps.

h. Horns.

I. Heater #1.

j. Heater #2.

k. Heater #3.

l. Electric wipers.

m. Strobe lamp.

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 lamps, 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.

H. A separate circuit breaker or FET shall be provided for each circuit except starter motor and

ignition circuits.

I. There shall be a manual noise suppression switch installed in the control panel. The switch shall be labeled and alternately colored. This switch shall be an on/off type that de-activates body equipment that produces noise, including at least, the AM/FM radio, heaters, air conditioners, fans and defrosters. This switch shall not de-activate safety systems, such as windshield wipers or lighting systems.

J. Buses may be equipped with a 12 volt power port in the driver's area.

NOTE: All available warranty information must be provided to the purchaser and to the State Executive Director of School Transportation as part of the bid package or upon receipt of the bus.

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 lamp 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). This aisle should be to an emergency door and the lift area. All wheelchair positions will be afforded the same available access.

FASTENING DEVICES

A. Wheelchair Restraints

1. All mobile seating 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 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.

4. 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.

5. All tie-downs used in the securement system for a mobile seating device must meet manufacturer=s specifications and be of the automatic retractable type.

6. 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.

7. 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.

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

B. Occupant Restraints

1. An occupant restraint must be included as part of each securement system. The occupant securement must consist of a retractable pelvic restraint and 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 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.
4. The mobile seating device restraint should be retractable and independent of the occupant restraint and designed so that the weight of the wheelchair is not absorbed by the occupant.

5. 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.

6. 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.

C. 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.

D. 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.

E. 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 to FMVSS 210.

GLAZING

Fire Blanket

A fire blanket shall be provided with a storage pouch mounted to the wall conveniently located and identified as a fire blanket. The fire blanket shall meet CRR 16 part 1610 standard for flammability of clothing. Blanket shall be approximately 62 inches X 80 inches.

Tinted glass may be installed in all doors, windows and windshield. Tinted plastic, which 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 29-31.

POWER LIFT

The lift, its design, installation and operation shall comply with United States Department of Transportation Rules and Regulations 49CFR, Part 38 from The Americans with Disabilities Act of 1990 and NHTSA Rules 403 and 404. The wheelchair lift must comply with the requirements for public use lifts and the requirements for all lifts. The wheelchair lift shall bear a label with the words “DOT-Public Use Lift”.

A. Requirements

A visual and audible warning must activate if the platform is more than 1” below the platform threshold area and portions of a passenger’s body or mobility aid is on the threshold area.

1. The visual warning must be a red beacon.

2. The audible warning must be a minimum of 85 db.

B. Operational requirements

1. During the range of passenger operation the velocity of the lift shall not exceed 6” per second.

2. During the stow and deploy operations the velocity shall not exceed 12” per second.

3. During the range of passenger operation acceleration of the platform must be equal to or less than 0.3g.

4. The maximum noise level may not exceed 80 dba.

C. Platform requirements

1. The platform shall have a minimum usable width of_32” measured at the platform surface.

2. The platform surface may not have protrusions which rise more than 0.25” above the platform surface.

3. Any vertical surface transition may not exceed 0.25” when at the ground level or vehicle level loading position.

4. When the platform is at the ground or vehicle level loading position, the slope of any surface over which a passenger may traverse to enter or exit the platform must have a rise to run not greater than 1:2 on the portion of the rise between 0.25” and 0.50”and 1:8 on the portion of the rise between 0.5” and 3.0”. The rise of any sloped surface may not be greater than 3.0”.

5. When the inner roll stop or any outer barrier is deployed, any gap between the inner roll stop and the lift platform and any gap between the outer barrier and lift platform must prevent passage of a 0.625” test block.

6. When the platform is at the vehicle floor or ground level loading position any horizontal gap over which a passenger may traverse to enter or exit the platform must prevent passage of a 0.5” sphere.

7. Any gap between the platform sides and edge guards which move with the platform must prevent passage of a 0.5” sphere.

8. The angle of the deployed platform, when stationary, and loaded with a standard load (600lbs), must not exceed 4.8 degrees with respect to the vehicle floor and must not exceed 3 degrees with respect to the platform’s unloaded position.

9. The platform must have edge guards that extend continuously along each side of the lift platform to within 3.0” of the edges of the platform that are traversed while entering and exiting the platform both at the ground and vehicle floor level loading positions.

10. The lift must have a means of retaining a wheelchair. After the appropriate Impact Test mandated by FMVSS 403 the test wheelchair must remain upright with all of its wheels on the platform surface throughout the range of passenger operations.

11. The retention device must be capable of withstanding a 1600 lb force as required.

12. The retention device must be deployed when the platform is 3” above the ground.

13. The lift platform must have an inner roll stop that will prevent any portion of a wheelchair,

when tested as required, from passing over the edge of the platform at the ground level loading position.

14. The lift must have a handrail located on each side of the lift. The graspable portion of each handrail may not be less than 30 " and not more than 38 " above the platform surface, measured vertically. The cross section of the graspable portion of each handrail may not be less than 1.25 " and more than 1.5 " in diameter or width and may not have less than a 0.125 radii on any corner. The vertical projection of the graspable portion of each handrail must intersect two planes that are perpendicular_to the platform reference plane and to the direction of travel of a wheelchair on the lift when entering or exiting the platform, and are 8" apart. The handrails must move such that the position of the handrails relative to the platform surface does not change.

    a. Each handrail must withstand a 100 lb force applied at any point in any direction without more than 1" displacement. After removal of the force the handrail shall exhibit no permanent deformation.

    b. Each handrail must withstand a 250 lb force applied at any point and in any direction without sustaining any failure, such as cracking, separation, fracture, or more than 4" of displacement of any point on the handrails relative to the platform surface.

    c. Throughout the range of passenger operations all edges of the platform surface must be outlined. The outlines must be 1" wide and of a color that contrasts with its background by 60%.

    d. Platform lighting must provide 5 lm/sq ft of luminance on all portions of the platform surface throughout the range of passenger operations.

    e. Platform slip resistance must have a coefficient of friction, in any direction, of any part of a wet platform surface of not less than 0.65

D. Structural integrity.

1. Fatigue endurance. The lift must remain operable when operated through a total of 15,600 cycles: 7800 unloaded raise/lower and stow/deploy and 7800 loaded raise/lower operations.

2. Proof load. The platform must be capable of holding three (3) times the standard load (1800lbs) without separation, fracture or breakage of any vehicle or lift component.

3. Ultimate load. The platform lift must be capable of holding four (4) times the standard load (2400lbs) without separation, fracture or breakage of the platform, supporting structure, or lifting mechanism.

E. Platform free fall limits.

In the event of any single-point failure of systems for raising, lowering or supporting the platform, any portion of the platform loaded with 600lbs may not fall vertically faster than 12" per second or change angular orientation more than 2 degrees from the orientation prior to the failure. This requirement applies whenever the lift is under primary power source operation or

manual backup operation.

F. Control systems.

1. The platform lift must have a switch that enables and disables the lift control switches. This function must be labeled “POWER”. The Power function must have two states: ON and OFF. The ON state must allow platform lift operation. When the POWER function is in the ON state an indicator light on the controls must illuminate. The OFF state must prevent lift operation and must turn off the indicator light.

2. The platform lift must have a switch that moves the lift from a stowed position to an extended position or to one of the two loading positions. This function must be identified as “DEPLOY” or “UNFOLD” on the control.

3. The platform lift must have a switch that lowers the lift platform. This function must be identified as “Down” or “Lower” on the control.

4. The platform lift must have a switch that raises the lift platform. This function must be identified as “Up” or “Raise” on the control.

5. The platform lift must have a switch that moves the lift from a position within the range of passenger operation to a stowed position. This function must be identified as “Stow” or “Fold” on the control.

6. Except for the power function the functions specified must activate in a momentary fashion by one switch or by a combination of switches. Verification with this requirement is made throughout the lift operations when tested as required.

7. Except for the POWER function the control panel switches must prevent simultaneous performance of more than one function. Verification with this requirement is made throughout the lift operations when tested as required.

8. Any single point failure in the control panel switches may not prevent the operation of any of the interlocks.

9. Identification of operating functions.

   a. Each operating function of each platform lift control must be identified with characters that are at least 0.1“ in height.

   b. The characters must be illuminated when the vehicle’s headlights are illuminated.

10. Except for the backup operation all control panel switches must be positioned together and in a location such that the lift operator has a direct, unobstructed view of the platform lift passenger and the passenger’s mobility aid, if applicable. Verification with this requirement is made throughout the range of passenger operations. Additional controls may be placed in other locations.

11. Operating instructions. Simple instructions regarding the platform lift operating

procedures, including backup operations must:

a. Be located near the controls.

b. Have characters with a minimum height of 0.1" and written in English.

c. Include the statement "DOT-Public Use Lift".

G. Jacking prevention. Except when the platform lift is operated in backup mode the control system or lift design must prevent the raising of any portion of the vehicle by the lift system when lowering the lift is attempted while the lift is at the ground level loading position both with and without a standard load (600lbs) on the lift.

H. Backup operation.

1. The platform lift must be equipped with a manual backup operating mode that can, in the event there is a loss of primary power source for lift operation or a lift malfunction can:

   a. Deploy the lift.

   b. Lower the loaded platform to the ground level loading position.

   c. Raise the unloaded platform to the vehicle floor loading position.

   d. Stow the lift.

2. During backup operation the wheelchair retention device and inner roll stop must be manually deployable and stowable.

3. The operating instructions near the lift control and in the vehicle owner's manual insert must contain information on manual backup operation which must include manual operation of the wheelchair retention device and inner roll stop during backup operation of the lift.

I. Interlocks

1. Except when the platform is operated in the backup mode the interlock requirements must be met, both with and without a standard load (600 lbs) on the lift.

2. The platform lift must have interlocks or operate in such a manner as to prevent:

   a. Forward or rearward mobility of the vehicle unless the platform is stowed.

   b. Operation of the platform lift from the stowed position until forward or rearward mobility of the vehicle is inhibited, by means of placing the transmission in park or placing the transmission in neutral and actuating the parking brake or the vehicle service brakes by means other than the operator depressing the vehicle's service brake pedal.

   c. Stowing of the platform lift when occupied by portions of a passenger's body, and/or a mobility aid. Verification of this requirement is made by placing a 6x6x12 " rigid box

weighing 50lbs on any portion of the platform surface that coincides with the unobstructed platform operating volume. Attempt to fold the lift using the operator control. The interlock must prevent the platform from stowing.

d. When the platform reaches a level where the inner roll stop is designed to deploy, the platform must stop unless the inner roll stop has deployed.

e. Movement of the platform up or down throughout the range of passenger operation, when the platform is above a horizontal plane 3 " above the ground level loading position unless the wheelchair retention device is deployed.

f. In the case of a platform that is equipped with an outer barrier, deployment of the outer barrier when occupied by portions of a passenger's body or mobility aid.

g. Deployment of any inner roll stop when the inner roll stop is occupied by portions of a passenger's body or mobility aid.

J. Operations counter. The platform lift must have an operation or cycle counter that records each complete up/down operation.

K. Vehicle owner's manual insert. The lift manufacturer must provide with the lift, inserts for the vehicle owner's manual that provide specific information about the lift. This insert must be written in English and must include:

1. A maintenance schedule that includes maintenance requirements that has, as a minimum, some dependency on the number of cycles on the operations counter.

2. Instruction regarding the platform lift operating procedures, including backup operations.

3. The owner's manual insert must also include:

a. The statement "DOT- Public Use Lift" on the front cover page.

b. The statement "DOT- Public Use Lift verifies that this lift meets the requirements of FMVSS 403."

L. Installation instructions. The platform lift manufacturer must include installation instructions with each lift. Information must be included that identifies:

1. The vehicles on which the lift is designed to be installed.

2. Procedures for operational checks that the vehicle manufacturer must perform to verify that the lift is fully operational. Such checks include, but are not limited to, platform lighting, the threshold warning signal, and interlocks, including those that interface with vehicle systems.

3. Any informational material or labels that must be placed on or in the vehicle in order to comply with FMVSS 403. Labels must be of a permanent nature that can withstand the elements of the outside environment.

4. The installation instructions must contain the statement “DOT- Public Use Lift” on the front cover.

    a. Installation instructions must contain the statement “Public use vehicle manufacturers are responsible for complying with the lift lighting requirements in FMVSS 404, Platform lift installations in Motor Vehicles”.

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. The opening, with doors open, shall be of sufficient width to allow the passage of wheelchairs. The minimum clear opening shall be 43" in width, and 57" “ in height. Entrance shall be of sufficient width and depth to accommodate various mechanical lifts and related accessories as well as the lifting platform.

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

C. 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. All doors shall open outwardly.

B. Lift doors shall have devices to hold doors in the open position.

C. 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.

D. 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.

E. Lift door shall have a window within one inch of the lower line of adjacent sash.

F. 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.

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

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

SPECIFICATIONS
FOR
MULTI-FUNCTIONAL SCHOOL ACTIVITY BUS (MFSAB)

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The vehicle must comply with the Definition of a Multifunction School Activity Bus in the Federal Motor Vehicle Safety Standards as listed in 49 CFR Part 571, which is the National Highway Traffic Safety Administration's Final Rule on this vehicle. This primary purpose of this vehicle will be to transport children, and as such, it must comply with all applicable Federal Motor Vehicle Safety Standards (FMVSS) for this type of vehicle and West Virginia Minimum School Bus Specifications. It must be purchased or leased as a new bus and may only be used for extracurricular activities. These buses may not be used to transport students to and from schools or between schools for the purpose of attendance. In addition, the vehicle must have been tested at and received a satisfactory evaluation from the West Virginia Department of Education. The MFSAB must also meet all other Federal (to include the Americans with Disabilities Act of 1990) and applicable West Virginia laws for passenger vehicles of this type. Vehicles shall be of the latest model year in standard production and, of which, parts are stocked and warranty service is available at one or more points in West Virginia or border cities
The MFSAB is designed to provide all of the crash safety standards that can be found on a traditional school bus, but without the "flashers and signs" that traditional school buses need for frequent pick-up and drop-off at school bus stops. The vehicle will not have the specialized warning devices such as stop signs and warning lights, and they will not be school bus yellow.

The following exceptions to the West Virginia Minimum Specifications for School Buses for regular route buses shall be allowed for these vehicles:

BRAKES: Shall meet standards set forth in school bus standards for size of vehicle.

COLOR: The local school with school system approval may determine the color of the activity bus. The color scheme may utilize any combination of up to THREE colors. This combination may be in addition to an optional white roof. The color National School Bus Yellow (SBMTC-008 Publication) shall not be used as a part of the color scheme. School systems and/or vendors shall submit preliminary color schemes to the West Virginia Department of Education, Office of School Transportation for approval prior to the purchase or manufacture of a MFSAB.

IDENTIFICATION:

1. The bus body shall bear the words "ACTIVITY BUS" in a contrasting color at least 8 " high in the area where "school bus" is normally positioned. Lettering and numbering shall conform to FMVSS and West Virginia Minimum Specifications and shall meet reflectivity standards. Bus numbering on this bus may be of a contrasting color.

2. The name of the school system shall be displayed in *at least five*-inch letters on both sides of the bus in the beltline area. NO SIGNS OR LOGOS shall be applied to any area of the bus including the bumpers. The name of the school may be displayed in the beltline area. No signs, logos, or other items shall be displayed on the windows of the bus.

LIGHTING AND WARNING DEVICES:

All activity buses shall meet state and federal standards for normal school bus lighting and warning device requirements with the following exceptions: MFSABs may not be equipped with alternately flashing amber or red signal lamps used for loading and unloading students. MFSABs may not be

equipped with stop arm signals or crossing control arms.

SEAT BELTS:

3 point lap-shoulder belts will be supplied for any MFSAB with a GVWR of 10,000 lbs and under. Shoulder belts supplied must be fully retractable and the anchorage must meet FMVSS-210.

SEATING:

All MFSAB buses shall have seats that comply with FMVSS-222. If the GVWR is 10,000 lbs and under, then it must also be equipped with 3 point lap-shoulder belts certified to meet appropriate FMVSS standards. School systems and/or vendors shall submit preliminary seating schemes to the West Virginia Department of Education, Office of School Transportation for approval prior to the purchase or manufacture of a MFSAB. Successful vendor shall coordinate with the agency issuing the purchase order in the selection of material and color and type of seats.

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 lamps 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 lamps 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 2@ 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. has 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 an 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 the highway, 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 lamps while loading or unloading pupils shall be at the option of the state. Use of red warning signal lamps 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 lamps.

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

SCHOOL BUS TYPE

DEFINITIONS

TYPE A

A Type "A" school bus is a conversion or bus constructed utilizing a cutaway front-section vehicle with a left side driver's door. This definition shall include two classifications: Type A-I, with a Gross Vehicle Weight Rating (GVWR) 14,500 pounds or less; and Type A-II, with a GVWR of greater than 14,500 and less than or equal to 21,500 pounds.

TYPE B

A Type "B" school bus is constructed utilizing a stripped chassis. The entrance door is behind the front wheels. This definition includes two classifications: Type B-1, with a GVWR of 10,000 pounds or less; and Type B-2, with a GVWR greater than 10,000 pounds.

TYPE C

A Type "C" school bus is constructed utilizing a chassis with a hood and front fender assembly. The entrance door is behind the front wheels; also known as a conventional school bus. This type also includes cutaway truck chassis or truck chassis/cab with or without a left side door and a GVWR greater than 21,500 pounds.

TYPE D

A Type "D" school bus is constructed utilizing a stripped chassis. The entrance door is ahead of the front wheels; also known as transit style school bus or forward control bus.

SPECIALLY EQUIPPED

A school bus designed, equipped, or modified to accommodate students with special needs.

APPENDIX C

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 “, 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 clamps 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 clamps, 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 ervice 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.