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VEHICLE EQUIPMENT SAFETY COMMISSION

Regulation VESC-10

MINIMUM REQUIREMENTS FOR TYPE II SCHOOL BUS CONSTRUCTION AND EQUIPMENT

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REGULATION VESC-10

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VESC-10

"MINIMUM REQUIREMENTS FOR TYPE II SCHOOL BUS

CONSTRUCTION AND EQUIPMENT"

1. PURPOSE AND SCOPE:

1.1 The purpose of this regulation is to enhance the safe transportation of primary and secondary grade students.

1.2 The scope of this regulation is to provide specific safety related standards regarding the construction and equipment of Type II School Buses as defined herein, manufactured on or after _____.

2. DEFINITIONS:

2.1 **School Bus - Type II:** means a bus that is sold, leased, or introduced for purposes that include carrying students to and from school or related events and has a gross vehicle weight rating (GVWR) of ten thousand (10,000) pounds or less. (This is not intended to include a bus designed and sold for operation as a common carrier in transportation.)

2.2 **Bus:** means a motor vehicle with motive power, except a trailer, designed for carrying 10 or more passengers in addition to the driver.

2.3 **SAE:** means Society of Automotive Engineers, Inc.

2.4 **Body on Chassis Type Bus:** means a vehicle constructed by mounting a bus body on a truck or other specific designed bus chassis.

2.4.1 **Body on Chassis Transit Type:** means the mounting of a body on chassis with an engine located inside the rear, center, or forward portions of the bus body extremities.

2.5 **Integral Type Bus:** means a bus manufactured as an integral unit and not constructed of a separate body and chassis.

2.6 **School Bus Alternately Flashing Signal Lamps:** means alternately flashing signal lamps mounted at the same horizontal level to inform highway users that the school bus is stopped or stopping to board or discharge passengers.

2.7 **FMVSS** - means Federal Motor Vehicle Safety Standards

3. DIMENSIONS:

3.1 Outside width not to exceed 96 inches. Outside overall length maximum 25 feet. Inside height shall be a minimum of 60 inches, aisle floor surface to ceiling.

CONSTRUCTION OF BODY

4. BATTERY CARRIER:

4.1 When the battery is mounted outside of the engine compartment by the chassis manufacturer, the body manufacturer shall securely attach the battery in a closed, drained, weather-tight and vented compartment in the body skirt, which shall retain the battery in the event of upset or roll-over of the vehicle. The battery shall be accessible from the outside for convenient servicing. The battery compartment door or cover shall be secured by an adequate and conveniently operated latch or other type fastener. The cables to the battery shall not be spliced.

5. BODY STRUCTURE:

5.1 Construction shall be of fire-resistant material, and all materials used inside the occupant compartment shall comply with the applicable requirements of FMVSS 302.

5.2 Construction shall provide a reasonably dustproof, gas-proof, weather-tight and fume-proof unit. Openings between the chassis and passenger compartment, where applicable, shall be sealed to prevent fumes or gases from entering the bus body.

5.3 The body manufacturer shall indicate in a permanent and readily visible location on the body the month and year of final completion of the vehicle.

5.4 The floor shall be level except in the wheel housing, toeboard, stepwell, fuel fill pipe area, and driver's platform areas - all of which shall be of fire-resistant material.

5.5 School bus body joint strength shall meet the requirements of FMVSS 221.

5.6 School bus rollover protection shall meet the applicable requirements of FMVSS 220.

6. BUMPER, REAR:

6.1 A rear bumper shall be provided, and it shall have not less than a 7 inch face. It shall be attached directly to the chassis frame with provision for easy removal, the prevention of hitching to or riding thereon, and shall be sufficient of strength to permit the bus to be pushed by another vehicle without permanent distortion. It shall extend sufficiently to protect all lamps and shall extend beyond the rearmost part of the body surface at least one inch measured at the floor line. It shall be painted black or covered with a retroreflective material. The rear bumper shall be located at a height of between 14 and 18 inches when measured from the bottom edge of the bumper to the level surface upon which the unloaded bus stands.

7. DEFROSTERS AND DEFOGGERS:

7.1 Windshield defrosting and defogging equipment shall meet the applicable requirements of FMVSS 103. Defrosting and defogging equipment shall keep the windshield, the window to the left of the driver and the glass in the service door clear of fog, frost, and snow. Defroster and defogger ducts, if used, shall be designed to prevent the placing of objects which might obstruct the flow of air. Portable heaters may not be used.

8. EMERGENCY EXIT:

8.1 Emergency exits shall be in accordance with the applicable requirements of FMVSS 217.

8.2 There shall be a head bumper pad installed on the inside at the top of the emergency exit. The pad shall be sufficient to reduce the likelihood of injury upon impact. This pad shall be approximately 4 inches in width and shall extend across the entire top of the exit opening. Passage to the emergency door shall be kept clear of obstruction.

8.3 The upper portion of a central rear emergency door, if provided, shall be equipped with approved safety glass, the exposed area of which shall be not less than four hundred (400) square inches. A left side emergency door, if provided, shall be equipped with safety glass meeting the same requirements in its upper portion. The lower portion of rear or side emergency doors shall be of at least the same gauge metal as the body.

8.4 The emergency door shall be equipped with a slide bar type latch which shall extend into or overlap the door frame no less than one inch. If a vertical slide bar latch system is used, it must simultaneously engage latch plates in both the floor and overhead structure no more than four and one-half inches from the opening side of the door(s). The outside handle shall be installed so as to minimize hitching and shall be a non-detachable device.

8.5 A distinctive audible and visual signal automatically operated shall clearly indicate to the driver the unlatching of the emergency door(s), and no cut-off switch except through the ignition switch shall be installed in the circuit.

9. EMERGENCY EXIT WINDOWS:

9.1 Emergency windows shall conform to the applicable requirements of FMVSS 217. The rear window shall be designed so as to be opened from either the inside or the outside. It shall be hinged at the top and be equipped with a linkage or mechanism that will automatically hold the opened window against the force of gravity at a minimum hinge opening angle of $60 \pm 5°$ measured from the closed window position. Such linkage or mechanism shall not prevent the window from opening at a full 90° due to gravitational forces should the bus be inverted. The outside handle shall be non-detachable and designed to minimize hitching.

9.2 If a bus is equipped with a rear emergency window and a rear divan seat and if the horizontal distance from the top of the back of a divan seat to the rear of the bus is greater than two inches, such space shall be covered by a shelf installed parallel to the floor capable of supporting a weight of 600 pounds over any four square inch area of shelf. The seat back and shield, if required, shall not obstruct the clear opening of the emergency window.

9.3 A distinctive audible and visual signal automatically operated shall clearly indicate to the driver the unlatching of the rear emergency window, and no cut-off switch except through the ignition switch shall be installed in the circuit.

10. FLOOR COVERING:

10.1 The floor in the driver's compartment, step-well, and the toeboard areas including the tops of the wheel housings, shall be covered with a wear and fire-resistant material which complies with the applicable requirements of FMVSS 302.

10.2 The floor covering in the aisle, step-well, and entrance areas shall be of a non-skid, wear resistant, fire resistant, and rib type which complies with the applicable requirements of FMVSS 302.

10.3 The floor covering shall not crack when subjected to sudden temperature change and shall be securely bonded to the floor with a waterproof adhesive material as recommended by the manufacturer of the floor covering material. All seams shall be sealed with a waterproof sealer.

11. HEATERS, HOSES AND SHUT-OFF VALVES:

11.1 An inside temperature of not less than 50° Fahrenheit at average minimum January temperature as established by the U.S. Department of Commerce, Weather Bureau, for the area in which the vehicle is to be operated shall be maintained throughout the bus.

11.2 All heaters shall bear a name plate which shall indicate the heater rating in accordance with SAE J638, said plate to be affixed by the heater manufacturer which shall constitute certification that the heater performance is as shown on the plate.

11.3 Heater hoses shall be adequately supported to guard against excessive wear due to vibration. The hoses shall not dangle or rub against the chassis or sharp edges and shall not interfere with or restrict the operation of any engine function. Heater hose shall conform to SAE J20c. Heater lines inside the passenger compartment shall be shielded to prevent accidental contact or scalding of the driver or passengers.

11.4 Each heater installation shall include a shut-off valve at the engine on each heater hose.

12. IDENTIFICATION:

12.1 Exterior - The body shall be painted a uniform color known as national school bus glossy yellow. This color shall meet color No. 13432, glossy yellow, of the revision of Federal Standard 595 in effect at the time of manufacture.

12.2 The trim on the exterior of the body including the lamp hoods, the emergency door arrow and the lettering on the front, rear, and on both sides of the body shall be in color No. 17038, black, on the revision to Federal Standard 595 in effect at the time of manufacture. The rear bumper may be covered with a retroreflective material.

12.3 Signs or lettering, other than that required or permitted by this regulation, shall not appear on the front, back or sides of the bus except the rated seating capacity and the owner's name may be displayed on the sides of the body. The words "School Bus" shall be displayed in black on the front and rear of the bus or on the signs attached thereto in letters eight inches in height and conforming to "Series B" of the standard alphabets for highway signs on the National School Bus Yellow background.

13. INTERIOR:

13.1 The ceilings and walls of the body shall be thermally insulated between the inner and outer panels with a fire-resistant material.

13.2 The interior of the bus shall be free of all projections likely to cause injury. An inner lining shall be provided on ceiling and walls. Forward panels and other components shall be lapped by the rearward panels or components in a manner which in the event of separation will reduce the probability of exposure of sharp edges or other injury producing surfaces to the seated occupants. Exposed edges shall be beaded, hemmed, or flanged.

14. MIRRORS:

14.1 Rear view mirrors shall conform to the applicable requirements of FMVSS 111. Rear view mirrors shall be located inside and outside of the bus, shall be firmly supported and adjustable and shall afford the driver a clear, stable reflected view of the road surface at each side of the vehicle and for a continued distance beginning at a point not greater than 200 feet to the rear and continuing to the horizon when measured on a straight and level road. The interior mirror shall be clear view safety glass having a reflective surface no less than five inches high and fifteen inches wide and shall be metal backed and framed. It shall have rounded corners and edges which shall be padded to reduce danger of injury upon impact. It shall afford the driver a good view of the bus interior and roadway to the rear.

14.2 Outside mirrors shall be located on each side of the bus forward of the driver's seat, and the reflecting surface shall not be obscured by the corner pillars. They shall be rectangular in shape, and the reflecting service shall have a minimum horizontal dimension of five inches and a minimum vertical dimen-

sion of ten inches. The outside mirror mounts shall include a side angle adjustable convex mirror with at least forty square inches of reflective surface with an average radius of curvature of not less than twelve inches and not greater than twenty-five inches to provide the driver with a reflected view of the roadway along the sides of the bus. The convex mirror shall be located so as not to reduce the visual field of the flat surfaced mirror below fifty square inches.

14.3 A convex mirror with at least forty square inches of reflective surface with an average radius of curvature of not less than twelve inches and not greater than twenty-five inches shall be firmly mounted so that the seated driver may observe a reflection of the road from the front bumper forward to a point where direct observation is possible. A convex mirror with at least forty square inches of reflective surface with an average radius of curvature of not less than twelve inches and not greater than twenty-five inches shall provide the driver with a reflected view of the roadway along the right front side of the bus forward of the reflected view provided in 14.2.

15. MOUNTING:

15.1 The chassis frame, for body on chassis type buses, shall extend to the rear edge of the rear body cross member. The body shall be attached to the chassis frame in such a manner as to minimize shifting of the body from the chassis under severe impact. Alteration in the length of the frame may be made only behind the rear hangers of the rear springs and/or forward of the front hangers of the front springs and shall not be for the purpose of extending the wheel base. Said alterations may be made only if designed and guaranteed either by the original chassis manufacturer or by the company installing the school bus body.

15.2 For body on chassis type buses, insulating material used at body to frame contact points shall be so attached that it will remain in position under any anticipated maintenance or bus operating conditions.

16. REFLECTORS:

16.1 Reflectors shall conform to the applicable requirements of FMVSS 108.

17. RUB RAILS:

17.1 There shall be one rub rail located approximately at seat level

which shall extend from the rear side of the service entrance completely around the bus body, except at the emergency door exit or rear compartment, to a point of curvature near the front of the body on the left side.

17.2 There shall be one rub rail located approximately at the floor line which shall extend over the same longitudinal distance as the upper rub rail, except at the wheel housing, and which shall terminate at the radii of the right and left rear corners.

17.3 Rub rails shall be constructed of 16-gauge longitudinally corrugated or ribbed steel of 4 inch minimum width. All rub rails shall be joined to the bus body so as to attain at least 60% of the tensile strength of the weakest joined material when strained in a direction parallel to the length of the rub rail. **20.**

17.4 Each joint in all required rub rails shall be constructed so as to attain at least 60% of the tensile strength of a jointless length of rub rail when strained in a direction parallel to the length of the rub rail. Rub rail joints shall not be directly over another panel joint in the bus material.

18. SEAT BELT:

18.1 A restraint system conforming to the applicable requirements of FMVSS 208, 209, and 210 shall be provided for the driver.

18.2 A lap belt installation shall be provided for each designated seating position in conformance with the applicable requirements of FMVSS 208, 209, and 210 as required by FMVSS 222.

19. SEATING AND CRASH PROTECTION:

19.1 All seats shall conform to the applicable requirements of FMVSS 222 and 302.

19.2 The aisle shall have a width no less than 12 inches and shall be straight and unobstructed through the entire passenger seating area parallel to the major axis of the bus.

19.3 A crash barrier meeting the applicable requirements of FMVSS 222 may be used on the right side of the bus. If used, it shall be located so as not to interfere with the driver's vision and be not farther forward than the rear of the driver's seat when adjusted to its rearmost position.

19.4 The minimum distance between the steering wheel and the back rest of the driver's seat shall be 11 inches. The driver's seat shall be rigidly positioned and shall have self-contained vertical adjustment of not less than three inches and fore and aft adjustment of not less than 4 inches without the use of separate tools or devices. A crash barrier meeting the applicable requirements of FMVSS 222 may be used behind the driver's seat. If used, it shall be located so as not to interfere with the fore and aft adjustment of the driver's seat.

19.5 A padded hand grip on each seat may be provided but shall be enclosed and non-protruding.

20. SERVICE ENTRANCE:

20.1 The service entrance shall be located on the right side near the front in a location which shall provide the seated driver an unobstructed view of the entrance. The entrance shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 50 inches. The service door may be of the sedan, jackknife, accordian, or split-type, and shall be manually or power operated by the seated driver and shall be designed to afford easy release and prevent accidental opening. No parts of the hand lever shall come together so as to shear or crush fingers. Split-type door may open outward, but if one section of a folding door opens inward and the other opens outward, the forward section shall open outward. Vertical closing edges shall be equipped with padding to prevent injury. The bottom of the lower glass panel shall be not more than 35 inches from the ground when the bus is unloaded. The top of the upper glass panel shall be not more than six inches from the top of the door. If a sedan type door is used, it shall be reinforced to support the door control operating mechanism and need not have glass in the lower portion nor padding on the vertical closing edges. A grab handle of stainless clad steel not less than 10 inches in length shall be properly secured in an unobstructed location inside the doorway. Power operated doors shall be equipped so as to regulate control and to permit manual operation in case of power failure. The service door shall be labeled on the inside in letters at least one half inch in height with instructions for emergency opening.

20.2 The step risers shall be approximately equal in height with the upper riser no more than 12 inches in height. The steps shall be surfaced with a non-skid material with a minimum of one and one-half inch white nosing as an integral piece. The step-well shall be illuminated by at least one lamp providing a white light actuated automatically when the clearance lights are in the on

position. The lower step shall be not less than 12 inches and not more than 16 inches above the level on which the unloaded bus rests. The entrance may be equipped with a running board-type step which does not extend beyond the width of the vehicle body.

21. STANCHIONS AND GUARD RAILS OR CRASH BARRIERS:

21.1 A stanchion shall be installed from floor to roof at the right rear corner of the driver's seat in such a position as to neither interfere with the adjustment of the seat nor obstruct the aisle. A guard rail, approximately 30 inches above the floor with a guard panel, shall be provided between the driver's seat and the left front seat. The guard rail and guard panel shall be placed so as not to interfere with the fore and aft adjustment of the driver's seat and shall extend from the stanchion to the left wall. The bottom of the guard panel shall be not more than ten inches above the floor. The driver's seat when adjusted to the rearmost position shall have a minimum of two inches of clearance between the rear of the driver's seat and the guard rail or panel guard. Alternatively, crash barriers as outlined in 21.4 may be provided.

21.2 A vertical stanchion shall be installed at the rear of the entrance step-well from floor to roof and located so as not to restrict the passageway at any level to less than 24 inches nor the aisle to less than 12 inches. A guard rail and step-well guard panel shall be installed from the right vertical stanchion to the right wall to prevent passengers in the front seat from being thrown into the step-well. The guard rail shall be approximately 30 inches above the floor and its guard panel shall not restrict the entrance passageway to less than 24 inches at any level. The panel shall extend from the guard rail to within 2 inches of the floor. The guard panel shall be positioned or flanged to avoid having its lower edge extended over the step-well and may be fastened to the floor. The clearance between the step-well guard panel and the first seat shall be at least 24 inches measured from the panel to the front face of the seat back at seat cushion height. Alternately, crash barriers as outlined in 21.4 may be provided.

21.3 All such stanchions and guard rails shall have a minimum tubing wall thickness of 3/16 inch, have a minimum of one inch outside diameter, be of steel or equivalent strength tubing, and padded to minimize injury producing impact forces. All stanchions and guard rails shall be securely attached to the floor, ceiling and walls commensurate with the design strength of stanchions and guard rails.

21.4 A crash barrier in compliance with the applicable requirements of FMVSS 222 may be provided both for the right front and left front of the bus as an alternate to the above described stanchions and guard rails.

22. STEERING WHEEL:

22.1 The steering wheel circumference shall have at least two inches of clearance at all points.

23. STIRRUP STEPS:

23.1 There shall be at least one folding stirrup step or recessed foothold and suitably located handles on each side of the front of the body for easy accessibility for cleaning the windshield and lamps except when windshield and lamps are easily accessible from the ground.

24. STOP SIGN:

24.1 A stop warning arm device, if provided, shall meet the applicable requirements of SAE J1133.

25. STORAGE COMPARTMENT FOR TOOLS:

25.1 If tools are carried on the bus, a fire-resistant container securely fastened of adequate strength capacity for tools, etc. for minimum emergency repairs shall be provided. If located inside, it shall be in the right rear of the bus under the rearmost seat.

26. SUN VISOR:

26.1 An interior adjustable sun visor shall be so installed that it can be turned up when not in use.

27. UNDERCOATING:

27.1 The entire underside of the body, including the floor members and side panels below the floor level, shall be coated with a fire-resistant undercoating material applied by the spray method in order to seal, insulate and reduce oxidation and noise level. Non-metallic components need not be coated.

28. VENTILATION:

28.1 The bus body shall be equipped with a suitable, controlled ventilation system of sufficient capacity to change the air with-

in the stationary bus at a rate not less than five cubic feet per minute multiplied by the designated seating capacity of the bus. If static-type exhaust roof ventilator(s) is used, it shall be non-closable and be installed such that the forward motion of the body results in air being drawn out of the body. 32

29. WEIGHT DISTRIBUTION AND GROSS WEIGHT:

29.1 The gross weight of the loaded vehicle shall at no time exceed the manufacturer's maximum gross vehicle weight rating, nor tire load rating, nor gross axle weight rating. 33

30. WHEEL HOUSING:

30.1 The wheel housing opening shall allow for easy tire removal and service.

30.2 The wheel housing shall be attached to the floor sheets in such a manner to prevent any dust, water, or fumes from entering the body. 34

30.3 The inside height of the wheel housing above the floor line shall not exceed 10 inches.

30.4 The wheel housing shall provide clearance for installation and use of tire chains on single and dual (if so equipped) power driving wheels. 35

30.5 No part of a raised wheel housing shall extend into the emergency door opening.

31. WINDOW OPENINGS:

31.1 All glass shall be installed so that the identification mark is visible and legible and shall conform to the applicable requirements of FMVSS 205. 36

31.2 All side windows shall (1) operate freely and (2) open from 7 to 10½ inches from the top only, except the driver's window which may be of a sliding fore and aft construction. All exposed edges of glazing material shall be banded. Windows shall be free of window guards or bars both inside and outside and equipped only with recessed latches. If side windows are included to meet the push-out emergency window exit requirements, they shall conform to the applicable requirements of FMVSS 217. 37

32. WINDSHIELDS:

32.1 The glass in the windshield shall be laminated safety glass and may be tinted. The identifying designation AS-1 shall be visible and legible. The glass shall meet the applicable requirements of FMVSS 205.

32.2 The windshield shall be designed and located so as to afford minimum of obstruction to the driver's view of the highway.

33. WINDSHIELD WASHER:

33.1 A windshield washer which will effectively clean the entire area covered by both the windshield wipers shall be provided. Windshield washer equipment shall meet the applicable requirements of FMVSS 104.

34. WINDSHIELD WIPERS:

34.1 A windshield wiping system, two-speed or more, shall be provided having required equipment and wiped glass area which complies with the applicable requirements of FMVSS 104.

CHASSIS REQUIREMENTS

35. AIR CLEANERS:

35.1 The bus engine shall be equipped with an adequate oil bath, dry element, or equivalent type air cleaner mounted outside the passenger compartment. The air cleaner shall comply with SAE J726b.

36. AXLES:

36.1 The front axle and suspension shall have sufficient capacity to support that portion of the load as would be imposed by the manufacturer's maximum gross vehicle weight rating.

36.2 The rear suspension assembly shall have a gross weight rating at ground equal to that portion of the load as would be imposed by the manufacturer's maximum gross vehicle weight rating.

37. BRAKES:

37.1 All braking systems shall be in compliance with the applicable requirements of FMVSS 105.

37.2 Brake lines shall be protected from excessive heat and vibration and be so installed as to prevent chafing.

37.3 Brake lining material shall meet the minimum standards of the Vehicle Equipment Safety Commission's Regulation, V-3. 41

37.4 Brake fluid installed in school bus hydraulic systems shall conform to the applicable requirements of FMVSS 116.

37.5 Each brake drum or rotor shall be permanently and plainly marked to clearly indicate in legible cast or stamped legend the maximum safe diameter of the drum or minimum safe thickness of the rotor beyond which it must not be worn or machined, but must be discarded.

38. BUMPER, FRONT:

38.1 A front bumper shall be provided with not less than a seven inch face. It shall be painted black and shall extend to protect the outer edges of the fenders. It shall be of sufficient strength to permit pushing another vehicle of equal comparable weight without permanent deformation. The front bumper shall be located at a height of between 14 and 18 inches when measured from the bottom edge of the bumper to the level surface on which the unloaded bus stands.

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39. COLOR:

39.1 The body shall be painted a uniform color known as National School Bus Glossy Yellow. This color shall meet Color No. 13432, Glossy Yellow, of the revision of Federal Standard 595 in effect at the time of manufacture. As an alternate, the cowl (hood) may be painted lusterless black, color, No. 37038 of the revision to Federal Standard 595 in effect at the time of manufacture, or it may be painted a lusterless yellow of a quality and color equal to color No. 13432. 43

39.2 The trim on the exterior of the body including the bumper, the lamp hoods, the emergency door arrow and the lettering on the front, rear, and on both sides of the body shall be in Color No. 17038, black, of the revision to Federal Standard 595 in effect at the time of manufacture. As an alternate, the rear bumper may be covered with a retroreflective material.

40. DRIVE SHAFT:

40.1 Each segment of the drive shaft shall be equipped with a suit-

able guard to prevent accident or injury in the event of its fracture or disconnection.

41. EXHAUST SYSTEM AND MUFFLER:

41.1 The exhaust system which includes the exhaust manifolds, joining gaskets, piping leading from the exhaust manifold, the muffler(s), and tail pipe(s) shall not enter the bus body at any location and shall be attached or suspended from the chassis frame. The exhaust system pipes shall be of non-flexible 16 gauge steel or equivalent and shall extend to, but not beyond, the rear limit of the bumper. The complete exhaust system shall be tightly connected and free from leaks and shall be properly insulated from the electrical wiring or any combustible part of the bus. The exhaust system shall not pass within 12 inches of the fuel tank and its connection or any flexible brake system hose unless a suitable heat baffle is used, in which case a minimum exhaust system separation of 1.5 inches shall be maintained to the fuel tank, its fittings, and any flexible brake system hoses. The size of the pipes in the exhaust system shall not be reduced below that at the engine manifold.

41.2 The total vehicle noise level shall not exceed 88 dbA when tested in accordance with SAE J366b.

42. FRAME:

42.1 The chassis manufacturer shall comply with Section 15.1 under "Mounting" where applicable.

43. FUEL SYSTEM AND TANK:

43.1 The fuel tank shall have the minimum capacity of 22 gallons. It shall be filled and vented entirely outside the body. The location of the fuel tank fill opening shall be such that accidental fuel spillage will not drip or drain to any part of the exhaust system. The fuel tank shall be in compliance with the applicable requirements of FMVSS 301.

43.2 A fuel filter with replaceable element shall be installed between the fuel tank and the carburetor.

43.3 The fuel tank, lines and fittings, except filler pipe shall not extend above the top of the chassis frame rail. The fuel lines shall be mounted to obtain maximum possible protection from the chassis frame.

44. HORNS:

44.1 A suitable horn(s) providing an audible warning at a distance of 300 feet to other highway users shall be conveniently controlled from the driver's seated position. Each bus shall be equipped with a reverse direction alarm (back up alarm-BUA) in compliance with SAE J994b with respect to acoustical performance for a Type B device (i.e. 107 dbA and $\pm$ 4 db with a supply voltage of 14 volts). Conformity to the laboratory environmental tests of Section 5 of SAE J994b shall not be required.

45. IGNITION LOCK:

45.1 An ignition lock shall be provided requiring the use of a key or other device to permit activation of the vehicle's starter mechanism.

46. INSTRUMENTS:

46.1 The bus shall be equipped with the following non-glare illuminated instruments and gauges, as a minimum, mounted for easy maintenance and repair and in such a manner that each is clearly visible to the seated driver. Such instruments shall be in compliance with the applicable requirements of FMVSS 101, 102, and 127.

A. Ammeter with Graduated Charge and Discharge

B. Fuel Gauge

C. Odometer

D. Oil Pressure Gauge

E. Speedometer

F. Upper Beam Headlamp Indicator

G. Water Temperature Gauge

47. SHOCK ABSORBERS:

47.1 Double-acting shock absorbers or other damping devices of sufficient capacity shall be provided at each wheel location.

48. SPRINGS:

48.1 Springs or other suspension devices shall be capable of supporting their designed share of the vehicle gross weight.

49. STEERING GEAR:

49.1 The steering gear shall provide safe and accurate performance at maximum load and speed and shall be easily adjusted. Only changes approved by the chassis manufacturer shall be permitted.

50. TIRES AND RIMS:

50.1 Tires and rims of proper size and tires with load ratings commensurate with chassis manufacturer's gross vehicle weight rating shall be provided and shall be in compliance with the applicable requirements of FMVSS 119 and 120.

51. UNDERCOATING:

51.1 The entire underside of the chassis, front fenders, floor members and side panels below floor level shall be coated with a fire-resistant undercoating material, applied by the spray method, for the purpose of sealing, insulating and reducing oxidation and the noise level. Non-metallic components need not be coated.

52. WINDSHIELD WIPER AND WASHER CONNECTIONS:

52.1 Provisions shall be made for windshield wipers and washer connections in compliance with FMVSS 104.

ELECTRICAL SYSTEM REQUIREMENTS

53. BATTERY:

53.1 The storage battery shall be of sufficient capacity to supply all electrical requirements and shall have a minimum cold cranking capacity rating at 0° Fahrenheit (−17.8 C°) of 425 amperes at a minimum reserve capacity of 250 minutes at 25 amperes, cold cranking ampere requirements and reserve rating capacities are in conformance with SAE J537h.

54. GENERATOR OR ALTERNATOR:

54.1 The electrical generator or alternator with rectifier shall have an operational rating capable of supplying sufficient electrical power to maintain a fully charged storage battery with all electrical equipment operating simultaneously with the exception of the horn and engine starting motor while the bus is engaged in normally anticipated use.

55. LAMPS AND SIGNALS:

55.1 All exterior lamps and signals shall be in conformance with the applicable requirements of FMVSS 108.

55.2 Two red stop lamps having an illuminated area of no less than 19 square inches shall be mounted on the rear at a height no less than 15 inches and not more than 72 inches above the surface on which the unloaded bus rests and shall be positioned as far apart as practicable.

55.3 School bus alternately flashing signal lamps shall be in conformance with the applicable requirements of FMVSS 108. A signal lamp switch shall be provided to permit the driver to: (a) turn the lamps off at his discretion and (b) turn the lamps on when the service door is closed. 5

55.4 School bus alternately flashing signal lamps shall be actuated by the automatic door switch, a momentary contact switch, and a master control switch. Additional devices for controlling the signal lamps shall (a) alternately flash the lamps at 60 to 120 cycles per minute and (b) warn the driver when any of the signal lamps are inoperative. Maximum brightness shall be attained in each cycle of flashing. Audible or visual indication that the signals are flashing shall be provided.

55.5 Hoods with a minimum thickness of 20 guage steel or other comparable material shall be securely fastened to the alternately flashing signal lamp housings. They shall extend at least five inches in front of the lens and from the vertical centerline of the lamp shall measure 80° along the perimeter from each side of the center, with the centerline of the hood coinciding with the top of the vertical centerline of the lamp housing.

55.6 The area around the lens of alternately flashing signal lamps and extending outward approximately three inches and the hoods shall be painted black. In installations where there is no flat vertical portion of the body immediately surrounding the

entire lens of the lamps, a circular or square band of black approximately three inches wide, immediately below and to both sides of the lens, shall be painted on the body or the roof area against which the signal lamps are seen.

55.7 Interior lamps shall adequately illuminate the entire aisle, the emergency passageway and the step-well.

55.8 Class A turn signal lamps which conform to the applicable requirements of FMVSS 108 shall be provided. These signals shall be equipped with a four-way hazard warning signal switch to cause simultaneous flashing of the turn signal lamps when needed as a vehicular traffic warning. Armored-type yellow (amber) turn signal lamps that are designed to conform to SAE J914a shall be mounted on the sides of the body at approximately seat level rub rail height just to the rear of the service door on the right side and approximately opposite the driver's seat on the left side. They are to be connected to function with the regular turn signal lamps.

56. WIRING:

56.1 All wiring shall conform to SAE J555a.

56.2 Wiring shall be arranged in at least nine regular circuits as follows:

A. Head lamps

B. Clearance, tail, stop, instrument, and step-well lamps

C. Dome lamps and other interior lamps

D. Starter motor

E. Ignition and emergency door signal

F. Turn signal lamps

G. Alternately flashing signal lamps

H. Horn

I. Heater and defroster

Any of the above combination circuits may be subdivided into independent circuits. When possible, all other electrical functions (sanders, electric-type windshield wipers) shall be provided with independent and properly protected circuits. Each body circuit shall be coded by number or letter at four inch intervals or by color. The code shall appear on a diagram of the circuits in a readily accessible location.

56.3 A separate fuse or circuit breaker shall be provided for each circuit except the starter motor, ignition circuits, and horn and shall be readily accessible to the driver.

56.4 All wires within the body shall be insulated and protected by covering of fibrous loom (or equivalent) which will protect them from external damage and minimize dangers from short circuits. Whenever wires pass through body or chassis members, additional protection in the form of a grommet or other appropriate type of insert shall be provided.

56.5 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.

56.6 Two extra fuses for each size of fuse used on the bus shall be conveniently mounted in the bus body.

56.7 The chassis manufacturer shall install a readily accessible electrical terminal so that the body and chassis electrical load can be indicated through a chassis ammeter (when provided) without dismantling or disassembling the chassis component. The chassis wiring system to terminal and the chassis ammeter shall be compatible with the generating capacity.

EQUIPMENT REQUIREMENTS

57. FIRE EXTINGUISHERS:

57.1 The bus shall be equipped with at least one pressurized, dry, chemical-type fire extinguisher, mounted in the extinguisher manufacturer's bracket of automotive-type and located in the driver's compartment in full view of and readily accessible to the driver. A pressure gauge shall be mounted on the extinguisher as to be readily read without removing the extinguisher from its mounted position.

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

58. FIRST AID KIT:

58.1 The bus shall be equipped with a first-aid kit, removable and readily identifiable, mounted in an easily accessible place in the driver's compartment, the contents of which, at a minimum, shall include but not be limited to the following:

A. 4 inch bandage compress ..... 1 package

B. 2 inch bandage compress ..... 1 package

C. 1 inch adhesive compress bandage ..... 2 packages

D. 40 inch triangualr bandage with 2 safety pins 1 package

E. Splint ..... 1 package

F. Tourniquet ..... 1 package

59. WARNING DEVICES FOR DISABLED VEHICLES:

59.1 At least three emergency warning devices shall be provided and they shall meet the applicable requirements of FMVSS 125.

60. LOCKED COMPARTMENT:

60.1 First-aid kit(s), warning devices, and wheel chocks may be stored under lock and key provided the locking device is connected with an automatic audible warning signal to notify the driver of the locked compartment when the ignition is turned on.

61. WHEEL CHOCKS:

61.1 All buses shall be equipped with one pair of wheel chocks.

REFERENCE MATERIAL

FMVSS— *Federal Motor Vehicle Safety Standards, Superintendent of Documents*, U.S. Government Printing Office, Washington, D.C. 20402

FMVSS 101 - Control Location, Identification and Illumination
FMVSS 102 - Transmission Shift Lever Sequence, Starter, Interlock, and Transmission Braking Effect
FMVSS 103 - Windshield Defrosting and Defogging Systems
FMVSS 104 - Windshield Wiping and Washing Systems
FMVSS 105 - Hydraulic Braking Systems
FMVSS 108 - Lamps, Reflective Devices and Associated Equipment
FMVSS 111 - Rearview Mirrors
FMVSS 116 - Hydraulic Brake Fluids
FMVSS 119 - New Pneumatic Tires
FMVSS 120 - Tire Selection and Rims for Vehicles Other Than Passenger Cars
FMVSS 125 - Warning Devices
FMVSS 127 - Speedometer and Odometer
FMVSS 205 - Glazing Materials
FMVSS 208 - Occupant Crash Protection
FMVSS 209 - Seat Belt Assemblies
FMVSS 210 - Seat Belt Assembly Anchorages
FMVSS 217 - Bus Window Retention and Release
FMVSS 220 - School Bus Rollover Protection
FMVSS 221 - School Bus Body Joint Strength
FMVSS 222 - School Bus Passenger Seating
FMVSS 301 - Fuel System Integrity
FMVSS 302 - Flammability of Interior Materials

BMCS— Bureau of Motor Carrier Safety, Federal Highway Administration, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

BMCS - 393 Sub-Part E "Fuel Systems" encompasses 393.65 and 393.67

SAE— Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096

SAE J20c - "Cooling System Hoses"
SAE J366b - "Exterior Sound Level for Heavy Trucks and Buses"
SAE J537h - "Storage Batteries"
SAE J555a - "Truck, Truck-Tractor, Trailer and Motor Coach Wiring"
SAE J638 - "Test Procedure and Ratings for Hot Water Heaters for Motor Vehicles"

SAE J726b - "Air Cleaner Test Code"
SAE J914a "Side Turn Signal Lamps"
SAE J994b - "Performance, Test, and Application Criteria for Electrical Operated Backup Alarm Devices"
SAE J1133 - "School Bus Stop Arm"

U.S. Department of Commerce, National Climatic Center, Federal Building, Asheville, North Carolina 28801

Average Minimum and Maximum Temperatures, anywhere in U.S.A.

General Services Administration, Specifications Division, Washington Navy Yard, Building 197, Washington, D.C. 20407

595 -13432 "National School Bus Glossy Yellow"
595 -17038 "Glossy Black Enamel"
595 -37038 "Lusterless Black"

V-3 — Vehicle Equipment Safety Commission, Suite 908, 1030—15th Street, N.W., Washington, D.C. 20005

V-3 Regulation "Minimum Requirements and Uniform Test Procedures for Motor Vehicle Brake Linings"


VE
SC