

## **Detailed Explanation of Changes to Kentucky Minimum Specifications for School Buses for 2014**

### Page 13 - AXLE (FRONT)

The front axle shall have a gross axle weight rating ~~at the ground equal to or exceeding that portion of the total load which is supported by the front axle~~ but not less than the minimum rating shown in the following table:

Reason for change: Federal Motor Vehicle Safety Standards require this and it is therefore unnecessary.

**Expected price change \$0.**

### Page 14 - AXLE (REAR)

The manufacturer shall provide a rear axle having an axle weight rating ~~equal to or exceeding that portion of the total load which is supported by the rear axle~~ but not less than the minimum rating shown in the following table:

Reason for change: Federal Motor Vehicle Safety Standards require this and it is therefore unnecessary.

**Expected price change \$0.**

### Page 16 - AIR CHAMBER

Air brakes installed on ~~thirty-four (34) and fifty-two (52) passenger chassis shall be de-rated to provide balance without aggressive wheel lockup.~~ Type "C" and "D" school bus chassis shall be equipped with the largest appropriate brake chamber ~~compatible with companion axle components (chambers and linings) based on the chassis configuration.~~ All brake chambers shall be MGM Long Stroke or approved equal. If the manufacturer anticipates that this requirement will result in any brake imbalance between axles, it shall be the responsibility of the manufacturer to adjust the chamber size to produce a balanced brake system.

Reason for change: Anti-lock Brake systems make this specification obsolete.

**Expected price change \$0.**

### Page 17 - AIR DRYER

An air dryer shall be installed on all air brake systems. The air dryer shall be Bendix AD-9 or prior approved equal. Dryers shall be equipped with an internal heater, mounted on the left chassis frame rail or other approved location, and bracketed for easy serviceability. All of the plumbing from the air compressor to the input of the air dryer shall be routed for direct entry into the air dryer, utilizing soft flow bends and eliminating all sumps in air lines. The supply line from the compressor to the air dryer shall be steel-braided Teflon.

**NOTE:** INSTALLATION OF THE AIR DRYER AND ROUTING OF THE AIR LINES SHALL REQUIRE PRIOR APPROVAL BY THE PUPIL TRANSPORTATION BRANCH AND THE AIR DRYER MANUFACTURER.

NOTE: IF THE STEEL BRAIDED TEFLON SUPPLY LINE IS NOT EXTENDED TO THE AIR DRYER ON TYPE D BUSES, THE BRAIDED PORTION SHALL BE A MINIMUM OF FIVE FEET LONG OF SUFFICIENT LENGTH TO ENSURE THAT THE ENGINE VIBRATION IS ISOLATED FROM THE AIR DRYER.

Reason for change: Certain buses require a different length supply line.

Expected price change \$0.

#### Page 19 - ALTERNATOR

The electric power source shall be a heavy-duty, bus-type alternator. The alternator shall be a minimum of one hundred eighty five ampere (185) minimum output at seven thousand five hundred (7,500) RPM rotor speed and a minimum of seventy four (74) ampere output at normal recommended engine idle speed. The alternator shall be driven by a serpentine belt designed and sized not to exceed the alternator bearing speed. The rotor shall be of a diameter that would not be destructive to belts being used. The alternator shall be pad mounted on the top side of the engine with the regulator indexed for easy service. The regulator shall be preset to fourteen (14) volts. It shall not have a cold, continuous draw in excess of ten (10) milliamperes and shall be self-energized with a cut in speed less than low engine idle speed. The alternator shall be Leece-Neville, 4939 PAH, 4932 PAH, AVI 160 or prior approved equal.

Reason for change: Leece-Neville AVI 160 produces 240 amps which exceeds the minimum requirements.

Expected price change \$0.

#### Page 20 - BATTERY

All chassis shall require installation of three (3) low maintenance or maintenance-free "Group 31" batteries. The batteries shall be designed for heavy-duty deep cycling bus operation. The batteries shall be constructed of thermal-rigid hard rubber or heavy plastic case and designed to resist damage from road shock and heat distortion. The battery shall be a minimum B.C.I group, size 31, twelve (12) volts, one hundred and eighty (180) ampere-hour capacity, cold-cranking current, six hundred and twenty-five (625) amps with top post terminals.

All batteries ~~mounted by the Type "C" chassis manufacturers shall be temporarily mounted in a skirt-mounted sliding tray. manner readily accessible to the body manufacturers for a skirt sliding tray mounting, without requiring relocation or length alteration to the battery cables.~~ All battery cables shall be securely routed to the left frame rail location without crossing over the top of any frame member. Routing and clamping of conductors shall be pre-engineered to the point of termination outside the left frame rail. Both battery cables shall attach to the battery posts, or battery terminals, with a bolted connector. ~~Type "D" chassis Manufacturers shall provide for the battery location, meeting the above mentioned performance requirements and shall coordinate with the Department of Education, Pupil Transportation Branch, for approval of location.~~

NOTE: ~~THE CHASSIS MANUFACTURER SHALL BE RESPONSIBLE FOR THE WARRANTY OF ANY BRAND OF BATTERY INSTALLED.~~

Reason for change: The body and chassis are no longer bid as separate components.

Expected price change \$0.

Page 22 - **ENGINE** Listed below are engine components that shall be included:

- 1) The manufacturer's standard de-aeration tank and coolant recovery system with the overflow escape hose, when applicable shall exit the engine compartment below the frame rail.
- 2) ~~Horton~~—An on/off Fan Clutch (electro-magnetic, or air). The eight cylinder engine shall utilize ~~Horton~~ direct sensing viscous fan.
- 3) An engine heater with a minimum of seven hundred and fifty (750) watts, one hundred and ten (110) line voltage, with a prior approved wire connection and location by the Department of Education, Pupil Transportation Branch. The heater receptacle shall be dust and water sealed and permanently located in a recessed area of the bumper, or prior approved location.
- 4) The oil filter shall be a minimum two (2) quart capacity. (1.79 quart net capacity) The oil filter shall be accessible for service without the use of special tools.
- 5) A primary fuel filter and water separator, shall be located between the tank and engine transfer pump. The filter shall be OEM installed and approved.
- 6) The fuel filter shall be Racor Model 330, thirty (30) micron spin-on, Racor Model 490, thirty (30) micron spin on or prior approved equal. The Pupil Transportation Branch at the pilot inspection shall approve the location.
- 7) If the fuel system includes a fuel return line to the tank, a secondary fuel filtration, in addition to the Racor Model 330 thirty (30) micron, shall be the manufacturer's standard for engine protection.
- 8) Fuel system check valve shall be installed on the engine side of the fuel line exiting the fuel filter.
- 9) The engine shall be equipped with an electronic hand throttle. The throttle shall have no reference to cruise control and shall be marked "Throttle – High/Low" or "High Idle". The hand throttle shall automatically return to idle when the service brake is depressed.
- 10) Corrosion-resistant metal hose bibs (sized for one inch ID heater hose), accessible to the body company for heater installation, shall be installed. Hose bibs, necessary plumbing, and indexing of plumbing shall require prior approval from the Pupil Transportation Branch.

- 11) Engine coolant hoses, requiring clamp connections one (1) inch and larger on the engine or associated components shall be equipped with a Breeze constant torque clamp, ~~Mubea constant tension clamp~~ or prior approved equal.

NOTE: ALL ENGINES SHALL HAVE THE CAPABILITY OF PROVIDING A MINIMUM FREE WATER FLOW OF THREE (3) GALLONS PER MINUTE AT ~~ONE HUNDRED AND SEVENTY (170) DEGREE TEMPERATURES AT ONE THOUSAND (1,000) ENGINE RPM FOR BUS HEATER OPERATION.~~

The engine housing cover and/or school bus body frontal area shall be so designed to provide reasonable access to the engine area. The cover shall provide access for maintenance needs of inspection and fluid levels, belt tension, hose, wiring and other requirements as necessary. Type D Front Engine buses

Reason for change: Horton no longer manufactures this type of fan clutch. "Throttle – High/Low" and "High Idle" are acceptable. Mubea constant tension clamps have been unreliable. The temperature is now increased by EPA clean air standards and this specification is no longer valid.

Expected price change \$0.

#### Page 23 - EXHAUST SYSTEM

A total exhaust system, exhaust pipe, muffler and tailpipe shall be furnished by the chassis manufacturer. All routing to or through the bumper shall be manufactures standard for rear exhaust evacuation. The system shall be warranted for five years. A manual regeneration mode shall be included in the system. The control for the start of this system shall be designed or located to be accessible to a technician but not the driver. The Control shall be ether a manual switch ~~in the electrical control panel~~ or a start switch in the first line diagnostic program provided by the vendor. This requires the ability to force regeneration on the vehicle diesel particulate filter when the sensors indicate it is required.

Reason for change: Other locations are acceptable.

Expected price change \$0.

#### Page 23 - ~~FIRE WALL~~

~~The chassis manufacturer shall provide a clear area on the right and left side of the firewall to facilitate the body company routing and location of the heater hose, heater valves and bulkhead fittings.~~

NOTE: ~~ANY ADDITIONAL COST TO THE BODY MANUFACTURER AS A RESULT OF THE CHASSIS MANUFACTURER FAILING TO ADVISE AND PROVIDE DOCUMENTATION SHALL BE BORNE BY THE CHASSIS MANUFACTURER.~~

Reason for change: The body and chassis are no longer bid as separate components.

Expected price change \$0.

## Page 23 - FRAME

The Type "C" school bus frame rating shall ~~equal or exceed the gross axle weight ratings~~ be a minimum fifty thousand (50,000) PSI. The frame side members shall be non-tapered and of one-piece construction. Extensions of the frame are permissible only when such alterations are behind the rear spring hanger and shall not be for the purpose of extending the wheelbase. Alterations shall be guaranteed by either the chassis or the body manufacturer whichever makes the extension. There shall be no welding to the frame side rails except by the chassis or body manufacturer and approved by the Pupil Transportation Branch. Frame rails shall be painted to avoid corrosion.

Reason for change: This standard is covered by FMVSS standards and not needed.

Page 24 - NOTE: ~~NO ITEMS INSTALLED BY THE CHASSIS MANUFACTURER ON THE CHASSIS SHALL EXTEND ABOVE THE TOP OF THE FRAME RAILS. ANY ITEM INSTALLED CLOSE TO THE TOP OF THE FRAME RAILS SHALL BE FAR ENOUGH BELOW THEM TO PERMIT REASONABLE ACCESS FOR SERVICE OF SAID ITEM. ANY ITEM INSTALLED ON THE FRAME RAILS SHALL NOT EXTEND CLOSER TO THE GROUND THAN EIGHTEEN (18) INCHES UNLESS POSITIONED IN A LOCATION TO ENSURE THAT THE BREAK OVER ANGLES RELATIVE TO APPROACH AND DEPARTURE WILL PROVIDE FOR EQUIVALENT GROUND CLEARANCE.~~

Reason for change: The body and chassis are no longer bid as separate components  
**Expected price change \$0.**

## Page 26 - INSTRUMENTS AND INSTRUMENT PANEL

The chassis instrument panel shall be equipped with the following:

1. Speedometer
2. Odometer
3. Voltmeter
4. Oil pressure gauge
5. Water temperature gauge
6. Water temperature light/buzzer
7. Fuel gauge
8. Upper beam headlight indicator
9. Turn signal indicator lights
10. Air gauge (chassis with straight air brakes)
11. Red light to indicate low air pressure
12. FMVSS 105 indicator lights
13. Tachometer (manufacturer's standard - located in the instrument panel)
14. Hour meter (located in the instrument panel and switched to operate only when engine is running)

The above mentioned instruments shall be mounted in the instrument panel in such a manner that each instrument is clearly visible for drivers ranging from the fifty (50) percentile adult female to the ninety-five (95) percentile adult male, while seated in the normal seating position, as defined by SAE. Instrument panels ~~shall be sealed to protect from moisture intrusion during transport to the body manufacture and~~ shall be warranted for five (5) years. ~~by the chassis manufacturer.~~ Instruments shall be accessible for maintenance and repair. Instruments and controls shall illuminate for night use and controlled by the headlight rheostat.

Reason for change: The body and chassis are no longer bid as separate components

Expected price change \$0.

#### Page 27 - LIGHTS

The chassis shall be equipped with halogen headlights and a dimmer switch. The dimmer switch location shall require prior approval of the Pupil Transportation Branch. School bus chassis of all pupil capacities shall be equipped with Class "A" turn signals (front). Type "C" school buses shall have fender-mounted, combination double-faced, turn signals. These marker lamps shall have amber lens in front and red lens in rear, and marker lamps on the side. Daytime running light shall be standard equipment. ~~Amperage draw shall not exceed six amps.~~

Reason for change: Amperage draw is left over from when we had 105 amp alternators. All alternators now require a minimum 185 amp output.

Expected price change \$0.

#### Page 28 - TIRES AND RIMS

Tires supplied on all Kentucky school bus chassis shall be first-line, steel belted, low profile and tubeless with highway-type tread. They shall be supplied by one of the major tire manufacturers under its own brand name and furnished as original equipment as shown in the chassis supplier's most recent data book and specifications literature on file with the Pupil Transportation Branch. The tires shall be of the same manufacture and tread design ~~wheels~~. The tires shall be Goodyear 295/75R22.5 G661 LR G, 295/75R22.5 G395 LR H, Continental/General 295/75R22.5, Michelin 275/80R22.5 XZE, Bridgestone/Firestone 295/75R22.5 or prior approved equal.

All tires, rims and wheels shall be balanced ~~by the chassis manufacturer~~. Any tire not balance correctable, with less than twenty (20) ounces of weight, shall be replaced. All tires shall be evaluated by the pre-delivery servicing dealer by means of road testing. Any tire out of balance at the time of the testing shall be corrected by the pre-delivery servicing dealer. All tires and rims shall meet or exceed the minimums in the following table, with the rim rating capable of exceeding the maximum tire inflation pressure.

Reason for change: The body and chassis are no longer bid as separate components.

Expected price change \$0.

## Page 29 - TRANSMISSION (AUTOMATIC)

Chassis, thirty-four (34) through eighty-four (84) passenger capacity, equipped with spring-loaded rear axle parking brakes, ~~may be purchased~~ shall be equipped with an automatic transmission.

Reason for change: All buses are automatic as standard equipment.

Expected price change \$0.

## Page 31 - WHEEL ALIGNMENT

All steering axles shall have a toe-in set to provide for ~~a zero inch (0") toe-in optimum drivability,~~ maneuverability and longevity under a normally loaded school bus axle in a normal driving mode.

Unladen axles shall have toe-in preset to one thirty-second (1/32) inches +/- one thirty-second (1/32") inch.

Reason for change: Toe-in varies and should be set for the specific bus.

Expected price change \$0.

## Page 33 - BATTERY

All batteries shall be installed in a battery box or sliding tray with a door. A battery hold down bracket shall be designed for clamping action around all four sides of the battery. All chassis will be equipped with three (3) batteries. The battery box shall be labeled with one-inch (1") letters. The bracket shall be designed for three (3) "Group 31" batteries and secured to the sliding tray with a minimum of two (2) tie-down bolts. Battery conductors entering the battery compartment shall be securely clamped to eliminate cable abrasion. (Brackets not allowing forward or lateral movement of the battery tray will not be acceptable.) ~~Type "D" chassis manufacturers shall provide for the battery location, meeting the above mentioned performance requirements and shall coordinate with the respective body manufacturer and the Department of Education, Pupil Transportation Branch, for approval of location.~~

Reason for change: The body and chassis are no longer bid as separate components. One standard will cover all buses.

Expected price change \$0.

## Page 34 - BUMPER (FRONT)

Type "C" and "D" front bumpers shall be equalavant in strength and durability to pressed-steel channel at least 3/16 inches thick and not less than eight inches wide (high). Front bumpers shall be one piece, ~~a minimum of three sixteenths (3/16) inches plate steel, nine and one half (9 1/2) inches high, frame mounted, die formed (minimum 14 inches blank),~~ with a ninety (90) degrees flange top and bottom. ~~Front bumpers shall be so designed and formed to equate in strength in the frontal and quarter loading, as compared to the strength of one fourth (1/4) inches front bumper installed by OEM on conventional school buses.~~ The front bumper shall be of sufficient strength to permit being pushed by another vehicle on a smooth surface with a five degree, (8.7 percent) grade without permanent distortion. The bumper shall be painted black. The front

bumper shall be designed and installed so that it is capable of supporting the weight of the front of the vehicle during towing or when being lifted by a jack.

Reason for change: Provides performance criteria for design without limiting the design.

Expected price change \$0.

#### Page 35 - COLOR

The outside of the school bus body, excluding those components painted by the chassis manufacturer, shall be painted with lead-free primer and polyurethane surface coat. The surface coat shall be "National School Bus Chrome (yellow) " in accordance with the colorimetric specifications of Federal Standard 595A, Color 13432. The roof of the school bus shall be painted with lead-free primer and white polyurethane surface coat. White paint shall be the manufacturer's standard design ~~extend to within six (6) inches above the drip rails on the side of the body~~ except that the front and rear roof caps shall remain National School Bus Yellow.

Reason for change: Allows white paint to terminate at the most logical point and makes allowance for bus bodies that do not have a traditional drip rail.

Expected price change \$0.

#### Page 36 - FLOOR SILLS

All floor sills shall be of prime commercial quality, mill-applied galvanized or galvalume steel. ~~There shall be one (1) main body sill at each side post and two (2) intermediate~~ Body sills shall be provided on approximately ten-inch (10") centers. All sills shall be of equal height and shall not exceed three (3) inches. All sills shall extend the width of the body floor except where structural members or features restrict the area. ~~The main body sill shall be equivalent to or heavier than ten (10) gauge and each intermediate body sill shall be equivalent to or heavier than sixteen (16) gauge, or each of~~ All of the body sills shall be equivalent to or greater than fourteen (14) gauge. All sills shall be permanently attached to the floor. Connection between the sides and the floor system shall be capable of distributing loads from vertical posts to all floor sills.

Reason for change: The old language made allowance for a vendor that is no longer in business all current vendors build using the new language.

Expected price change \$0.

#### Page 37-40 - RACK TESTING

A diagonal (racking) load test shall be performed on Type A,B,C,D school buses to assure adequate shear stiffness and strength of the bus body. Details of the test are provided below.

A two cycle loading sequence shall be conducted following the procedures as follows:

A. Requirements: When a force equal to 1-1/2 times the GVW is applied to the edge of the roof of the vehicle's body structure through a force application plate as specified in (b), test procedures:

A. (1) The diagonal movement at any point on the application plate shall not exceed 5 1/8 inches; and

A. (2) Each emergency exit of the vehicle provided in accordance with FMVSS 217 shall be capable of operation as specified in that standard during the full application of the force and after release of the force.

B. Test Procedures: Each vehicle shall be capable of meeting the requirements of (1) and (2) when tested in accordance with the procedures set forth below.

B. (1) The vehicle shall be supported on a rigid surface along the lower ledge of the frame or along the body sills in the absence of a frame.

B. (2) The load shall be applied through a force application plate that is flat and rigid. The dimensions of the plate shall be chosen to assure that the plate edges never make contact with the vehicle skin during testing. A typical width is 18 inches, and a typical length is 20 inches less than the length of the vehicle's roof measured along its longitudinal centerline.

B. (3) Place the force application plate in contact with the edge of the vehicle roof. Orient the plate so that it is flat and the rigid surface is perpendicular to a diagonal line connecting the most distant points on an interior cross section of the vehicle. The rear edge of the plate shall be positioned approximately 20 inches from the rear edge of the vehicle roof. A Temporary stand may be used to support the plate until a force is applied.

B. (4) Apply an evenly distributed force in a diagonally downward direction through the force application plate at any rate not more than 0.5 inch per second, until a force of 500 pounds has been applied.

B. (5) Apply additional force in a diagonally downward direction through the force application plate at a rate of not more than 0.5 inch per second until the force specified in (a) has been applied, and maintain this application force.

B. (6) Measure the diagonal movement of any point on the force application plate which occurred during the application of force in accordance with (5) and open the emergency exits as specified in (A) (2).

B. (7) Release all diagonal force applied through the force application plate and operate the emergency exits as specified in (A)(2).

C. Test Conditions: The following conditions apply to the requirements specified in (3).

(C)(1) Temperature: The ambient temperature is any level between 32 degrees and 90 degrees F.

(C)(2) Windows and Doors: Vehicle windows, door and emergency exits are in the fully closed position and latched but not locked.

D. An alternative method of testing for the racking load test shall be as follows:

(D)(1) The racking load shall be applied along a line connecting the most distant points on a transverse cross section of the bus interior so that it produces a shear distortion of the cross section.

(D)(2) The maximum jack load for a two frame assembly is determined by the following formula:

$J=2P$  J-maximum jack load for two-frame assembly

$P$ =load/frame

Where  $P$ = $DVW$  divided by  $N$

$DVW$ -dynamic vehicle weight

N- total number of body frames

and DVW=DF x GVW

DF-dynamic factor, not less than 1.5

GVW-gross vehicle weight

Thus, for a DF=1.5, a GVW=22,000 pounds-force and N=11, the dynamic vehicle is DVW=33,000 pounds force, the load/frame is P=3,000 pounds force and the maximum jack force is J=6,000pounds force.

(D)(3) When a complete bus body is rack loaded, the total load DVW must be distributed uniformly along the body. This may be accomplished by mounting a series of hydraulic jacks along the length of the bus interior. Seat may be removed to facilitate jack mounting. The rack load will be considered to be uniformly distributed when the variation in hydraulic jack readings is less than 10 percent. A maximum load, the sum of all jack readings, shall equal DVW.

The test may be performed on a complete bus body or on a representative section composed of at least two complete frames (body posts plus roof bows) and floor. Standard seats may be installed in the test section in a manner identical to that of the full bus body. Fabrication procedures for the test assembly shall be identical to those used in normal bus body production.

A two-cycle loading sequence shall be conducted, with intermeadiate, final load and deflection readings recorded according to the procedure described above.

The maximum deflection in line with the jack (A, maximum) shall not exceed four inches.

Manufacturers shall specify which testing was used and submit appropriate certification information to the Department of Education.

Reason for change: Rack testing ensures that the bus roof will not collapse in a rollover accident. In the absence of a federal standard, seven states have adopted this test. The bus manufactures' have already conducted this test. This ensures that any bus body purchased will have the strength characteristics to survive a roll over without structural collapse.

Expected price change \$0.

#### Page 40 - CONSTRUCTION

~~All body floor joints shall be fastened to meet sixty (60) percent joint strength. The body floor in the toe board area shall be designed to mate to the chassis toe board area without the use of structural transition panels unless the structural transition panels meet sixty (60) percent joint strength at the point of attachment of the body floor and/or super structure. Cutouts for the transmission opening shall be covered by the original transmission cover supplied by the chassis manufacturer without extension flanges.~~

Reason for change: This specification is covered in FMVSS 221 and is not needed in this specification.

Expected price change \$0.

## Page 42 - PROTECTION

An air pressure valve shall be required for the protection of the air brake system in which air shall be drawn from the supply tank in accordance with FMVSS 121. ~~and shall be located as per the requirements of the respective chassis body builder's manual. The body company shall supply an air pressure regulator for air supply to the slave cylinder that will ensure the regulated air supply not to exceed the designated regulator setting. The body company shall supply~~ A means to control the door closure and opening speed shall be provided. The force required to achieve the door closure shall be a maximum of sixty five (65) pounds prior to and through the door achieving the closing plane. The door closure force shall be so constructed to minimize the occurrence of injury to persons caught in the area while in a door closing mode. The door shall be so designed to provide for manual opening in the absence of air pressure or electrical current for energizing without further action by the driver such as manually off-loading the cylinder or de-meshing the gears.

Reason for change: The body and chassis are no longer bid as separate components.

**Expected price change \$0.**

## Page 46 - TESTING PROCEDURE

1. Apply a seventeen thousand (17,000) pound force to a designated area of the school bus side, including a left side emergency door, to determine if that force will cause a deflection amount greater than ten (10) inches inward.
2. Door retention hardware must be capable of withstanding an outward force of five thousand two hundred and eighty (5,280) pounds before the side intrusion test and five thousand two hundred and eighty (5,280) pounds after, through a distance of less than ten (10) inches with twenty thousand (20,000) pounds of intrusion force applied. ~~The top and bottom latching bars shall be enclosed in such a fashion as to prevent their being used as a handle upon exit. Such installation will be subject to Pupil Transportation Branch inspection.~~
3. All body sides adjacent to the passenger seating positions shall be required to withstand the above mentioned intrusion force, relative to the amount of deflection.
4. The left side emergency door, when installed, shall have an adjacent body structure so designed that the side body structure shall withstand the above-mentioned intrusion, relative to the amount of deflection. The left side emergency door shall be secured with a three (3) point latching mechanism.

Reason for change: Eliminates language that is unclear.

## Page 48 - WIRING

~~All school bus body wiring shall conform to the "Standards of the Society of Automotive Engineers";~~ All ground studs shall meet three (3) wire standard ASE J1908-9.3 ground stud criteria, coded for identification, with amperage rating of twenty-five (25) percent greater than the designed load. The body company shall provide, and clearly identify, two positive leads and two grounding points for the connection of two way radios and video cameras. These circuits shall operate at all times that the key is in the on position. ~~and shall be capable of carrying 20 amps.~~

Reason for change: Clarifies which standard wiring shall conform with.

Expected price change \$0.

Page 48 - SOLENOID SWITCH

The bus body electrical system shall be equipped with a continuous-duty solenoid switch of adequate capacity to handle the body electrical load. This solenoid switch shall be energized by the ignition switch in either the accessory or run position. The solenoid shall disconnect the electrical power from all bus body circuits when the ignition switch is in the "OFF" position, except to those body circuits that are energized by a chassis switch provided by the chassis supplier. This solenoid switch is to be a one hundred (100) AMP continuous-duty. ~~White Rogers 124-105-211 or prior approved equal.~~ The body feed wire shall be connected to the chassis terminal post and shall have a minimum current carrying capacity of one hundred twenty-five (125) amperes, continuous (four-gauge minimum).

Reason for change: White Rogers no longer makes this solenoid.

Expected price change \$0.

Page 50 ~~TOTAL ELECTRICAL LOAD~~

~~The total constant electrical load shall not exceed one hundred (100) amps.~~

~~NOTE: THE TOTAL CONSTANT ELECTRICAL LOAD IS TO BE COMPUTED AS THE CONSTANT LOAD, PLUS THIRTY FIVE PERCENT (35%) OF THE INTERMITTENT LOAD. THE INTERMITTENT LOAD SHALL INCLUDE ONLY THESE ITEMS:~~

- ~~▪ Back up alarm~~
- ~~▪ Turn signal lamps (4)~~
- ~~▪ Stop lamps (4)~~
- ~~▪ Back up lamps (2)~~
- ~~▪ Step well lamp~~
- ~~▪ Domes (8)~~
- ~~▪ Warning lamps (8) (8) lamp system~~
- ~~▪ Stop arm~~
- ~~▪ Heated mirrors (2)~~
- ~~▪ Wipers, radio~~

Reason for change: Amperage draw is left over from when we had 105 amp alternators. All alternator now have a minimum 185 amp output.

Expected price change \$0.

Page 54 - GLASS

Openings in the school bus body that require glass must be closed with quality glazed ASA safety glass. ~~that is a minimum one eighth (1/8) inches thick.~~

The windshield shall be **LAMINATED SAFETY GLASS ASA-1** with a minimum distortion.

The bottom portion of the rear emergency door shall be ASA LAMINATED SAFETY GLASS.

Reason for change: This is covered in FMVSS 217 and is not needed.

Expected price change \$0.

#### Page 55 - HEATERS

School bus heating systems shall meet the following performance standards:

- A. Provide evenly distributed heat throughout the bus body.
- B. Provide defrosting for the windshield and entrance door.
- C. Have capabilities of providing evenly distributed heat, creating a temperature rise to 50 degrees Fahrenheit inside the body shell when soaked in an ambient temperature of 0 degrees Fahrenheit for fifteen (15) hours.
- D. The heater water flow shall be controlled by the installation of bulkhead mounted water shutoff valves. (Water shutoff valves and bulkhead mounts shall require approval from the Pupil Transportation Branch. Refer to heater valve drawings of the appendix.)
- E. Valves shall be one-quarter ( $\frac{1}{4}$ ) turn, ball-type, and have a minimum nominal three quarters ( $\frac{3}{4}$ ) inch internal port.
- F. The heater hose entrance through the firewall or floor shall be through prior approved bulkhead fittings.
- G. Type C – FC buses shall have all drivers' heaters air duct extended beyond the driver's side modesty panel into the passengers area.
- ~~H. Total heater electrical load, including defroster fans, shall be no more than forty five (45) amperes.~~
- I. Switching for heaters shall provide independent switches for each motor.
- J. Type C and type D bus heaters shall have easily removable air filters.

#### **Heater performance shall be measured by the following:**

A temperature measurement that is taken thirty-nine (39) inches inward from side walls, thirty-nine (39) inches inward from windshield and rear door, and thirty-six (36) inches above the floor. It shall include measurements from the front, middle and rear of the bus. The heat shall be evenly distributed through the aisle area.

The bus will be soaked at an ambient temperature of zero (0) degrees Fahrenheit for fifteen (15) hours. The temperature must rise to 50 degrees Fahrenheit inside in twenty (20) minutes when one hundred and seventy (170) degree water is applied at a rate of three (3) gallons per minute at a maximum of six (6) PSI pressure.

~~NOTE: MAXIMUM CURRENT FLOW FOR HEATERS INCLUDING DEFROSTERS SHALL NOT EXCEED FORTY FIVE (45) AMPERES.~~

Reason for change: Amperage draw is left over from when we had 105 amp alternators. All alternators now require a minimum 185 amp output.

Expected price change \$0.

#### Page 57 - INSULATION

The ceiling and all walls shall be insulated with fire resistant, underwriter-approved fiberglass insulation or prior approved material having an "R" value not less than six (6), a minimum thickness of one and one-half (1½) inches. All voids, including those caused by roof bows and header caps, shall be insulated. Type "D" school buses, ~~having a frontal area designed by the body company manufacturer, shall require the frontal area to be insulated. with the insulation of a type approved by chassis and body manufacturers.~~

Reason for change: The body and chassis are no longer bid as separate components.

Expected price change \$0.

#### Page 58 - BACK-UP LAMPS

The school bus body manufacturer shall install two (2) back-up lamps, located on the left and right rear of the body as far outboard and as low as is practical. These back-up lights shall be Weldon, Grote, Sound Off Signal L.E.D. lights or prior approved equal. In addition to these lights there shall be a white, six lamp, L.E.D light mounted on the chassis frame rail cross member immediately behind the axle. This light shall be pointed down to illuminate the area to the under and outside of the rear wheels. The light shall be wired into the back up lamp circuit. This light shall be a high intensity focused LED white light Eluminator Model 600w WWL or prior approved equal.

Reason for change: Drivers need to see the area around the rear wheels when backing during the hours of darkness.

Expected price change \$200.00.

#### Page 59 - OPERATION OF WARNING LIGHT-STOP ARM SYSTEM

The location of the momentary switch is subject to the approval of the Pupil Transportation Branch. The momentary switch shall be ~~Cole Hersee 9238, or Eaton 53-5262 for manual operation,~~ a yellow momentary rocker switch or approved equal. The momentary switch and its operation shall be identified by decal or lettering and should function as follows:

Reason for change: These parts no longer exist.

Expected price change \$0.

Page 60 - INSTALLATION REQUIREMENTS

Each flashing signal lamp shall be mounted with its axis substantially parallel to the longitudinal axis of the vehicle. The front and rear alternately flashing signal lamps shall be spaced as far to the left and right of header as practicable, fore and aft facing and grouped in a way to provide for the amber lights spaced as far apart on the header as possible.

Vertical and lateral vision of the front and rear alternately flashing warning lights shall not be obstructed by any part of the body or lamp house. LAMP HOODS WILL NOT BE ACCEPTED. A square or rectangular area around the lens of each alternate flashing signal light and extending outward ~~approximately~~ at least three (3) inches shall be painted black. In installations where there is no flat vertical portion of the body immediately surrounding the entire lens of the lamp, a square or rectangular band of black (~~approximately~~ at least three inches wide) immediately below and to both sides of the lens, shall be painted on the body or roof area. The signal shall be visible from a distance of five hundred (500) feet along the axis of the vehicle.

TURN SIGNALS (FRONT AND REAR)

Type "D" school buses shall be equipped with the manufacturer's standard front turn signals with amber lens. ~~and side turn signals.~~

Reason for change: Clarifies turn signal requirements.

Expected price change \$0.

Page 62 - AIR-OPERATED STOP ARM

~~The chassis manufacturer shall designate the air source location for stop arm activation. The chassis air supply shall be protected by a pressure protection valve. This valve shall meet the chassis manufacturer's requirements. The A pressure protection valve shall be installed by the body bus manufacturer.~~

Reason for change: The body and chassis are no longer bid as separate components.

Expected price change \$0.

Page 63 - DISABLED WARNING DEVICES

Three (3) triangular warning devices, housed in approved containers and secured in an approved location, shall be provided. These devices shall meet the ICC and FMVSS requirement and shall be located in the drivers outside toolbox. The box shall be labeled "Triangle Reflectors Inside" secured with a metal band to withstand a 20G load in any direction to the tool box.

Reason for change: Triangles have been moved out of the passenger compartment and into the tool box to protect passengers in an accident.

Expected price change Decrease \$30.00.

#### Page 65 - LOCAL DISTRICT LETTERING ADDITIONS

Local districts may add riding rules on the bulk head to the right of the driver's interior mirror. These rules shall be affixed in such a manner that they can be clearly viewed by the passengers. The riding rules shall be printed on high quality adhesive back film no larger than eight and one half by eleven inches.

Local districts may install a service sticker on the bulkhead no larger than three by five inches. These decals shall be located to the left side of the driver's mirror.

Local Districts may install the bus insurance card and registration above the driver's left side window or inside the driver's overhead accessory box if the bus is so equipped. These are to be adhered on three edges to allow the items to be pushed in from the top. Local districts may upgrade existing buses to any of the standard text in the lettering section of this specification. This restriction does not apply to manufacturer installed logos, signs or decals which are not expressly prohibited elsewhere within the specification.

Reason for change: Clarifies the manufactures ability to place their brand identification on the bus.

Expected price change \$0.

#### Page 66 - MIRRORS

##### INTERIOR

The school bus body shall be equipped with an interior rear vision mirror ~~of at least ten (10) inches by thirty (30) inches~~ or the largest that can be accommodated within the designed space. This mirror shall have a metal back of at least twenty-gauge steel attached in such a manner that it reinforces the metal backing and provides stable mounting points located not less than nine (9) inches from the ends of the mirror. The mirror glass shall be clear view laminated glass or clear view glass, a minimum of one-eighth of an inch (1/8"), bonded to a backing which retains the glass in the event of breakage. The glass and backing shall be set in U-shaped vinyl glazing, completely surrounding the mirror. The corners of the mirror shall be rounded. ~~with a nominal radius of one and one half (1½) inches.~~ The interior mirrors shall be designed for driver adjustment, mounted vibration-free, in the center of the driver's area and require approval of the Pupil Transportation Branch at the pilot inspection.

Reason for change: Clarifies the intent to have the largest mirror possible.

Expected price change \$0.

#### Page 66 - REAR VISION (OUTSIDE)

The mirror system shall be capable of providing the driver with a view along the left and right sides of the vehicle ~~or view of the rear tires at ground level, view a minimum distance of two hundred (200) feet to the rear of the bus and at least twelve (12) feet perpendicular to the side of the bus at the rear axle lines.~~ as required by FMVSS 111. These mirrors shall be heated and remotely adjustable. The heating element shall be equipped with a timer. The mirrors shall be mounted so as to prevent vertical and horizontal vibration. ~~and shall meet the requirements of FMVSS 111.~~ This standard shall be met using Rosco Eurostyle or approved equal. These mirrors shall be mounted on breakaway arms and breakaway brace.

Reason for change: This requirement is listed in FMVSS 111 and is not needed.

Expected price change \$0.

*Page 66 - CROSSVIEW MIRROR SYSTEM*

The cross view mirror system shall provide the driver with indirect vision of an area at ground level from the front bumper forward and the entire width of the bus to a point where the driver can see by direct vision. The cross view system shall also provide the driver with indirect vision of the area at ground level around the left and right corners of the bus to include the front tires and service entrance on all types of buses to a point where it overlaps with the rear vision mirror system as required by FMVSS 111.

The cross view mirror system shall meet the requirements of FMVSS 111. The mirrors used to meet this requirement shall be Rosco, Hawkeye, Eye-Max LP Crossover or approved equal. The mounting of these mirrors shall be on solid stanchions. The stanchions shall be braced for maximum strength and minimum vibration. All mirror mounting brackets shall be bolted with backing plate installed on the underside of the fenders. Stanchions and brackets mounted on fiberglass shall have rubber bushings between the stanchions, brackets and fenders.

Reason for change: This requirement is listed in FMVSS 111 and is not needed.

Expected price change \$0.

*Page 68 - REFLECTIVE MATERIAL*

The rear of the bus body shall be marked with strips of reflective National School Bus Yellow material to outline the perimeter of the back of the bus using material which conforms with requirements of FMVSS 131, Table 1. The perimeter marking or rear emergency exits per FMVSS 217 and/or the use of reflective "SCHOOL BUS" signs partially accomplish the objective of this requirement. To complete the perimeter marking of the back of the bus, strips of at least one (1) inch wide reflective National School Bus Yellow material shall be applied horizontally above the rear windows and above the rear bumper extending from the rear emergency exit perimeter marking outward to the left and right rear corners of the bus and vertical strips shall be applied at the corners connecting these horizontal strips.

Sides of the bus body shall be marked with reflective National School Bus Yellow material at least one and three-fourths (1 3/4) inches in width extending the length of the bus body passenger compartment and located between the floor line and the beltline.

Reason for change: Defines a logical stopping point for reflective tape.

Expected price change \$0.

*Page 68 - RUB RAILS*

Bus bodies shall be equipped with three (3) rub rails. There shall be one (1) rub rail located on each side of the bus body, approximately seat level. The left side rub rail shall extend from the curvature of the cowl body post rear of the driver's window at the front to the emergency doorpost. The right side rub rail shall extend from the entrance door to the emergency doorpost.

The rear end of both the left side and right side rub rail shall be fastened securely to the emergency doorpost.

Reason for change: Defines a logical stopping point for the rub rails.

Expected price change \$0.

#### Page 72 - SEAT NUMBERING

All seats shall be numbered. Seats on the service door side shall have odd numbers (1,3,5,7...). Seats on the driver's side shall have even numbers. Each seat number shall be installed on the wiring race above the window line or on the ceiling panel immediately above the wiring race. Below or next to the number the body company shall install three letters, A-aisle, M-middle, W-window. Letters shall be two inch black cut letters. Thirty inch seats shall not have the middle label.

Reason for change: Allows an alternative installation area for vendors that do not have a smooth wiring race.

Expected price change \$0.

#### Page 74 - STEPS

~~Either a two or three step riser may be used.~~ The first step shall be not less than twelve (12) inches and not more than sixteen (16) inches from the ground. All risers shall be equal in height. The riser height shall not exceed approximately nine (9) inches.

~~When the two step riser system is used, the height of the riser shall not exceed ten and one half (10½) inches. When the ground height dictates the necessity for a three step riser, the riser height shall be approximately eight (8) inches, with all risers being equal in height.~~ The step well shall be fully enclosed and shall not protrude beyond the body sideline.

Reason for change: Make all steps uniform. This is available from all manufacturers.

Expected price change \$0.

#### Page 74 - STORAGE COMPARTMENT

A storage compartment, located on the right side of the body, shall be installed on all ~~fifty two (52) through eighty four (84) passenger~~ school buses. The location, when practical, shall be ~~on the right side of the body, aft of the rear wheels, with exception of RE,~~ subject to the approval of the Pupil Transportation Branch. ~~All thirty four (34) passenger body shells shall have the box installed on the right side behind the rear wheels.~~ The storage compartment shall be approximately thirteen (13) inches high, fifteen (15) inches deep, and twenty-five (25) inches wide and be located under the floor in the body skirt. The door and box shall be sealed to minimize water and dust leakage. All doors shall be equipped with key locks.

Reason for change: Clarifies requested storage compartment location.

Expected price change \$0.

**Page 75 - STROBE LIGHTS**

All Kentucky school buses, Types "A", "C", "D" and special needs, shall be equipped with roof-mounted low profile white strobe lights. The light shall be located on the roof centerlines in the center of the third window from the rear. The lights shall have metal housing, be approximately ~~ten (10) joule~~ Class 2 and approximately four and a half (4 1/2) inches high by five and five eighths (5 5/8) inches in diameter. The power supply may be located in the light base, if the power supply is remotely located. The power supply shall be securely mounted in the school bus rear header. The light shall be individually switched with the switch located in the switch console accessible to the driver and lit with a pilot light. All wiring shall meet SAE standards. The wiring shall run to the rear header and designated roof panel through the wiring molding provided for other body wiring. It shall be protected through openings in the body and strapped to the main body harness.

Reason for change: Clarifies strobe light type.

Expected price change \$0.

**Page 75 - SUNSHIELD**

An adjustable sunshield of tinted transparent plastic, approximately six (6) by thirty (30) inches, shall be provided in the driver view area. This requirement shall be met with a Tiger Eye Multi-Adjustable Sun Visor or prior approved equal.

Reason for change: Drivers have been dissatisfied with current sunshields.

Expected price change increase \$100.00.

**Page 75 - UNDERCOATING**

The entire underside of the school bus body, including metal chassis fenders, floor members, seat mounting bolts and side panels below floor level, shall be undercoated with a commercial grade asphalt material (asbestos-free). Bus manufacturers may use other products to achieve ten year rust through protection with the approval of the Department of Education.

Reason for change: Allows flexibility for bus companies the use other methods to prevent corrosion.

Expected price change \$0.

**Page 75 - WARRANTY**

The normal body warranty shall be the manufacturer's standard, twelve thousand (12,000) miles or twelve (12) months. Any school bus body or body component warranty extension greater than standard warranty coverage shall be made available to purchasers. The date in which the body warranty shall begin will be stated as part of the invitation to bid on Kentucky school buses. Major component pass through warranty shall be filed with the Kentucky Department of Education at the pre-bid award conference. All bus bodies shall be warranted against rust through for ten years (not pro-rated).

Reason for change: Requires bus vendors to increase the level of corrosion protection or risk excessive warranty claims.

Expected price change \$500.00.

**Page 76 - WHEELHOUSING SPLASH GUARDS**

~~The body company shall install~~ All Type C buses shall be equipped with splashguards (mud flaps) on the front of all front fenders. The splashguards shall be made of durable rubber composition, bolted to the front extension of the front fender and extending within approximately eight (8) inches of the ground. Material shall be anti-sail. Mounting shall include a metal backing strip.

Reason for change: The body and chassis are no longer bid as separate components.

**Expected price change \$0.**

**Page 89 - SPECIAL SERVICE OPENING, Type A Buses**

There shall be a service opening for the electro hydraulic lift, located on the right side of the body behind the rear wheels. All other requirements, with the exception of location, shall be the same as a Type C bus.

Special service doors shall have a minimum height of fifty-eight (58) inches. Roof intrusion tests at the special service door shall be required if installation of this door requires removal of the ~~sill at the window height~~ window header.

Reason for change: Header is the correct term for this part. Sill is the lower part of the window.

**Expected price change \$0.**

**Page 89 - SERVICE DOOR ENTRANCE**

A suitable device shall be provided to assist passengers during entry or egress. This device shall allow for easy grasping or holding and shall have no openings or pinch points which might entangle clothing, accessories or limbs. It shall be designed to afford easy accessibility to small children.

The twenty-two (22) passenger conversion van shall have, at a minimum, two step risers designed for easy entrance and exit by special needs students. The risers shall be equal in height and width with the height being a maximum of nine (9) inches.

On the thirty-four (34) through sixty-six (66) passenger bus, there shall be three (3) step risers of equal height ~~and width~~ in the entrance way, placing the first landing approximately twelve (12) inches to fourteen (14) inches above the ground level and otherwise meeting all requirements listed for the regular-type school bus. All steps must extend the full width of the step well.

Reason for change: This is current industry standard and the specification should reflect the standard.

**Expected price change \$0.**

**Page 90 - ELECTRO-HYDRAULIC LIFT**

Only Type "C" thirty-four (34) through sixty-six (66) passenger and Type "A" twenty-two (22) passenger school buses may be equipped with an electro-hydraulic lift.

Thirty-four (34) through sixty-six (66) passenger body shells shall be equipped with a Braun Millennium series hydraulic lift Model L917IB or L919B standard. Local districts may request, Ricon S series S5510 or MaxonWL7 version C.

The above-mentioned lifts shall be rated at a minimum eight hundred (800) pounds working capacity, be equipped with a pressure relief switch for ground contact, and have automatic positioning at the floor level.

The successful vendor (~~Braun, Ricon, Maxon~~) shall provide factory support from the lift manufacturer on an as needed basis and up to five training classes for technicians during the contract period.

The controls pennant shall be mounted and accessible to the operator from the outside of the bus. It shall be protected by a re-settable circuit breaker within the lift manufacturer's specifications. The outside vertical post shall be padded to below barrier height. The platform shall be thirty-inches wide at a minimum, with the power provided through the ignition switch energizing a separate solenoid (~~White Rogers 123-105-211 or Prestolite 28308~~). The solenoid on all twenty-four (24)-passenger buses shall be located under the hood. A ground cable shall be installed from the lift frame to the vehicle frame of the bus.

Reason for change: The L919B is the same lift as the L917IB except the platform is one inch wider. It therefore fits some applications better and should be used in those cases. The solenoids listed are no longer manufactured.

**Page 91 - NOTE: NO SOLENOID OR BREAKER SHALL BE INSTALLED IN ANY BATTERY BOX.**

~~The lift platform shall be equipped with two (2) security handrails. The handrails shall move with the lift, have a height of thirty to thirty five (30-35) inches, and be located on the fore and aft side of the lift platform. The lift shall be certified to lift eight hundred (800) pounds and a label shall be installed to that effect on the lift post. The lift shall be equipped with an automatic roll stop, which shall be fully engaged before the platform begins its upward movement.~~

Reason for change: This is listed in the ADA lift standard and is not needed.

**Expected price change \$0.**

**Page 92 - MODESTY PANELS, STANCHIONS AND BARRIERS**

A restraining barrier or padded modesty panel and stanchion must be provided rearward of the entrance door. ~~Restraining barriers shall be positioned between the entrance area and the first passenger seat, both fore and aft of the special service opening in front of the first passenger seat between the wheelchair position and passenger seat, and~~ A restraining barrier shall be positioned between the back of the driver's seat and the first wheelchair position. ~~(A padded modesty panel and stanchion may be provided in place of a restraining barrier aft of the entrance door and fore~~

~~of the lift.)~~ A restraining panel and stanchion must be provided immediately forward and rearward of the lift. Restraining barriers shall meet the FMVSS 222 design criteria for barriers..

NOTE: A padded modesty panel and stanchion are permitted only forward of a wheelchair position. Retaining barriers are required forward for all passenger seats.

Reason for change: Clarifies the language as to where a retaining barrier is required and when a modesty panel and stanchion are required.

Expected price change \$0.

#### Page 93 - **STORAGE COMPARTMENT**

~~A storage compartment shall be installed on all special needs equipped twenty two (22) through sixty six (66) passenger school buses.~~

~~On fifty two (52) and sixty six (66) passenger shells, the location shall be on the right side body, aft of the rear wheel, behind the fuel tank cage, on either the left or right side depending upon the location of the engine exhaust pipe.~~

~~The twenty two (22) and thirty four (34) passenger body shells shall have the storage compartment located aft of the entrance door.~~

~~The storage compartment shall be approximately thirteen (13) inches high, fifteen (15) inches deep, and twenty five (25) inches wide and located under the floor in the body skirt. The door and box shall be sealed to minimize water and dust leakage. All doors shall be equipped with key locks.~~

~~—NOTE: ONLY ONE STORARTMENT IS REQUIRED PER BUS.~~

#### Page 94 - **INFECTIOUS LIQUID SPILL CONTROL BODY FLUIDS KIT**

~~An infectious liquid spill control~~ A body fluids kit shall be installed on all school buses.

Reason for change: Required on all school buses. Language moved to Page 72.

Expected price change \$0.

#### Page 106 - **OXYGEN CYLINDER TRANSPORTATION**

When a students IEP requires that an oxygen cylinder be transported the district shall secure the cylinder by an approved system such as the Sure Lock GO2 hold down. This system shall be load tested.

Reason for change: Districts have requested a standard method of transporting oxygen.

Expected price change \$300.00 if district selects this option.

#### Page 114 - **TRACTION CONTROL**

Local School district may purchase automatic traction control/enhancement as an optional part of the airbrake full vehicle wheel control system.

Reason for change: Some districts requested this option for increased traction on certain routes.  
Expected price change increase \$300 if a district selects this option.

DRAFT