ADMINISTRATIVE ADDENDUM
OHIO SCHOOL BUS MINIMUM CONSTRUCTION RULES

ADDENDUM SECTION 3301-87-01
PG. 3

(O) CLARIFICATION

INTERPRETATION OF "NEW" WILL BE MADE BY THE ASSISTANT DIRECTOR, DIVISION OF SCHOOL FINANCE, OHIO DEPARTMENT OF EDUCATION. "NEW" GENERALLY MEANS ANY ITEM THAT HAS NOT BEEN USED ON A SCHOOL BUS BEFORE. EXAMPLE: SIX SPEED TRANSMISSION. THIS TYPE OF TRANSMISSION IS NOT NEW, BUT IT HAS BEEN REDESIGNED BY ONE COMPANY AND NEVER USED ON A SCHOOL BUS IN OHIO. THEREFORE, IT WOULD NEED TO BE FIELD TESTED. ANOTHER EXAMPLE, VARIOUS TYPES OF AIR SUSPENSION.

ADDENDUM SECTION 3301-87-02
PG. 5

(CHART)

	Capacity	Front	Rear
Type A	10-16-23	3,100	
TYPE C LINE 2	47-~~35~~-53	6,000	15,000
UNDER TYPE D NEW LINE	66-72 (RE)	10,800	19,000
	~~73~~ 78-84(RE)		

PG. 6

(C) BATTERY - MINIMUM SUGGESTED BY CHASSIS MANUFACTURER.

(1) Gasoline Power: ~~Battery shall have a rating of not less than group 8D-900, with four hundred thirty reserve minutes measured per S.A.E. J-537th at twenty-five-ampere rate. Exception: Type A school bus - manufacturer's standard. Type B school bus - at least four hundred seventy five CCA at zero degrees with one hundred thirty reserve minutes. (also see paragraph (J) of this rule.)~~ Gasoline - 800 CCA or larger.

ADDENDUM SECTION 3301-87-02 (CONTINUED)

Diesel Power: ~~Minimum of twelve hundred fifty CCA for eight and two-tenths £ Detroit and equivalent midrange diesel engines, minimum of sixteen hundred CCA for thirty-two hundred eight and equivalent engines.~~ DIESEL - 1250 CCA MINIMUM OR LARGER DEPENDING ON ADDITIONAL AMP DRAW.

TYPE A AND B BUSES DIESEL POWERED --

TWO (2) 500 CCA OR LARGER DEPENDING ON LIFT REQUIREMENTS IF SO EQUIPPED.

PG. 7

(D) BRAKES 2ND SENTENCE

Chassis rated from sixty-five-passenger conventional, or transit-type chassis with capacity of ~~fifty-nine~~ FIFTY-FOUR-passenger school bus or greater shall be equipped wih air brakes, or as an option, hydraulic disc brakes.

(D)(1) OPTION - HYDRAULIC FOUR WHEEL DISC OR FORD DISC FRONT, DRUM REAR HYDRAULIC BRAKES.

PG. 12

NEW SECTION

(3)(c) VACUUM ASSISTED BRAKES PERMITTED.

PG. 12

(D)(6) ~~Lining for air brakes shall be constructed of asbestos-free material~~ ALL BRAKE LINING MATERIAL SHALL BE ASBESTOS-FREE and meet the following minimums:

	Axle	Brake Lining
Front	9,000 lbs.	15" X 4"
Rear	19,000 lbs.	16 1/2" X 7"

PG. 14

(H)(1) COOLING SYSTEM

ADDITION TO SECOND SENTENCE

The fan, alternator, and water pump, IF BELT DRIVEN, shall be driven by dual belts and shall be equipped with matched pulleys and matched belts.

PG. 15

(H)(6) Chassis shall be equipped with a coolant recovery system~~.~~ OR IF DIESEL POWERED A DEAIRATION SYSTEM.

(J) ELECTRICAL SYSTEM

(1) ALTERNATOR

Third sentence (b) Twelve through TWENTY-THREE ~~TWENTY-FOUR~~ capacity school buses equipped with a lift shall have dual batteries with an eighty-ampere alternator.

PG. 17

(3) Type A AND B buses tailpipes shall be manufacturer's standard.

(5) EXCEPTION: TYPE A AND B BUSES MANUFACTURER'S STANDARD.

PG. 21

(j) EXCEPTION: TYPE A AND B BUSES MANUFACTURER'S STANDARD WARNING LIGHT ACCEPTABLE.

PG. 22

(S)(3)(c)

Front turn signals shall be double-faced and supplied by the chassis manufacturer in compliance with requirements of FMVSS 108. Placement shall be in an area most visible to other motorists. Exception: Type A B AND D bus double-faced turn signals are not required.

PG. 22

(T) OIL FILTER

~~Oil filter shall have an oil capacity of at least one quart for gasolinepowered school buses and one two-quart or two one-quart capacity for diesel-powered school buses.~~ Hose must meet FMVSS 106 and S.A.E. J1402. DIESEL OIL FILTER, MANUFACTURERS STANDARD CAPACITY. See the following table.

ADDENDUM SECTION 3301-87-02 (CONTINUED)
PG. 24

(V)(4)(c)

Engine heater, minimum ~~one thousand watts~~ SEVEN HUNDRED AND FIFTY WATTS.

(V)(4)(d) DIESEL oil filter, ~~shall be minimum one two-quart or two one-quart~~ MANUFACTURER'S STANDARD capacity.

PG. 25

(V)(4)(g) AIR THROTTLE PERMITTED.

PG. 27

(Z)(7) TIRE CHART

UNDER 71 CAPACITY
LINE 1 10R22.5 ~~F~~ G

ADDENDUM SECTION 3301-87-03
PG 32

(C)(2) Rear bumper shall be wrapped around back corners of bus and extend forward at least twelve inches, measured from rear-most point of body at floor line. Rear bumper shall also protect reat corners of body by extending beyond the body exterior side panels. The bend of the rear bumper at the rear body corners shall be sufficient to allow the entire contour of the forward end of the rear bumper to ~~be within~~ EXTEND NO MORE THAN ONE INCH BEYOND the body line of the exterior side panels.

ADDENDUM SECTION 3301-87-03 (CONTINUED)

PG. 33

(D) Capacity

Row of Seats	Rated Capacity 3-3 Plan; Rump Width of 13 Inches	Rated Capacity 3-2 Plan; Rump Width of 15 Inches
9	53 Conventional	44 Conventional
9*	54 Forward Control	45 Forward Control
10	59 Conventional	46 Conventional
10*	60 Forward Control	50 Forward Control
11	65 Conventional	54 Conventional
11*	66 Forward Control	55 Forward Control
11*	66 Rear Engine	55 Rear Engine

*ADDED

PG. 37

(9) Rub Rails

(c) ~~Both~~ ALL rub rails shall be attached at each body post and all other upright structural members.

(d) ~~Both~~ ALL rub rails shall be four inches or more in width (after formed) and shall be a minimum of sixteen-guage steel, corrugated or ribbed pattern.

(e) ~~Both~~ ALL rub rails shall be mounted outside body panels.

PG. 39

(G) Defroster

(3) Two adjustable, six-inch auxiliary defroster fans shielded with small mesh metal OR POLYPROPYLENE guards shall be installed. EXCEPTION; TYPE A SCHOOL BUSES, ONE FAN REQUIRED.

(H) Doors

(1) Service doors.

(a) Service door shall be power or manually operated, under control of the driver, so designed as to afford easy release,and to

prevent accidental opening. when manual lever is used, no parts shall come to get her so as to ~~shee~~ SHEAR or crush fingers.

PG. 41

(2) Emergency doors.

(c) Exterior door handle shall be of permanent hitch-proof design and mounted with enough clearance to permit opening ~~with~~ WITHOUT touching door surface.

PG. 47

(10) A fuel access plate shall be installed for easy access to fuel gauge mechanism and shall be installed above the regular floor covering when possible. The access plate shall not be undercoated. Panel shall be identical to floor material in thickness and coating and shall be sealed to prevent any leakage or moisture. Interior shall not be undercoated. Exception: Type A AND B school ~~bus~~ BUSES.

(K) Fuel Opening - The fuel fill opening in the body skirt shall be equipped with a hinged cover held closed by a spring or other conveniently operated device. The mechanism that holds this cover closed shall be sufficient to keep it closed under severe operating conditions. The fuel fill opening shall be large enough to permit the entire pump nozzle to pass through the opening and reach the fill neck of the fuel tank. EXECPTION: TYPE A AND B SCHOOL BUSES.

PG. 51

(O) Insulation.

(2) A plywood floor shall be applied on top of the steel floor. Floor covering shall be applied on top of the plywood. Plywood shall be five-eights of an inch thick five-ply BB CD exterior grade. Plywood shall extend to firewall and under driver's seat. Plywood shall be sanded and vacummed before covering is applied. Waterproof sealing material shall be applied ~~to the side wall seams and~~ to seams

in the sections of plywood floor. Plywood shall be four feed by eight feet sections, pieced only as necessary. Drawings shall be provided which show how the plywood is to be installed.

CLARIFICATION - WATERPROOF SEALING APPLIED ON TOP OF THE PLYWOOD TO HOLD THE FLOOR COVERING IS CONSIDERED AS ONE METHOD OF SEALING THE SEAMS IN THE PLYWOOD FLOOR. THIS METHOD IS ACCEPTABLE UNTIL FURTHER NOTICE.

PG. 53

(2) Additional Requirements.

(a) The service door step well light shall be wired with the marker light circuit and activated by a switch controlled by the service door. On Type C bus the light shall be a minimum of ~~six inches in diameter~~ TEN CANDLEPOWER. (WELDON NO. 3-8025-1400 STEPWELL LIGHT OR EQUIVALENT.)

(d) (i) These lamps are to use ~~single~~ DOUBLE-contact bulbs.

PG. 59

(R)(2) Mirror brackets shall extend forward a minimum of fourteen inches. (CLARIFICATION: AS MEASURED FROM THE FRONT EDGE OF THE WINDOW POST.)

(R)(2)(a) Two flat mirrors - ~~six-by-twelve-inch~~ SIX-BY-SIXTEEN-INCH (6 X 16) overall measurement. (EXCEPTION TYPE A MANUFACTURER'S STANDARD)

PG. 60

(R)(2)(b) 6 X 16

(R)(3) ~~Two~~ ONE convex mirrors measuring not less than ten inches in diameter shall be fender-mounted on EACH sides of all Type B and C buses. Mirrors shall be mounted in such a manner that the seated driver may observe ~~all~~ areas in front of the bus ~~where direct observation is not possible~~ and

along each side of the bus from the front corner to the rearmost part of the bus. ADDITIONAL MIRRORS MAY BE FENDER-MOUNTED TO PROVIDE OBSERVATION ALONG EACH SIDE OF THE BUS. EXCEPTION: TYPE A SCHOOL BUS- TWO SEVEN AND ONE HALF INCH SIDE VIEW, AND TWO SEVEN AND ONE HALF INCH CROSSVIEW.

(R)(6) EXCEPTION: TYPE A SCHOOL BUS.

PG. 62

(Y)(1) EXCEPTION: TYPE A SCHOOL BUS.

PG. 63

ADD (e) BARRIER-TYPE A SCHOOL BUS.

A BARRIER/PADDED GUARD PANEL SHALL BE PLACED FORWARD OF ALL SEATS NOT HAVING ANOTHER PASSENGER SEAT IN FRONT OF IT.

PG. 64

(AA) Steps - Service Door.

(2) Service door entrance shall be equipped with three steps. Risers in each case shall be approximately equal. EXCEPTION: TYPE A AND B BUSES.

(5) Grab handles of maximum length but not less than ten inches long shall be installed on both sides of the interior step well area. These handles shall be stainless-steel clad. Both grab handles must be securely fastened. Exception: Grab handles not required on Type A school buses. ON TYPE B SCHOOL BUSES GRAB HANDLES MAY BE MOUNTED ON JACKKNIFE DOOR.

PG. 65

(CC)(1) AND (2) ADD - EXCEPTION: TYPE A SCHOOL BUS.

PG. 66

(GG)(1) All glass in windshield windows and driver's windows shall be approved safety glass one-

ADDENDUM SECTION 3301-87-03 (CONTINUED)

~~eighth of an inch thick~~; with A.S.A. "one" rating or better, as specified by the "American Standards Association."

PG. 67, 68

(HH)(2) AND (3) EXCEPTION: TYPE A SCHOOL BUS.

ADDENDUM SECTION 3301-87-04
PG. 73

(7) Fenders - Manufacturer's Standard, painted national school bus ~~chrome~~ yellow.

(9) Governor.

(a) All school buses rated below thirty-six passenger capacity ~~shall~~ MAY be equipped with a road and engine speed governor. Such governor shall be set at fifty-five miles per hour maximum.

(c) Road speed controll ~~shall~~ MAY be installed and set prior to delivery of vehicle to purchaser.

ADDENDUM SECTION 3301-87-05 (ALSO SEE BARRIER PAGE 64)
PG. 75

(B) Chassis.

(1) Axles - GVWR.

(a) Front - Three thousand ~~four~~ ONE hundred GVWR.

(b) Rear - ~~Six~~ FIVE thousand THREE HUNDRED GVWR.

(6) Governor - road and engine speed governor ~~required~~ OPTIONAL AND IF USED to be set not to exceed fifty-five miles per hour.

PG. 76

(C) Body.

(1) Heaters - Two heaters required. Second heater to be installed ~~on right side under third row of seats~~ NEAR THE REAR OF THE BUS.

ADDENDUM SECTION 3301-87-06
PG. 80

(H)(11) The lift mechanism shall be equipped with adjustable limit switches and/or by-pass valves to prevent excessive pressure from building in the hydraulic system when the platform reaches the full up position or down position. If the lift is not powered down, mechanism shall be designed to cause a slow descent of platform to ground level. Rapid descent of lift is not acceptable. ~~A sensor device shall be installed to stop lift when platform hits any object or obstruction.~~

PG. 82

(M)(8) ADD A HEAD BUMPER PAD SHALL BE INSTALLED ABOVE THE LIFT DOOR AND/OR ON THE LIFT FRAME.

(N) Special Service Entrance Doors.

(1) A single door may be used if the width of the door opening does not exceed ~~forty~~ FORTY-THREE inches.

(2) Two doors shall be used if any single door opening would have to exceed ~~forty~~ FORTY-THREE inches.

PG. 83

(O) Other.

(2) All school buses which transport handicapped shall be equipped with FM two-way radios(SEE PAGE 88), and roof ventilator emergency escape exit(s). ~~Type A school buses shall have one roof exit and Type B and C school buses shall have two roof exits.~~ FORTY-SEVEN CAPACITY OR LESS SHALL HAVE ONE ROOF EXIT LOCATED IN THE MIDDLE OF THE SCHOOL BUS. BUSES FIFTY-THREE OR GREATER CAPACITY SHALL HAVE TWO ROOF EXITS. (SEE PAGE 95 FOR SPECIFICATIONS ON THE ROOF VENTILATOR EMERGENCY EXITS.)

ADDENDUM SECTION 3301-87-09
PG. 88

(B) Air ~~brake~~ door - power operated service door.

ADDENDUM SECTION 3301-87-09 (CONTINUED)

PG. 88

(I) RADIOS-FM radio with ~~UHF, four hundred fifty to four hundred seventy MHz~~ two-way three channels, and twenty-five watts. RADIOS TO BE PROVIDED BY PURCHASER.

ADDENDUM SECTION 3301-87-10
PG. 94

(W) School bus crossing control arms - school bus crossing control arms shall be designed to work in conjunction with the opening of the service door. ~~A yellow light may be used which will be activated automatically when the crossing arm is extended.~~

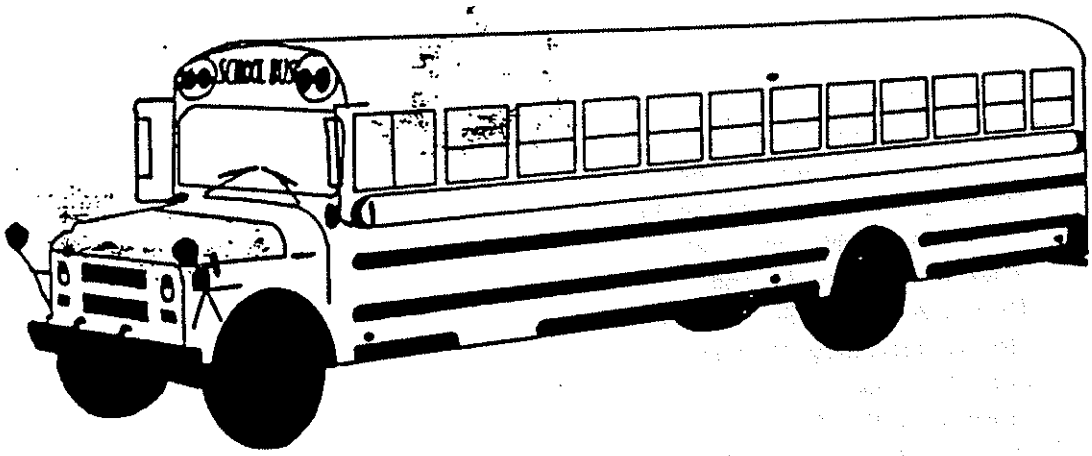
ADDITIONAL SPECIFICATIONS - STOP ARM SIGN--

1. ALL SCHOOL BUSES SHALL BE EQUIPPED WITH AN OCTAGONAL "STOP" SIGN; BACKGROUND SHALL BE A MINIMUM 18 X 18 INCHES AND SHALL BE REFLECTIVE MATERIAL RED IN COLOR WITH WHITE LETTERING. THE SIGN SHALL BE SO MOUNTED AS TO NOT INTERFERE WITH THE DRIVER'S VISION TO THE REAR WHEN THE SIGN IS EXTENDED. THE STANDARD OCTAGONAL SIGN SHALL CONTAIN TWO FLASHING RED LAMPS WHICH ARE VISIBLE FROM BOTH SIDES OF THE EXTENDED SIGN. STROBE LIGHTS OPTIONAL. SHOULD BE USED ONLY AS WARRANTED.

2. THE WORD "STOP" SHALL BE REFLECTIVE WHITE LETTERS. SIGNAL SHALL BE MANUAL, VACUUM, ELECTRIC OR AIR POWER CONTROLLED AND SO CONSTRUCTED AS TO LOCK IN EXTENDED AND CLOSED POSITION AND SHALL BE APPROVED BY THE ASSISTANT DIRECTOR, PUPIL TRANSPORTATION SECTION, DIVISION OF SCHOOL FINANCE, OHIO DEPARTMENT OF EDUCATION.

3. THE STOP ARM SHALL OPERATE WHEN THE SERVICE DOOR IS OPENED AND WHEN THE RED FLASHING WARNING LIGHTS COME ON DURING THE WARNING LIGHT CYCLE.

OHIO SCHOOL BUS MINIMUM CONSTRUCTION STANDARDS



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FOREWORD

Contained herein are the minimum standards covering the construction and equipping of school buses, as recommended by the school bus minimum standards advisory committee, adopted by the state board of education and filed with the secretary of state. These standards were adopted with the advice and consent of the director of highway safety and shall apply to all school bus chassis and bodies manufactured on and after April 1, 1978, which are owned and operated by any school district in this state. (Section 4511.76 of the Ohio Revised Code.)

The school bus minimum standards advisory committee is comprised of representative superintendents, transportation directors, and other school officials: members of the Ohio state highway patrol - representing the director of highway safety: and staff members of the pupil transportation section of the Ohio department of education.

The department of education is appreciative of the combined efforts of the members of the school bus minimum standards advisory committee and experts from the school bus body and chassis manufacturing industry who offered their services in the interest of formulating a standard designed for maximum safety, efficiency, and dependable service.

School officials and others responsible for pupil transportation should familiarize themselves with these standards and make certain that all school buses and equipment purchased after the effective date meet or exceed the same.

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OHIO
DEPARTMENT OF EDUCATION

3301-87-01 through 3301-87-09

OHIO SCHOOL BUS MINIMUM STANDARDS

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3301-87-03	School bus body standard - twenty-four through eighty-four rated seating capacity.
3301-87-04	School bus body and chassis with a manufacturers rated seating capacity of sixteen through thirty-five passengers.
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3301-87-06	School buses used to transport handicapped pupils shall meet the construction requirements of rules 3301-87-01 to 3301-87-05 of the Administrative Code and be equipped as follows when required by the purchaser.
3301-87-07	Rated seating capacities.
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3301-87-01 General provisions.

(A) The effective date of these standards shall be on and after April 1, 1978.

(B) The Ohio school bus minimum standards, revised 1978, that are presented in the following pages of this document do hereby supersede and take precedence over all similar specifications previously adopted. These standards also cancel all existing "approved equal" certification and all construction approvals or waivers.

(C) Revision of these standards will be considered annually at a meeting of the school bus minimum standards advisory committee. The chief of pupil transportation for the Ohio department of education shall annually present necessary revisions to the state board of education for adoption.

(D) Equivalency - permission to use a device or material as an "equivalent" to that called for in the standard must be requested in writing by the manufacturer or owner.

(E) Failure to comply with any of the standards and the procedures as outlined may result in the suspension of authorization for sale of the chassis and/or body in the state of Ohio until such discrepancy is corrected by the manufacturer or his responsible representative and concurred with by the pupil transportation section of the Ohio department of education.

(F) Each manufacturer shall file a statement of compliance (on or before April 1, 1978) that all products and components manufactured for use in school buses sold for use in Ohio, as defined by division (F) of section 4511.01 of the Revised Code, will meet or exceed all standards effective on and after April 1, 1978.

(G) The responsibility for compliance with these school bus standards rests with the dealers, manufacturers, and purchasers. Failure to comply with these standards may result in the suspension of the authorization for sale or use of the chassis and/or body in the state of Ohio until such discrepancy is corrected and written approval is issued by the department of education.

(H) Specifications shall be filed in duplicate by the school bus chassis and/or body manufacturer, that will meet or exceed these standards. Specifications being submitted by the manufacturers shall also include any sales brochures and pertinent literature. Specifications shall be filed when new models are introduced.

(I) Pre-delivery inspection shall be conducted by both body and chassis manufacturers to assure bus being delivered is in satisfactory

operating order (all components) and meets all federal and Ohio standards. This pre-delivery inspection shall be according to the specific instructions of purchaser and to his satisfaction.

(J) Bus shall be delivered clean inside and out.

(K) Body and chassis manufacturers shall provide a written document specifying warranty provisions. Effective date of all warranties shall be date of delivery to the purchaser.

(L) All specifications, literature, charts, and general communications should be sent to: Chief, Pupil Transportation, State Department of Education, 811 State Office Building, 65 South Front Street, Columbus, Ohio 43215.

(M) Pre-delivery service - chassis manufacturer

(1) The chassis manufacturer shall provide for a pre-delivery service at the body plant location after the body is mounted and prior to delivery to the purchaser.

(2) Documents to be provided to the purchaser by the chassis dealer at the time of delivery:

(a) Line set tickets.

(b) A copy of the pre-delivery service must be submitted to the purchaser at the time of the unit's delivery.

(c) Pre-delivery check-out form by chassis manufacturer or his agent.

(d) Warranty book and statement of warranty.

(e) Service manual when requested.

3301-87-02 Standards and specifications for school bus chassis with rated seating capacity of twenty-four through eighty-four.

(A) Air cleaner - Each school bus engine shall be equipped with an air cleaner.

(B) Axle - All school buses shall be limited to two axles.

(1) Front: No front axle shall be less than the minimum rating shown in the following table.

Rows of Seats	Rated Seating Capacity	
4	23-24 passenger chassis	- 4,000 pounds
6	35-36 passenger chassis	- 5,000 pounds
8	47-48 passenger chassis	- 5,000 pounds
9	53-54 passenger chassis	- 6,000 pounds
10	59-60 passenger chassis	- 7,000 pounds
11-12	65-66-72 passenger chassis	-***7,500 pounds
12	*71-72 passenger chassis	- 11,000 pounds
13	*77-78 passenger chassis	- 11,000 pounds
13	**77-78 passenger chassis	- 11,000 pounds
14	*83-84 passenger chassis	- 11,000 pounds
14	**83-84 passenger chassis	- 11,000 pounds

* Transit type school bus chassis, forward control
** Transit type school bus chassis, pusher
*** See approved chassis options

(2) Rear:

(a) Rear axle shall be full-floating type.

(b) Rear axle shall be single speed.

(c) Rear axle ratio shall permit the school bus to attain a top speed of approximately sixty-two miles per hour. (See Power Train.)

(d) No rear axle shall be less than the minimum rating shown in rule 3301-87-07 of the Administrative Code.

(C) Battery

(1) The electrical system shall be twelve-volt.

(2) All school buses of rated capacity of fifty-nine-passenger or larger, conventional or transit, shall be equipped with a storage battery or batteries with a capacity which shall be equal to or exceed one hundred amperes when measured at twenty-hour rate.

(3) All school buses of rated capacity of twenty-four through fifty-four-passenger shall be equipped with a battery of no less than one hundred ampere capacity measured at twenty-hour rate.

(4) One or two batteries may be mounted inside of the engine compartment. An adequate hold down device shall be provided and shall be readily accessible for service.

(5) If the battery is not mounted under the hood it shall be mounted on the left side of the chassis. No part of the battery shall extend above the top of the chassis frame. Sufficient cable shall be provided so that splicing is unneccessary.

(6) When battery is mounted on the chassis rail by the chassis manufacturer it shall be the responsibility of the school bus body manufacturer to install the battery in a drawer type pull-out tray to facilitate removal and servicing.

(D) Brakes - All braking systems shall comply with DOT standards Federal Motor Vehicle Safety Standard (FMVSS) 105 or 121.

(1) Types of brake systems - Chassis rated from twenty-four to sixty capacity shall be equipped with four-wheel power assisted hydraulic brakes. Chassis rated from sixty-five passenger conventional, or transit type chassis with capacity of fifty-nine-passenger or greater shall be equipped with air brakes.

(2) Air brakes - All air brake systems shall be S-cam type.

(a) Service brakes - Every bus, under all conditions of load, shall be equipped with service brakes of standard make designed to bring the vehicle to a safe stop in such a manner that will not interfere in any way with steering or control of the vehicle and shall be provided in accordance with FMVSS 121.

(i) Compressors - On buses using air brakes for service, emergency and parking brakes, the compressor shall be a standard production model with a twelve cubic feet displacement at a speed of one thousand two hundred fifty revolutions per minute.

(ii) Reservoir requirement - Air brake systems shall have at least two reservoirs, or one reservoir with dual chambers with a total capacity which is equal to or greater than twelve times the total volume of all brake actuators at full travel.

(iii) *(a)* Safeguarding of reservoir function.

(b) Check valve - Brake system reservoirs shall be equipped with a check valve or equivalent device that will prevent depletion of stored air in the event of a leak or failure of components or connections. The check valve shall be mounted in such a manner as to provide easy access for maintenance.

(c) Safety valve - Buses equipped with compressed air brakes shall require a safety valve installed in the first reservoir, designed to release air pressure in excess of one hundred fifty pounds per square inch.

(d) Drain cock - Buses equipped with compressed air brakes shall be equipped with a drain cock to drain from the lowest point of the dry reservoir.

(e) An automatic moisture ejection valve shall be properly installed on the wet tank.

(iv) Tubing and hose - Brake tubing and hose shall conform to the "Society of Automotive Engineers Standards" and equivalent to automotive engineering practice of the transit industry. These transmission lines and connections in the brake system shall be installed so as to accommodate all normal motions of the vehicle without damage or chafing.

(v) A relay valve shall be installed in the rear application line.

(vi) Gauge and warning devices for brake systems - Vehicles using air shall be equipped with illuminated gauge, accurate to within ten per cent of actual reservoir pressure. Vehicle shall be equipped with audible warning device which will give continuous warning to the driver when air pressure in the system available for braking is sixty pounds per square inch or less.

(b) Stoplight switches - Electric or mechanical pneumatic stoplight switches shall be installed by the chassis manufacturers to operate in the air lines to complete an electric circuit to the stoplight when a brake application of six pounds per square inch or more is made. Stoplight indication

should always occur whenever brakes are being applied, whether service or emergency.

(c) Emergency stopping system, air or vacuum

(i) All school buses shall be equipped with an emergency stopping system.

(ii) Brake system(s) shall perform emergency stopping function and be so designed and constructed that a single failure anywhere in brake system, excepting mechanical parts of wheel brake assemblies, brake pedal or attachments to brake valve or master cylinder which performs service brake function, will not leave vehicle without operative brakes capable of stopping vehicle, when loaded up to and including manufacturer's GVWR (gross vehicle weight rating).

(iii) *(a)* Control requirements of air brake emergency stopping system.

(b) Control of emergency stopping system shall be designed and constructed to conform with the following:

(i) The control valve(s) shall be visible to the driver and shall be mounted on the steering column or on the dash panel within twelve inches to the right of the steering column. (Exception - transit type buses may be mounted on dash panel within twelve inches to the left of the steering column.)

(ii) The emergency spring brakes shall start to apply when the air pressure in all reservoirs has been reduced to approximately sixty pounds per square inch.

(iii) The emergency spring brake shall be so constructed as to permit release by means of a manual release bolt.

(d) Hydraulic brakes - All hydraulic brake systems shall comply with FMVSS 105.

(e) Parking brakes - Parking brake system may be a parking brake on the driveline and/or emergency stopping system using the rear wheel brakes, and shall be designed and constructed to meet the following requirements:

(i) Parking brake shall hold vehicle stationary, or limit traction of braked wheels on twenty per cent grade under any condition of legal loading.

(ii) When applied, parking brake shall remain in applied position with capability set forth as above, despite exhaustion of source of energy used for application, or leakage of any kind.

(f) Brake pedal - Surface of brake application pedal shall be covered with a rubber pad or a nonskid surface.

(E) Bumper - front

(1) Front bumper on all conventional type buses shall be furnished by the chassis manufacturer.

(2) Front bumper on all transit buses shall be furnished by the body manufacturer.

(3) Front bumper shall be at least 3/16" of pressed steel, channel one piece construction, and a minimum of eight inches in width after forming.

(4) Front bumper shall be of wrap-around design extended to offer maximum protection of fender lines without permitting snagging or hooking.

(5) Front bumper shall be attached to the frame and extend forward of grille, head lamps, fender or hood sections to provide maximum protection.

(6) Front bumper shall be of sufficient strength to permit pushing of vehicle of equal weight without permanent distortion to bumper, chassis or body.

(F) Clutch - Chassis using manual transmission shall be equipped with a clutch with a torque capacity greater than or equal to maximum engine torque.

(G) Color - chassis

(1) Bumper shall be painted black.

(2) Cowl and fenders shall be painted national school bus chrome.

(3) Hood shall be painted nonreflective national school bus chrome. (Exception: forward control units)

(4) Frame shall be painted black.

(5) Grille shall be painted national school bus chrome. (Exception: grilles can be chrome or anodized aluminum finish.)

(6) Wheels, spokes and rims shall be painted black. (Exception: rims that are a natural iron gray (unpainted) need not be painted black.)

(H) Cooling system

(1) The cooling system fan shall be heavy-duty reinforced type. The fan, alternator, and water pump, when driven by dual belts shall be equipped with matched pulleys and belts.

(2) The cooling system radiator shall be of sufficient capacity to cool the motor at all speeds in all gears. Thermostatic controls shall be high temperature type.

(3) On all chassis requiring hoses or extensions to fill radiators the hose or extension shall be so designed to permit adding of coolant without trapping air.

(4) Permanent ethylene-glycol base antifreeze shall be provided by chassis manufacturer to protect the cooling system to minus twenty degrees F. when tested at normal engine temperature.

(5) When a chassis is equipped with an automatic transmission, said chassis shall have a heavy-duty cooling system with increased capacity in the radiator, fan, and other necessary components, to provide for the additional cooling required by the automatic transmission.

(6) Chassis shall be equipped with a coolant recovery system.

(I) Drive shaft - Each drive shaft shall be equipped with adequate protective metal guard or guards to prevent whipping through floor or dropping to ground if broken.

(J) Electrical system

(1) (a) Alternator - School buses of rated capacity of fifty-nine and sixty-five passengers shall be provided with a one hundred ampere alternator with a matched regulator and an ammeter gauge. Transit buses with a rated capacity of seventy-one, seventy-seven, and eighty-three passengers shall be equipped with a one hundred thirty ampere alternator.

(b) All school buses of twenty-four through fifty-four capacity shall be provided with a minimum of eighty ampere alternator.

(c) Alternator shall be driven by dual belts with matched pulleys.

(2) Battery. (See paragraph (C).)

(3) Lamps and signals. (See paragraph (U).)

(4) Voltage regulators. Regulator shall be full transistor matching capacity type.

(5) Wiring. (See paragraph (FF).)

(6) Power terminal. Chassis manufacturer shall provide an adequate electric power source terminal for bus body power connection. This terminal shall be connected by No. 8 wire or larger wire of adequate gauge running from the power supply. The terminal shall be of the single post type, a minimum of one-fourth inch stud and located on the fire wall above the toeboard on the left-hand side.

(7) All buses shall be equipped with a voltmeter with graduated scale to sixteen volts.

(K) Exhaust System

(1) Exhaust pipe, muffler, and tail pipe shall be outside bus body and attached to chassis.

(2) Muffler shall be heavy-duty truck type of aluminized or stainless steel, or ceramic coated to offer maximum resistance to corrosion or oxidation.

(3) Tail pipe shall be constructed of seamless or electrically welded tubing of 16 gauge steel or equivalent, and shall extend at least five inches beyond chassis frame with

sufficient length to reach the bumper, but not to extend beyond rear bumper. (Exception: where frame extends to the rear bumper, five inch extension not required.

(4) Diameter of tail pipe shall not be reduced after it leaves the muffler.

(5) The rear end of tail pipe must be located at least twenty inches to the right or left of the centerline of the chassis.

(6) Exhaust system shall be insulated from fuel tank and fuel tank connections by securely attached metal shield at any point where it is twelve inches or less from the fuel tank or fuel tank connections.

(L) Fenders - front

(1) Total spread of outer edges of front fenders measured at fender line shall exceed total spread of front tires when front wheels are in straight ahead position.

(2) Front fenders shall be braced and free from any body attachment. Trailing edge of front fender shall extend to bottom of front body section. Fender extensions are acceptable.

(3) Chassis sheet metal shall not extend beyond rear face of cowl.

(4) Color. See paragraph (G).)

(M) Frame

(1) Frame shall be designed to correspond with or exceed standard practice performance criteria for trucks of same general load specifications used for severe service.

(2) Frame side members shall be one-piece construction with the following exceptions:

(a) Extension of these members shall be designed, furnished, and guaranteed by chassis or body manufacturer. Installation shall be guaranteed by the company installing extension. Extension of frame lengths shall not be for the purpose of extending wheel base.

(b) No holes shall be permitted in the chassis rails except those drilled at the chassis plant or authorized by the chassis manufacturer.

(c) Welding to chassis rails is permitted and must be guaranteed by the company making the modifications.

(N) Fuel tank - All fuel tank specifications shall conform with FMVSS 301.

(O) Governor - Engine speed governor shall be installed on all buses. Settings shall comply with manufacturer's maximum recommended governed speed and set by the chassis manufacturers.

(P) Heating system - Engine design shall provide inlet and outlet holes in accessible locations for attachment of bus heating system water lines.

(Q) Horn

(1) Bus shall be equipped with dual horns of standard make, each horn capable of producing complex sound in band of audio frequencies from 250 to 2,000 cycles per second and having total sound level of 82-102 decibels within these frequency limits when measured at fifty feet from the vehicle.

(2) Sound level measurements shall be made with meter that complies with American Standards Association, Inc. Measurement shall be made with meter set to flat response.

(R) Instruments and instrument panel

(1) Chassis shall be equipped with the following instruments and gauges. (Lights in lieu of gauges are not acceptable.)

(a) Speedometer.

(b) Odometer which will give accrued mileage including tenths of miles.

(c) Ammeter with graduated charge and discharge, both ammeter and its wiring to be compatible with generating capacities and capable of measuring continuous current draw of one hundred amperes.

(d) All buses shall be equipped with a voltmeter with a graduated scale of sixteen volts.

(e) Oil pressure gauge.

(f) Water temperature gauge.

(g) Fuel gauge.

(h) Upper beam headlamp indicator light.

(i) Left and right turn signal indicator.

(j) All chassis with air brake systems shall be equipped with a visible gauge and audible low pressure indicator to warn driver if air pressure in air brake system falls below sixty pounds per square inch.

(k) All chassis with vacuum brake system shall be equipped with a visible low pressure indicator and lighted graduated gauge. The gauge shall be accurate within ten per cent of actual reservoir pressure, which will indicate to the driver the vacuum, in inches of mercury, available for operation of brakes.

(l) A pusher, transit type chassis shall be equipped with an electric tachometer.

(2) All instruments shall be easily accessible for maintenance and repair.

(3) Above instruments and gauges shall be mounted on instrument panel in such a manner that each is clearly visible to driver in a seated position.

(4) All instrument faces shall be illuminated.

(5) The chassis manufacturer shall provide and cover instrument panel with plastic covering or equivalent in order to provide protection from precipitation from time of manufacture until body is mounted.

(S) Lamps and signals - chassis

(1) All lamps and their installation shall conform to current federal standards.

(2) Chassis shall be equipped with sealed beam head lamps, beams to be controlled by a foot operated dimmer switch.

(3) A self-cancelling turn signal shall be installed by the chassis manufacturer as an integral part of the steering column assembly and shall have circuit wires of sufficient length for the connection of the bus turn signals by the school bus body manufacturers.

(a) Turn signal systems shall be independent units and the chassis manufacturer shall provide a four-way hazard warning switch to cause simultaneous flashing of turn signal lamps when needed as vehicular traffic hazard warning.

(b) The chassis manufacturer shall install a left and right turn signal direction indicator on the instrument panel plainly visible to the driver.

(c) Front turn signals shall be double faced and supplied by the chassis manufacturer in compliance with requirements of the "Motor Vehicle Safety Standard No. 108." Placement shall be in an area most visible to other motorists.

(T) Oil filter - Oil filter of 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 an oil capacity of at least one quart.

(U) Openings - All openings made by the chassis manufacturer in floorboard and firewall shall be sealed by the chassis manufacturer to prevent gases from entering driver's compartment. Boots for the accelerator pedal, gear shift, and emergency brake, when required, shall be supplied by the chassis manufacturer.

(V) Power train

(1) Under GVWR loaded condition the engine, transmission and other drive line components shall be capable of maintaining a speed of fifty-five miles per hour on a road grade of one per cent when the engine is operating at ninety per cent of the engine manufacturers recommended maximum or governed revolutions per minute.

(2) Gasoline engine - Chassis equipped with gasoline engines shall meet or exceed the cubic inch displacement as shown in following table.

24 C*	passenger chassis	-	300 cubic inch
36 C*	passenger chassis	-	300 cubic inch
48 C*	passenger chassis	-	330 cubic inch
54 C*	passenger chassis	-	340 cubic inch
60 C*	passenger chassis	-	340 cubic inch
66 C*	passenger chassis	-	340 cubic inch
72 C*	passenger chassis	-	340 cubic inch

72 FC**	passenger chassis	-	400 cubic inch
72 RE***	passenger chassis	-	400 cubic inch
78 FC**	passenger chassis	-	400 cubic inch
78 RE***	passenger chassis	-	400 cubic inch
84 FC**	passenger chassis	-	400 cubic inch
84 RE***	passenger chassis	-	400 cubic inch

* C = conventional
** FC = forward control - transit
*** RE = rear engine - transit

(W) Shock absorbers - Heavy-duty double acting shock absorbers shall be installed on front and rear of the school bus chassis.

(X) Springs

(1) Suspension assemblies as specified shall maintain control stability of school bus under all loading conditions.

(2) Springs or suspension assemblies shall be designed to carry their proportioned share of gross vehicle weight in accordance with the weight distribution as shown in the section, weight distribution. (See paragraph (EE).)

(3) If leaf-type front springs are used, stationary eyes shall be protected by full wrapper leaf in addition to main leaf.

(4) If leaf-type rear springs are used, they shall be of progressive type.

(Y) Steering gear assembly

(1) All school bus chassis in all passenger capacities shall be equipped with heavy-duty, truck-type integral power steering. Power steering components shall be compatible with the GVWR for each capacity as shown in chassis manufacturer's literature.

(2) Steering mechanism shall provide for easy adjustment for lost motion.

(3) Steering gear assembly shall be so constructed and guaranteed by chassis manufacturer to provide maximum safety and steering performance of school bus under all conditions of load and speed.

(4) No changes shall be made in steering mechanism unless approved by chassis manufacturer.

(5) There shall be a clearance of at least two inches between steering wheel and any other surface or control.

(6) Chassis manufacturers shall provide and cover steering wheel and column with a temporary plastic covering or equivalent, in order to provide protection from precipitation from the time of manufacture until body is mounted.

(Z) Tires, rims and wheels

(1) All tires provided by chassis manufacturer shall meet performance standards as established by chassis manufacturers original equipment testing in the current year of manufacture.

(2) All tire capacities shall conform to current federal requirements.

(3) All rim sizes and construction standards shall conform with current federal requirements.

(4) Chassis manufacturer and/or authorized dealer shall balance all wheels and make necessary alignments prior to delivery.

(5) Dual rear tires (wheels) shall be provided on all vehicles.

(6) All tires on a given vehicle shall be of same size, construction and capacity.

(AA) Tow hooks - Two heavy-duty tow hooks shall be furnished and factory installed and not extending beyond the front bumper.

(BB) Transmission

(1) Manufacturer shall furnish best available transmission compatible with power plant.

(2) The manufacturer shall install a mechanical type transmission with full synchromesh in all forward speeds except first and a reverse gear as per the following chassis capacities;

(a) Twenty-three-rated capacity through fifty-three-rated capacity -- minimum of four forward speeds and one reverse speed.

(b) Fifty-nine-capacity through eighty-three-rated capacity -- five forward speeds and one reverse speed.

(c) Chassis transmission shall be equipped with a backup light switch. This switch to be activated when the gear shift lever is in the "reverse" position.

(CC) Undercoating - Chassis manufacturer shall coat undersides of front fenders with fire-resistant asphalt base, rubber base, or equivalent undercoating material and applied by spray method in order to seal, deaden sound, insulate and prevent oxidation.

(DD) Vehicle identification number plate location shall be as follows:

(1) Conventional school bus chassis serial number identification plate (vehicle identification number) shall be securely mounted on the dash panel or the firewall area of the engine compartment by the chassis manufacturer.

(2) Transit type school bus identification plate shall be mounted on the dash or an acceptable area in the driver's area. Engine compartment mounting is not acceptable.

(EE) Weight distribution

(1) Conventional - Weight distribution of fully loaded bus on level surface shall be such that not more than seventy-five per cent of gross vehicle weight is on rear tires and not more than thirty-five per cent is on front tires.

(2) Transit - with engine inside front of body. If entrance door is ahead of front wheels, not more than seventy-five per cent of gross vehicle weight shall be on rear tires, nor more than fifty per cent on front tires. If entrance door is behind front wheels not more than seventy-five per cent of gross vehicle weight shall be on rear tires, nor more than forty per cent on front tires. With engine in rear not more than seventy-five per cent of gross vehicle weight shall be on the rear tires, nor more than forty per cent on front tires.

(FF) Wiring

(1) All wiring shall conform to current standards of the Society of Automotive Engineers.

(2) Tail light and stop light electrical connections shall be supplied by the chassis manufacturer through the main electrical terminal block, to be connected by the school bus body manufacturer.

Former EDb-921-02

3301-87-03 School bus body standard - twenty-four through eighty-four rated seating capacity.

(A) Aisle

(1) Minimum clearance between seats shall be twelve inches at seat level and fourteen inches at top of seats.

(2) On forward control (engine front) buses the aisle shall not be less than twelve inches, measured at floor level, between engine cover and any other object. Hold down fastening devices used on engine cover shall be designed to prevent hooking or catching on shoes or clothing.

(B) Battery

(1) Battery and all battery cable shall be provided by the chassis manufacturer.

(2) Body manufacturer shall provide, at customer option, a drawer-type pull out tray to facilitate servicing or removal of battery (ies). The battery(ies) shall be enclosed by a compartment constructed of mill-applied zinc steel provided with drain ports, hold down carrier mounted as to avoid blocking filler ports, and latching device to prevent accidental opening. Undercoating shall be provided and applied to battery box. Battery tray shall be equipped with a safety device to keep tray from sliding completely out to prevent battery from being dropped.

(C) Bumper, rear

(1) Rear bumper shall be one piece, heavy-duty type, of pressed steel channel, at least 3/16 inch of thickness and a minimum of eight inches in width (high) after forming.

(2) Rear bumper shall be wrapped around back corners of bus and extend forward at least twelve inches, measured from rear-most point of body at floor line.

(3) Bumper shall be fastened to chassis frame side rails in such a manner as to develop full strength of bumper section from rear or side impact. Bracing materials shall have an impact ratio comparable to that of bumper material and shall be fastened at the ends and radii of the bumper, attached to the side of the frame only and not to body at any point.

(4) Rear bumper shall extend beyond rear-most part of body surface at least one inch, measured at floor line.

(5) No spaces, projections, or cut-outs that will permit a hand hold shall be permitted.

(6) Two rear tow hooks shall be installed, with the hooks and their mountings of sufficient strength to tow the vehicle at the vehicle's curb weight.

(7) Front ends of the bumper shall be enclosed by end caps or other protective metal or shall have the ends rounded or tucked in and shall be free from sharp edges or projections likely to cause injury or snagging.

(8) A rubber or metal strip shall be installed to close any opening exceeding one-fourth inch between rear bumper and body metal.

(D) Capacity (rated) - Seating spacing shall conform to and be in full compliance with FMVSS 222 - school bus passenger seating and crash protection.

Rows of Seats	Rated Capacity 3-3 Plan; Rump Width of 13 Inches	Rated Capacity 3-2 Plan; Rump Width of 15 Inches
4	24 Conventional	20 Conventional
6	36 Conventional	30 Conventional
8	48 Conventional	40 Conventional
9	54 Conventional	45 Conventional
10	60 Conventional	50 Conventional
11	66 Conventional	55 Conventional
12	72 Conventional	60 Conventional
12	72 Forward Control	60 Forward Control
12	72 Rear Engine	60 Rear Engine
13	78 Forward Control	65 Forward Control
13	78 Rear Engine	65 Rear Engine
14	84 Forward Control	70 Forward Control
14	84 Rear Engine	70 Rear Engine

(E) Color - body exterior and interior

(1) (a) All exterior metal shall be painted national school bus chrome yellow enamel with exception of those areas listed below. All components (as listed) not painted yellow shall be painted black enamel.

(b) Components to be painted black:

(i) Lettering and numbering

(ii) Bumpers

(iii) Floor level rub rail

(iv) Seat level rub rail

(v) Background area for warning light system

(2) All interior panels, walls, and roof surfaces shall be painted by the body manufacturer.

(F) Construction - body

(1) (a) All bus body construction components shall be of prime commercial quality mill applied zinc coated steel. All such construction materials shall be fire resistant. (Zinc coated items shall include structural members, inside and outside panels, floor panels, joints, floor sills, and step wells; excluded are door handles, grab handles, interior decorative parts, other interior plated parts, and components heavier than twelve gauge.)

(b) All metal surfaces that will be painted shall be (in addition to above requirements) chemically cleaned, etched, zinc-phosphate-coated, and zinc-chromate- or epoxy-primed or conditioned by equivalent process.

(c) In providing for these requirements, particular attention shall be given to 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 subject to abrasion during vehicle operation.

(2) (a) Upon final assembly of the bus body and after mounting body upon chassis, the total unit strength of the school bus shall meet or exceed all strength criteria as established by FMVSS 220 and 221.

(b) Body construction shall provide a reasonably dustproof and watertight unit.

(3) When water leaks or dust leaks, due to workmanship at point of manufacture, occur during the first year of use, these leaks shall be repaired entirely at the expense of the bus body manufacturer as a part of the regular warranty.

(4) (a) Floor - The floor shall be not less than fourteen gauge mill applied zinc coated steel sheet.

(b) There shall be a main floor cross member of at least ten-gauge steel or equivalent placed at each side post extending the full width of the floor plate and permanently attached.

(c) There shall be a minimum of two intermediate floor cross members of at least sixteen-gauge steel equally between the main floor cross members and permanently attached.

(5) (a) Longitudinal strainers, rub rails, and roof strainers

(b) All longitudinal side strainers and members shall be a minimum of sixteen-gauge steel.

(i) There shall be one longitudinal side strainer (or impact rail) mounted at belt line (window sill level) and extending at least from the front main vertical post (excluding the front door entrance) to the last main vertical post on each side of body. This member shall be attached at each vertical post.

(ii) There shall be one longitudinal side strainer mounted at the side window header level and extended completely around the bus body. This member shall be attached at each vertical post.

(iii) Additional longitudinal side strainers are permissible if they form an integral part of the body construction and meet all fastening requirements.

(iv) Side strainers used in basic construction at floor level and extending above floor line may be utilized as mounting base at wall line for rail mounted seats.

(6) Rub rails

(a) Body manufacturers shall install one rub rail at approximately seat level (except for opening for emergency door). This rail shall extend from main vertical post behind the entrance door to the forwardmost vertical post on the left side of the body.

(b) A second rub rail shall be installed at approximately the floor line and cover the same longitudinal area as the seat level rail (except at wheel housings) and shall extend to the radii of right and left rear corners.

(c) Both rub rails shall be attached at each body post and all other upright structural members.

(d) Both rub rails shall be four inches or more in width (after formed) and shall be a minimum of sixteen-gauge steel, corrugated or ribbed pattern.

(e) Both rub rails shall be mounted outside body panels.

(f) External longitudinal members are permissible in addition to all previously specified members if they form an integral part of the body construction and meet the fastening requirements above.

(7) Roof strainers - Two or more roof strainers or longitudinal members shall be provided to connect, to reinforce flattest portion of roof skin, and to space roof bows. These strainers may be installed between roof bows or applied externally. They shall extend from the windshield header and are to function as continuous longitudinal members extending from the windshield header. At all points of contact between strainers or longitudinal members and other structural material, attachment shall be made by means of welding, riveting, or bolting.

(8) Rear corner reinforcements - Rear corner construction of the bus body between the floor and window sill and between the emergency door posts and last vertical side posts shall consist of at least three structural members which will provide impact and penetration resistance equal to or greater than that provided by frame members in the sides of the body. Such structural members shall be securely attached at each end.

(9) Ceiling panel construction - If the ceiling is so constructed to contain lap joints, the forward panel shall be lapped by the rear panel and the exposed edges shall be beaded, hemmed or flanged or otherwise treated to minimize sharp edges.

(10) All body components shall be designed and constructed so as to avoid the entrapment of moisture.

(G) Defroster (see heater requirements)

(1) (a) A defroster system shall be installed of sufficient capacity to keep windshield area, left front side window to rear of driver's vision, and service door glass area free of condensation or ice under all possible combinations of pupil load and climatic conditions.

(b) Defroster system shall be capable of providing at least sixty per cent fresh air.

(2) Two adjustable, six-inch auxiliary defroster fans shielded with small mesh metal guards shall be installed.

(a) Fans shall be mounted to complement the defroster system used by the manufacturer.

(b) Auxiliary defroster fans shall be controlled individually by two speed switches located in the electrical control panel.

(H) Doors

(1) Service doors

(a) Service door shall be power or manually operated, under control of the driver and so designed as to afford easy release, and to prevent accidental opening. When manual lever is used, no parts shall come together so as to shear or crush fingers.

(b) Manual door control mechanism shall be heavy-duty, bearing type, adjustable for wear, noncorrosive, anodized steel, or equivalent.

(c) Service door shall be located on right side of bus opposite driver and within his direct view.

(d) Service door shall have minimum horizontal opening of twenty-four inches and minimum vertical opening of sixty-eight inches.

(e) Service door shall be split or folding type. Split type door includes any sectional door which divides and opens inward or outward.

(f) All door glass shall comply with current FMVSS 205. Glass in service door shall provide maximum area of visibility for operation of bus.

(g) All edges of service door shall be sealed by flexible rubber or equivalent material to prevent air from entering door entrance when closed.

(h) There shall be no safety rail or hand holds mounted on the service door.

(i) There shall be a head bumper pad installed on the inside at the top of the entrance door. This pad shall be approximately four inches in width and extend across the entire top of the entrance door opening.

(2) Emergency doors

(a) Emergency door shall meet FMVSS 217 and be designed to be opened from inside and outside of bus and shall be equipped with fastening device which may be quickly released but is designed to offer protection against accidental release.

(b) Emergency door shall be equipped with slide-bar, cam or gear operated latch. Slide bar shall have minimum stroke of one inch. Emergency door latch shall be equipped with suitable electric plunger-type switch connected with buzzer located in driver's compartment. Switch shall be enclosed in metal case, and wires leading from switch shall be concealed in bus body. Switch shall be so installed that plunger contacts farthest edge of slide bar in such manner that any movement of slide bar will immediately close circuit on switch and activate buzzer. A separate interior handle shall be provided to pull the door shut from the inside.

(c) Exterior door handle shall be of permanent hitch-proof design and mounted with enough clearance to permit opening without touching door surface.

(d) All emergency door openings shall be completely weatherstripped.

(e) Operation instructions for opening of door shall be lettered or decaled on the inside of the emergency door.

(f) There shall be no step-type mechanism in the use of the emergency door.

(g) No seat or chassis or body component shall be installed in the aisleway leading to the emergency door. Exception: see side emergency door.

(h) Emergency door shall bear words "EMERGENCY DOOR" both inside and outside in letters at least two inches high. Words shall be placed directly above the emergency door or on the upper portion of the door.

(i) (i) Rear emergency door - On all buses, except rear engine transits, an emergency door shall be

located in the rear of bus body and centered with respect to the body.

(ii) Emergency door shall have a minimum horizontal opening of twenty-four inches and a minimum vertical opening of forty-eight inches measured from floor level.

(iii) Rear emergency door shall be hinged on right side and shall open outside.

(iv) The rear emergency door shall contain upper and lower glass panels which comply with FMVSS 205.

(v) Glass in emergency door shall provide maximum area of visibility for safe operation of bus.

(vi) There shall be a head bumper pad installed over the emergency door on the inside of the bus body. This pad shall be at least the width of the door opening. Padding shall be of the same material as the padding used over the service door exit.

(j) (i) Side emergency door - On all rear engine transit buses, a side emergency door shall be located in the rear half of the left side of the bus body. The door shall be hinged on the front side.

(ii) The glass in side emergency door shall be one piece and compatible with design of side windows and shall contain glass which meets FMVSS 205.

(3) Emergency windows (pusher transits)

(a) An emergency window shall be installed above the engine compartment and shall be no smaller than sixteen inches in height and fifty-four inches in width.

(b) The emergency window shall meet FMVSS 205. Glass shall be tempered unless specified laminated by the purchaser.

(c) Windows shall be hinged from top and provided with a device to insure against accidental closing during an emergency.

(d) Emergency window in rear shall be equipped with latch on the inside, also be equipped with a handle of hitchproof design which will permit opening from the outside.

(e) Emergency window shall bear words "EMERGENCY EXIT" in letters at least two inches high both inside and outside the window. Words shall be placed no more than three inches directly above window.

(f) Emergency window shall be equipped with a buzzer. When not fully latched, it shall actuate a signal audible to the driver. Buzzer shall be in the driver's compartment.

(I) Emergency equipment - Shall be mounted in the driver's compartment area in an accessible location.

(1) Fire extinguisher - Bus shall be equipped with at least one dry-chemical type fire extinguisher of at least five-pound capacity, twenty B.C. rating, mounted in a quick release type bracket and easily accessible from the driver's compartment. The extinguisher is to be equipped with a dial type, graduated gauge, which indicates loss of pressure. Fire extinguisher shall be of the type that permits the dry-chemical case to be refilled by ordinary procedures.

(2) First aid kits shall be dust-proof, plainly labeled and mounted in a location easily accessible to the driver. Minimum units for the school bus shall be as follows: a sixteen-unit kit shall be used on forty-two passenger and smaller buses, and twenty-four-unit kits for forty-eight passenger and larger.

(3) Contents of sixteen-unit first aid kit

(a) 2 units - 1" adhesive compress
(b) 2 units - 2" bandage compress
(c) 1 unit - 3" bandage compress
(d) 1 unit - 4" bandage compress
(e) 1 unit - 3" x 3" plain gauze pads
(f) 1 unit - 4" gauze roller bandage
(g) 2 units - plain absorbent gauze - 1/2 square yard
(h) 2 units - plain absorbent gauze - 24" x 72"
(i) 3 units - triangular bandages
(j) 1 unit - scissors, tweezers

(4) Contents of twenty-four unit first aid kit

(a) 3 units - 1" adhesive compress
(b) 3 units - 2" bandage compress
(c) 2 units - 3" bandage compress
(d) 1 unit - 4" bandage compress
(e) 1 unit - 3" x 3" plain gauze pads
(f) 2 units - 4" gauze roller bandage
(g) 4 units - plain absorbent gauze - 1/2 square yard
(h) 3 units - plain absorbent gauze - 24" x 72"
(i) 4 units - triangular bandages
(j) 1 unit - scissors, tweezers

(5) Reflectors - Three triangle reflectors with weighted stands, properly encased for easy storage. Six fusees, thirty-minute type shall be encased with the triangle reflectors. The triangle reflectors shall meet FMVSS 125. The reflectors and fusees shall be encased together in a heavy duty container. Container shall be equal to or exceed flare box Model RT80-CA supplied by the "Toledo Pressed Steel Company, Toledo, Ohio 43612." A lockable metal bracket shall be provided to hold these items. The bracket shall be mounted within easy access of the driver.

(6) Wrecking bar - One twenty-four inch wrecking bar.

(J) Floor covering

(1) All floor covering shall be permanently bonded to the floor and must not crack or lose its adhesive power when vehicle is subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and recommended by the manufacturer of the floor covering material.

(2) Underseat areas shall have a smooth fire-resistant floor covering having a minimum overall thickness of .125 inches. The entire joint between the floor covering and the wall of the school bus body shall be covered with a curved, fitted, rust-free metal molding or preformed interior panel.

(3) Driver's compartment floor area shall be of the same quality material as the underseat floor covering. It shall be permanently bonded to the floor; floor mat is not acceptable.

(4) Center aisle covering shall be fire-resistant rubber non-skid, wear resistant and ribbed. Minimum thickness shall be .1875 inches measured from the top of the ribs.

(5) Transmission inspection plate

(a) Shall be installed for easy access and servicing of the clutch and transmission installed above the regular floor covering when possible.

(b) Shall not be undercoated.

(6) Brake, gear shift, and accelerator boots supplied by the chassis manufacturer shall be installed by the school bus body manufacturer.

(7) Metal molding or stripping

(a) Metal stripping or molding shall cover all floor covering joints between the ribbed center aisle and smooth under-seat floor covering.

(b) Cove molding is required at the junction of the floor covering and side wall and may be formed side wall panel or separate cove base.

(c) Molding around the wheelwell and floor covering shall be provided to seal floor covering with the wheelwell.

(8) Accelerator boot will be used around the accelerator rod passing through the toe board or floor board to prevent fumes or dust from entering the driver's compartment.

(9) Entrance step treads, including the edge at floor level, shall be of the same quality as the aisle material and shall be formed with a minimum turndown lip of three-fourths inch. Step treads shall have an integral white, yellow, or orange nosing of one and one-half inch or more or use diagonal stripes. Treads shall be permanently bonded to the metal steps and sealed to prevent water from getting underneath the step tread.

(K) Fuel opening - The fuel fill opening in the body skirt shall be equipped with a hinged cover held closed by a spring or other conveniently operated device. The mechanism that holds this cover closed shall be sufficient to keep it closed under severe operating conditions. The fuel fill opening shall be large enough to permit the entire pump nozzle to pass through the opening and reach the fill neck of the fuel tank.

(L) Heaters

(1) All school buses shall be equipped with two or more hot water heaters capable of maintaining inside temperature of fifty degrees F with one hundred and fifty degrees F of water being delivered to the system at a rate of six gallons per minute using an ambient temperature of zero degrees to ten degrees.

(2) Conventional type buses shall be equipped with a right and left front heater with an integrated defroster system of a capacity to provide heat for the front part of the bus, driver's compartment, to keep the windshield area, service door glass, driver's left glass area and stepwell clear of moisture, ice and snow.

(3) Transit type buses shall be equipped with front heater(s) with integrated defroster system of sufficient capacity to provide heat for the front part of the bus and the driver's compartment, to keep windshield area, driver's left glass area, service door glass area and stepwell clear of moisture, ice and snow.

(4) Hot water heaters shall bear the name plate rating in accordance with the standard code for testing and rating automotive bus hot water heater and ventilating equipment.

(5) A third heater is required on all sixty and larger capacity buses and is to be mounted to the rear of the rear wheelwell.

(6) Two-speed switches shall operate all heater fans independently.

(7) All hot water lines shall be a minimum of one inch inside diameter and shall be enclosed.

(8) Heater cores and fans shall be completely encased, but designed to permit servicing heater assembly by removing all or part of case.

(9) Heater hose installation in the engine compartment shall include two brass shut off valves able to shut off coolant completely when necessary.

(a) One mounted between the water pump outlet and heater hose connection.

(b) One mounted between the motor block and the return heater hose connection.

(10) The body manufacturer shall add the required amount of permanent ethylene-glycol base anti-freeze after heaters have been connected, to protect cooling system of bus to minus twenty degrees F. tested at normal engine temperature.

(11) There shall be a heater water flow regulating valve installed for convenient operation when the driver is in a normal seated position.

(M) Identification - Body shall bear the following words:

(1) "SCHOOL BUS" in black letters at least eight inches high on both front and rear of body. Lettering shall be placed as high as possible without impairment of visibility.

(2) "STOP" on the rear of bus in letters approximately ten inches high on door or center of bus.

(3) "STATE LAW" on the rear in letters at least five inches high below "STOP" on door or center of bus.

(4) Name of the school district shall appear on both sides of the vehicle at the belt line and be at least five inches high.

(5) County of the school district shall appear on both sides of the vehicle in five-inch high letters with the school district name unless the city or exempted village appear as a part of the district name. City or exempted village districts that are not geographical locations must also list name of county.

(6) Ownership of the vehicle shall appear on the entrance door side in two-inch high letters.

(7) District assigned bus numbers shall be five inches high and shall be located as follows:

(a) On body above entrance door

(b) On rear in area of right side tail light

(c) On left side in vicinity of driver's window

(d) On front in area designated by the buyer

(N) Inside heights - Inside body height shall be nominal seventy-two inches or more measured metal to metal at any point on longitudinal center line from front vertical bow to rear vertical bow.

(O) Insulation - Bus body shall be fully insulated in the roof and all body panels to deaden sound, reduce vibrations and heat transfers. Insulation one-inch minimum thickness in addition to the usual sprayed on material shall be a fiber glass or equal and fire resistant material.

(P) Interior

(1) Interior of bus shall be free of all projections.

(2) All buses shall require inner linings on ceiling and walls.

(Q) Lamps and signals - All lamps herein listed and their installation shall conform to current standards and recommendations of the Society of Automotive Engineers and meet FMVSS 108.

(1) Construction of components

(a) All lamps, reflectors and their installation shall conform to federal motor vehicle safety standards where applicable and national minimum school bus standards where not covered by federal standards or additional requirements stated herein.

(b) Directional signal, stop light, tail light, marker light, clearance light, identification light, backup light and reflector lenses shall be of acrylic plastic. Alternately flashing red and amber signal lamps shall be sealed beam of acrylic plastic lens construction. Body mounted stop lamps, directional signals and red signal lamps shall be visible throughout one hundred eighty degrees.

(c) All exterior lamp sockets shall be brass nickel plated or stainless steel.

(d) Alternately flashing red signal lamps, body mounted directional signals and stop lamps shall be grounded by attaching a ground wire or strap from the lamp socket or negative side of the bulb to the bus body or ground wire included in the wiring.

(e) Wiring shall conform to current SAE standards. A body load disconnect solenoid of one hundred ampere continuous duty shall be supplied and installed so that when the ignition switch is in the off position all body electrical circuits will be inoperative except the directional signals, hazard warning, stop light, backup light, marker, clearance, identification, and head lamp circuits are exempted from this requirement.

(2) Additional requirements

(a) The service door step well light shall be wired with the marker light circuit and activated by a switch controlled by the service door.

(b) Interior dome lights shall be provided and activated by independent switch or switches. Dome lights shall be equipped with plastic or shatter-proof lens.

(c) Combination stop and tail lamps: bus shall be equipped with two combination stop and tail lamps. These shall have double filament lamp bulbs. These shall be connected to the brake operated stop lamp circuit.

(d) Bus shall be equipped with two stop lamps with a diameter of not less than seven inches with plain red lens, emitting red light plainly visible from a distance of five hundred feet to the rear. These lamps shall be as high as practicable but below the window line and spaced as far apart laterally as practicable, but not less than three feet. Measurements shall be taken from lamp centers. The stop lights to be activated by the brake switch.

(i) These lamps to use single-contact bulb.

(ii) These lamps to have a red lens approximately seven inches in diameter.

(iii) Grounding instructions: The socket of these stop lamps shall be grounded separately, either by use of a wire with one end permanently affixed to the socket and the other end affixed to the lamp base or bus body metal or by the use of a lamp socket flange grounded to the bus body metal by a screw or bolt.

(e) Directional signals

(i) Front, side, and rear directional signals shall be wired to operate properly with the front directional signals supplied by the chassis manufacturer on all conventional type school buses. Transit type school buses shall have front, side, and rear directional signals installed by the school bus body manufacturer.

(ii) School bus body manufacturer shall install required signal lamps to the directional signal control switch so all directional signal lamps shall be operative. The directional signal system shall be installed on an integral part of the hazard warning signal switch activated by an independent switch furnished by the chassis manufacturer.

(iii) Color of lenses shall be amber. All front and rear directional signals installed by the body manufacturer shall be at least six inches in diameter. Side directional signals shall be armor protected.

(f) Warning lamp control switches - The warning control switch shall be provided and mounted on the steering column, right side, to operate the warning signals. The warning control

shall include one manual switch, one master switch, one door control switch which will close the warning light circuit when the door is open, and an indicator lamp to show when the master switch has been activated.

(g) Two backup lights are required and shall be mounted on or below the belt line on the school bus body. Backup lights shall conform with FMVSS.

(3) School bus alternately flashing warning signal lamp

(a) Each school bus body shall be equipped with a system of four red signal lamps designed to conform to SAE standard J887 "School Bus Red Signal Lamps", and four amber signal lamps designed to conform to that standard except for their color. Both red and amber lamps shall be installed in accordance with SAE standard J887, except that:

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

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

(b) These lamps shall flash at a designed rate from sixty to one hundred twenty cycles per minute.

(c) Operation of warning light (and stop arm system if installed).

(i) With the entrance door closed, activate manual start switch. The amber pilot light and amber warning lights flash.

(ii) When the entrance door handle is moved toward the open position, the amber pilot and amber warning lights go off and red pilot and red warning lights flash. Stop arm if installed is automatically extended and lights on the stop arm flash.

(iii) Close entrance door. All lights go out and stop arm retracts automatically. The entrance door switch that activates the red lights in the eight-light system shall be located in a position or shall be protected by a cover or guard that will prevent the

likelihood of this switch being activated or deactivated by pupils boarding or leaving the bus.

(iv) ~~With master switch closed, open the entrance door. Red lights flash and the stop arm extends.~~ 3-12-79 GS

(v) With the entrance door open, depress the manual push button. The red pilot and red warning lights flash. The stop arm is automatically extended and the lights on the stop arm flash.

(vi) Both the amber pilot light and the red pilot lens shall be approximately one-half inch in diameter. These pilot lights shall be installed in a position clearly visible to the driver.

(vii) An emergency system for extending the stop arm and flashing the red warning lights on the bus body and the stop arm shall be installed on each bus body.

(a) An emergency override switch shall be installed in the bus body electrical accessory panel in an area isolated from the other switches where possible. This switch shall be installed with a standard switch identification decal with the words "WARNING LIGHTS" or "EMERGENCY WARNING LIGHTS".

(b) This system shall operate the red flashing lights, extend the stop arm, and operate the red pilot light.

(d) Installation requirements

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

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

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

(iv) Vertical and lateral vision of the front and rear alternately flashing warning lights shall not be obstructed by any part of the body of lamphouse insofar as standard bus body construction will permit.

(v) A square or rectangular area around the lens of each alternately flashing signal light and extending outward approximately three inches shall be painted black. In installations where there is no flat vertical portion of the body immediately surrounding the entire lens of the lamp, a square or rectangular band of black approximately three inches wide, immediately below and to both sides of the lens, shall be painted on the body or roof area against which signal light is seen from a distance of five hundred feet along the axis of the vehicle.

(4) School bus body lamps and reflectors - All lamps and reflectors shall comply with FMVSS 108 - clearance lamps:

(a) Body shall be equipped with a red armored clearance lamp at each of the rear corners and an amber armored clearance lamp at each of the front corners. These lamps to be mounted at the highest and widest position on these corners.

(b) Body shall be equipped with an amber armored intermediate or mid-body marker or clearance light on both sides. These lamps shall be mounted in accordance with FMVSS.

(c) Armored clearance lamps shall conform to SAE Code PC. Lamps shall be equal to Grote Nos. 45013 and 266, or Weldon No. 5050 with armor. Bulbs in these lamps shall be minimum five thousand hour bulbs with four candle power illumination.

(d) These clearance lamps shall be connected to the chassis headlight circuit and shall be activated by the chassis headlight switch.

(R) Mirrors

(1) Interior clear-view mirror shall be at least six by thirty inches overall. If not metal-backed and framed, mirror shall be of laminated plate safety glass. It shall have rounded corners and protected edges.

(2) Two adjustable exterior side-view mirrors shall be provided, one on the left and one on the right of the driver. Mirrors shall be affixed to bus body by means of a braced "D" mount to minimize mirror vibration and set to give the driver a clear view to the rear of the left and right rear corners of the bus. Rear view mirror combinations shall be as follows:

(a) Two flat mirrors - six by twelve inch overall measurement.

(b) Two mirrors with combination flat face mirror overall minimum measurement six by eleven inches and a four by six convex mirror may be used in place of the six by twelve inch flat face mirror.

(3) Cross view mirror shall be provided and shall measure at least seven and one-half inches in diameter and shall be fender mounted on the left side of the bus in such a manner that the seated driver may observe areas in front of the bus where direct observation is not possible. Crossover installation is also required on transit type buses.

(4) Two convex mirrors measuring not less than seven and one-half inches in diameter shall be mounted on front of each school bus in such a manner that the seated driver may observe the areas along each side of the bus from the front wheels to the rearmost part of the bus.

(S) Mounting, body on chassis

(1) Insulating material shall be placed between all main cross-sill and intermediate members. Insulating material shall be at least one-fourth inch thick and shall be attached to chassis frame or body members so that the body will not move under severe operating conditions.

(2) Chassis frame shall extend to rear edge of rear body cross member.

(3) Bus body shall be attached to chassis frame in such a manner as to prevent shifting or separation of the body from the chassis under severe operating conditions.

(4) Body front shall be attached and sealed to the chassis cowl in such a manner as to prevent entry of moisture.

(T) Mud flaps - All buses shall be equipped with two front fender mud flaps.

(U) Openings - All openings created in mounting of bus body to chassis shall be sealed by body manufacturer to prevent entrance of gases, dust or moisture into passenger and driver compartments.

(V) Overall length - Overall length of a school bus shall not exceed forty feet.

(W) Overall width - Overall width of the school bus shall not exceed ninety-six inches.

(X) Seat belt for driver

(1) Seat belt for driver shall be provided. Belts shall be equipped with protective boot and retractor on each side and of sufficient quality and strength to keep it retracted and off floor when not in use.

(2) Belt shall be installed in compliance with current federal and SAE standards.

(Y) Driver's seat

(1) Minimum distance between steering wheel and back rest of driver's seat shall be eleven inches. Driver's seat shall have vertical adjustment of not less than four inches and horizontal adjustment of not less than four inches.

(2) All sewing on cushions and backs shall be single stitched, with a minimum of #12 four-ply glaze finish thread of the best grade or its approved equal. Seams in cushions and seat backs shall be forty-two-ounce or equivalent material strength as upholstery.

(Z) Passenger seats

(1) All seating and restraining barrier design and construction must meet the provisions of FMVSS 222 (school bus seating and crash protection).

(2) All seats shall have a minimum depth of fifteen inches.

(3) All seats shall be forward-facing.

(4) No bus shall be equipped with jump seats or portable seats. Minimum of thirty-six-inch headroom for sitting position above the top of undepressed cushion line of all seats shall be provided. Measurement shall be made vertically not more than seven inches from side wall at cushion height and at fore-and-aft center of cushion.

(5) Seat construction

(a) Backs of all seats shall be the same width at the top and same height from floor also slanting at the same angle with the floor.

(b) Seat covering shall be artificial leather equal to coated fabrics, forty-two-ounce finished weight, fifty-four inches wide, reinforced backing of 1.06 broken twill. Padding and covering on all seats shall be of material that will not flash or explode upon contact with spark or open fire.

(c) Padding - All seat backs and rails shall be covered with energy absorbing material as required by FMVSS 222.

(d) A passenger seat cushion retention system shall be employed to prevent the passenger seat cushion from disengaging from the seat frame in the event of an accident. Each seat cushion retention system shall be capable of withstanding a vertical static load equal to a minimum of five times the weight of the cushion. The system shall also be capable of withstanding a forward or rearward static load equal to twenty times the weight of the cushion.

(AA) Steps - service door

(1) The first step of the service door shall be not less than twelve inches and not more than sixteen inches from the ground.

(2) Service door entrance may be equipped with two or more steps. Risers in each case shall be approximately equal.

(3) Steps shall be enclosed to prevent accumulation of ice and snow.

(4) Steps shall not protrude beyond side body line.

(5) A grab handle not less than ten inches long shall be installed in the step well area and shall be stainless steel clad. The grab handle shall not be mounted to the service door.

(6) Surface of steps shall be of nonskid material.

(a) Steps shall be covered with first quality step covering material. Step covering material shall have nonskid characteristics and be of ribbed or corrugated design. Step covering shall have a turned-down nosing of a contrasting color of either white, yellow, or bright orange.

(b) Step covering shall be securely fastened to the steps in a manner that will minimize tripping. This requires that the heads of mounting screws or bolts be below the top surface of the step tread.

(BB) Access steps

(1) Steps shall be installed on each side of the school bus to allow access to windshield for cleaning.

(2) Grab handles shall be securely mounted in a suitable position.

(CC) Sun visor

(1) The school bus shall be equipped with at least one interior adjustable transparent sun visor, folding type, which is a minimum of six by thirty inches in size.

(2) A right sun visor which is at least six by sixteen inches in size is permitted.

(DD) Undercoating - Entire underside of body, including floor components, side and panels below floor level, and exterior of battery drawer shall be coated with fire-resistant, asphalt base, rubber base, or other approved material applied by spray method, unless otherwise specified by customer.

(EE) Ventilation - Body shall be equipped with a suitable, controlled ventilating system of sufficient capacity to maintain a satisfactory ratio of outside-to inside-air under operating conditions without opening of windows except in extremely warm weather.

(FF) Wheel housings

(1) Wheel house shall be attached to floor components in such a manner to prevent water, dust or fumes from entering the bus body.

(2) Wheel house openings shall allow for easy tire removal and service.

(3) Inside height of wheel housing above floor line shall not exceed ten inches.

(4) Wheel housing shall provide clearance for dual wheels as established by the "National Association of Chain Manufacturers".

(GG) Windshield and windows

(1) All glass in windshield windows and driver's windows shall be approved safety glass; with A.S. 1 rating or better, as specified by the American Standards Association.

(2) Glass in windshield shall be heat absorbent, laminated plate. Windshield shall be large enough to permit the driver to see the roadway clearly, installed to reduce glare, and be installed between front corner posts that are designed and placed to provide maximum visibility for the driver.

(3) Window at the left of the driver shall be A.S. 1 or better and capable of opening, equipped with a lock type closure.

(4) Windshield shall have horizontal gradiant band starting slightly above line of driver's vision and gradually decreasing in light transmission to twenty per cent or less at the top of the windshield. Windshield may be fully tinted in lieu of above.

(5) Glass in all side windows and doors shall be of A.S.A. 2 or better grade, as specified in the American Standard Code Z26.1. All A.S.A. 2 glass shall be tempered unless specified laminated by the purchaser.

(6) Each side window shall be double sash and provide unobstructed emergency opening at least nine inches high and twenty-two inches wide obtained by lowering the upper sash.

(7) Individual windows shall not have a vertical opening greater than twelve inches. Stops shall be installed where needed to obtain this dimension.

(8) All exposed edges of glass shall be banded.

(HH) Windshield wipers

(1) Bus body to be equipped with two heavy-duty bus type windshield wipers.

(2) Each windshield wiper to be operated by a separate electric motor.

(3) Each windshield wiper motor to be operated by a separate electric switch properly identified.

(4) Switches shall provide for two-speed operation.

(5) The windshield wiper motor or motors shall have sufficient power, and the wiper arms and blades shall be of sufficient length to provide the largest cleaning arc possible with conventional type wipers.

(6) Wiper blades shall be a minimum of sixteen inches in length. These blade holders shall be the type that require only the replacement of the rubber blade.

(7) The left-side windshield wiper shall be so positioned that the approximate center of the wiped area will be directly in front of the driver in a normal seated position. The right-side windshield wiper shall be so positioned that the wiped area will provide the driver with maximum vision to the right in a normal seated position.

(II) Windshield washers (electric)

(1) The school bus body shall be equipped with an electrically operated windshield washer by which a stream of washing fluid is directed to both sides of the windshield in the approximate center of the wiped area.

(2) The windshield washer fluid reservoir shall have a minimum capacity of two quarts in rigid plastic container. It shall be mounted in a position readily accessible for refilling.

(3) This washer shall be operated by a separate switch properly identified. This switch shall be easily reached by the driver in a normal seated position.

(JJ) Wiring

(1) All wiring shall conform to current Standards of Society of Automotive Engineers.

(2) Circuits

(a) There shall be no less than eight regular circuits, as follows:

(i) Head, tail, stop (brake), and instrument panel lamps

(ii) Clearance lamps - step well

(iii) Dome

(iv) Starter motor

(v) Ignition and emergency door signal

(vi) Turn signal lamps

(vii) Alternately flashing red and amber signal lamps

(viii) Horn

(b) Any of above combination circuits may be subdivided into additional independent circuits.

(c) Whenever heaters and defrosters are used, at least one additional circuit shall be installed.

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

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

(3) A separate fuse or circuit breaker shall be provided for each circuit except starter motor and ignition circuits.

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

(5) Wires not enclosed within body shell shall be fastened securely at intervals of not more than twenty-four inches. All joints shall be soldered or joined by equally effective connectors.

Former EDb 9-21-03

3301-87-04 School bus body and chassis with a manufacturers rated seating capacity of sixteen through thirty-six passengers.

(A) School buses of this rated capacity shall meet all requirements of rules 3301-87-01 to 3301-87-03 of the Administrative Code with the following modifications.

(B) Chassis

(1)

Axle Rated Capacity Rows	Seating Capacity	Wheel Base Inches	Front Axle GVWR Pounds	Rear Axle GVWR Pounds
4	16-20	125	3,400	6,000
4	16-24	125	4,000	6,000
4-5	22-30	133	4,000	8,000
5-6	26-36	157	4,000	10,000

(2) Brakes

(a) Service brakes shall be hydraulic power assisted.

(b) Disc type brakes are permitted.

(c) Parking brake - manual - manufacturers standard.

(3) Bumpers - front, chassis manufacturers standard, painted black.

(4) Electrical system

(a) Twelve volt with alternator rated not less than sixty amps.

(b) Battery shall have a rating of seventy amps or more, measured at the twenty hour rate.

(5) Engine - not less than three hundred cubic inches.

(6) Exhaust system - manufacturers standard.

(7) Fenders - manufacturers standard painted national school bus chrome yellow.

(8) Fuel tank - manufacturers standard.

(9) Governor

(a) All school buses rated below thirty-six passenger capacity shall be equipped with a road and engine speed governor. Such governor shall be set at fifty-five miles per hour maximum.

(b) Road and engine speed control shall be equal to or exceed the performance of Model RSC2-5 manufactured by "Sturdy Controls Division, 1839 Carolina Beach Road, Wilmington, North Carolina 28401."

(c) Road speed control shall be installed and set prior to delivery of vehicle to purchaser.

(10) Transmission

(a) Manual - three speed forward, one reverse.

(b) Automatic (optional) three speed forward, one reverse.

(C) School bus body

(1) Heaters - two required, one front, one rear.

(2) Interior height - minimum sixty inches.

(3) Windshield washer - fluid capacity, two quarts minimum in rigid plastic container.

(4) Windshield wipers - wiper blade length shall be the maximum possible for the windshield.

(D) All seats shall provide each passenger with not less than thirteen inches of rump room.

3301-87-05 School bus body and chassis with manufacturers rated seating capacity of ten through fifteen passengers.

(A) School buses of this rated capacity shall meet all requirements of rules 3301-87-01 to 3301-87-04 of the Administrative Code with the following exceptions.

(B) Chassis

(1) Axles - GVWR.

(a) Front - three thousand four hundred GVWR.

(b) Rear - six thousand GVWR.

(2) Alternator - sixty amp.

(3) Battery - seventy amp.

(4) Brakes - manufacturer's standard, disc brakes permitted.

(5) Fuel tank - manufacturer's standard.

(6) Governor - road and engine speed governor required and to be set not to exceed fifty-five MPH.

(7) Instruments - manufacturer's standard.

(8) Tow hooks - not required.

(C) Body

(1) Heaters - two heaters required. Second heater to be installed on right side under third row of seats.

(2) Inside height - sixty inches minimum.

(3) Turn signals - manufacturer's standard.

3301-87-06 School buses used to transport handicapped pupils shall meet the construction requirements of rules 3301-87-01 to 3301-87-05 of the Administrative Code and be equipped as follows when required by the purchaser.

(A) Special lift gate service opening

(1) There shall be an enclosed service opening located on the right side of the body. Minimum clear opening shall be thirty inches for a lift.

(2) Door posts, headers, and all floor sections around this opening shall be reinforced to provide strength and support equivalent to adjacent side wall and floor construction of an unaltered model.

(3) A drip mold shall be installed above the opening so as to spill water from the entrance.

(B) Additional lift gate service door(s) requirements

(1) Lift may be enclosed by either one or two doors.

(2) The door or doors must open outwardly.

(3) All doors shall be weather-sealed and so constructed that a flange on the forward door overlaps the edge of the rear post or door when closed. Provisions shall be made for fastening the door or doors in a wide-open position.

(4) Door shall be either a manually operated single door or double door. Door or doors shall be hinged to the body side using a heavy-duty type hinge and shall afford maximum safety when the door or doors are in the closed position.

(5) Door materials, panels, and structural strength shall be equivalent to conventional service and emergency doors. Color, lettering, and other exterior features shall match adjacent sections of the body.

(6) Door or doors shall have a glass window set in rubber compatible with and set to the lower line of adjacent sash.

(7) A handle is to be secured to the inside of the door or doors of the lift so that it may be easily reached to close the door while inside the bus.

(C) Electro-hydraulic lift

(1) Power unit for lift shall be designed with double-acting cylinders for raising and lowering platform. Lifting mechanism shall have a minimum pay load capacity of six hundred pounds. Power unit

shall be electro-hydraulic, self-contained motor pump, valve and reservoir unit, and have an operating time of ten to fifteen seconds. Lifting cylinder shall have honed surfaces. All hydraulic oil hoses must conform to or be better than SAE specification 100-R3. A by-pass valve shall be installed in down side of main cylinder so that the bus body will not be tilted or injuries caused when the hoist contacts ground or other object.

(2) Controls for lift shall be on the end of at least a sixty inch cable and clips shall be provided to hold control box for both stationary and portable operation.

(3) Lift platform shall be at least twenty-six inches wide and thirty-eight inches long. Platform shall have wheelchair stop on the end and platform shall be hydraulically raised and lowered.

(4) Adjacent under-floor areas, three sides, shall be closed off with properly designed shields when the platform is in the lowered position so as to prevent limbs from being injured during operation of the lift.

(D) Barrier panels - A barrier panel shall be installed on the rear side of the lift gate service door. All seats shall meet FMVSS 222.

(E) Fastening devices for wheelchairs - the body shall be equipped with suitable fastening devices to hold wheelchairs in place.

(F) Seats and retaining belts - vehicles with less than ten thousand pounds GVW shall be provided with retaining belts, one for each passenger position. (Longitudinal seats with arm rests on each end are permitted.)

(G) Aisles - A thirty inch wide aisle leading to the emergency door shall be specified by the purchaser when free access is desired for wheelchairs.

(H) Special light - A light shall be placed inside the bus over the special service door and shall be operated by a separate switch located in the door area.

(I) Regular service door entrance

(1) Stainless steel clad grab rails shall be provided on each side of this entrance and shall be placed in such a manner as to afford easy accessibility to small children entering or leaving the bus.

(2) Grab rails shall not be obstructed when service doors are open.

(J) Gasoline tank - Gasoline tank may be relocated to accommodate a hydraulic lift.

3301-87-07

Rated Seating Capacities	9-15	16-23	22-28	26-35	35-36	47-48	53-54	59-60	65 & 71	72 FC & RE	78 FC & RE	84 FC & RE
										Transit Buses		
Rows of Seats	4	4	4-5	5-6	6	8	9	10	11-12	12	13	14
Rate GVWR	9,400	9,400	10,000	14,000	20,000	20,000	21,000	24,000	24,500	28,000	28,000	28,000
Front Axle Rating	3,400	3,400	4,000	4,000	5,000	5,000	6,000	7,000	7,500	11,000	11,000	11,000
Rear Axle Rating	6,000	6,000	6,000	10,000	15,000	15,000	15,000	17,000	17,000	17,000	17,000	17,000
Alternator	60 AMP	60 AMP	80 AMP	80 AMP	80 AMP	80 AMP	80 AMP	100 AMP	100 AMP	130 AMP	130 AMP	130 AMP
Battery	70 AMP	70 AMP	100 AMP	100 AMP	100 AMP	100 AMP	100 AMP	100 AMP	100 AMP	160 AMP	160 AMP	160 AMP
Wheel Base (Minimum)	125	125	133	157	149	187	217	235	254	194	215	235

3301-87-08 Approved chassis options.

(A) Air brake automatic slack adjusters.

(B) Automatic radiator shutters are required on all diesel engines. Automatic radiator shutters are optional on gasoline engines.

(C) Automatic transmissions approved for school buses with a rated seating capacity of twenty-four or more passengers include: "Allison AT540", "Allison MT643", and "New Process A345." All range selector controls for automatic transmissions must be illuminated.

(D) Axle - front, nine thousand pounds GAWR "heavy duty" axle recommended for increased front axle and component parts durability, serviceability, and longer life.

(E) Brake system air dryer shall be equal to or exceed the performance of Model 286934 manufactured by Bendix Heavy Vehicle Systems group.

(F) Declutching fan.

(G) Diesel engine.

(H) Drain valve control inside driver compartment.

(I) Drive wheel sanders.

(J) Engine heater.

(K) Engine hour meter.

(L) Fiberglass hood and fenders.

(M) Larger fuel tanks.

(N) Locking hand throttle.

(O) Oil lubricated wheel bearings.

(P) Road and engine speed control shall be equal to or exceed the performance of Model RSC2-5 manufactured by "Sturdy Controls Division, 1839 Carolina Beach Road, Wilmington, NC 28401.

(Q) Rubber suspension for rear axle shall be equal to or exceed the suspension manufactured by Mor/ryd Inc., P. O. Box 579, Elkhart, IN 46514.

(R) Spare tire and rim.

(S) Tachograph.

(T) Tachometer.

3301-87-09 Approved body options.

(A) Body panels - bright metal interior body panels

(B) Door - power operated service door

(C) Floor - 5/8" five ply, plywood floor

(D) Horn - air horn

(E) Lights

(1) Backing light system

(2) Fog lamps

(3) Lamp monitoring system

(4) Single white strobe light

(F) Lock - entrance service door lock

(G) Mirrors

(1) Heated mirror

(2) Extra mirror

(H) Padded interior side rails

(I) Public address systems

(J) Radios - all types

(K) Rubber fender extensions

(L) Seats - six or eight way adjustable driver seats

(M) Signs - lighted school bus signs

(N) Stop arm - octagon shape only, must meet or exceed SAE standard J1133.

(O) Storage compartments (outside)

(P) Ventilator(s) - static or powered

(Q) Windows

(1) Swing out emergency side windows

(2) Thermal windows

(R) Wipers - air powered windshield wipers

APPENDIX

CURRENT FEDERAL MOTOR VEHICLE SAFETY

STANDARDS (FMVSS) APPLICABLE TO SCHOOL BUSES

Standard	Description
101	Control Location, Identification and Illumination - specified operability, visibility, labeling and illumination requirements for specific controls and displays.
102	Transmission Shift Lever Sequence, Starter Interlock, and Transmission Braking Effect - specifies for automatic transmissions the sequence of shift position and requirements for a neutral start switch and braking effect; also required labeling of shift patterns for all transmissions.
103	Windshield Defrosting and Defogging Systems - specifies that each vehicle have a windshield defrost/defog system.
104	Windshield Wiping and Washing Systems - specifies that each vehicle must be equipped with windshield wiping and washing systems meeting specific SAE requirements.
105	Hydraulic Braking Systems (effective 4-1-77) - establishes equipment, stopping distance and parking brake requirements for school buses. Stopping distance requirements include fully active and partial failure stops. Maximum pedal efforts are specified.
106	Brake Hoses - establishes performance and labeling requirements for brake hoses, hose assemblies and fittings.
107	Reflecting Surfaces - specifies maximum specular gloss for specific interior components.
108	Lamps, Reflective Devices and Associated Equipment - specifies performance and location requirements for lamps, reflectors and their associated equipment.
109	New Pneumatic Tires - establishes performance and labeling requirements for passenger car tires.
110	Tire selection and rims - establishes requirements for use of FMVSS 109 tire and rims on vehicles.
111	Rearview Mirrors - specifies locations and performance requirements for rearview mirrors.
113	Hood Latch Systems - requires that each vehicle with a front opening hood be equipped with primary and secondary latches. Rear opening hoods need only have a primary latch.
116	Motor Vehicle Brake Fluids - establishes performance and labeling requirements for brake fluids; required that vehicles be equipped with complying fluids.

Standard	Description
119	New Pneumatic Tires for Vehicles Other than Passenger Cars - establishes performance and labeling requirements for tires other than passenger car tires.
120	Tire Selection and Rims for Motor Vehicles Other than Passenger Cars. (Effective 9-1-76) - requires that vehicles be equipped with tires meeting FMVSS 119 and with rims adequate to support GAWR. (Effective 8-1-77) - each rim must be marked with specific information. (Effective 9-1-77) - vehicles must be labeled with specified tire information. (Effective 1-1-78) - customer supplied tires must not be installed on vehicles by the manufacturer. (Effective 9-1-79) - vehicles must be labeled with specified tire information.
121	Air Brake Systems - specifies performance and equipment requirements for air brake systems. Buses are currently exempt from stopping distance requirements.
124	Accelerator Control Systems - specifies "return to idle" capability for accelerator control systems including specific requirements for two or more sources of energy to perform this function.
205	Glazing Materials - specifies performance and labeling requirements for glazing materials.
206	Door Locks and Door Retention Components - specifies strength requirements for door latches and door attaching systems.
207	Seating Systems - requires that the driver's seat in a bus meet specified strength requirements.
208	Occupant Crash Protection - requires that the driver's seat on a bus be equipped with a seat belt or positive restraint system.
209	Seat Belt Assemblies - establishes strength and labeling requirements for seat belt assemblies.
210	Seat Belt Assembly Achorages - specifies strength and location requirements for seat belt achorages.
217	Bus Window Retention and Release - specifies retention requirements for windows other than the windshield; (Effective 4-1-77) - specifies size and operation requirements for school bus emergency exists; also requires an ignition interlock for lockable emergency exits.
219	Windshield Zone Intrusion (Effective 9-1-77, for vehicles with a GVWR of 10,000 pounds or less) - specifies a protection zone on and around the windshield under impact into a fixed barrier at up to 30 mph.
220	School Bus Rollover Protection (Effective 4-1-77) - establishes strength and deflection requirements for school bus roof.

Standard	Description
221	School Bus Body Joint Strength (Effective 4-1-77) - establishes strength requirements for school bus panel joints based on the strength of the materials to be joined.
222	School Bus Passenger Seating and Crash Protection (Effective 4-1-77) - establishes strength and deflection requirements for school bus seats; specifies maximum seat spacing; specifies injury criteria upon impact by a specific handform and leg form; requires forward facing seats.
301	Fuel System Integrity - for vehicles with a GVWR or 10,000 pounds or less - requires that fuel spillage and leakage not exceed 1 ounce per minute in a 30 mph frontal impact; (Effective 4-1-77) - school buses with a GVWR exceeding 10,000 pounds must meet the spillage and leakage requirements when impacted at any point at any angle by a movable barrier at up to 30 mph; (Effective 9-1-77 for vehicles with a GVWR of 10,000 pounds or less) - extends spillage and leakage requirements to angular front, rear and side impacts.
302	Flammability of Interior Materials - specifies than materials used in the occupant compartment not exceed a burn rate of 4 inches per minute.