

Washington State School Bus Specifications



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SPECIFICATIONS FOR SCHOOL BUSES

Effective September 1, 2010

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The Superintendent would like to acknowledge the dedicated work of all those involved in the development and production of this manual. The result of this work is a safer, more efficient school bus to provide transportation for the students of Washington State, to and from school and school activities. While it is not possible to specifically include the names of all those involved, the single individual most responsible for maintaining the accuracy of the information contained in this manual is the regional transportation coordinator, Mike Kenney. His work is a reflection of his exceptional passion for the safety of students and is deeply appreciated.

DEFINITIONS

The following definitions are used in this manual:

1. "School bus" shall mean every vehicle with a seating capacity of more than ten persons, including the driver, regularly used to transport students to and from school or in connection with school activities.
2. A Type A school bus shall mean a conversion bus constructed utilizing a cutaway front section vehicle with a left side driver's door. This definition includes two classifications: Type A-1, with a Gross Vehicle Weight Rating (GVWR) of 10,000 pounds or less; and Type A-2, with a GVWR greater than 10,000 pounds, not to exceed 36-passenger seating capacity.
3. A Type B school bus shall mean a conversion or body constructed and installed upon a van or front section vehicle chassis, or stripped chassis, with a GVWR greater than 10,000 pounds, designed for carrying more than ten persons. Part of the engine is beneath and/or behind the windshield and beside the driver's seat, and the service entrance door is behind the front wheels.
4. A Type C school bus shall mean a body installed upon a flat back cowl chassis, or a stripped chassis, with a GVWR greater than 10,000 pounds, designed for carrying more than ten persons. The service entrance door is behind the front wheels. This type also includes the above chassis with a passenger seating capacity greater than 36, and may have a left side driver's door.
5. A Type D school bus shall mean a body installed upon a chassis, with a GVWR greater than 10,000 pounds, designed for carrying more than ten persons. The engine may be behind the windshield and beside the driver's seat, at the rear of the bus behind the rear wheels, or midship between the front and rear axles. The service entrance door is ahead of the front wheels.
6. A Special Needs School bus shall mean any Type A, B, C, or D school bus as defined in this section, which has been modified to transport students requiring the use of a Wheelchair/Mobility Aid Position or Lift.

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SECTION I

SCHOOL BUS SPECIFICATIONS

SECTION I SCHOOL BUS SPECIFICATIONS

AIR CLEANER—

1. The bus shall be equipped with a heavy duty, dry-element, or equivalent, air cleaner.
2. The air cleaner shall be mounted outside the passenger compartment. All diesel engine air filters shall include a latch-type restriction indicator that retains the maximum restriction developed during operation of the engine. The indicator shall include a reset control.

AISLE—

Minimum width of all aisles shall be 12 inches. (Also see Emergency Exits, Page 15, Item 1.t.)

ALTERNATOR—

1. If belt driven, the belt drive shall be capable of handling the rated capacity of the alternator with no detrimental effect on the alternator, pulleys, belts, or other driven components.
2. A direct-drive alternator is permissible in lieu of a belt drive.
3. The alternator, with compatible regulator, shall be of heavy duty, long-life design.
4. Alternators shall have the following capacities: (See *Appendix*, Page 61, Item 1, for the Estimating Method for Suggested Alternator Capacity.)
 - a. Buses 15,000 lbs. or less Gross Vehicle Weight Rating (GVWR) shall have a minimum output of at least 130 amperes. Buses equipped with an electrical power lift shall have a minimum 145 ampere alternator.
 - b. All buses over 15,000 lbs. GVWR, shall be equipped with a heavy-duty truck or bus-type alternator, having a minimum output rating of at least 160 amperes, and shall produce a minimum current output of 50 percent of the output rating at engine idle speed.

AXLE LOADING—

At maximum GVWR, no suspension component including the frame, springs, axles, rims, and tires will be loaded beyond the rated capacity, as required in Code of Federal Regulation (CFR) 49, Parts 567 and 568, and tire and axle loading requirements specified in Revised Code of Washington (RCW) 46.44.041 and RCW 46.44.042. (See *Appendix*, Page 81, Item 24.)

AXLES—

1. The front axle, including all types of suspension assemblies, shall have a 3,000 lb. minimum capacity. The gross axle weight rating at ground shall be at least equal to that portion of the load as would be imposed by the chassis manufacturer's maximum GVWR.
2. The rear axle shall be full floating. The rear axle, including all types of suspension assemblies, shall have a 5,000-lb. minimum capacity. The gross axle weight rating at ground level shall be at least equal to that portion of the load as would be imposed by the chassis manufacturer's maximum GVWR.
3. Hubs allowing the use of dual rear wheels shall be provided. Buses 10,000 lbs. GVWR and under may have single rear wheels.

BACK-UP ALARM—(Optional)

An automatic audible alarm may be installed behind the rear axle and shall comply with the published Backup Alarm Standards (SAE J994b), providing a minimum of 112 dBA, or shall have a variable volume feature that allows the alarm to vary from 87 dBA to 112 dBA sound level, staying at least 5 dBA above the ambient noise level.

BATTERY—

1. The battery shall have a minimum cold cranking capacity rating equal to the cranking current required for 30 seconds at 0° Fahrenheit (-17.8°C) and a minimum reserve capacity rating of 120 minutes at 25 amperes.
2. Two batteries or more are acceptable if the combined capacity rating meets or exceeds the preceding requirements.
3. Buses may be equipped with a battery shut-off switch. If equipped, the switch is to be mounted in a location not readily accessible to the driver or passengers.

Type A

4. The battery or batteries may be standard installation provided by the chassis manufacturer. If a second battery is required to meet the (Cold Cranking Amps) CCA requirement, and not placed under the hood, it must be mounted as stated in Item 5, below.

Type B, C, and D

5. The battery(ies) shall be securely attached on a slide-out or swing-out tray in a closed, vented compartment in the body skirt whereby the battery may be exposed to the outside for convenient servicing. Battery compartment door or cover shall be hinged at the front or top and secured by an adequate and conveniently operated latch or other type fastener. The door may be an integral part of the battery slide tray.

6. The battery cable lengths shall be according to School Bus Manufacturer's Technical Council (SBMTC), School Bus Technical Reference Book, current edition. (See *Appendix*, Page 67, Item 12.)
7. The battery location shall be identified near the battery on the exterior of the bus in black letters no less than 1 inch high and no more than 2 inches high.

BELT CUTTER—

All buses shall be equipped with a belt cutter. The belt cutter shall be secured in the driver's compartment, within the driver's reach and view while the driver is seated. (If not in view, the compartment must be labeled) The belt cutter shall be durable and designed to prevent the operator or others from being cut during use.

BODY SIDES, EXTERIOR—

Exterior body sides shall be free of all projections or protuberances capable of snagging or catching clothing.

BRAKES—

1. Every school bus shall be equipped with service brakes to produce a braking efficiency that complies with RCW 46.37.351. (See *Appendix*, Page 80, Item 22.)
2. All brake lines shall be protected from excessive heat and vibration, and be so installed as to prevent chafing.
3. Parking brake control shall be in plain view and within easy reach of the driver while seated in a normal driving position with the seat belt fastened.
4. All buses with an inside body length of 230 inches or more shall be equipped with air brakes. (See *Appendix*, Page 68, Item 14, for proper measurement procedure.)
5. All brake systems shall be designed to permit visual inspection of brake lining wear without removal of any chassis components, except the dust cover.
6. The parking brake shall meet the holding requirements of Federal Motor Vehicle Safety Standard (FMVSS) 571.121.s5.6.2.
7. Antilock brake systems for either air or hydraulic brakes shall include control of **all** axles in compliance with FMVSS 121 and 105, respectively.

BRAKES, AIR—

1. The service brake system shall act directly on all wheels.
2. Each bus shall have a braking system with spring or air-actuated emergency/parking brake capability.

3. The emergency/spring brakes shall be automatically applied when the air pressure in all service reservoirs falls below 45 pounds per square inch (PSI) and activates at no less than 20 PSI.
4. The emergency/spring brakes shall remain applied after automatic or manual application, even upon restoration of service reservoir system air, until parking control is manually released by the driver.
5. The emergency/parking brake air system on any bus, with a "Park-Brake" position on the automatic transmission shift quadrant, shall be designed so that when the operator moves the shift control lever to the "Park-Brake" position, the parking brake will automatically apply by activation of the existing emergency/parking brake dash control valve. Further, the air system design shall require the operator to manually release the parking brake with the existing emergency/parking brake dash control valve after first moving the shift control lever out of the "Park-Brake" position.
6. The vehicle securement switch, if installed, shall be a switch located in the driver compartment within easy reach of the driver from a driving position. When applied, the switch will activate a system that will secure the bus by means of applying the service brake, spring brake, or transmission lockup or any combination. Deactivation may be by other means than the switch. The spring brake control valve (PP1) may be a part of this system but does not take the place of this switch. The switch shall be guarded as to prevent accidental application.
7. All air brake systems shall be equipped with a desiccant-type air dryer installed according to manufacturer's specifications.
8. All buses with air brakes shall be equipped with a compressor rated no less than 12-cubic feet per minute (CFM).
9. The air braking system shall include an illuminated gauge or gauges on the instrument panel to monitor service air pressure. Audible and visible low-pressure indicators will give continuous warning to the operator when the air pressure in either system falls below 60 PSI.
10. The supply or "wet tank" reservoir shall be equipped with a condensate drain valve that can be operated from either the driver's compartment or from alongside the bus body.
11. All reservoirs shall have a condensate drain valve. The service brake reservoirs shall have the largest available dump valve that can be manually operated from inside or outside the bus. There shall be a fitting to allow the system to be charged from shop air.

BRAKES, HYDRAULIC—

1. Buses shall be equipped with dual hydraulic brake systems, shall be power assisted and of the type that will operate even if the engine is not running.

2. All brake systems shall be equipped with warning signals, readily audible and visible to the operator that will give a continuous warning should any malfunction of either the brake pressure system or booster system occur. Those brake systems using vacuum shall give continuous warning when the vacuum in the system available for braking is eight (8) inches of mercury or less, and shall have an illuminated gauge which will indicate to the operator the vacuum available for the operation of the brakes. (A1, A2, and B buses - gauge not required.)
3. Any vacuum power assist unit shall be the largest unit recommended by the manufacturer for the model chassis bid.
4. An auxiliary vacuum reservoir may be supplied by the manufacturer to supply other vacuum-powered accessories. The reservoir supply shall be protected by a check valve.

BUMPERS, FRONT—

1. School buses shall be equipped with a front bumper. The chassis manufacturer for all school bus types shall furnish the front bumper, unless there is a specific agreement between the chassis manufacturer and body manufacturer.
2. The front bumper shall be of pressed steel channel or equivalent material (except Type A buses having a GVWR of 14,500 lbs or less, which may be OEM supplied) at least 3/16 inches thick and not less than 8 inches wide (high). It shall extend beyond the forward-most part of the body, grille, hood, and fenders and shall extend to the outer edges of the fenders at the bumper's top line.
3. The front bumper, except breakaway bumper ends, shall be of sufficient strength to permit pushing a vehicle of equal gross vehicle weight (GVW) without permanent distortion to the bumper, chassis, or body.
4. The bumper shall be designed or reinforced so that it will not deform when the bus is lifted by a chain that is passed under the bumper (or through the bumper if holes are provided for this purpose) and attached to both tow eyes. For the purpose of meeting this specification, the bus shall be empty and positioned on a level, hard surface and both tow eyes shall share the load equally.

BUMPERS, REAR—

1. Rear bumper shall be attached to the chassis frame in such a manner that it may be easily removed, shall be so braced as to develop full strength of bumper section from rear or side impact, and shall be so attached as to discourage hitching of rides on the rear of the bus.
2. Rear bumper shall extend beyond the rear-most part of the body surface at least 1 inch, measured at the floor line.

3. Rear bumper shall be shielded between body and bumper so as to discourage hitching of rides on the rear of the bus.

Type A and B

4. Rear bumper shall be wrapped around the back corners of the bus. It shall extend forward at least 6 inches, measured from the rear-most point of the body at the floor line.
5. Rear bumper shall be of pressed steel channel at least 1/8-inch thick and minimum 5- inches wide (high) and of sufficient strength to permit being pushed by another vehicle without permanent distortion.

Type C and D

6. Rear bumper shall be wrapped around the back corners of the bus. It shall extend forward at least 12 inches, measured from the rear-most point of the body at the floor line.
7. Rear bumper shall be of pressed steel channel at least 3/16-inch thick and minimum 8- inches wide (high) and of sufficient strength to permit being pushed by another vehicle without permanent distortion.

CAMERAS—(Optional)

1. Cameras may be mounted in the front, side, back and/or mid-ship of the bus. If mid-ship, they must be mounted off center and over a seat back. Corners and sharp edges shall be rounded or covered with a protective material. If mounted on the windshield, they must not be in the Out of Service Area as referenced in the WSP Inspection Manual.
2. Recording equipment shall be mounted as not to produce any tripping hazard if floor mounted.

CAPACITY PLATE—

A label indicating the maximum design capacity of the bus shall be located near or incorporated in the bus body identification label.

CERTIFICATION—

Chassis, body, and after-market parts manufacturers shall, upon request, certify to the Office of Superintendent of Public Instruction (OSPI) that their product meets all Washington State and National School Transportation Specifications & Procedures on items not covered by certification issued under requirements of the National Traffic and Motor Vehicle Safety Act.

CLUTCH—

1. Clutch torque capacity shall be equal to or greater than the engine torque output.
2. A starter interlock shall be installed to prevent actuation of the starter if the clutch pedal is not depressed.

COLOR—

1. School bus body shall be painted National School Bus Yellow. (See *Appendix*, Page 62, Item 2.)
2. All Rub rails and bumpers shall be gloss black. The rub rails trim color shall be at least 2-inches wide. The hood may be non-reflective black (See *Appendix*, Page 62, Item 4.) or non-reflective yellow.
3. Body side lettering shall be black on National School Bus Yellow or National School Bus Yellow on black.
4. Grilles may be the manufacturer's standard production color.
5. Chassis shall be black. (See *Appendix*, Page 62, Item 3.) Cowl and fenders shall be in National School Bus Yellow (NSBY). (See *Appendix*, Page 62, Item 2 or non-reflective yellow. Wheels may be black, yellow, or manufacturer's standard color.
6. The roof of the bus may be painted white except that the front and rear roof caps shall remain National School Bus Yellow. (Reference Appendix B, in the *2010 National School Transportation Specifications & Procedures Manual*.)
7. **Effective September 1, 2005:** Reflective material shall be installed on the following areas of the bus. See *Appendix*, Page 69, Item 15, for a diagram defining locations of markings referred to below.
 - a. The rear of the bus body shall be marked with a strip of reflective National School Bus Yellow material no greater than 2 inches in width to be applied to the back of the bus, extending from the left lower corner of the "SCHOOL BUS" lettering, across to the left side of the bus, then vertically down to the top of the bumper, across the bus on a line immediately above the bumper to the right side, then vertically up to a point even with the strip placement on the left side, and concluding with a horizontal strip terminating at the right lower corner of the "SCHOOL BUS" lettering.
 - b. "SCHOOL BUS" signs, if not a lighted design, shall be marked with reflective National School Bus Yellow material comprising background for lettering of the front and/or rear "SCHOOL BUS" signs.
 - c. The sides of the bus body shall be marked with reflective National School Bus Yellow material at least 1 3/4 inches but not more than 6 inches in width,

extending the length of the bus body and located (vertically) as close as practicable to the beltline. Marking not required on emergency or lift doors.

8. The front and/or rear bumper may be marked diagonally 45 degrees down toward the left side of the bus with 2-inch wide strips of non-contrasting reflective material.

CONSTRUCTION—

The following construction standards shall apply in addition to federal standards governing school bus body construction and testing.

1. Construction shall be of prime commercial quality steel or other metal or other material with strength at least equivalent to all-steel as certified by the bus body manufacturer. All such construction material used in the interior of the bus shall be fire-resistant.
2. Fiberglass or other resin-coated materials may be used on the exterior of the bus if their use does not compromise the ability of the bus to meet FMVSS 220 and 221 for rollover and joint strength requirements.
3. **Side Intrusion Test:** The bus body shall be constructed to withstand an intrusion force equal to the curb weight of the vehicle, but shall not exceed 20,000 lbs, whichever is less. Each vehicle shall be capable of meeting this requirement when tested in accordance with the procedures set forth below.

The complete body structure, or a representative seven-body section mock up with seats installed, shall be load-tested at a location 24 inches plus or minus 2 inches above the floor line, with a maximum 10-inch diameter cylinder, 48 inches long, mounted in a horizontal plane.

The cylinder shall be placed as close as practicable to the mid-point of the tested structure, spanning two internal vertical structural members. The cylinder shall be statically loaded to the required force of curb weight or 20,000 lbs, whichever is less, in a horizontal plane with the load applied from the exterior toward the interior of the test structure. Once the minimum load has been applied, the penetration of the loading cylinder into the passenger compartment shall not exceed a maximum of 10 inches from its original point of contact. There can be no separation of lapped panels or construction joints. Punctures, tears or breaks in the external panels are acceptable but are not permitted on any adjacent panel.

Body companies shall certify compliance with this intrusion requirement, including test results, if requested.

4. Construction shall be dust-proof and watertight.
5. All openings between the chassis and passenger compartment must be sealed.

CROSSING CONTROL ARM—

1. All school buses shall be equipped with a crossing control arm. The crossing arm shall:
 - a. Be right side mounted on front bumper.
 - b. Extend at least 5 feet six 6inches and be so constructed to prevent injury to students.
 - c. Be activated at any time the stop signal arm is extended or the overhead alternately flashing red lights are activated by the door switch.
2. Air-braked buses may be equipped with an air or electric actuated control arm. If air, an air pressure regulator valve mounted in an accessible location shall be provided.
3. Non-air-braked buses may be equipped with either electric or vacuum actuated control arms.
4. If an electric unit is installed on any bus, a quick disconnect plug near the bumper shall be provided. Override switch is not allowed.
5. All air, electrical, or vacuum hoses and wiring shall be securely mounted and protected by grommets or loom wherever they pass through or over body or chassis members.
6. The crossing arm wand, if painted, shall be school bus yellow or yellow and black.

DEFROSTERS—

1. Defroster system shall be of sufficient capacity to keep the windshield clear of fog, ice, and snow.
2. Defrosting and defogging equipment shall direct a sufficient flow of heated air onto the windshield, the window to the left of the driver, and the glass in the viewing area directly to the right of the driver to reduce the amount of frost, fog and/or snow.
3. The defrosting and defogging system shall conform to SAE Standards J381 and 382. (See *Appendix*, Page 62, Item 8.)
4. The defroster and defogging system shall be capable of furnishing heated outside ambient air, except that part of the system furnishing additional air to the windshield, entrance door and stepwell may be of the re-circulating air type. Auxiliary fans are not to be considered as a defrosting and defogging system.
5. Auxiliary fans, if installed, shall meet the following requirements:

- a. The fans for the left and right sides shall be placed in a location where the flow is not obstructed. The location of the fan must not reduce the drivers' vision to the mirrors.
- b. Fans shall be in a location where they can be adjusted to their maximum effectiveness, without blocking driver's view of the mirrors.
- c. Shall be no larger than 6 inches in diameter.
- d. Blades shall be covered with a protective cage. A separate switch shall control each of the fans.

DOORS, SERVICE—

1. The service door shall be located on the right side of the bus within the driver's view.
2. Vertical closing edges shall be equipped with flexible material.
3. The service door shall be equipped with padding at the top edge of the door opening. Pad shall be at least 3-inches wide and 1-inch thick, including the backing, and extend the full width of the door opening. This may be accomplished with multiple sections with no more than 1 inch between sections.
4. The glass in the door shall be of AS-3 grade or better. The bottom of the glass panel(s) shall not be more than 10 inches from the top surface of the bottom step. The top of the glass panel(s) shall not be more than 6 inches from the top of the door.
5. Side cargo-type doors are not permitted.
6. The service door shall be a split-type, sedan-type or jackknife-type. (Split-type door includes any sectioned door, which divides and opens inward or outward.) If one section of a split-type door opens inward and the other opens outward, the front section shall open outward.
7. The service door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 68 inches.
8. The service door may have manufacturer-supplied lock. It shall not be a padlock-type outside door lock.

Type A

9. The service door may be power or manually operated. Door shall be under control of the driver, and so designed as to afford easy release. If manual, the door shall be equipped with a positive latching device to prevent accidental opening. If power, the door shall be equipped with a manual release in case of power failure. When hand lever is used, no parts shall come together so as to shear or crush fingers. Manual door controls shall not require more than 25 lbs. of force to operate at any point

throughout the range of operation, as tested on a ten percent grade both uphill and downhill.

Type B, C and D

10. The service door shall be power operated, under control of the driver, and so designed as to afford easy release. The door shall be equipped with a manual release in case of power failure.

DRIVE SHAFT—

Torque capacity of the drive shaft assembly shall at least equal maximum engine torque as developed through lowest transmission gear reduction. The drive shaft or each portion, if segmented, shall be equipped with a protective metal guard or guards of sufficient strength to prevent the front of the driveline from dropping to the ground, if broken.

EMERGENCY EQUIPMENT—

1. Body fluid cleanup kit.
 - a. Each bus shall be equipped with a removable and moisture proof body fluid cleanup and deodorant kit for use on potentially infectious blood and body fluid spills. It shall be properly identified as a body fluid cleanup kit and shall consist of a durable container with a minimum of the following contents:
 - (1) One pair of medical examination gloves.
 - (2) One packet of odor absorbent material.
 - (3) Two water-resistant spatulas.
 - (4) One paper bag with lining or one plastic bag.
 - (5) At least 100 square inches of germicidal wiping cloth or one bottle of Environmental Protection Agency (EPA) registered hospital grade germicidal detergent and at least one plain wiping cloth.
 - (6) One bottle containing at least 1/2 ounce of antiseptic hand rinse or one packet of antiseptic hand wipe towelettes. (All items to be non-flammable.)
 - (7) One plastic final disposal bag with twist-ties.
 - (8) One step-by-step instruction sheet with corresponding photographs.
 - b. Kit shall be properly secured, be as compact as possible and be conveniently mounted in the driver's area out of reach of seated students. (Also see Emergency Equipment Cabinet, Page 12.)

2. Fire extinguisher.

- a. The bus shall be equipped with at least one UL-approved pressurized, dry chemical fire extinguisher. The extinguisher shall be securely mounted in a bracket, located in the driver's compartment and readily accessible to the driver and passengers. A pressure gauge shall be mounted on the extinguisher and shall be easily read without moving the extinguisher from its mounted position.
- b. The fire extinguisher shall have a total rating of 2A10BC or greater and at least 5 lbs capacity. The operating mechanism shall be sealed with a type of seal that will not interfere with the use of the fire extinguisher. (Also see Emergency Equipment Cabinet, below.)

3. First aid kit.

The bus shall have a removable, moisture-proof and dust-proof first aid kit in an accessible place in the driver's compartment. It shall be properly mounted, secured and identified as a first aid kit. The location of the first aid kit shall be marked. (Also see Emergency Equipment Cabinet, below.) (See *Appendix*, Page 62, Item 5, for contents.)

4. Highway Warning Kit.

- a. Buses shall be equipped with a highway warning kit containing a minimum of three reflective triangles.
- b. Whenever possible, the highway warning kit shall be located in the driver's compartment readily accessible to the driver and secured. (Also see Emergency Equipment Cabinet, below.)

EMERGENCY EQUIPMENT CABINET—

An equipment cabinet may be installed in the driver's compartment to include any of the following: the body fluid cleanup kit, fire extinguisher, first aid kit, and the highway warning kit. This cabinet, if installed, shall be labeled in contrasting colored letters not more than 2 inches and not less than 1-inch high identifying all of the contents therein. All emergency equipment located within the equipment cabinet must be secured but readily accessible. Cabinet shall be securely anchored and have a latch capable of securing contents within.

EMERGENCY EXITS—

1. Emergency doors and emergency windows.

- a. There shall be no steps leading to the emergency door(s). If a rear-or side-emergency door sill extends above the floor line, a ramp shall be provided covering all area over which a foot may pass as an individual exits through the door. This will also serve to cover heater hoses or other equipment located

- above the floor surface leading to any emergency door. If no sill exists and such equipment is recessed into the floor, there may be a removable access cover protruding no more than 1/4 inch above the floor surface in this same area.
- b. Emergency doors shall have a device to maintain a minimum 90-degree opening position. The device shall not require any action on the part of the user other than pushing the door to the specified position, or just beyond the specified position. This device shall be located so it will not impede egress or cause injury.
 - c. The device shall be corrosion-resistant and hold the door at the specified opening position with the bus in any position, unless the pull of gravity will cause the door to remain open to its fullest extent. The device shall permit the user to close the door from inside or outside of the bus.
 - d. Emergency door(s) shall be equipped with padding at the top edge of each door opening. Pad shall be at least 3 inches wide and 1 inch thick including the backing, and extend the full width of the door opening. This may be accomplished with multiple sections with no more than 1 inch between sections.
 - e. Each school bus emergency door, side emergency window, or rear emergency window shall have the designation "Emergency Door" (for emergency doors) or "Emergency Exit" (for emergency windows) in letters at least 2-inches high, of a color that contrasts with its background, located at the top of or directly above the door or window on the inside and outside surfaces of the bus. Lettering may be on the glass. Designations meeting the above requirements may be placed on or up to 4-inches below the glass of the emergency window or emergency door(s) (the upper glass for rear-emergency door) on the outside surface of the bus. Concise operating instructions describing the motions necessary to unlatch and open the door or window, in letters at least 3/8-inch high, of a color that contrasts with its background, shall be located within 6 inches of the release mechanism on the inside surface of the bus. An arrow shall be located as close as possible to the release mechanism on the inside to indicate direction of release. The color of the arrow shall be red.
 - f. An arrow shall be located as close as possible to the release mechanism on the outside surface of each emergency door or window to indicate direction of release. The color of the arrow shall be black or red.
 - g. When the release mechanism is not in the closed position and the vehicle ignition is in the "on" position with the engine running, a continuous warning sound shall be audible at the driver's seating position and in the vicinity of the emergency door having the unclosed mechanism. This warning sound shall also be required for the rear-emergency exit window when moved outward from the closed position no more than 1 inch measured at the bottom edge of the window.
 - h. Guard(s) of metal or other material at least equal in strength to metal shall be placed over emergency door control(s) on the inside to reduce the chance of accidental opening.

- i. Provision for opening emergency doors and windows from outside shall consist of a non-detachable device so designed as to discourage hitching of rides but to permit opening when necessary. There shall be no handles on back of bus other than the manufacturer's standard handle(s) on emergency doors or emergency windows.
- j. Emergency door(s) or emergency window locks of any kind are prohibited unless they meet the ignition interlock requirements of FMVSS 217, Item S5.2.3. which states in part: "The engine starting system of a school bus shall not operate if any emergency door is locked from either inside or outside the bus." If a lock of any kind is placed in the locked position, with the vehicle ignition in the "on" position and with the engine running, a continuous warning sound shall be audible at the driver's seating position and in the vicinity of the emergency door or window having the locked device.
- k. All school buses with a rear-emergency door and an inside body length of 215 inches or more must also have a left-side emergency door. This measurement is to be made near the centerline of the bus from the rear side of the stepwell to the appropriate point at rear of passenger seating area. (See *Appendix*, Page 68, Item 14, for proper measurement procedure.)
- l. Rear door(s) must be equipped with a fastening device which may be quickly released from both the inside and outside and designed so as to offer protection against accidental release.
- m. Emergency doors shall have minimum horizontal opening of 24 inches and minimum vertical opening of 45 inches measured from floor level.
- n. The upper portion of the emergency door(s) shall be equipped with glass of AS-3 grade or better. The exposed area shall be not less than 300 square inches for the left-side emergency door and not less than 400 square inches for the rear-emergency door.
- o. Emergency door(s) latch(es) shall be equipped with an interior red colored handle that will extend at least 9 inches from the door jamb toward the center of the emergency door and shall lift up to release the latch.
- p. All buses must have a standard rear-emergency door or a rear-emergency window.
- q. All Type C and D buses equipped with a rear-emergency window must have a left- and right-side emergency door.
- r. If equipped, the left-side emergency door shall be located forward of the rear axle at the approximate center of the usable passenger seating area. (Also, see Item s. below.)

- s. The right-side emergency door may be located behind the rear axle or in front of the rear axle. If located in front of the rear axle, the door must be as close as practicable to the rearmost part of the passenger seating area. The right-side emergency door and the left-side emergency door shall be placed as to ensure maximum separation of the two side emergency doors.
- t. At a minimum, there shall be clear aisles and side-emergency door openings large enough to permit unobstructed passage of a rectangular parallelepiped 45-inches high, 12-inches wide, and shall extend from the outer edge of the door sill to the center aisle of the bus, keeping the 45-inch dimension vertical, the 12-inch dimension parallel to the opening, and the lower surface in contact with the floor of the bus, or if a sill exists at the side-emergency door, level with the top of the sill at all times.
- u. To achieve the requirements of Item t. above, automatic flip-up seats may be used at side-emergency doors only, and shall meet the following:
 - (1) Automatic flip-up seats shall be placed at the maximum seat spacing permitted by FMVSS 222 of 24 inches from the seating reference point (SRP).
 - (2) Automatic flip-up seats shall be constructed to prohibit passenger limbs from becoming entrapped between the seat back and the seat cushion when in the upright, or seated position.
 - (3) The bottom of the flip-up seat shall be covered with sheet metal or other material of equal strength and durability to prevent lacerations, puncture wounds, or the snagging of clothing.
 - (4) The seat cushion shall be designed to rise to a vertical position automatically when not occupied.
- v. No seat or restraining barrier may extend rearward of the forward most portion of the latch mechanism handle of a side-emergency door when it is in the latched position. (See *Appendix*, Page 71, Item 16.)
- w. The rear-emergency exit window shall be no smaller than 16 inches in height and 54 inches in width. The window shall be hinged from the top, shall be equipped with a device(s) to assist in opening and shall have a device to maintain a minimum 90-degree opening position. The device shall not require any action on the part of the user other than pushing the door to the specified position, or just beyond the specified position. This device shall be located so it will not impede egress or cause injury.
- x. Platforms or panels shall cover the space between the rear seats and emergency window. These platforms or panels shall be installed on a horizontal plane at a point no more than 4-inches below the bottom of the emergency window.

2. Side emergency windows (optional).
 - a. May not be used to replace state-required emergency exits.
 - b. Limit of two per side.
 - c. Shall meet all labeling requirements of FMVSS 217.
3. Emergency roof exit/ventilator(s).
 - a. All buses shall be equipped with a minimum number of emergency roof exit/ventilator(s) according to maximum design capacity as follows:
 - (1) Up to and including 34 passengers = 1 exit.
 - (2) 35 passenger and above = 2 exits.
 - b. If the bus is equipped with one-emergency roof exit/ventilator, it shall be located at the approximate center of the usable passenger seating area.
 - c. If the bus is equipped with two emergency roof exit/ventilators, one shall be in the approximate center of the forward one-half of the usable passenger seating area and one in the approximate center of the rear one-half of the usable passenger seating area.
 - d. If the bus is equipped with three emergency-roof exits/ventilators, they shall be in the approximate center of each one-third of the usable passenger seating area.
 - e. In all of the above situations, if locating a roof hatch in the approximate center of a seating area will intersect a roof bow, then placement shall provide maximum separation of the emergency exits.
 - f. There shall be an alarm on each emergency roof exit/ventilator that will give a continuous warning sound audible at the driver's seating position when any emergency roof exit/ventilator latching mechanism is moved to the emergency exit position.
 - g. Each emergency roof exit/ventilator shall be capable of being opened to its emergency exit position from inside and outside the bus.
 - h. Each emergency roof exit/ventilator shall meet all applicable requirements of FMVSS 217.

ENGINE FIRE EXTINGUISHER—(Optional)

When a fire suppression system is installed, nozzles for fire suppression systems shall be located in the engine compartment, under the bus, in the electrical panel, or under the dash, but shall not be located in the passenger compartment. The system must include a light or buzzer to alert the driver that the system has been activated.

ENGINE SHUTDOWN DEVICES—

Devices that automatically shut the engine down completely due to high temperature, low oil pressure, etc., are prohibited.

EXHAUST SYSTEM—

1. The exhaust pipe, after treatment system, and tailpipe shall be outside the bus body compartment and shall be attached to the chassis so any other chassis component is not damaged.
2. The tailpipe and after treatment system shall be constructed of a corrosion-resistant tubing material at least equal in strength and durability to 16-gauge steel tubing of equal diameter.
3. The tailpipe may be flush with, or shall not extend more than 2 inches beyond, the perimeter of the body for side-exit pipe or the bumper for rear-exit pipe. The exhaust system shall be designed such that exhaust gas will not be trapped under the body of the bus.
4. The tailpipe shall exit to the left or right of the emergency exit door in the rear of the vehicle or to the left side of the bus in front of or behind the rear drive axle. The tailpipe exit location on all Types A-1 or B-1 buses may be in accordance to the manufacturer's standards. The tailpipe shall not exit beneath any fuel filler location, emergency door, or lift door.
5. The exhaust system shall be insulated in a manner to prevent any damage to any fuel system component.
6. The design of the after treatment systems shall not allow active (non-manual) regeneration of the particulate filter during the loading and unloading of passengers. Manual regeneration systems will be designed such that unintentional operation will not occur.
7. For after treatment systems that require Diesel Exhaust Fluid (DEF) to meet federally mandated emissions:
 - a. The composition of DEF must comply with International Standard ISO 22241-1. Refer to engine manufacturer for any additional DEF requirements.
 - b. The DEF supply tank should be designed to meet a minimum ratio of three diesel fills to one DEF fill.

8. Tailpipe may extend through bumper.
9. The exhaust system on gas-powered buses shall be properly insulated by a securely attached shield or shields at any point where it is 12 inches or less from the fuel tank or connections on the fuel tank.

FENDERS, FRONT—

1. The total spread of the outer edges of the front fenders, measured at the fender line, shall exceed the total spread of the front tires when the front wheels are in the straight-ahead position.
2. The front fenders shall be properly braced and free from any body attachment.

FLAG—(Optional)

1. A flag decal may be located on the belt line in front of or behind the district/contractor name.
2. The flag decal shall be no larger than the height of the School District name.
3. The decal shall meet all Federal Flag Regulations. (Title 4, United States Code, Chapter 1, Section 1 and Section 2 and Executive Order 10834.)

FLOOR and FLOOR COVERING—

1. The floor in the under-seat area, including tops of the wheelhousings, driver's compartment and toeboard, shall be covered with an elastomer floor covering, having a minimum overall thickness of 1/8 inch and a calculated burn rate of 0.1 or less using the test methods, procedures and formulas listed in FMVSS No. 302. The driver's area and toeboard area in all Type A buses may be the manufacturer's standard flooring and floor covering.
2. Floor covering must be permanently bonded to the floor and must not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be of a type recommended by the manufacturer of the floor covering material. All seams must be sealed with waterproof sealer.
3. The floor covering in the aisles shall be ribbed or other raised pattern elastomer and have a calculated burn rate of 0.1 or less using the test methods, procedures and formulas listed in FMVSS No. 302. Minimum overall thickness shall be 3/16 inch measured from the tops of the ribs or raised pattern.
4. The floor shall be of prime commercial quality steel of at least 14-gauge or other metal or other material at least equal in strength to 14-gauge steel. The floor shall be flat from front to back and from side to side except in the wheel housings, toe board, and driver's seat platform areas.

Type B, C, and D

5. A flush-mounted, sealed inspection plate shall be provided in the floor of the bus for access to the fuel tank sending unit and/or fuel pump. This plate shall not be installed under flooring material.

FRAME—

1. The frame or equivalent shall be of such design and strength as to correspond at least to standard practice for trucks of same general load characteristics, which are used for severe service.
2. Any secondary manufacturer that modifies the original chassis frame shall certify the performance of the workmanship and materials resulting from such modification. (See Certification, Page 6,)
3. Any after-market frame modification shall not be for the purpose of extending or shortening the wheelbase.
4. Holes in the top or bottom flanges or frame side rails and welding to the frame shall not be permitted except as provided or accepted by the chassis manufacturer. (This does not prevent the use of a shear rubber-type suspension system.)
5. Frame lengths shall be provided in accordance with the design criteria for the complete vehicle.

FUEL TANK—

Type A

1. Single fuel tank shall be the largest offered by the manufacturer.
2. Multiple fuel tanks are permissible if installed by the chassis manufacturer.

Type B, C and D

3. Each fuel tank shall be a minimum of 30-gallon capacity and be provided by the chassis manufacturer. The actual draw capacity of each fuel tank shall be a minimum of 83 percent of the tank capacity. Each fuel tank shall be filled from and vented to the outside of the body, the location of which shall prohibit accidental fuel spillage on any part of the exhaust system.
4. No portion of the fuel system outside the engine compartment, except the filler tube, shall extend above the top of the chassis frame rail. Fuel lines shall be mounted to obtain maximum possible protection from the chassis frame.
5. A fuel filter/water separator with replaceable element shall be installed according to the engine manufacturer's specifications. (Filter/separator shall be heated on diesel engines.)
6. Center-mount tanks meeting all requirements of FMVSS 301 are permissible.

7. A flush-mounted, sealed inspection plate shall be provided in the floor of the bus for access to the fuel tank sending unit and/or fuel pump. This plate shall not be installed under flooring material.
8. The fuel tank may be mounted on the left chassis frame rail or behind the rear wheels on buses equipped with a wheelchair/mobility aid lift.
9. Installation of alternative fuel systems, including fuel tanks and piping from the tank to the engine, shall comply with all applicable fire codes in effect on the date of manufacture of the bus. (Also see *Appendix*, Page 75, Item 19.)

GOVERNOR—

1. An engine speed limiter shall be provided and set to limit engine speed, not to exceed the maximum revolutions per minute, as recommended by the engine manufacturer.
2. A road speed governor may be installed.

HAND THROTTLE—

Type C and D

All Type C and D buses shall be equipped with a locking type hand throttle or an electric/electronic controlled fast idle.

HEATING SYSTEM—PROVISION FOR

The engine shall be capable of supplying water having a temperature of at least 170° Fahrenheit at a flow rate of 50 lbs., or greater, per minute at the return end of 30 feet of 1-inch inside diameter automotive hot water heater hose. (See *Appendix*, Page 67, Item 13.)

HEATING AND AIR CONDITIONING SYSTEMS—

1. Heating System.
 - a. Heaters shall be of hot water type.
 - b. The front heater shall be of fresh air, or combination fresh air and re-circulating type.
 - c. Portable heaters may not be used.
 - d. Heater hoses and clamps shall be adequately supported and shielded to protect hoses against excessive wear due to vibration. Hoses inside of the vehicle must have protective shielding to protect the driver and passengers in the event of hose rupture. Heater hoses shall conform to SAE J20r3 Class D-1. (See *Appendix*, Page 62, Item 8.)

- e. Buses shall have a minimum of two heaters: one front and one rear.
- f. The heating system shall be capable of maintaining bus interior temperatures as specified in SAE test procedure J2233.
- g. Hot water system shall include a shutoff valve installed in the pressure and return lines at or near the engine in an accessible location.
- h. Accessible bleeder valves shall be installed in an appropriate place in the return lines of body company-installed heaters to remove air from the heater lines.
- i. Heater motors, cores and fans must be readily accessible for service. Access panels shall be provided as needed.
- j. Auxiliary fuel-fired heating systems may be installed, provided they meet the following requirements:
 - (1) Heaters shall use commercially available grades of diesel only.
 - (2) Heater(s) may be direct hot air, or connected to the engine's cooling system.
 - (3) Heater(s) shall be installed per the heater manufacturer's written instructions.
 - (4) Heater exhaust shall exit on the left side or rear of the bus, at a location as described in Exhaust System, Items 3, 4, and 5, Page 17.
 - (5) Heater manufacturer shall provide certification to OSPI that the unit complies with all applicable FMVSS.
 - (6) Heater shall be equipped with a positive shut off, manual re-set rollover protection device. This device shall activate at any angle of 45° or greater from horizontal.
 - (7) Heaters shall be protected by their own fuse or circuit breaker and have high and low voltage protection shutdown.
- k. Passenger heaters: All heaters in the passenger compartment shall be equipped with a device, installed in the hot water pressure line, which regulates the water flow to all passenger heaters. The device shall be able to be operated by the driver while seated. The driver and passenger heaters may operate independently of each other for maximum comfort.

2. Passenger Compartment Air Conditioning (Optional)

The following specifications are applicable to all types of school buses that may be equipped with air conditioning. This section is divided into two parts: Part A covers performance specifications and Part B covers other requirements applicable to all buses.

A. Performance Specifications

- i. **Standard Performance:** The installed air conditioning system should cool the interior of the bus from 100 degrees to 80 degrees Fahrenheit, measured at three points (minimum) located four feet above the floor on the longitudinal centerline of the bus. The three required points shall be: (1) three feet above the center point of the horizontal driver seat surface, (2) at the longitudinal midpoint of the body, and (3) three feet forward of the rear emergency door or, for Type D rear-engine buses, three feet forward of the end of the aisle. Note: for the Type A vehicles, placement of the rear thermocouple should be centered in the bus over the rear axle. The independent temperature reading of each temperature probe inside the bus shall be within a range of ± 3 degrees Fahrenheit of the average temperature at the conclusion of the test.
- ii. **High Performance:** The installed air conditioning system should cool the interior of the bus from 100 degrees Fahrenheit to 70 degrees Fahrenheit, measured at three points (minimum) located 4 feet above the floor on the longitudinal centerline of the bus. The three required points shall be: (1) three feet above the center point of the horizontal driver seat surface, (2) at the longitudinal midpoint of the body, and (3) three feet forward of the emergency door or, for Type D rear-engine buses, three feet forward of the end of the aisle. The independent temperature reading of each temperature probe inside the bus shall be within a range of ± 3 degrees Fahrenheit of the average temperature at the conclusion of the test.

B. Test Conditions

The test conditions under which the above performance standards must be achieved shall consist of: (1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 100 degrees Fahrenheit; (2) heat-soaking the bus at 100 degrees Fahrenheit at a point measured 2 feet horizontally from the top of the windows on both sides of the bus, with windows open for two hours; and (3) closing windows, turning on the air conditioner with the engine running at 1250 ± 50 RPM, and cooling the interior of the bus to 80 degrees Fahrenheit, (standard performance) or 70 degrees Fahrenheit (high performance), within 30 minutes while maintaining 100 degrees Fahrenheit outside temperature.

The manufacturer shall provide facilities for the user or user's representative to confirm that a pilot model of each bus design meets the above performance requirements.

C. Other Requirements.

- (1) Evaporator cases, lines, and ducting (as equipped) shall be designed in such a manner that all condensation is effectively drained to the exterior of the bus

below the floor level under all conditions of vehicle movement and without leakage on any interior portion of bus.

- (2) Evaporators and ducting systems shall be designed and installed to be free of projections or sharp edges. Ductwork shall be installed so that exposed edges face the front of the bus and do not present sharp edges.
- (3) On school buses equipped with Type-2 seatbelts having anchorages above the windows, the ducting (if used) shall be placed at a height sufficient to not obstruct occupant securement anchorages. This clearance shall be provided along the entire length (except at evaporator locations) of the passenger area on both sides of the bus interior.
- (4) The body may be equipped with insulation, including sidewalls, roof, firewall, rear, inside body bows and plywood or composite floor insulation to aid in heat dissipation and reflection.
- (5) All glass (windshield, service and emergency doors, side and rear windows) may be equipped with maximum integral tinting allowed by federal, state or ANSI standards for the respective locations, except that windows rear of the driver's compartment, if tinted, shall have approximately 28 percent light transmission. (Reference RCW 46.37.430.)
- (6) Electrical generating capacity shall be provided to accommodate the additional electrical demands imposed by the air conditioning system.
- (7) Roofs may be painted white to aid in heat dissipation. (See *Appendix*, Page 70, Item 15.) Air intake for any evaporator assembly(ies), except for front evaporator of Type A-1, shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case.
- (8) For all buses (except Type D rear engine transit) equipped with a rear evaporator assembly, evaporator shall not encroach upon head impact zone, but may occupy an area of less than 26.5 inches from the rear wall and 14 inches from the ceiling.
- (9) For Type D rear engine transit buses equipped with a rear evaporator over the davenport, the evaporator assembly may not interfere with rear exit window and may not extend above the rear seating row.

HORN—

Buses shall be equipped with a horn or horns of standard make, with each horn capable of producing complex sound in bands of audio frequencies between 250 and 2,000 cycles per second and tested per SAE Standard J377. (See *Appendix*, Page 62, Item 8.)

IDENTIFICATION—

1. The school bus body shall have the words “SCHOOL BUS” at least 8-inches high on both the front and rear of the body. (See Color, Page 7, Item 7.b.) Lettering shall be placed as high as possible without impairment of visibility. Lettering shall conform to “Series B” of Standard Alphabets for Highway Signs. (See *Appendix*, Page 62, Item 6.)
2. District name and number shall be placed on each side of the bus below the window line with 4-inch minimum letters.
3. Contractor or Cooperative name shall be placed on each side of the bus below the window line with 4-inch minimum letters.
4. A reflective sign or decal, to be attached to the rear of the bus, shall measure a minimum of 400 square inches and bear the wording:

Unlawful to Pass
when
Red Lights Flash

The lettering of lines 1, 2, and 3 shall be 3 inches in height. The color of lines 1 and 2 shall be black. The color of line 3 shall be red. The background shall be silver-retrodirective-reflex-reflective sheeting. The material shall be automotive engineering grade or better, meeting initial reflectance value in FHWA FP 85 and retaining at least 50 percent of these values for a minimum of six years. When it is necessary to split the sign to conform to the design of the rear door, the separation shall not be more than 1 inch.

5. Only signs and lettering approved by state law, regulation, or authority shall appear on the bus.
6. The district name may be placed on the front and/or back of the bus below the window line in letters no larger than 3 inches in height.
7. Equipment identification numbers no larger than 6 inches may be placed on the front and/or rear of school bus and/or on or near one or more of the four corners of the bus.

INSIDE HEIGHT—

Type A-1

1. The inside body height shall be a minimum of 62 inches.

Type A-2, B, C, and D

2. The inside body height shall be 72 inches or more, measured metal to metal, at any point on the longitudinal centerline from the front vertical bow to the rear vertical bow.

INSTRUMENTS AND INSTRUMENT PANEL—

1. Instruments and gauges shall be mounted on the instrument panel in such a manner that each is clearly visible to the driver in a normal seated position. (See *Appendix*, Page 62, Item 8.)
2. All instruments shall be easily accessible for maintenance and repairs.
3. Instrument panel shall have lamps of sufficient candlepower to illuminate all instruments and gauges.
4. The chassis shall be equipped with the following instruments and gauges (indicator lights in lieu of gauges are not acceptable, except as noted):
 - a. Speedometer;
 - b. Odometer;
 - c. Oil-pressure gauge;
 - d. Water-temperature gauge;
 - e. Fuel gauge;
 - f. Upper-beam headlight indicator;
 - g. Turn-signal indicator;
 - h. Glow-plug indicator, if appropriate.

Type A and B (Item i. only)

- i. Ammeter or voltmeter with graduated scale indicating charge and discharge.

Type C and D (Items j. through p.)

- j. Ammeter and voltmeter with graduated scale;
- k. Air pressure gauge/warning indicator; See Brakes, Page 4, Item 10.
- l. Vacuum gauge/warning indicator; See Brakes, Page 5, Item 2.
- m. Tachometer;
- n. Automatic transmission temperature gauge or warning light;
- o. An instrument indicating both MPH and RPM may be used in lieu of the separate speedometer and tachometer units;
- p. Multi-function gauge (MFG): Refer to the *2010 National School Transportation Specifications & Procedures Manual*.

5. On all buses both the ammeter and its wiring are to be compatible with generating capacity.

INSULATION—

1. The body shall be insulated with suitable material for deadening sound. The roof shall be insulated with a minimum of 1-1/2 inches of fiberglass or equal and properly vented to prevent condensation. The rest of the body shall be insulated with fiberglass or equal material capable of maintaining the inside bus body temperatures at the required level for the area in which the bus is used. The Underwriters Laboratories must approve all materials used. (See *Appendix, Page 62, Item 7.*) The body shall be dustproof and watertight.
2. Floor insulation shall be either five-ply nominal 5/8 inch (1/2 inch for Type A-1 buses) thick plywood or material of equal or greater strength and insulation R value. The plywood shall equal or exceed properties of exterior-type softwood plywood, C-D Grade as specified in standard issued by U.S. Department of Commerce. (See *Appendix, Page 62, Item 7.*) When plywood is used, all edges and seams of the floor shall be sealed.
3. If foam spray is applied to the underside of a school bus for insulation purposes, it must not cover any items needed to be inspected by the Washington State Patrol during an initial or routine inspection, including, but not limited to, body clips, fuel system parts, and air system parts.

INTERIOR—

1. The interior of the bus shall be free of all unnecessary projections, which include but are not limited to, luggage racks and attendant handrails, likely to cause injury. This standard requires inner lining on the ceiling and walls. All walls from the top of the seat rail to the bottom of the windows shall be covered with an unpainted durable finished material. If the ceiling is constructed so as to contain lapped joints, exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges.
2. The driver's area forward of the foremost padded barriers will permit the mounting of required safety equipment and vehicle operating equipment.
3. Every school bus shall be constructed so that the noise level taken at the ear of the occupant nearest to the primary vehicle noise source shall not exceed 85dBA when tested according to the procedure found in *Appendix B, of the 2010 National School Transportation Specifications & Procedures Manual.*
4. The bus shall be equipped with two holders in which to display the operating permit and certificate of registration. Holders shall be 4 by 5-inches minimum, with a transparent covering and located in the driver's compartment for easy access.

5. WAC rules and/or district policy addressing student conduct and safety related issues may be displayed in the driver's compartment, securely fastened, in an area which will not obstruct the driver's view.
6. Individual student seating identification may be placed above windows in the passenger compartment. Seating identification shall be securely fastened and shall not exceed 24 square inches.
7. Flammables such as aerosol cans and cleaners may be in an outside storage compartment. Fuel shall not be transported in outside storage compartment. A product, liquid or gel, which stipulates "Hand Sanitizer," and is labeled flammable, will be allowed in the driver compartment as long as it is stored so as to not be a loose item. There shall be no more than one 16 oz container.

LAMPS AND SIGNALS—

1. All lamps on the exterior of the vehicle shall be approved by OSPI and the Washington State Patrol, Equipment and Standards Division, and shall conform to design, construction and mounting requirements as specified in SAE J887a (See *Appendix*, Page 624, Item 8.) and/or FMVSS 108 as appropriate, or any subsequent standards thereof.
2. Interior lamps shall be provided which adequately illuminate the aisle and stepwell. Interior lights shall be able to illuminate with the ignition key in any position. Stepwell light shall be illuminated by a service door operated switch so as to illuminate only when the ignition switch or headlights and clearance lights are on and the service door is opened.
3. Alternately flashing school bus warning lights (RCW 46.37.290) shall comply with all standards of Chapter 204-21 WAC. (See *Appendix*, Page 72, Item 17.) Also see Washington State Patrol Inspection Procedures for Eight-light systems. (See *Appendix*, Page 74, Item 18.)
4. Turn signals, stop and tail lamps.
 - a. Each school bus shall be equipped with amber signal lamps mounted as high as practicable, front and rear, and placed as wide apart as practicable but not less than 3 feet. These signal lamps must be connected to a hazard-warning switch to cause simultaneous flashing when needed as a vehicular traffic hazard warning. Front turn signal lamps may satisfy this requirement.
 - b. The rear turn signal lamps shall be at least 7 inches in diameter (or if a shape other than round, a minimum of 38 inches of illuminated area) and their center line shall be approximately 8-inches below the rear windows.
 - c. The location of the front turn signal lamps shall be such that they can be clearly distinguished when the headlamps are lighted on the lower beam.

- d. There shall also be side amber turn signal lamps, one mounted on the right side just behind the entrance door, and one mounted on the left side just behind the driver's compartment as high as practicable in the beltline area.
 - e. The turn signal lamps shall flash at a rate from 60 to 120 times per minute and shall reach full brilliance during each cycle.
 - f. There shall be visible and/or audible means of giving a clear indication to the driver when the signal lamps are on.
5. Buses shall be equipped with four combination red stop and tail lamps. The upper set shall consist of two combination lamps with a minimum diameter of 7 inches (or if a shape other than round, a minimum 38 square inches of illuminated area) and shall be mounted on the rear of the bus just inside the turn signals.
6. The lower set shall consist of two combination lamps with a minimum diameter of 4 inches (or if a shape other than round, a minimum of 12 square inches of illuminated area) and shall be placed on the rear of the body between the beltline and the floor line. The rear license plate lamp may be combined with one lower tail lamp. Stop lamps shall be activated by the service brakes and shall emit a steady light when illuminated.
7. Backup lamps.

The bus body shall be equipped with at least two but not more than four white rear backup lamp signals. Minimum lamp size shall be four 4 inches in diameter, maximum lamp size shall be 7 inches in diameter. If a shape other than round, there shall be a minimum of 13 square inches of illuminated area, meeting FMVSS 108. If backup lamps are placed on the same horizontal line as the brake lamps and turn signal lamps, they shall be inboard.

8. Strobe lamp.

If installed, the strobe shall comply with WAC 204-21-210 and be subject to the following requirements:

- a. Polarity protected;
 - b. Clear white lens only;
 - c. Maximum height above bus roof, less than 8 inches; and
 - d. Radio frequency interference and electromagnetic interference filtering required. (Light must not be capable of activating emergency traffic control light switches.)
9. When the body switch-control panel lighting is separate from the dashboard panel lighting, the body switch-control panel lighting must have an independent dimmer switch.

10. An overhead map light shall be provided in the driver's compartment with a separate switch.
11. **Type C & D**
The rearmost dome light in the row(s) shall be operable by a separate switch or switch position.
12. Curb/Loading lighting shall not be located above the window line or above the service door and shall be flood lighting.
13. Headlight may be Halogen (white or blue).

METAL TREATMENT—

1. All metal, 12 gauge or thinner, used in construction of the bus body shall be zinc or aluminum-coated or treated by equivalent process before the bus is constructed. (Included are such items as structural members, inside and outside panels, floor panels and floor sills; excluded are door handles, grab handles, stanchions, interior decorative parts, and other interior plated parts.)
2. All metal parts to be painted shall be (in addition to above requirements) chemically cleaned, etched, zinc-phosphate coated, and zinc-chromate or epoxy-primed or conditioned by an equivalent process.
3. 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 subjected to abrasion during vehicle operation.
4. As evidence that above requirements have been met, samples of materials and sections used in construction of the bus body, shall be subjected to a cyclic corrosion testing as outlined in SAE J1563.

MIRRORS—

1. Exterior mirror systems shall meet or exceed all requirements of FMVSS 111.
2. All mirror systems shall be easily adjustable, but be rigidly mounted and braced so as to reduce vibration.
3. Interior rearview mirror: The interior rearview mirror shall be of clear view safety glass, of unit magnification (flat) at least 6 by 16-inches overall for Type A-1 and A-2 buses, and at least 6 by 30-inches overall for Type B, C and D buses to afford clear view of pupils and roadway to rear. One additional interior rearview mirror may be placed in the driver's compartment to allow the driver more vision of the students immediately behind them. This mirror may be of unit magnification or convex. This mirror must be no larger than 35 square inches and must be mounted as stated in Item 2. Mirrors shall be metal backed and framed and have rounded corners and protected edges.

4. Exterior rearview mirror system: Each bus shall have one left side and one right side rearview mirror of unit magnification. The mirrors shall provide the driver clear views of the following areas:
 - a. The left and right sides of the bus and to the rear of the bus for a distance of at least 200 feet.
 - b. The rear tires at ground level and at least 12 feet perpendicular to the left and right side of the bus at a point 32 feet back from the front bumper.
5. It may be possible to satisfy the requirement of Item 4.b. for the left side with the exterior rearview mirror described in Item 4.; however, this mirror must continue to meet the requirements of Item 4.a.
6. Additional mirrors, if required to meet Item 4.b., shall be either of unit magnification or have an average radius of curvature no less than 40 inches.
7. All rear-view mirror systems shall be heated and power remote controlled.
8. The Original Equipment Manufacturer (O.E.M.), in design considerations, shall make every effort to lessen the blind spot(s) behind all rear-view mirror systems (driver and passenger side) by using overhead mounting configurations or maximum separation of mirrors on single-point or loop brackets.
9. The right side, rear-view mirror system shall not be obscured by the unwiped portion of the windshield.
10. Cross-view mirror system: The cross-view mirror system shall be heated and shall provide the driver indirect vision of the following areas not observable by direct vision:
 - a. From ground level directly below the full width of the front bumper, vertical and forward, to points where direct vision occurs.
 - b. From ground level around the left- and right-front corners of the bus, vertical and to the sides, to points where direct vision occurs.
 - c. The left and right sides of the bus, to include the front tires at ground level, the service entrance and rearward on each side to a point where indirect vision overlaps with the rearview mirror system.
 - d. Reduction in apparent image size in cross-view mirrors shall be no greater than necessary to show the view described.

MOUNTING—

1. The chassis frame shall extend to the rear edge of the rear body cross member. The bus body shall be attached to the chassis frame in such a manner as to prevent shifting or separation of the body from the chassis under all operating conditions.

2. The body front shall be attached and sealed to the chassis cowl in such a manner as to prevent entry of water, dust, and fumes through the joint between the chassis cowl and body.
3. Isolating material shall be placed at all contact points between the body and chassis frame, and shall be so attached to the chassis frame or body member that it will not move under all operating conditions.

MUD FLAPS—

Mud flaps shall be rubber and meet requirements of RCW 46.37.500. (See *Appendix*, Page 81, Item 23.)

NOISE SUPPRESSION SWITCH—

Each bus shall be equipped with an on/off (not momentary) switch mounted in the driver's compartment to turn off all noise-producing accessories simultaneously, including, but not limited to, heater/air conditioning blowers, defroster fans, auxiliary fans and radios, if so equipped. This switch shall not disable the emergency exit buzzers. This does not apply to two-way communication systems. In addition, a red light may be activated by the switch to alert students.

OIL FILTER—

Type A

1. Full-flow oil filter shall be provided.

Type B, C, and D

2. Full-flow oil filter shall be provided and have a capacity of at least one quart.

OPENINGS—

All openings in the floorboard and firewall between the chassis and passenger-carrying compartment shall be effectively sealed, to prevent fumes or moisture from engine compartment or beneath the chassis from entering the passenger compartment. Where plates are used to cover openings, they shall have gaskets and be fastened securely.

OVERALL LENGTH—

Maximum length for school buses shall be limited to 43 feet. If over 40.5 feet, there may not be more than 14 rows of seats.

POWER AND GRADEABILITY—(See *Appendix*, Page 63, Item 11.)

RACKS—

The use of any type of racks inside or outside of the bus is prohibited.

RETARDER SYSTEM—(Optional)

Retarder system, if installed, shall limit the speed of a fully-loaded school bus to 19 mph on a 7 percent grade for no less than 3.6 miles.

ROUTE IDENTIFIER—(Optional)

1. External.
 - a. Shall not be larger than 75 square inches.
 - b. May not be placed in the windshield or any windows.
 - c. May be symbols and/or letters.
 - d. Must be of quality construction with no snagging hazard and/or sharp edges.
2. Internal.
 - a. Shall not be larger than 75 square inches.
 - b. Must be displayed in the first right-side passenger window.
 - c. May be symbols and/or letters.
 - d. Must be mounted on transparent material.

RUB RAILS—

1. External.
 - a. There shall be one rub rail located on each side of the bus body, approximately at seat level, which shall extend from the rear side of the entrance door to the radius of the rear corner on the right side, except at the emergency door and from the radius of the front corner, cowl, or rear of the driver's door to the radius of the rear corner on the left side, except at the electrical access panel or emergency door.
 - b. There shall be one rub rail on each side of the bus located approximately at floor line which shall cover the same longitudinal area as the upper rub rails, except at the wheelhousings and side emergency doors.
 - c. Both rub rails shall be attached at each body post and all other upright structural members.
 - d. All rub rails shall be 4 inches or more in width, shall be of 16-gauge steel or other material of equal strength and shall be constructed in corrugated or ribbed fashion.

- e. All rub rails shall be applied outside the body or outside body posts. Snap-on rub rails do not satisfy this requirement.
- f. All rub rails shall be provided with a sufficient number of drain holes to reduce the chance of body rust.
- g. Other rub rails may be added. Optional rub rails must meet the requirements of d. through f. above.

2. Internal.

- a. Internal body side structure may be substituted for external rub rails, provided they meet the following requirements:
 - (1) There shall be no less than three internal rails located on each side of the bus, one at shoulder level, one at seat level and one at floor level.
 - (2) The internal rails on the right side shall extend from the rear side of the entrance door to the radius of the right-rear corner, and from the radius of the left-front corner to the radius of the left-rear corner.
 - (3) Internal rails may be constructed of round tubing, angle or channel metal, or other material providing the equivalent strength and durability of 10-gauge or heavier, 1-1/2 by 3-inch rectangular steel tubing.
 - (4) The rails may be one piece, welded to each body post and all other upright structural members, or they may be segmented and welded between each body post and all other upright structural members.
- b. A letter from the manufacturer certifying that the body side structure of their bus meets or exceeds the above criteria shall be required by the Superintendent of Public Instruction prior to initial sale in Washington State of this type bus.

SANDERS—(Optional)

Where required or used, sanders shall:

- 1. Be of hopper cartridge-valve type;
- 2. Have a metal hopper with all interior surfaces treated to prevent corrosion from moisture;
- 3. Have a cover on filler opening of hopper, which screws into place, sealing the unit airtight;
- 4. Have discharge tubes extending to the front of each rear wheel under the fender;
- 5. Have no-clogging discharge tubes with slush-proof, nonfreezing rubber nozzles;

6. Be operated by an electric switch with a pilot light mounted on the instrument panel;
7. Be exclusively driver-controlled; and,
8. Be of at least 100-pound (grit) capacity on each side.

SEAT AND SEAT BELT FOR DRIVER—

1. A Type 2 lap/shoulder belt shall be provided for the driver. The assembly shall be equipped with an emergency locking retractor (ELR) for the continuous belt system. The lap portion of the belt shall be guided or anchored where practicable so as to prevent the driver from sliding sideways under it.
2. The driver's seat shall be of the high-back type with a minimum seat back adjustment of 15 degrees and with a head restraint to accommodate a 95 percentile adult male as defined in FMVSS 208. The driver's seat shall be secured with nuts, bolts, and washers or flanged-headed nuts. When the seat is at its fullest extension from the steering wheel, the minimum distance between the steering wheel and backrest of driver's seat shall be 11 inches. The driver's seat shall have vertical adjustment, and shall have fore-and-aft adjustment of not less than 4 inches.
3. Type A buses may be manufacturer's standard seat.

SEATS—

1. All seats shall be forward facing and shall comply with FMVSS 222.
2. All seats shall have a minimum depth of 15 inches and seat backs and barriers shall be a minimum of 28-inches high (a minimum of 24 inches from the seating reference point (SRP)).
3. No bus shall be equipped with jump or portable seats.
4. Automatic flip-up seats are permitted, in Type C and D buses only, at side-emergency doors only. (See Emergency Exits, Page 15, Items u. (1)–(4).)
5. The forward-most pupil seat on the right side of the bus shall be located so as not to interfere with the driver's vision.
6. In determining seat width, allowable average rump width shall be:
 - a. Thirteen inches where the 3–3 seating plan is used.
 - b. Fifteen inches where the 3–2 seating plan is used.
7. There shall be a minimum of 36-inches headroom for sitting positions from the un-depressed seat cushion line to the ceiling of the bus. Measurement shall be made vertically not more than 7 inches from the sidewall at the cushion height and fore-and-aft center of the seat cushion.

8. Each seat leg shall be secured to the floor, and seat frames to the seat rail, by a minimum of two bolts, washers, and nuts, flange nuts, weld nuts or tapping blocks which will allow removal and reinstallation of the seat. This requirement does not apply to track seating.
9. If seats are track seating mounted, spacing between seats or seats and crash barriers shall not exceed FMVSS No. 222 maximum permissible distance. Manufacturers shall provide written instructions to the end user that details seat placement procedures that comply with FMVSS No. 222.
10. All restraining barriers and passenger seats shall be covered with a material that meets the criteria contained in the *School Bus Seat Upholstery Fire Block Test*. (Appendix B, of the *2010 National School Transportation Specifications & Procedures Manual*.)
11. Seat sleeves for the purpose of storage may be placed over the seat back or barrier. Material must meet *School Bus Seat Upholstery Fire Block Test*. (Appendix B, of the *2010 National School Transportation Specifications & Procedures Manual*.) Must have a closure device, or flap with closure device to secure contents.
12. Lap belts shall not be installed on passenger seats in large school buses (over 10,000 pounds GVWR) except in conjunction with child safety restraint systems that comply with the requirements of FMVSS No. 213. Lap/shoulder systems are allowed.

SECURITY—(Optional)

1. Camera recording systems may be installed, but shall be mounted so as to minimize the potential for injury. (See Cameras, Page 6.)
2. The State Bus Number may be placed on the roof for identification. The lettering shall be black, approximately 24-inches high and located in the approximate center of the bus, as to not interfere with the roof hatch(es).

SHOCK ABSORBERS—

1. The bus shall be equipped with heavy-duty front and rear double-acting shock absorbers compatible with the manufacturer's rated axle capacity.

Type C and D

2. Shock absorbers are not required on a trunion-type rear suspension.

SPRINGS—

1. Springs or other types of suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain a loaded bus without evidence of overload.

2. Springs or other types of suspension assemblies shall be designed to carry their proportional share of gross vehicle weight.
3. If leaf springs are used in the rear, they shall be parabolic- or progressive-type.

Type C and D

4. If multi-leaf front springs are used, stationary eyes shall be protected by a full wrapper leaf in addition to the main leaf. Parabolic springs are exempt from this requirement.

STEERING GEAR—

1. Steering gear shall be approved by the chassis manufacturer and designed to assure safe and accurate performance when the vehicle is operated with maximum load and at maximum speed.
2. The steering mechanism shall provide for easy adjustment for lost motion.
3. No changes shall be made in the steering apparatus, which are not approved by the chassis manufacturer.
4. There shall be clearance of at least 2 inches between the steering wheel and cowl instrument panel, windshield or any other surface.
5. Power steering is required and shall be of the integral type with integral valves.
6. The steering system shall be designed to provide a means for lubrication of all wear-points, if wear-points are not permanently lubricated.
7. Power steering hoses shall be protected from excessive heat and vibration and be so installed as to prevent chafing.

STEPS—

1. The service door entrance may be equipped with two-step or three-step stairwell. Risers in each case shall be approximately equal to and shall not exceed a height of 10 inches. When plywood floor is used on steel, the height of the top step may be increased by the thickness of the plywood used.
2. Steps shall be enclosed to prevent accumulation of ice and snow.
3. Steps shall not protrude beyond the side bodyline while the bus is in motion.
4. A handrail not less than 20 inches in length shall be provided in an unobstructed location inside the doorway.

Type A and B

5. The first step at the service door shall be not less than 10 inches and not more than 14 inches from the ground when the bus is empty.

Type C and D

6. The first step at the service door shall be not less than 10 inches and not more than 16 inches from the ground when the bus is empty.
7. On chassis modifications which may result in increased ground clearance (such as four-wheel drive), an auxiliary step may be provided to compensate for the increase in ground-to-first-step clearance. Such steps shall meet the requirements of Items 1.-4. below, in Step Treads. These steps need not be enclosed.

STEP TREADS—

1. All steps, including the floor line platform area, shall be covered with an elastomer floor covering having a minimum overall thickness of 0.187 inch.
2. The step covering shall be permanently bonded to a durable backing material that is resistant to corrosion.
3. Step treads shall have 1-1/2-inch white nosing as an integral piece without any joint. The floor level step need not have white nosing.
4. The rubber portion of the step treads shall have the following characteristics:
 - a. Abrasion resistance: Step tread material weight loss shall not exceed 0.40 percent, as tested under ASTM D-4060, *Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser*, (CS-17 Wheel, 1000 gram, 1000 cycle);
 - b. Weathering resistance: Step treads shall not break, crack, or check after ozone exposure (7 days at 50 phm at 40 degrees C) and Weatherometer exposure (ASTM D-750, *Standard Test Method for Rubber Deterioration in Carbon-Arc Weathering Apparatus*, 7 days); and
 - c. Flame resistance: Step treads shall have a calculated burn rate of .01 or less using the test methods, procedures and formulas listed in FMVSS No. 302, *Flammability of Interior Materials*.
 - d. Nonskid/nonslip material shall be used on the nose of the step treads. This does not include the floor level step.
5. All areas between the step treads and the vertical risers shall be sealed with a waterproof sealer.

STIRRUP STEPS—

Type C and D

1. There shall be one stirrup step and a suitably located handle on each side of the front body for easy accessibility for cleaning the windshield and lamps.
2. A step, in lieu of the stirrup steps, is permitted in or on the front bumper.

STOP SIGN—

1. All school buses shall be equipped with one octagonal stop sign meeting the applicable requirements of FMVSS 131. The background shall be a minimum of 18 by 18 inches and shall be red in color with the word “STOP” in white lettering. The sign shall be mounted so as not to interfere with the driver’s vision to the rear when the sign is extended. The standard octagonal sign shall contain two) flashing red strobe lamps, which are visible from both sides of the extended sign. These strobe lamps shall be connected to the alternately red flashing signal lamp circuits.
2. The signal shall be manual, vacuum, electric or air power controlled and so constructed as to lock in the extended and closed position.
3. The control for the “STOP” sign shall be mounted within view and easy access of the driver, but not readily accessible to students.
4. The control for the “STOP” sign and red warning lights shall be manually operable before or after opening of the service door. (See WAC 204-21-190 in *Appendix*, Page 72, Item 17.) Also see Washington State Patrol Inspection Procedures for Eight-light systems. (See *Appendix*, Page 74, Item 18.)

STORAGE COMPARTMENT—

1. Buses shall have a metal container of adequate strength and capacity for storage of tire chains and/or tow chains and such tools as may be necessary for minor emergency repairs while the bus is en route.
2. The storage container shall be located either inside or outside the passenger compartment. If inside, it shall be located under the first or last row of passenger seats, be fastened to the floor and have a separate cover (seat cushion may not serve for this purpose) that can be securely latched. If outside, it shall be dust-proof and watertight.
3. Buses equipped with luggage compartments need not meet the requirements of Item 1. and Item 2. above.
4. The storage container may be located in the engine compartment on Type D rear-engine buses.

SUN VISOR—

Type A-1 and A-2

1. The sun visor may be manufacturer’s standard.

Type B, C and D

- 2 An interior adjustable sun visor not less than 6- inches wide and 30 inches long shall be so installed that it can be turned up when not in use. The visor shall be mounted so that it will maintain any position in which it is placed. The visor may pivot to the left or an additional left side visor may be added.

- 3 When the visor is in a turned-up position, it will be securely held so that the un-mounted edge will be in such a position that it will not endanger the driver. It shall be supported by two brackets and shall be transparent.

TIRES AND RIMS—

1. Tires and rims of proper size and load rating, commensurate with the chassis manufacturer's GVWR, shall be provided. (See *Appendix*, Page 81, Item 24.)
2. All tires on any given axle shall be of the same size, ply, and load rating.
3. Combination of rims and tires shall allow for tire chain installation.
4. Recapped or retread tires are not permitted on front axles.
5. Re-grooved tires are not permitted.
6. Section repairs are not permitted in the front tires.
7. Spare tire, if carried, shall be appropriately mounted in an accessible location outside the passenger compartment.

Type D

8. Rear tandem suspension shall have a minimum of six tires.

TOWING ATTACHMENTS, FRONT—

Type B, C, and D

Each chassis shall be equipped with two tow hooks or tow eyes mounted or capable of immediate mounting on the forward portion of the frame and they shall be of sufficient strength to pull or be pulled by another vehicle of the same GVW. Tow eyes or hooks shall be attached so they do not project beyond the front bumper.

TOWING ATTACHMENTS, REAR—

Buses shall be equipped with two rear tow hooks or tow eyes, secured or capable of immediate securing to the chassis frame and be sufficiently strong to tow the GVW of the bus. Permanently attached tow hooks shall not protrude beyond the bumper. If rear tow hooks or tow eyes are attached to each frame side member, the frame and frame cross members must be of sufficient strength to take the GVW of the bus in tow without distortion. Holes in the rear bumpers which allow access to towing attachments must be covered.

TRANSMISSION—

1. Manual or automatic transmissions shall provide not less than three forward speeds and one reverse speed.

2. The chassis manufacturer shall warrant the transmission to withstand the maximum torque developed by the engine.
3. When the automatic transmission is controlled by a shift lever, there shall be a detent between each gear position.
4. Buses equipped with manual transmissions shall have a transmission shift diagram affixed to the dash immediately ahead of the shift lever.

Type C and D

5. Transmission shall have an externally accessible filter.

TURNING RADIUS—

1. A chassis with a wheelbase of 264 inches or less shall have a right and left turning radius of not more than 42-1/2 feet, curb-to-curb measurement.
2. A chassis with a wheelbase of 265 inches or more shall have a right and left turning radius of not more than 44-1/2 feet, curb-to-curb measurement.

UNDERCOATING—

1. The chassis manufacturer or agent thereof shall coat the undersides of steel or metallic-constructed front fenders with rust-proofing compound for which compound manufacturer has issued notarized certification of compliance to the chassis builder that the compound meets or exceeds all performance requirements of SAE J1959.
2. The entire underside of the bus body, including floor sections, cross members, below the floor line side panels, and outer bottom and vertical surfaces of the luggage compartments shall be coated with rust-proofing compound for which the compound manufacturer has issued notarized certification or compliance to the bus body manufacturer that the compound meets or exceeds all performance requirements of SAE J1959.
3. Type A buses may have restrictions for undercoating around exhaust systems. If so, plywood and/or bare metal must be protected against corrosion.
4. If Foam Spray is applied to the underside of a school bus for sealing or insulation purposes, it must not cover any items that need to be inspected by the Washington State Patrol during an initial or routine inspection, including, but not limited to, body clips, fuel system parts, and air system parts. Seat fasteners may be covered.
5. Undercoating compound shall be applied with suitable airless or conventional spray equipment to recommended film thickness and shall show no evidence of voids in the cured film. Undercoating is expected to prevent rust under all bus service conditions.

Type A-1 and A-2

6. Floor section(s) between the frame rails need not be undercoated, provided that the underside of the floor section(s) are covered with a durable finished material, which may include material with a painted surface, under which shall be placed fiberglass or equal insulating material capable of holding bus body temperatures at the required level for the area in which the bus is used. This insulating material shall be completely covered and held in place by non-rusting metal or material other than metal having equivalent strength and durability.

VENTILATION—

1. The body shall be equipped with a suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.
2. A static-type exhaust ventilator shall be installed in the low-pressure area of the roof.
3. An emergency roof exit/ventilators may serve requirements of Item 1. and Item 2. above.
4. A power ventilator may be used in place of or in addition to the static vent.

WHEELHOUSINGS—

1. Wheelhouse openings shall allow for easy tire removal and service.
2. Wheelhousings shall be attached to floor sheets in such a manner as to prevent dust, water or fumes from entering the body. Wheelhousings shall be constructed of 16-gauge steel or other material of equal strength.
3. Wheelhousings shall provide clearance for installation and use of tire chains.
4. Inside height of wheelhousings above the floor line shall not exceed 12 inches.
5. No part of a raised wheelhousing shall extend into the emergency door opening.

WHEELS AND HUBS—

Type A and B

1. Wheels shall be disc-type.
2. Hubs shall be not less than five studs.
3. Dual rear wheels shall be provided for all buses over 10,000 lbs. GVWR.

Type C and D

4. Wheels shall be disc-type and may be hub or stud-piloted when flange or cone-type nuts are used.

5. Type C and D buses equipped with hydraulic brakes shall have no less than six stud hubs. (See Brakes, Page 3, Item 4.)
6. Type C and D buses equipped with air brakes and stud-piloted wheels shall have ten stud hubs, front and rear and a separate set of Budd-type, ball seat lug nuts for both the inside and outside rear dual wheels.
7. Type C and D buses equipped with air brakes and hub-piloted wheels may have 8 or 10 stud hubs, front and rear.

WINDSHIELD AND SIDE WINDOWS—

1. The glass in the windshield shall be AS-1 safety glass, so mounted that its identification mark is legible and of a quality of laminated glass to prevent distortion of view in any direction. Laminated safety glass shall be in compliance with FMVSS 205.
2. The windshield shall be large enough to permit the operator to see the highway clearly, shall be slanted to reduce glare, and shall be installed between the front corner posts that are so designed and located as to afford a minimum obstruction of the operator's view of the highway.
3. Glazing in all side windows behind the driver, doors, and rear windows shall be AS-3 grade or better. Windows beside the driver shall be AS-2 grade or better.

Type A-1

4. Each passenger-side window, excluding the rear-side quarter windows, shall have an unobstructed opening of at least 9 inches in height and 22 inches in width, when lowered, to provide emergency egress.

Type A-2 and B

5. Each passenger-side window, excluding the rear-side quarter windows, shall have an unobstructed opening of at least 12 inches in height and 22 inches in width, when lowered, to provide emergency egress.

Type C and D

6. Each passenger-side window, excluding any door windows and the rear side quarter windows, shall have an unobstructed opening of at least 12 inches in height and 22 inches in width, when lowered, to provide emergency egress. There may be one additional window on each side of the bus that measures less than 22 inches in width. These windows are not required to open.

WINDSHIELD WASHERS—

An electric, air, or vacuum-powered windshield washer which will effectively clean the entire area covered by both windshield wipers shall be provided. Windshield washer equipment shall meet FMVSS 104.

WINDSHIELD WIPERS—

1. A two-speed or variable speed windshield wiping system, with intermittent feature, shall be provided. Windshield wiper equipment shall meet FMVSS 104.
2. The wipers shall be operated by one or more air or electric motors of sufficient power to effectively operate the wiper system. If one motor is used, the wipers shall be designed to give full sweep of the windshield.

WIRING—

1. All wiring shall conform to current SAE standards. (See *Appendix*, Page 62, Item 8.)
2. Circuits.
 - a. Wiring shall be arranged in circuits as required, with each circuit protected by a fuse, circuit breaker or field effect transistor. A system of color and/or number coding shall be used and an appropriate identifying wiring diagram of each body as manufactured shall be provided to the end user along with the wiring diagram provided by the chassis manufacturer. A system of color and number coding shall be used on buses manufactured after January 1, 1992. The following body interconnecting circuits shall be color-coded as noted:

<u>FUNCTION</u>	<u>COLOR</u>
Left-Rear Directional Light	Yellow
Right-Rear Directional Light	Dark Green
Stoptlights	Red
Back-up Lights	Blue
Taillights	Brown
Ground	White
Ignition Feed, Primary Feed	Black

The color of cables shall correspond to SAE J1128.

- b. Wiring shall be arranged in at least six regular circuits, as follows:
 - (1) Head, tail, stop (brake) and instrument panel lamp;
 - (2) Clearance and stepwell lamps. (Stepwell lamp shall be actuated when the service door is opened.);
 - (3) Dome lamps;
 - (4) Ignition and emergency door signal;
 - (5) Turn signal lamps; and

- (6) Alternately flashing signal lamps.
 - c. Any of the above combination circuits may be subdivided into additional independent circuits.
 - d. There shall be at least one circuit for each additional heater or defroster installed.
 - e. Whenever possible, all other electrical functions (such as sanders and electric-type windshield wipers) shall be provided with independent and properly protected circuits.
3. The entire electrical system of the body shall be designed for the same voltage as the chassis on which the body is mounted.
 4. All wiring shall have an amperage capacity equal to or exceeding the designed load. All wiring splices shall be done at an accessible location and noted as splices on the wiring diagram.
 5. The body power wire shall be attached to a special terminal on the chassis.
 6. All wires passing through metal openings shall be protected by a grommet.
 7. Wires not enclosed within the body shell shall be fastened securely at intervals of not more than 18 inches. All joints shall be soldered or joined by equally effective connectors.
 8. Chassis manufacturer shall install a readily accessible terminal strip or connector on the body side of the cowl, or at an accessible location in the engine compartment of vehicles designed without a cowl, that shall contain the following terminals for the body connections:

a. Main 100-amp body circuit;	b. Tail lamps;
c. Right-turn signals;	d. Left-turn signals;
e. Stop lamps;	f. Back-up lamps; and
g. Instrument panel lights (dimmer controlled).	

SECTION II

SPECIAL NEEDS SPECIFICATIONS

SECTION II SPECIAL NEEDS SPECIFICATIONS

SPECIFICATIONS FOR SCHOOL BUSES TO TRANSPORT STUDENTS WITH SPECIAL NEEDS. (Reference WAC 392-143-010, in *Appendix*, Page 76.)

The classification for any school bus used to transport students with special needs will be determined as if the bus was equipped with a standard seating arrangement. As an example: A bus that would be rated as a 48-passenger bus could be constructed or modified to transport 21 students with special needs. This bus will be classified as a 48-passenger bus on the operating permit with a reference to its reduced capacity.

This section lists, with respect to vehicles constructed or modified for transportation of students with special needs:

1. Standards for special equipment.
2. Exceptions in standards for school buses.

AISLE—

Buses equipped with wheelchair/mobility aid lifts shall have aisles between seat bottoms, between seats and wheelchair/mobility aid positions, or between stanchions at least 30 inches in width. Aisles between wheelchair/mobility aids shall be at least 20 inches in width.

ALTERNATOR—

Buses equipped with lifts, shall have alternators of sufficient amperage output to maintain battery(ies) at a charge level adequate to fulfill total current demand of all systems. Minimum idle output shall be 50 percent of the output rating.

BATTERY—

Buses equipped with lifts shall have a battery that will provide a minimum reserve capacity of 180 minutes at 25 amps draw and the highest CCA performance available.

IDENTIFICATION—

Buses with power lifts shall display the International Symbol of Accessibility located below the window-line on the rear and/or right side. Such emblem(s) shall be white on blue background, shall not exceed 12 inches in size, and shall be of high intensity reflective material meeting Federal Highway Administration (FHWA) FP-85 standards.

LIFT, POWER—

1. Vehicle Lift.

- a. Power lift shall be right side mounted and stored within or under the vehicle.
- b. Lifting mechanism and platform shall meet a minimum 2,400 lbs. static load test and be capable of lifting a minimum payload of 800 lbs.
- c. Lift travel shall allow the lift platform to rest securely on the ground.
- d. Lift design shall prevent excessive pressure that could damage the lift system when the platform is fully lowered or raised, or that could jack up the vehicle.
- b. Lift shall be designed so as to prevent accidental lowering while in storage.
- c. Lift shall be able to operate with ignition key in any position.

2. Controls.

- a. Power lifts shall be so equipped that they may be lowered and raised in the event of power failure of the lift mechanism. There shall be a means of preventing the lift platform from falling while in operation due to a power failure.
- b. A switch shall be installed so that the lifting mechanism will not operate when the lift platform door(s) is closed.
- c. Power unit for lift shall be located so as not to restrict or impair center aisle space or foot and legroom between seats.
- d. On electric power lifts a circuit breaker or fuse shall be installed between the power source and lift motor as close to the power source as possible.
- e. Electrical cable between power source and lift motor shall be of a gauge heavy enough to operate the lift continuously with no more than one volt drop. There shall be no splices in the cable. Solenoids, cable ends, and breakers/fuses must be enclosed for protection from the elements and road splash or spray.
- f. Controls shall be provided that enable the operator to activate the lift mechanism from either inside or outside the bus. The controls may be interlocked with the vehicle brakes, transmission or door, or they may provide other appropriate mechanisms or systems to ensure the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged. The lift shall deploy to all levels (e.g., ground, curb and intermediate positions) normally encountered in the operating environment.
- g. Where provided, each control for deploying, lowering, raising and stowing the lift and lowering the roll-off barrier shall be of a momentary contact type requiring continuous manual pressure by the operator and shall not allow improper lift

sequencing when the lift platform is occupied. The controls shall allow reversal of the lift operation sequence, such as raising or lowering a platform that is part way down, without allowing an occupied platform to fold or retract into the stowed position.

3. Platform.

- a. The lift platform shall have a minimum clear width of 28 1/2 inches at the surface of the platform, and a minimum clear width of 30 inches measured from 2 inches above the platform surface to 30 inches above the surface of the platform. The minimum clear length of the platform between the outer edge barrier and inner edge shall be 48 inches.
- b. The lift platform shall be equipped with barriers to prevent any of the wheels of a wheelchair or mobility aid from rolling off the platform during its operation. A movable barrier or inherent design feature shall prevent a wheelchair or mobility aid from rolling off the edge closest to the vehicle until the platform is in its fully raised position. Each side of the lift platform, which extends beyond the vehicle in its raised position, shall have a barrier a minimum 1 1/2-inch high. Such barriers shall not interfere with maneuvering into or out of the aisle. The loading-edge barrier (outer barrier), which functions as a loading ramp when the lift is at ground level, shall be sufficient when raised or closed, or a supplementary system shall be provided, to prevent a power wheelchair or mobility aid from riding over or defeating it. The outer barrier of the lift shall automatically raise or close, or a supplementary system shall automatically engage, and remain raised, closed, or engaged at all times that the platform is more than 3-inches above the roadway or sidewalk and the platform is occupied.

Alternatively, a barrier or system may be raised, lowered, opened, closed, engaged, or disengaged by the lift operator, provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed or the supplementary system is engaged.

- c. The lift platform (not including the entrance ramp) shall not deflect more than three degrees (exclusive of vehicle roll or pitch) in any direction between its unloaded position and its position when loaded with 600 pounds applied through a 26 inch by 26 inch test pallet at the center of the platform.
- d. Power-lift platform and ramp shall be covered with nonskid materials.

4. Handrail.

Platforms on lifts shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have a usable component at least 8-inches long with the lowest portion at approximately 30 inches above the platform and the highest portion a maximum 38 inches above the platform. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a

cross-sectional diameter between 1 1/4 inches and 1 1/2 inches or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than 1/8 inch. Handrails shall be placed to provide a minimum 1 1/2-inch knuckle clearance from the nearest adjacent surface. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

5. Padding.

On fold-out type lifts, all stationary frame members and potentially dangerous edges or surfaces, such as sharp corner angles and sharp or jagged edges which might result in lacerations or puncture wounds while the lift is in storage, must be covered with impact padding material. Padding shall be a closed-cell urethane foam, rubber or vinyl type of material a minimum of 3/16-inch thick.

6. Elevator lifts.

If elevator-type lift is used, guard panels shall be installed at both the rear and front edges of the lift opening extending into the bus. The height of the guard panels must be within 2 inches of the lower sill of the side windows. The guard panels and any potentially dangerous edges or surfaces on or adjacent to the lift shall be padded with material as described in Item 5. above. A removable, padded guard chain or cable shall be installed to separate the lift opening in floor from the passenger area.

LIGHT—

A light located on the inside of the bus over the lift door shall illuminate the lift loading area and be activated when the door latch has been moved to the open position. This requirement will also serve as a warning indication to the driver that the door is in a jarred position. The light shall operate with the ignition key in any position.

RAMPS—

When a power-lift system is not adequate to meet an individual student's need, as specified in the student's Individualized Education Program (IEP), a ramp device may be used.

1. If a ramp is used, it shall be of sufficient strength and rigidity to support the special device, occupant, and attendant(s). It shall be equipped with a protective flange on each longitudinal side to keep special device on the ramp.
2. Floor of ramp shall be of nonskid construction.
3. Ramp shall be of weight and design, and equipped with handle(s), to permit one person to put ramp in place and return it to its storage place.

SEATS, SEATING AND WHEELCHAIR/MOBILITY AID POSITIONS—

1. **Effective December 31, 2006:** There shall be no side-facing wheelchair/mobility aid positions.
2. There shall be an FMVSS 222 restraining barrier immediately behind the stepwell.
3. Every bus that is lift equipped shall have at least one school bus seat no less than 15 inches in width.
4. Any passenger seat that has a child safety seat attached thereto, shall be equipped with seat belts that meet the requirements of FMVSSs 208, 209, and 210.
5. All child safety seats transported in any school bus shall meet the requirements of FMVSS 213.
6. Child safety seats shall be secured to the bus seat in a manner prescribed and approved by the manufacturer.
7. Infant seats (for children under 12 months) shall be attached to the bus seat rearward facing.
8. Type A-1 buses shall be limited to three wheelchair/mobility aid positions.
9. Type A-2 and B buses shall be limited to four wheelchair/mobility aid positions.
10. Type C and D buses shall be limited to six wheelchair/mobility aid positions.
11. A wheelchair/mobility aid position shall never be located to block a power lift door location.

SECUREMENT AND RESTRAINT SYSTEM FOR WHEELCHAIR/MOBILITY AID AND OCCUPANT—

For the purpose of this section, the term “securement” or phrase “securement system” is used exclusively in reference to the device(s), which secure the wheelchair/mobility aid. The term “restraint” or phrase “restraint system” is used exclusively in reference to the device(s) used to restrain the occupant of the wheelchair/mobility aid. The phrase “securement and restraint system” is used to refer to the total system, which secures and restrains both the wheelchair/mobility aid and the occupant.

1. Securement and restraint system—general.
 - a. The Wheelchair/Mobility Aid Securement and Occupant Restraint System shall be designed, installed, and operated to accommodate passengers in a forward-facing orientation within the bus and shall comply with all applicable requirements of FMVSS 222. Gurney-type devices shall be secured parallel to the side of the bus.

- b. The bus body floor and sidewall structures where the securement and restraint system anchorages are attached, shall have equal or greater strength than the load requirements of the system(s) being installed.
- c. Grade 5 bolts or better shall be used to secure inserts or cargo track to bus floor or wall. Bolts shall not restrict the incremental adjustment positions of the cargo track.
- d. All belt-end fittings used to attach belts to the floor or wall inserts or cargo track, shall be a positive lock type to prevent accidental disconnecting and be made of metal and designed for quick attachment and detachment without the use of tools.
- e. The wheelchair/mobility aid securement system belts and the occupant restraint system belts shall be color coded with black for the occupant.
- f. Belt systems shall be made of a material that can be cut with shears or other sharp cutting instrument.
- g. All securement and restraint systems shall be fully adjustable and of such design to accommodate various sizes of wheelchair/mobility aids and occupants.
- h. Adjusters and belt tension devices shall be a positive mechanical locking type.
- i. Where the term “metal to metal” is used, the intent is to have the vendor supply industry standard devices, which may have a combination of metal, plastic, or other materials in the buckle assembly that meet or exceed the strength requirements outlined in FMVSS 209.
- j. The following information shall be provided with each vehicle equipped with a securement and restraint system:
 - (1) Detailed instructions, including a parts list, regarding installation and use of the system; and
 - (2) Detailed instructions, including a diagram, regarding the proper placement and positioning of the system, including correct belt angles.
- k. A device for storage of the securement and restraint system (webbing or strap assemblies) shall be provided. When the system is not in use, the storage device shall allow for clean storage of the system, shall keep the system securely contained within the passenger compartment, shall provide reasonable protection from vandalism and shall enable the system to be readily accessed for use.

2. Wheelchair/mobility aid securement system.

- a. Wheelchair/mobility aids shall be securely anchored in a fixed position.

- b. Wheelchair/mobility aids shall be secured through the use of separate floor inserts or aircraft quality cargo track securement devices. The cargo track may be either slotted "E" track, or aircraft cargo track. If cargo track is used, incremental adjustments shall not exceed 2 inches.
 - c. There shall be sufficient floor inserts or cargo track to provide four points of attachment (two forward and two rear) for each wheelchair/mobility aid position.
 - d. Belts between wheelchair/mobility aid and floor inserts or cargo track shall be secured at a 45-degree angle plus or minus 15 degrees. The rear belts shall slope downward from the wheelchair/mobility aid to the floor toward the rear of the bus. The front belts shall slope downward from the wheelchair/mobility aid to the floor toward the front of the bus.
 - e. As installed, each securement anchorage shall be capable of withstanding a minimum force of 3,000 pounds when applied as specified in FMVSS 222. When more than one securement device share a common anchorage, the anchorage shall be capable of withstanding the force indicated above, multiplied by the number of securement devices sharing that anchorage.
 - f. Each securement device (webbing or strap assembly) shall be capable of withstanding a minimum force of 2,500 pounds when tested in accordance with FMVSS 209.
3. Occupant restraint system.
- a. The occupant restraint system shall be designed to be attached to the bus body either directly or in combination with the wheelchair/mobility aid securement system, by a method, which prohibits the transfer of weight or force from the wheelchair/mobility aid to the occupant in the event of an impact.
 - b. The occupant restraint belts and attachment hardware shall meet or exceed FMVSS 209 and 210.
 - c. Occupant belt systems may consist of three or four attachment points. The lap belt shall attach directly or indirectly to inserts or cargo track on the bus floor. The upper torso belt(s) or harness shall attach to inserts or cargo track on the bus floor or bus wall (occupants of gurney-type devices shall be secured to the gurney device).
 - d. The upper torso belt(s) or harness shall be separate from the lap belt assembly.
 - e. The buckle or attachment device joining the lap and upper torso belt(s) or harness at the lap position shall be of the quick release type and have metal-to-metal attaching devices on all ends.
 - f. The occupant restraint system shall be capable of allowing the removal of the occupant from the wheelchair/mobility aid without disturbing the securement of the wheelchair/mobility aid.

- g. When the occupant upper torso restraint belt(s) or harness is attached to the floor, a stanchion at least 36 inches in height shall be provided. The stanchion shall be placed to the rear of the occupant and be secured directly to the floor or by use of floor inserts or cargo track. The stanchion shall serve to maintain, in a fixed position, horizontal and vertical movement of the restraint belt(s). This may be accomplished by the use of a device or devices built into or attached to the stanchion, which the restraint belt(s) may be placed over or threaded through. The stanchion shall be covered with impact padding material at least 3/16-inch thick down to within 3 inches of the floor. The impact padding shall meet flammability requirements of FMVSS 302. The stanchion shall provide a padded, adjustable headrest, either removable from or built into the stanchion whenever the occupant's head is 18 inches or less from the stanchion.

4. Dynamic testing.

- a. The wheelchair/mobility aid securement and occupant restraint system shall be subjected to and successfully pass a dynamic sled test at a minimum impact speed/deceleration of 30 mph/20g's.
- b. Experienced personnel using an impact simulator with proven ability to provide reliable, accurate test results that can be replicated shall perform the dynamic test.
- c. The dynamic test shall be performed in accordance with the procedures set forth in *Appendix A* of SAE J2249: Test for Frontal Impact Crash Worthiness.
- d. The wheelchair/mobility aid used for testing purposes shall be a rigid, reusable surrogate wheelchair that complies with the requirements of *Appendix D* of SAE J2249: Specification for Surrogate Wheelchair.
- e. The dynamic test shall be performed using system assemblies, components and attaching hardware that are identical to the final installation in type, configuration and positioning. The body structure at the anchorage points may be simulated for the purpose of the sled test.
- f. When tested, the wheelchair/mobility aid securement and occupant restraint system shall pass the criteria specified in Section 6.2 of SAE J2249: Performance Requirements of Frontal Sled Impact Test. Following is an abridged summary of the criteria presented in *Appendix D*.
 - (1) Retain the test dummy in the test wheelchair and on the test sled with the test wheelchair in an upright position.
 - (2) Do not show any fragmentation or complete separation of any load carrying part.
 - (3) Do not allow the horizontal excursions of the test dummy and the test wheelchair to exceed specified limits.

(4) Prevent the test wheelchair from imposing forward loads on the test dummy.

(5) Allow removal of the test dummy and the test wheelchair subsequent to the test, without the use of tools.

SPECIAL SERVICE LIFT ENTRANCE—

1. Bus bodies may have a special service lift entrance constructed in the body to accommodate a wheelchair/mobility aid lift for the loading and unloading of passengers.
2. The opening to accommodate the special service lift entrance shall be at any convenient point on the right (curb side) of the bus and far enough to the rear to prevent the door(s), when open, from obstructing the right front regular service door (except in the case of a regular-front service door lift).
3. The opening may extend below the floor through the bottom of the body skirt. If such an opening is used, reinforcements shall be installed at the front and rear of the floor opening to support the floor and give the same strength as other floor openings.
4. The opening, with doors open, shall be of sufficient width to allow the passage of wheelchair/mobility aid. The minimum clear opening through the door and the lift mechanism shall be 52 inches in height and shall accommodate a 30-inch wide wheelchair/mobility aid.
5. A drip molding shall be installed above the opening to effectively divert water from entrance.
6. Entrance shall be of sufficient width and depth to accommodate various mechanical lifts and related accessories as well as the lifting platform.
7. Door posts and headers of entrance shall be reinforced sufficiently to provide support and strength equivalent to the areas of the side of the bus not used for service doors.
8. Special service lift entrance shall be equipped with padding at the top edge of the inside opening. Pad shall be at least 3-inches wide and 1-inch thick, including the backing, and extend the full width of the inside opening. This may be accomplished with multiple sections with no more than 1 inch between sections.
9. A single door or double doors may be used for the special service entrance.
10. All doors shall open outwardly.
11. All doors shall have positive fastening devices to hold doors in the open position.

12. All doors shall be weather sealed, and on buses with double doors they shall be so constructed that a flange on the forward door overlaps the edge of the rear door when closed.
13. When manually operated dual doors are provided, the rear door shall have at least one-point fastening device to the header. The forward mounted door shall have at least three-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. These locking devices shall afford maximum safety when the doors are in the closed position. The door and hinge mechanism shall be of a strength that will provide for the same type of use as that of a standard entrance door. The fastening point at floor line of body does not apply to elevator type lifts.
14. Door materials, panels and structural strength shall be equivalent to the conventional service and emergency doors. Color, rub rail extensions, lettering and other exterior features shall match adjacent sections of the body.
15. Door(s) shall be equipped with a device that will actuate an audible or visible signal located in the driver's compartment when door(s) is not securely closed and ignition is in "on" position. When double doors are provided, the forward door shall activate the device.

SUPPORT EQUIPMENT AND ACCESSORIES—

Any support equipment and/or accessories required for transportation, including those required in the IEP, that deviate from these specifications must be reviewed and approved by OSPI.

1. Such special items, if used, shall be secured at the mounting location to withstand a pulling force of five times the weight of the item, or shall be retained in an enclosed, latched compartment. Including, but not limited to, the following: crutches, walkers, canes, oxygen bottles, ventilators, or similar devices.
2. Electric powered wheelchair/mobility aids, transported on school buses shall be equipped with sealed lead acid batteries or batteries containing dry or gel-type electrolyte. Batteries shall be effectively secured to the wheelchair/mobility aid.
3. Oxygen and Breathing Aid Apparatus.
 - a. Breathing aid apparatus shall be securely mounted or fastened to a mobile seating device, a bus seat, or the bus if the apparatus is in use during transit. If the apparatus is not in use during transit, it shall be secured in a storage cabinet or secured to the bus in a positive manner. (See Item 1 above.)
 - b. Oxygen bottles transported in a school bus shall be no larger than 5 inches in diameter and 30 inches high, or the cubic inch equivalent, if a shape other than cylindrical.
 - c. Oxygen bottles shall have valves and regulators that are protected.

SECTION III

ALTERNATIVE POWER SPECIFICATIONS

SECTION III ALTERNATIVE POWER SPECIFICATIONS

GENERAL REQUIREMENTS—

Alternative power school buses shall meet all the specifications in this manual and the specific requirements for the type of alternate power systems listed below:

1. The bus shall meet all applicable Federal Motor Vehicle Safety Standards (FMVSS).
2. Original equipment manufacturers (OEMs) and conversion systems using compressed natural gas (CNG) shall comply with National Fire Protection Association (NFPA) Specification 52 A, "Compressed Natural Gas Vehicular Fuel Systems," in effect at the time of installation. Fuel systems using liquefied petroleum gas (LPG) shall comply with NFPA Specification 58 A "Liquefied Petroleum Gases Engine Fuel Systems" in effect at the time of installation.
3. All alternative power buses shall be capable of traveling not less than 200 miles with a full load, except those powered by electricity shall be capable of traveling not less than 80 miles.
4. Natural gas-powered buses shall be equipped with an interior/exterior gas detection system. All natural gas-powered buses shall be equipped with an automatic or manual fire detection and suppression system.
5. All materials and assemblies used to transfer or store alternative fuels shall be installed outside the passenger/driver compartment.
6. The total weight shall not exceed the GVWR when loaded to rated capacity.
7. The manufacturer supplying the alternative fuel equipment must provide the owner and operator with adequate training and certification in fueling procedures, scheduled maintenance, troubleshooting and repair of alternative fuel equipment.
8. All fueling equipment shall be designed specifically for fueling motor vehicles and shall be certified by the manufacturer as meeting all applicable federal, state, and industry standards.
9. All on-board fuel supply containers shall meet all appropriate requirements of the American Society for Mechanical Engineering (ASME) code, DOT regulations or applicable FMVSSs and NFPA standards.
10. All safety devices that discharge to the atmosphere shall be vented to the outside of the vehicle. The discharge line from the safety relief valve on all school buses shall be located in a manner appropriate to the characteristics of the alternative fuel. Discharge lines shall not pass through the passenger compartment.
11. A positive, quick-acting (1/4 turn) shut-off control valve shall be installed in each gaseous fuel supply line, as close as possible to the fuel supply containers. The

valve controls shall be placed in a location easily operable from the exterior of the vehicle. The location of the valve controls shall be clearly marked on the exterior surface of the bus.

12. An electrical grounding system shall be required for grounding of the fuel system during maintenance-related venting.

HIGH VOLTAGE-POWERED VEHICLES

ALTERNATOR—

1. The alternator shall meet the applicable state specifications. Alternately, the alternator functions may be performed by the Hybrid Drive System Batteries.

BATTERY(IES)—

1. Low Voltage Battery.
 - a. The Low Voltage Battery shall meet the applicable state specifications. Alternately, the Low Voltage Battery functions may be performed by the Hybrid Drive System Batteries.
2. Hybrid Drive System Batteries
 - a. Energy storage for the Hybrid Drive System shall be protected from crash impacts and shall be encased in a non-conductive, acid-resistant compartment. This compartment must be well ventilated to preclude the possibility of hydrogen gas buildup. Energy storage shall be located in an area and in such a way as to provide ease of service.
 - b. Batteries shall require automatic electrical isolation in the case of a vehicle crash.
 - b. The Hybrid Drive System Batteries shall allow for a minimum storage of 28 kWh for charge depletion.
 - c. The high voltage battery system integrity shall meet the specified spillage performance standards in accordance with test conditions specified in FMVSS No. 305 as applicable.
3. Battery Management System
 - a. The Hybrid Drive System Batteries may be equipped with a system that allows the batteries to be charged via connection to the local electric utility, otherwise known as a Plug-in Hybrid Electric system. The plug connector shall make a conductive electrical connection and shall be an Apollo 200 AMP connector by BIW Connector Systems or approved equal.
 - b. The Hybrid School Bus shall have equipment for monitoring the status of the batteries while the batteries remain on the vehicle. This equipment shall include the capability to balance the state of charge and monitor temperature of individual battery modules (if appropriate).

BRAKES, SERVICE—

The Hybrid School Bus shall include a regenerative braking system that uses the motor and/or generator to slow the vehicle in conjunction with the service brakes while returning electrical energy to the Hybrid Drive System Batteries.

DIFFERENTIAL RATIO—

The Differential shall be compatible with the Transmission/Hybrid Drive System and provide for a minimum of 60 mph in highest gear. (Also see *Appendix, Power and Gradeability*, Page 63, Item 11.)

ENGINE EQUIPMENT—

1. The hybrid system shall include a system that deactivates the engine when not in use; such as, at red lights, and reactivates the engine when needed for acceleration.
2. The engine shall be equipped with system that electrically heats the engine to maintain minimum starting temperature. This system should be integrated with the Plug-in Battery Management System, if so equipped, and not require a separate electrical grid connection. The engine heater shall also heat the fuel filtration system. The engine heater shall be switched to allow this heating to be optional.

FUEL SYSTEM COMPATIBILITY—

The diesel fuel system shall be capable of operating with a 20 percent biodiesel blend (B20).

HIGH VOLTAGE SYSTEM—

1. Wire, cable and conductor insulation in the High Voltage System shall provide adequate insulation for the voltage used and for ambient temperatures ranging from -15°F to 120°F. All high voltage circuits shall be bright orange in color or otherwise labeled as HIGH VOLTAGE. All high voltage circuits shall provide adequate and automatic protection against electrical overloads caused by short circuits or other excessive current conditions through the use of fuses, circuit breakers, and ground fault interruption.
2. Each door, cover, or other panel that affords immediate access to any high voltage area shall be plainly marked with a hazard warning label which shall read WARNING –HIGH VOLTAGE or DANGER–HIGH VOLTAGE. This label shall be located in a highly conspicuous place. All high voltage access areas shall be equipped with a lock or otherwise secured to prevent unauthorized access.
3. The High Voltage System should be designed so that when the ignition switch is off, the propulsion motor is positively disconnected. All other accessories powered by the main propulsion battery circuit shall remain operable when the ignition switch is off.

4. All buses shall be equipped with an additional manual or automatic switch or device independent of the propulsion motor disconnect controls that permits the positive disconnection of all circuits from the Hybrid Drive System Batteries. This switch shall be operable from outside the vehicle. Each door or panel providing access to this switch shall be plainly marked to indicate that it is a main-power-disconnect switch or device.

IGNITION SYSTEM—

The ignition switch circuit shall be linked to the Battery Management System and will prevent driving the vehicle while it is connected to an external battery charging source.

TRANSMISSION/HYBRID DRIVE SYSTEM—

1. The Hybrid Drive System shall work in conjunction with the chassis engine to provide motive power to the bus. This system shall be automatically controlled requiring no intervention by the driver after it has been put in forward or reverse gear. Systems that require the use of a manual clutch or require the driver to shift through a progression of gears will not be accepted.
2. The Hybrid drive controller/converter system shall incorporate a Ground Fault Interrupt (GFI) system that protects passengers and others from electrical shock if a shorted circuit or water intrusion situation occurs.
3. The bus dash shall have an indicator light that indicates whether the bus is operating in Charge Depleting or Charge Sustaining mode. Charge Depleting is an operating mode in which the state of charge of the Hybrid Drive System Battery decreases as the bus operates. At a certain minimum state of charge, the bus becomes Charge Sustaining. Charge Sustaining is an operating mode in which the Battery Management System seeks to maintain or increase the state of charge of the Hybrid Drive System Battery. The Hybrid School Bus shall have the capability to operate in both modes.
4. The Hybrid Drive System shall have a system for protecting system components from thermal damage due to electrical overload. This system should include temperature sensors at critical points and be capable of reducing Hybrid Drive System electrical power when necessary. The bus dash shall have a warning light that indicates when a Hybrid Drive System component exceeds a safe temperature. The warning light should illuminate prior to critical temperature to allow sufficient time to safely stop the bus.

SECTION IV

APPENDIX

APPENDIX

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APPENDIX

Item 1. Alternator: The term “heavy duty” as used anywhere in these specifications shall mean that the item to which the term is applied shall exceed the usual quantity, quality, or capacity supplied with standard production vehicles and it shall be able to withstand unusual strain, exposure, temperature, wear, and use.

Estimating Method for Suggested Alternator Capacity

Constant Load

Equipment	of Units	Current Draw (Amperes)
Ignition	1	2.5
Head lamps (Type 2 dual lower beam)	2	8.4
Tail lights.....	2	1.2
Clearance lights	4	1.2
Cluster light.....	6	1.8
Intermediate marker lamps	2	0.6
Body instrument panel	1	0.3
Primary front heater	1	24.0
Primary defroster	1	9.5
Supplementary front heater	1	9.5
Supplementary defroster	1	9.5
Underseat heater, large	1	12.2
Underseat heater, small.	1	6.1
Defroster fan	1	3.0
Windshield wiper motor.. ..	2	12.0
Fuel pump.....	1	3.0

Intermittent Load

Emergency door buzzer	1	1.0
Flashing warning signal system (Lamps and motor)	2	4.4
Stepwell and six interior dome lights	7	2.1
Individual additional dome lights	1	0.3
Stop (brake) lights	4	2.8
Turn signals	3	2.1
Windshield washers	1	0.9
Backup lamps	2	1.4

- To determine the electrical load (in amperes) for a typical school bus, the following formula is recommended:

$$\text{Constant load} + 35\% \text{ of intermittent load} = \text{total load.}$$

Item 2. Color: National School Bus Yellow. Refer to *Appendix B*, in the *2010 National School Transportation Specifications & Procedures Manual*.

Item 3. Color: Federal Standard No. 595a, black enamel No. 17038 (gloss).

Item 4. Color: Federal Standard No. 595a, black enamel No. 37038 (matte).

Item 5. First Aid Kit:

Contents of 24-Unit First Aid Kit:

- (1) 2 1-inch x 2 ½-yards adhesive tape rolls.
- (2) 24 sterile gauze pads 3 x 3 inches.
- (3) 100 ¾ x 3-inch adhesive bandages.
- (4) 8 2-inch bandage compress.
- (5) 10 3-inch bandage compress.
- (6) 2 2-inch x 6-foot sterile gauze roller bandages.
- (7) 2 non-sterile triangular bandages approximately 40 x 36 x 54-inches with two safety pins.
- (8) 3 sterile gauze pads 36 x 36 inches.
- (9) 3 sterile eye pads.
- (10) 1 pair rounded-end scissors.
- (11) 1 pair medical examination gloves.
- (12) 1 mouth-to-mouth airway.

Item 6. Identification: Available from Federal Highway Administration (FHWA), <http://fhwa.dot.gov>

Item 7. Insulation: Underwriters Laboratories, Inc., 2600 N.W. Lake Rd., Camas, WA 98607

Item 8. Defrosters, Heaters, Horn, Lamps and Signals, Wiring: Society of Automotive Engineers, www.sae.org

Item 9. Tire Radius:

7.50 x 20 =	17.0	8 x 22.5 =	17.1
8.25 x 20 =	17.6	9 x 22.5 =	17.9
9.00 x 20 =	18.6	10 x 22.5 =	18.6
10.00 x 20 =	19.2	11 x 22.5 =	19.2
11.00 x 20 =	19.7	12 x 22.5 =	19.7
12.00 x 20 =	20.4		

Item 10. Tire Revolutions per Mile:

7.50 x 20 =	568	8 x 22.5 =	563
8.25 x 20 =	549	9 x 22.5 =	543
9.00 x 20 =	520	10 x 22.5 =	529
10.00 x 20 =	504	11 x 22.5 =	501
11.00 x 20 =	487	12 x 22.5 =	487
12.00 x 20 =	470		

Item 11. Power and Gradeability:

Buses with bodies manufactured after April 1, 1977, must meet all criteria for power and gradeability under Items c., d., and e. below.

- a. GVW (gross vehicle weight) shall be the sum of (1), (2), (3), and (4) below. The appropriate manufacturer shall furnish these weights to the Superintendent of Public Instruction in such form as he/she may prescribe:
 - (1) Manufacturer's published chassis weight.
 - (2) Manufacturer's published body weight.
 - (3) Total seated pupil weight (passenger capacity) x 120 pounds per pupil.
 - (4) 150 pounds of driver's weight.
- b. The manufacturer of the chassis shall furnish to the Superintendent of Public Instruction in such form as he/she may prescribe:
 - (1) The certified published horsepower of diesel and gas engines.
 - (2) The certified published maximum lbs. ft. torque of diesel and gas engines.
 - (3) The certified published C.I.D. of diesel and gas engines.
- c. GVW as described in Items a. (1)–(4) above of any school bus shall not exceed:
 - (1) 155 lbs. per certified published horsepower for diesel engine units.

- (2) 67 lbs. per certified published cubic inch displacement for gas engine units.
- d. Gradeability shall be calculated using the following formula with a minimum G of 8 percent required.

$$G = \frac{(\text{Torque}) (.85) (12) (\text{Axle Ratio}) (\text{Trans. 1}^{\text{st}} \text{ Gear Ratio})}{\text{GVW} \times \text{Tire Radius}} - 12\%$$

Item 1. GVW applied to the formula shall be as described in Items a. (1)–(4) above.

Item 2. Transmission first gear ratio applied to the formula for automatics shall be the product of the lowest gear times the converter stall ratio.

- e. School buses shall be limited to 60 MPH + or - 4 MPH in the fastest gear with the engine operating at 85 percent of governed RPM (maximum 90 percent for diesel engines governed below 2800 RPM; obtain engine manufacturer's recommended cruising RPM) using the following formula:

$$\text{MPH} = \frac{(\text{Engine RPM}) (60)}{\text{Transmission} \times \text{Axle Ratio}} \div \text{Tire Revolutions per Mile}$$

- f. See below for examples.

POWER AND GRADEABILITY EXAMPLES

HP or CID to GVW Example

- a. Diesel Engine 65-Passenger Conventional
- | | | | |
|-----|--|---|-------|
| (1) | Manufacturer's Published Chassis Weight | = | 9190 |
| (2) | Manufacturer's Published Body Weight | = | 7300 |
| (3) | Total Seated Pupil Weight (65 x 120 lbs.) | = | 7800 |
| (4) | Driver's Weight | = | 150 |
| | TOTAL GVW | = | 24440 |
| (5) | 24440 ÷ 155 = 157 Minimum HP Engine Required | | |
- b. Gas Engine 65-Passenger Conventional
- | | | | |
|-----|--|---|-------|
| (1) | Manufacturer's Published Chassis Weight | = | 7536 |
| (2) | Manufacturer's Published Body Weight | = | 8043 |
| (3) | Total Seated Pupil Weight (65 x 120 lbs.) | = | 7800 |
| (4) | Driver's Weight | = | 150 |
| | TOTAL GVW | = | 23529 |
| (5) | 23529 ÷ 67 = 351 Minimum CID Engine Required | | |

Gradeability Example (Minimum G of 8 percent)

$$G = \frac{(\text{Torque } (.85) (12) (\text{Axle Ratio}) (\text{Trans } 1^{\text{st}} \text{ Gear Ratio})}{\text{GVW} \times \text{Tire Radius}^*} - 12\%$$

$$G = \frac{345 \times .85 \times 12 \times 6.5 \times 6.99}{23,529 \times 18.6} = 36\% - 12\% = 24\%$$

MPH Example (60 MPH + or - 4 MPH in the fastest gear at 85 percent of governed RPM (maximum 90 percent for diesel engines governed under 2800 RPM; obtain manufacturer's recommended cruising RPM)).

$$\text{MPH} = \frac{(\text{Engine RPM}) (60)}{\text{Transmission} \times \text{Axle Ratio}} \div \text{Tire Revolutions Per Mile}^*$$

- a. Engine governed at 3600 RPM, 10.00 x 20 bias ply tires, 5.83 axle ratio.

$$.85 \times 3600 = 3060 \text{ RPM}$$

$$\text{MPH} = \frac{3060 \times 60}{1 \times 5.83} = 31492.28 \div 504 = 62.48 \text{ MPH Cruising Speed}$$

$$\text{MPH} = \frac{3600 \times 60}{1 \times 5.83} = 37049.74 \div 504 = 73.51 \text{ MPH Top Speed}$$

- b. Engine governed at 2800 RPM, 10.00 x 20 bias ply tires, 4.53 axle ratio.

$$.85 \times 2800 = 2380 \text{ RPM}$$

$$\text{MPH} = \frac{2380 \times 60}{1 \times 4.53} = 31523.17 \div 504 = 62.54 \text{ MPH Cruising Speed}$$

$$\text{MPH} = \frac{2800 \times 60}{1 \times 4.53} = 37086.09 \div 504 = 73.58 \text{ MPH Top Speed}$$

- c. Engine governed at 2100 RPM, 12 x 22.5 radial tires, 3.69 axle ratio.

$$.90 \times 2100 = 1890 \text{ RPM}$$

$$\text{MPH} = \frac{1890 \times 60}{1 \times 3.69} = 30731.70 \div 487 = 63.10 \text{ MPH Cruising Speed}$$

$$\text{MPH} = \frac{2100 \times 60}{1 \times 3.69} = 34146.34 \div 487 = 70.11 \text{ MPH Top Speed}$$

Method of Selecting Approximate Axle Ratio.

(Use 85 percent or maximum 90 percent of governed RPM and 60 MPH)

$$R = \frac{(\text{RPM}) (\text{Tire Radius})^*}{168 \times \text{MPH}}$$

a. $R = \frac{3060 \times 19.2}{168 \times 60} = 5.83$ Axle Ratio

b. $R = \frac{2380 \times 19.2}{168 \times 60} = 4.53$ Axle Ratio

c. $R = \frac{1890 \times 19.7}{168 \times 60} = 3.69$ Axle Ratio

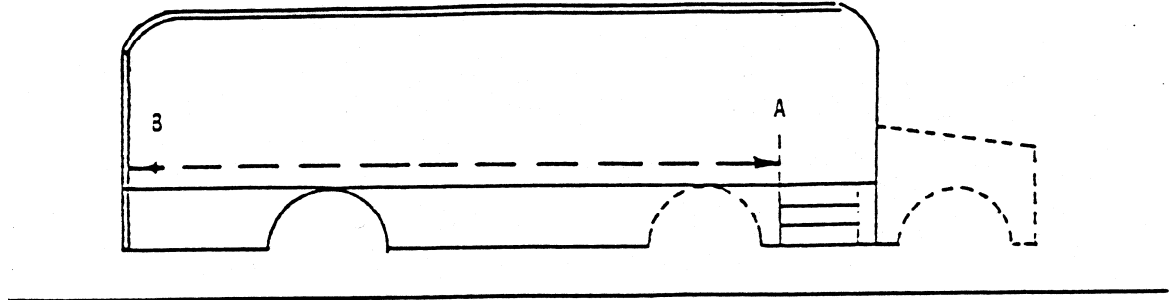
*Tire radii and tire revolutions per mile measurements will vary between tire manufacturers. When using the above formulas, measurements for the brand, type, and size tires to be used on the vehicle should be obtained from the manufacturer.

Item 12. Battery, Construction, Frame and Fuel Tank: Obtainable from School Bus Manufacturer's Institute, *Design Objectives Booklet*, August 1990 Edition and School Bus Manufacturer's Technical Council, *School Bus Technical Reference Booklet*, August 2001 Edition.

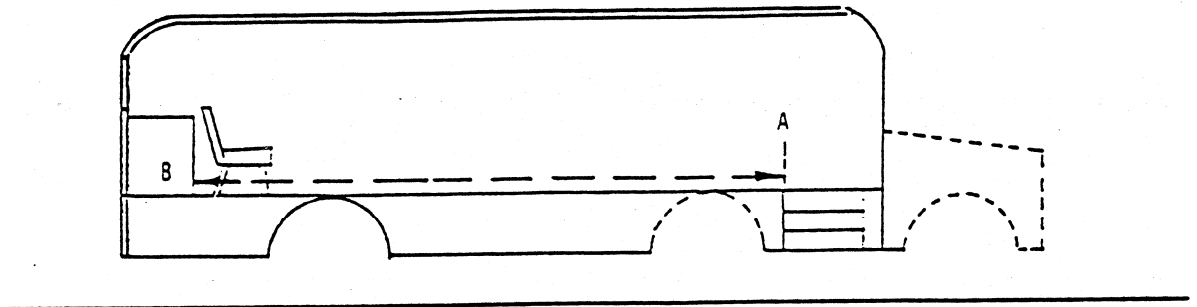
Item 13. Heaters, Provision for Heating System: Refer to *Appendix B*, in the, *2010 National School Transportation Specifications & Procedures Manual*.

Item 14. Interior Body Measurement Procedures

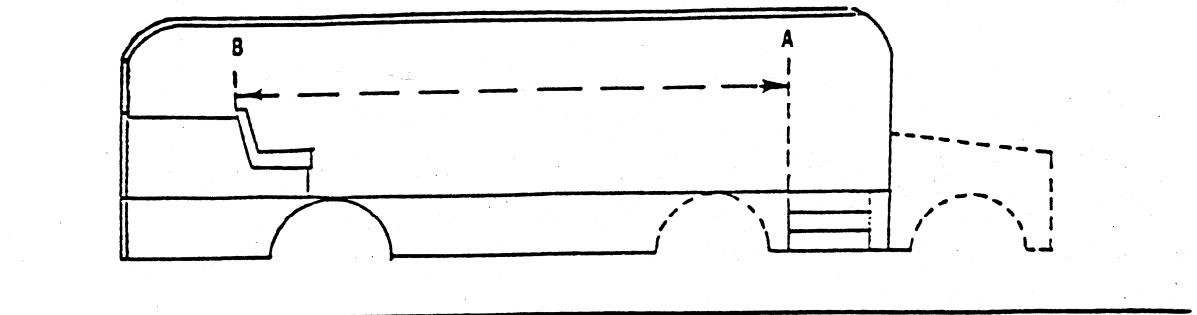
Forward engine transit or conventional with rear emergency door.
Measure from rear of stepwell to inside of emergency door at floor level.



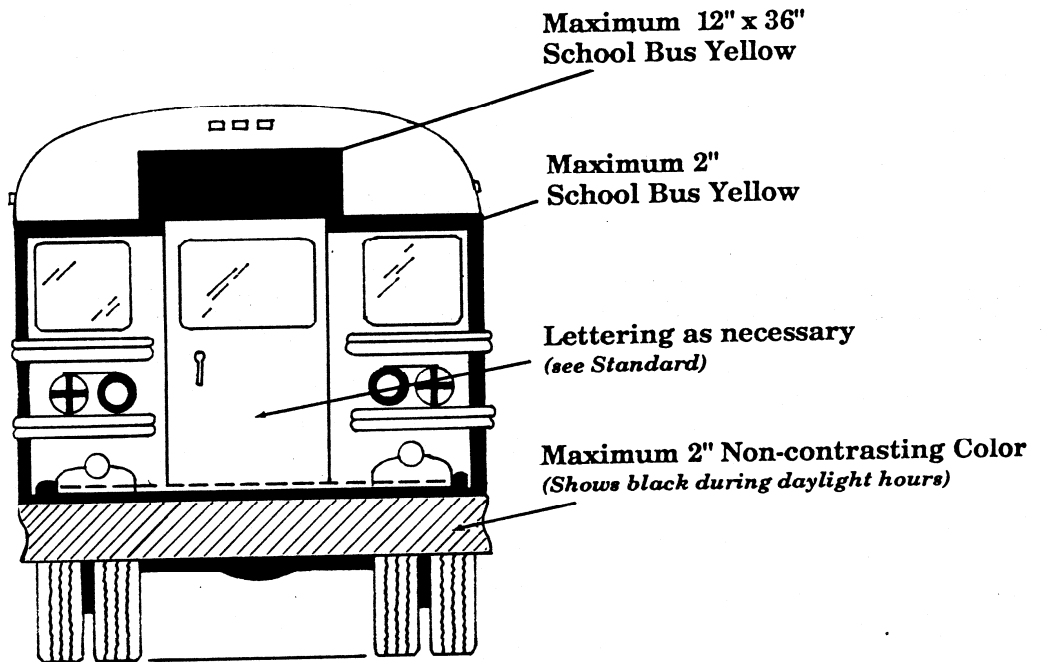
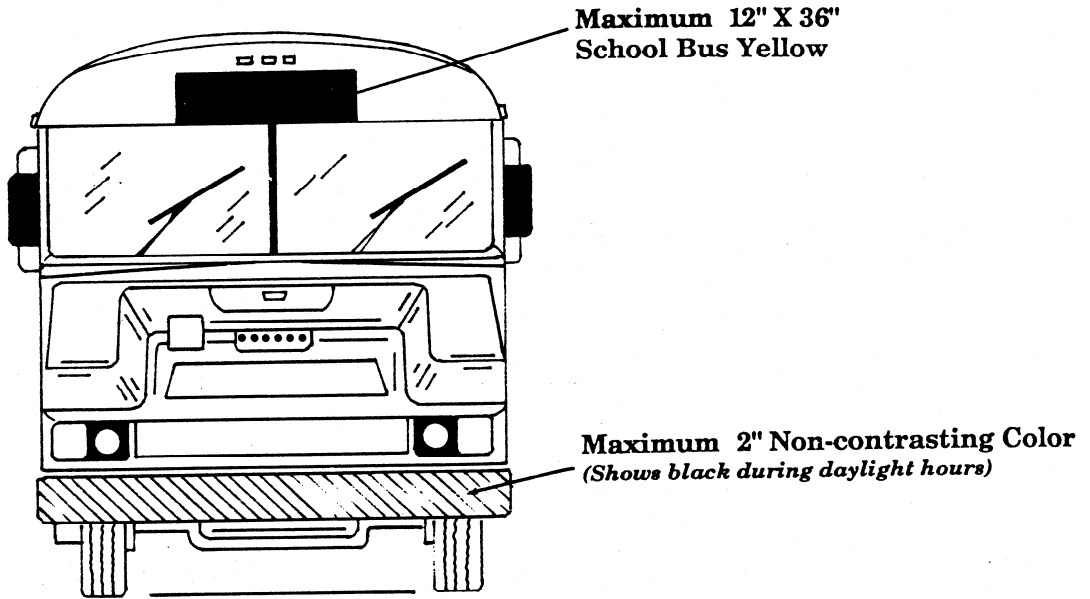
Forward engine transit or conventional with rear luggage compartment
and standard rear seat.
Measure from rear of stepwell to inside face of luggage compartment
at floor level.



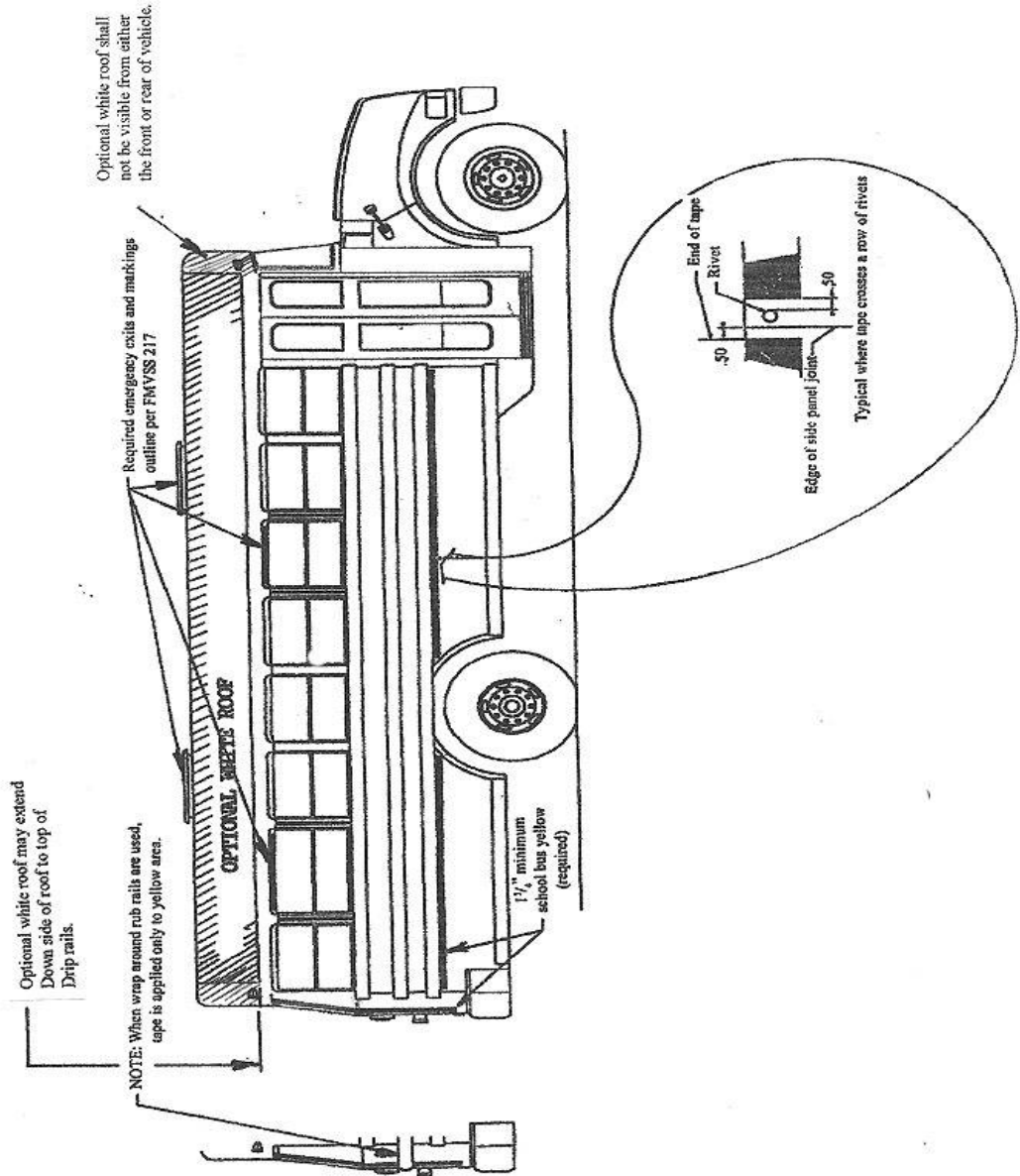
Rear engine transit or conventional with rear luggage compartment and
davenport seat.
Measure from rear of stepwell to top rear most point of davenport seat
back.



Item 15. Placement of Reflective Markings

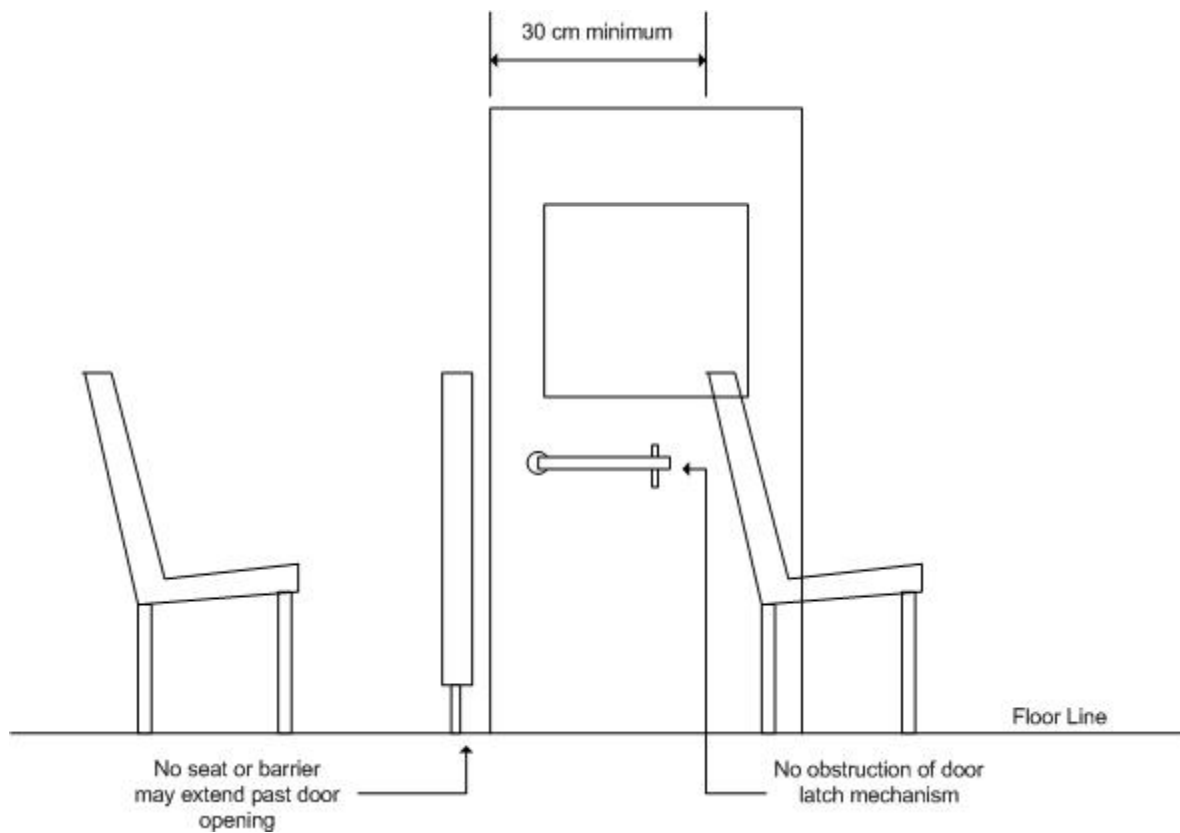


Item 15 (continued) Placement of Reflective Markings and White Roof



Item 16. Minimum Side Emergency Exit Clearance Specifications

49 CFR CH. V, §571.217



Item 17.

**Chapter 204-21 WAC
Standards for School Bus Warning Lamps**

Last Update: 9/17/08

WAC

204-21-190 School bus warning lamps.

204-21-210 Bus hazard warning strobe lamp.

204-21-190 School bus warning lamps.

(1) If the bus is a privately owned school bus or private carrier bus, then it must not use the eight lamp warning system unless such use is in conformance with the rules and regulations set forth by the superintendent of public instruction in chapters 392-143 and 392-145 WAC. The requirements for private carrier buses may be found under chapter 204-32 WAC.

(2) If the bus is a school bus owned and operated by any public school district and all privately owned school buses operated under contract with a school district in the state and used for the transportation of public school children, then the warning lamp system must:

(a) Be operated in accordance with the regulations set forth in chapter 392-145 WAC.

(b) Consist of a total of eight lamps conforming to SAE Standard J887a, J1318, or the standard in effect for such lamp at the time it was manufactured. Two amber and two red on both the front and rear of the bus. The amber lamps must be mounted inboard of the red lamps.

(c) Be mounted as high as practicable on the bus body and as near the outside edges of the body as curvature permits.

(d) Have shielding to protect the lamps from the elements.

(e) Be mounted on a background that is painted black and extends a minimum of three inches outward from the lamps.

(f) Be mounted and aimed as specified in 49 CFR Part 571.108 (FMVSS 108) and SAE Standard J887a.

(g) Be clearly visible from a distance of at least five hundred feet in normal sunlight.

(h) Be activated only by means of a manually operated switch. Such activation will cause the right and left amber lamps to flash alternately until the stop signal arm is extended, or the bus entrance door is opened, at which time the amber lamps must be automatically deactivated and the right and left red lamps must be automatically activated. Whenever the warning lamp system has been activated, opening of the entrance door must automatically deactivate the amber lamps, cause the stop signal arm to extend, and activate the red lamps. Automatic extension of the stop signal arm does not apply to systems equipped with a manually operated stop signal arm.

(i) Have all lamps flashing at a rate from sixty to one hundred twenty times per minute and must reach full brilliance during each cycle.

(j) Have lamp controls which must consist of:

(i) The master or sequencing switch which must be in plain view and mounted within easy reach of the driver, and which must activate the system sequencing and deactivate the system at any time during the sequence.

(ii) An override switch which must automatically activate the red lamps whenever the stop signal arm is extended even though the master control switch is turned off, and which must automatically deactivate the amber lamps if previously activated regardless of the then present normal state of sequencing or entrance door position. Such override switch must be designed and installed so as to function with air, vacuum, electric, or manually operated stop signal arms. The stop signal arm must be capable of being extended at any time, regardless of the position of the entrance door. The opening of the entrance door must not cause extension of the stop signal arm, or the activation of the red lamps unless the master switch has been activated.

(iii) A minimum of two pilot lamps, one amber and one red, each of which must flash when the like colored warning lamps are in operation. Pilot lamps which show the operation of each individual lamp are permissible. All pilot indicators must be located so as to be clearly visible to the driver.

WAC 204-21-210 Bus hazard warning strobe lamp.

All bus hazard warning strobe lamps must meet the Class I requirements of SAE Standard J1318, and may only be used as follows:

(1) School buses may be equipped with a single additional hazard strobe lamp in addition to the eight lamp warning system. Such lamps must:

(a) Not be mounted any closer than six feet from the rear of the bus measured from a vertical plane tangent to the rearmost point of the bus body. However:

(i) If the bus is equipped with a roof hatch falling within the above mentioned measurements, the strobe lamp may be located directly behind the roof hatch.

(ii) If the bus has a clear lens strobe lamp, less than eight inches in height, it may be mounted on the centerline of the roof in the rear one-half of the bus.

(b) Be activated by a switch independent of all other lamp switches. This switch must be plainly labeled and have a pilot lamp that must indicate when the lamp is in operation.

(c) Only be used when the bus is occupied with school children and one or more of the following conditions exists:

(i) The bus is in motion in inclement, sight obscuring conditions, including but not limited to rain, fog, snow, and smoke;

(ii) There is a need to improve the visibility of the bus when stopping, standing, or starting onto a highway;

(iii) There is limited visibility caused by geographic hazards such as winding roadways, hills, trees, buildings, etc.

The strobe lamp shall not be activated solely because of darkness.

(2) Municipal transit vehicles (as defined in RCW [46.04.355](#)) may be equipped with a single additional hazard strobe lamp. Such lamps:

(a) May be mounted on the centerline of the roof in the rear one-half of the bus so long as the lamp is clear and less than eight inches in height.

(b) Be activated by a switch independent of all other lamp switches. The hazard strobe lamp switch must be plainly labeled and have a pilot lamp that must indicate when the lamp is in operation.

(c) Only be used when the bus is occupied with passengers and one or more of the following conditions exists:

(i) The bus is in motion in inclement, sight obscuring conditions, including but not limited to rain, fog, snow, and smoke;

(ii) There is a need to improve the visibility of the bus when stopping, standing, or starting onto a highway;

(iii) There is limited visibility caused by geographic hazards, such as winding roadways, hills, trees, etc.

The strobe lamp must not be activated solely because of darkness.

Item 18

WASHINGTON STATE PATROL INSPECTION PROCEDURE

Stop signal arm, Crossing control arm, and Eight-light warning lamp system

Commence inspection with engine running, service door closed, and all control switches off.

General Requirements:

1. The crossing control arm must extend at any time the red lights flash.
2. During lamp operation, the amber and red lights shall flash at a rate between 60 and 120 times per minute, and reach full brilliance during each cycle.
3. Red and amber indicator lights shall flash in the driver's compartment at any time the respective lights flash on the outside of the bus.

Step A. (Power and manually operated systems)

1. Extend stop signal arm; red lights should flash.
2. Open and close service door; red lights should continue to flash, and stop signal arm should remain extended.
3. Retract stop signal arm; red lights should cancel.

Step B. (Power and manually operated systems)

1. Turn master switch on, if so equipped.
2. Turn sequencing switch on; amber lights should flash.
3. Extend stop signal arm; amber lights should cancel, and red lights should flash.
4. Open and close service door; stop signal arm should remain extended, and red lights should continue to flash.
5. Retract stop signal arm; red lights should cancel.

Step C. (Power operated systems only)

1. Turn master switch on, if so equipped.
2. Turn sequencing switch on; amber lights should flash.
3. Open service door; amber lights should cancel, stop arm should extend, and red lights should flash.
4. Close service door; stop arm should retract, and red lights should cancel.
5. Open service door. If stop arm extends, and red lights flash, turn master switch off.

Step D. (Manually operated systems only)

1. Turn master switch on, if so equipped.
2. Turn sequencing switch on; amber lights should flash.
3. Open service door; amber lights should cancel and red lights should flash.
4. Close service door; red lights should cancel.
5. Open service door. If red lights flash, turn master switch off.

As of 3-8-93

Item 19.

CHAPTER 212-50 WAC

**IDENTIFICATION FOR
ALTERNATIVE FUEL SOURCE MOTOR VEHICLES**

WAC

212-50-010	Administration Authority
212-50-020	Application and Scope
212-50-030	Definitions
212-50-040	Placard Issuance
212-50-050	Placard Design and Size
212-50-060	Placard Designation
212-50-070	Placement on Vehicle
212-50-080	Severability

WAC 212-50-010 Administration Authority. These rules were adopted pursuant to Chapter 145, Laws of 1984 and RCW 46.37.467 to provide for an identification placard to be issued for vehicles using an alternative fuel source.

WAC 212-50-020 Application and Scope. The provisions of these rules shall apply to every automobile, including buses, truck, motorcycle, motor home, or off-road vehicle that is fueled by an alternative fuel source.

WAC 212-50-030 Definitions. (1) "Alternative fuel source," as used in this chapter, includes: Propane, compressed natural gas, liquid petroleum gas, alcohol, or any chemically similar gas, but does not include gasoline or diesel fuel.

(2) "National Fire Protection Association" means the nationally recognized organization dedicated to fire safety and development of standards for fire protection and safeguarding of hazards, whose headquarters are located at Batterymarch Park, Quincy, MA 02269.

WAC 212-50-040 Placard Issuance. Until such time as the National Fire Protection Association issues a specific alternative fuel source, the placard designed by the state fire marshal, as set out in these rules, shall be required.

WAC 212-50-050 Placard Design and Size. The placard shall be a weather resistant, diamond shaped label, 4-3/4 inches long and 3-1/4 inches wide. Lettering shall be a minimum of one inch in height, and centered horizontally across the placard. The label shall be of contrasting reflective luminous material and have a 1/8 inch border.

WAC 212-50-060 Placard Designations. The placard for propane or liquefied petroleum gas shall include the lettering "PROPANE." Lettering and border shall be silver on a black background. The placard for compressed natural gas shall include the lettering "CNG" across the center. The border and lettering shall be silver on a blue background.

WAC 212-50-070 Placement on Vehicle. The label shall be placed on an exterior vertical or near-vertical surface on the lower right rear of the vehicle (on the trunk lid of a vehicle so equipped, but not on the bumper of any vehicle) inboard from any other markings. The label shall be provided with a good quality self-adhering adhesive.

WAC 212-50-080 Severability. If any provision of these rules or its application to any person is held invalid, the remainder of the rules or the application of the provision to other persons or circumstances is not affected.

Item 20.

**CHAPTER 392-143 WAC
TRANSPORTATION—SPECIFICATIONS for SCHOOL BUSES**

Last Update: 4/6/04

WAC

392-143-001	Authority.
392-143-005	Purpose.
392-143-010	Definitions
392-143-015	School bus specifications manual.
392-143-025	Additional local specifications.
392-143-030	School buses—Permit and license.
392-143-031	School bus inspection—School bus operation permit.
392-143-032	School bus operation permit.
392-143-035	Routine inspection of school buses.
392-143-040	Other required inspections of school buses.
392-143-050	Resold school buses.
392-143-055	Responsibility for compliance with school bus specification rules.
392-143-060	School bus specifications continued compliance.
392-143-070	Other vehicles used to transport students.
392-143-080	Signs and markings for school buses—Exterior—Interior.

WAC 392-143-001 Authority. The authority for this chapter is RCW 46.61.380 which authorizes the superintendent of public instruction to adopt and enforce regulations to govern the design, marking, and mode of operation of all school buses transporting common school students.

WAC 392-143-005 Purpose. The purpose of this chapter is to implement RCW 46.61.380 by establishing the specifications governing the design and marking of all school buses owned and operated by any school district and all school buses which are privately owned and operated under contract or otherwise with any school district in the state for the transportation of common school students. The provisions of this chapter shall be incorporated by express reference into all school district contracts for the transportation of common school students in privately owned and operated school buses.

WAC 392-143-010 Definitions. The definitions in this section apply throughout this chapter unless the context clearly requires otherwise:

- (1) "School bus" means every vehicle with a seating capacity of more than ten persons including the driver regularly used to transport students to and from school or in connection with school activities.
- (2) "School bus specifications manual" means that manual published and distributed to each school district by the superintendent of public instruction.
- (3) "School bus operation permit" means that form issued by the superintendent of public instruction to an individual school district or educational service district, which is required prior to the use of any school bus for the transportation of any common school students.
- (4) "Inspection officer" means an employee of the Washington state patrol trained and designated by the chief of the Washington state patrol to inspect school buses.
- (5) "SPI Form 1028" means that form prepared and distributed by the superintendent of public instruction upon which the inspection officer indicates that the school bus has been inspected and approved, for used buses previously inspected by the Washington state patrol.
- (6) "SPI Form 1029" means that form prepared and distributed by the superintendent of public instruction upon which the inspection officer indicates that the school bus has been

inspected and approved upon initial purchase, used buses not previously inspected by the Washington state patrol, and buses which have been repowered or which have undergone rehabilitation or modification repair.

WAC 392-143-015 School bus specifications manual. The school bus specifications manual shall incorporate all specifications required by the federal department of transportation motor vehicle safety standards and govern the specifications for all school buses. The manual is hereby incorporated into this chapter by reference. Prior to any revision of the school bus specification manual, the superintendent of public instruction shall serve notice to interested parties and shall hold at least one public hearing.

WAC 392-143-025 Additional local specifications. Any school district board of directors may adopt and require such additional school bus specifications as it deems necessary.

WAC 392-143-030 School buses--Permit and license. If a school bus is approved in compliance with WAC 392-143-031 and the school district has met requirements of WAC 392-143-032, the superintendent of public instruction shall send three copies of the school bus operation permit to the appropriate school district. The original shall be retained by the school district; one copy shall be placed in the permit holder in the school bus; and one copy shall be presented to the county auditor, along with the operator's application for an exempt state license for the bus if applicable. County auditors shall not issue an exempt license for the bus unless a school bus operation permit accompanies the application for a license.

WAC 392-143-031 School bus inspection--School bus operation permit. All school buses must be inspected and approved by a Washington state patrol inspection officer prior to initial issue or reissue of a school bus operation permit. Effective December 31, 2004, no school bus operation permit shall be valid for any school bus which does not meet Federal Motor Vehicle Safety Standards adopted April 1, 1977.

WAC 392-143-032 School bus operation permit. The superintendent of public instruction shall issue school bus operation permits as follows:

(1) School buses owned or operated by a public school shall be issued a school bus operation permit on receipt of the following properly executed documents for each new school bus or used school bus not previously issued a school bus operation permit in Washington state:

- (a) Original SPI Form 1020, School Bus Acquisition/Disposition Report;
- (b) Copy of the sellers invoice or bill of sale;
- (c) Copy of complete set of the successful vendor's bid specifications;
- (d) Copy of each warrant issued in full payment of the bus or each warrant issued in part payment of the bus, if any, and, copy of the conditional sales contract, lease purchase agreement, or other evidence of contractual liability;
- (e) Original weight slip for the vehicle; and
- (f) Original SPI Form 1029, Initial School Bus Inspection.

(2) School buses owned by a private contractor and operated under contract to a public school shall be issued a school bus operation permit on receipt of the following properly executed documents for each new school bus or used school bus not previously issued a school bus operation permit in Washington state:

- (a) Original SPI Form 1020A, School Bus Acquisition Report;
- (b) Original weight slip for the vehicle; and
- (c) Original SPI Form 1029, Initial School Bus Inspection.

(3) A school bus operation permit shall be reissued on receipt of the following properly executed documents for school buses previously licensed in Washington state: Provided, That

no school bus operation permit shall be reissued to any school bus which does not meet Federal Motor Vehicle Safety Standards adopted April 1, 1977:

(a) Original SPI Form 1020A, School Bus Acquisition Report, from the school district acquiring the school bus;

(b) Original SPI Form 1020B, School Bus Disposition Report, from the school district disposing of the school bus, with existing school bus operating permit attached;

(c) Copy of SPI Form 1028, Routine School Bus Inspection, properly authenticated as the inspection report from the most recent annual one hundred percent fleet inspection, which inspection was made within twelve months prior to the date of acquisition;

(d) For school district owned or operated buses, a seller invoice or bill of sale; and

(e) A copy of the warrant issued in payment of the purchase of the bus.

WAC 392-143-035 Routine inspection of school buses. All school buses shall be inspected annually by the Washington state patrol. Inspection dates and centers shall be determined by the superintendent of public instruction and the chief of the state patrol. School districts shall be notified by the chief of the state patrol prior to each annual inspection of the time and place of inspection. School buses not presented for inspection at the time and place scheduled by the chief of the state patrol shall not be operated as a school bus unless the requirement is temporarily waived in writing by the chief of the state patrol or until the school bus has passed a required inspection. A second inspection of at least twenty-five percent of each school district's fleet shall be conducted annually by the Washington state patrol. This second inspection shall be unannounced and the inspection team shall select which buses in the fleet it will inspect. These unannounced inspections shall be scheduled so that they do not disrupt the regular transportation program.

WAC 392-143-040 Other required inspections of school buses. All school buses which have been rebuilt, have received a major modification, have received a major repair, or have received an interior renovation or refurbishment shall be inspected prior to transporting students in accordance with the following criteria:

(1) A rebuilt school bus: For the purpose of this section, a rebuilt school bus shall fully comply with all current Washington specifications at the time the school bus is rebuilt and shall be inspected in accordance with WAC 392-143-030.

(2) A school bus receiving a major modification: For the purpose of this section, school bus modifications (e.g., hydraulic lift and/or ramp for wheelchairs) shall meet all current state of Washington specifications at the time the major modification is made and shall be inspected in accordance with WAC 392-143-030.

(3) A school bus receiving a major repair (not routine maintenance): For the purpose of this section, a school bus that has received repairs to or rebuilding of the frame, steering, suspension, or braking systems or has been repowered shall be identified as needing inspection. Any repairs made shall meet or exceed Washington specifications in effect at the time of the original manufacturing date of the bus and shall be inspected in the same manner as a new school bus with emphasis on mechanical safety items.

(4) A school bus receiving an interior renovation or refurbishment (not routine seat repair): For the purpose of this section, a school bus that has received an interior renovation or refurbishment shall be identified as needing inspection. Renovation or refurbishment of interiors shall meet the Federal Motor Vehicle Safety Standard (FMVSS) 222 and shall be inspected in the same manner as a new school bus with respect to FMVSS 222.

WAC 392-143-050 Resold school buses. A school district which sells a school bus to anyone other than another school district shall be responsible for removing the school district's name and number and all lettering and markings identifying the vehicle as a school bus prior to its delivery to the purchaser. However, if the district sells the school bus to a private party who

certifies in writing that the school bus shall be used as a private carrier bus, the district need not remove the emergency lights and stop signal paddle.

WAC 392-143-055 Responsibility for compliance with school bus specification rules. The responsibility for compliance with this chapter lies with the board of directors of each school district. Failure to comply with this chapter shall constitute cause for the withholding of state transportation funds for such time and to such extent as is necessary to ensure compliance.

WAC 392-143-060 School bus specifications continued compliance. School districts shall maintain all school buses in such condition that they shall continue to meet or exceed Washington state specifications in effect when the bus was manufactured, except as such standards or specifications are subsequently repealed or reduced.

WAC 392-143-070 Other vehicles used to transport students. All vehicles with a seating capacity including the driver of ten persons or less shall not be required to meet school bus specifications. Such vehicles regularly used to transport students to and from school or in connection with school activities shall carry the approved school bus first-aid kit, fire extinguisher, and highway warning kit. These vehicles also shall pass a safety inspection routinely conducted at the intervals outlined in WAC 392-143-035.

Students, while being transported in any vehicle not required to meet school bus specifications but used for to and from school transportation and to and from school activities transportation, shall share the same compartment and shall be provided the same general safety and comfort as the driver.

All vehicles used to transport students with a manufacturer rated seating capacity including the driver greater than ten persons shall be required to meet school bus specifications.

WAC 392-143-080 Signs and markings for school buses—Exterior—Interior. Signs and markings on the exterior of any school bus shall be limited to the requirements of RCW 46.61.380, the requirements of the school bus specifications manual for school buses addressing “identification” and “color,” the minimum requirements of “Highway Safety Program Standard No. 17,” and any applicable Federal Motor Vehicle Safety Standard (FMVSS).

Signs and markings on the interior of any bus shall be limited to necessary and/or required manufacturers' equipment and/or component identification and instruction, and the requirements of the school bus specifications manual.

Item 21.

RCW 46.37.290 Special lighting equipment on school buses and private carrier buses.

The chief of the Washington state patrol is authorized to adopt standards and specifications applicable to lighting equipment on and special warning devices to be carried by school buses and private carrier buses consistent with the provisions of this chapter, but supplemental thereto. Such standards and specifications shall correlate with and, so far as possible, conform to the specifications then current as approved by the society of automotive engineers.

Item 22.

RCW 46.37.351 Performance ability of brakes. Every motor vehicle and combination of vehicles, at all times and under all conditions of loading, upon application of the service brakes, shall be capable of:

- (1) Developing a braking force that is not less than the percentage of its gross weight tabulated herein for its classification,
- (2) Decelerating to a stop from not more than twenty miles per hour at not less than the feet per second per second tabulated herein for its classification, and
- (3) Stopping from a speed of twenty miles per hour in not more than the distance tabulated herein for its classification, such distance to be measured from the point at which movement of the service brake pedal or control begins.

Tests for deceleration and stopping distance shall be made on a substantially level (not to exceed plus or minus one percent grade), dry, smooth, hard surface that is free from loose material.

	<i>Classification of Vehicles</i>	<i>Braking force as a % of gross vehicle or combination weight</i>	<i>Declaration in feet per second per second</i>	<i>Brake system application and braking distance in feet from initial speed of 20 MPH</i>
A	Passenger vehicles with a seating capacity of 10 people or less including driver, not having a manufacturer's gross vehicle weight rating.....	52.8%	17	25
B-1	All motorcycles and motor-driven cycles.....	43.5%	14	30
B-2	Single unit vehicles with a manufacturer's gross vehicle weight rating of 10,000 pounds or less....	43.5%	14	30
C-1	Single unit vehicles with a manufacturer's gross weight rating of more than 10,000 pounds	43.5%	14	40
C-2	Combinations of a two-axle towing vehicle and a trailer with a Gross trailer weight of 3,000 lbs or less.....	43.5%	14	40
C-3	Buses, regardless of the number of axles, not having a manufacturer's gross weight rating	43.5%	14	40
C-4	All combinations of vehicles in driveaway-towaway operations.....	43.5%	14	40
D	All other vehicles and combinations of vehicles.....	43.5%	14	50

Item 23.

RCW 46.37.500 Fenders or splash aprons. (1) Except as authorized under subsection (2) of this section, no person may operate any motor vehicle, trailer, or semitrailer that is not equipped with fenders, covers, flaps, or splash aprons adequate for minimizing the spray or splash of water or mud from the roadway to the rear of the vehicle. All such devices shall be as wide as the tires behind which they are mounted and extend downward at least to the center of the axle.

(2) A motor vehicle that is not less than forty years old or a street rod vehicle that is owned and operated primarily as a collector's item need not be equipped with fenders when the vehicle is used and driven during fair weather on well-maintained, hard-surfaced roads.

Item 24.

RCW 46.44.042 Maximum gross weights—Axle and tire factors. Subject to the maximum gross weights specified in RCW 46.44.041, it is unlawful to operate any vehicle upon the public highways with a gross weight, including load, upon any tire concentrated upon the surface of the highway in excess of six hundred pounds per inch width of such tire. An axle manufactured after July 31, 1993, carrying more than ten thousand pounds gross weight must be equipped with four or more tires. An axle carrying more than ten thousand pounds gross weight must have four or more tires, regardless of date of manufacture. Instead of the four or more tires per axle requirements of this section, an axle may be equipped with two tires limited to five hundred pounds per inch width of tire. This section does not apply to vehicles operating under oversize or overweight permits, or both, issued under RCW 46.44.090, while carrying a nonreducible load.

The following equipment may operate at six hundred pounds per inch width of tire: (1) A nonliftable steering axle or axles on the power unit; (2) a tiller axle on fire fighting apparatus; (3) a rear booster trailing axle equipped with two tires on a ready-mix concrete transit truck; and (4) a straddle trailer manufactured before January 1, 1996, equipped with single-tire axles or a single axle using a walking beam supported by two in-line single tires and used exclusively for the transport of fruit bins between field, storage, and processing. A straddle trailer manufactured after January 1, 1996, meeting this use criteria may carry five hundred fifteen pounds per inch width of tire on sixteen and one-half inch wide tires.

For the purpose of this section, the width of tire in case of solid rubber or hollow center cushion tires, so long as the use thereof may be permitted by the law, shall be measured between the flanges of the rim. For the purpose of this section, the width of tires in case of pneumatic tires shall be the maximum overall normal inflated width as stipulated by the manufacturer when inflated to the pressure specified and without load thereon.

The department of transportation, by rule with respect to state highways, and a local authority, with respect to a public highway under its jurisdiction, may extend the weight table in RCW 46.44.041 to one hundred fifteen thousand pounds. However, the extension must be in compliance with federal law, and vehicles operating under the extension must be in full compliance with the 1997 axle and tire requirements under this section.