-

SECTION IV

BODY SPECIFICATIONS

EXCEPTIONAL CHILD BUSES

TYPES A, B, C, AND D BUSES

MINIMUM BODY SPECIFICATIONS, EXCEPTIONAL CHILD BUSES TYPE A, B, C, and D

1.0 GENERAL REQUIREMENTS FOR EXCEPTIONAL CHILD BUSES

Exceptional child bus body structure and equipment shall conform to the regular bus body specifications in Section III and must meet the additional requirements of this section (listed below) regarding modifications necessary for installation of special equipment. Proper bracing shall be added as specified in the body standards.

All school buses equipped with wheelchair lifts shall meet the requirements of this section. Additionally, all wheelchair lift equipped buses shall meet or exceed the requirements of FMVSS 403 and 404.

A power-up, gravity-down lift shall be made available based on local district needs on all type wheelchair-lift equipped bodies. All wheelchair lifts shall meet the requirements of FMVSS 403 and 404, and the Americans with Disabilities Act (except where requirements herein differ from ADA, then requirements listed herein shall prevail), and all requirements listed herein. Other ADA requirements for non-lift equipment are not applicable.

National School Transportation Specifications and Procedures, Revised 2005, shall also be applicable, including dynamic testing requirements for mobile seating device and occupant securement systems. Body manufacturer may be required to provide certification that exceptional child buses and equipment meet the additional requirements of the National Specifications pertaining to buses for special needs students.

2.0 TECHNICAL REQUIREMENTS

The wheelchair lift shall meet the technical requirements below.

2.1 GENERAL LIFT AND/OR BODY REQUIREMENTS

2.1.1 Weight

The weight of the lift shall not adversely affect the legal axle loading, the maneuverability, structural integrity, or the safe operation of the vehicle on which it is installed.

2.1.2 Operation Constraints

2.1.2.1 The lift shall operate when the bus is on level ground and on road grades up to 7 percent or 4 degrees.

2.1.2.2 The lift shall operate when the bus is on level ground and when the bus is at an angle of plus or minus 8.7 percent or 5 degrees due to road crowns, depressions, or curb geographics.

2.1.3 Boarding Direction

See ADA requirements contained in 49 CFR, Part 38.

2.1.4 Location of Lift and Door Requirements

2.1.4.1 Whenever possible, the option shall be provided to the local purchaser to have the lift located either in front of or behind the rear wheels, on the right side of the bus.

2.1.4.2 If the lift is located forward of the rear wheels, it shall be located away from the regular service entrance so any fully opened, forward-mounted door will not obstruct the conventional service entrance.

2.1.4.3 Door posts, headers, and floor sections around this special opening shall be reinforced to provide strength and support equivalent to adjacent sidewall and floor construction of an unaltered model.

2.1.4.4 A drip molding shall be installed above opening to effectively divert water away from entrance.

2.1.4.5 All doors must open outwardly.

2.1.4.6 All doors shall be weather sealed. Design shall provide positive means of holding door, or doors, in open position during lift operation. Friction type catches are not acceptable. This specification shall not be achieved by means of a hinge-mounted pin or other device that would result in extra leverage on the door hinge point(s).

2.1.4.7 When manually operated dual doors are provided, rear door shall have at least a one-point fastening arrangement to header. The forward mounted door shall be constructed so that a flange on the door overlaps the edge of the rear door when closed. This door shall have at least a 3-point fastening devicewith one point to the header, one to the floor line of the body, and the other to the rear door. This locking device shall afford maximum safety when doors are in the closed position. When single door is used, locking device shall meet requirements for emergency door lock. Door hinge(s) shall be adequately heavy duty to prevent sagging of door over the useful life of the bus. A single door may be used to enclose a clear door opening of no more than 43 inches in width. All lift entrances shall have a clear, finished door opening height of at least 56 inches.

2.1.4.8. 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.

2.1.4.9. Each door shall have a glass window set in rubber compatible with and set to the lower line of adjacent sash.

2.1.5. Padding and Protective Covering

2.1.5.1. Pinching movements, shear areas, or places where clothing or other objects could be caught or damaged shall be covered or in other ways protected to prevent passenger injury when lift is in operation.

2.1.5.2. The outermost stationary frame structure of the lift exposed to the passenger compartment shall be padded with high density foam down to within 3 inches of the floor to minimize injury in normal use and in case of an accident.

2.2 Platform Requirements

2.2.1. Dimensions

2.2.1.1. Platform Width: Minimum 34 inches; See ADA requirements contained in 49 CFR, Part 38.

2.2.1.2. The minimum clear length of the lift platform as measured between the outer barrier and the inner edge or roll stop shall be 40 inches. For further requirements, also see ADA requirements contained in 49 CFR, Part 38.

2.2.2. Protrusions and Openings

2.2.2.1. Protrusions: See ADA requirements contained in 49 CFR, Part 38.

2.2.2.2. The lift platform shall not have any openings greater than 3/4 inch in width, except for a hand hold not exceeding 1½ inch X 4 inch located midway between the edge barriers.

2.2.3. Gap

When a lift is at the floor loading and unloading position, there shall be no gap between the vehicle floor and the lift platform. This condition shall be achieved by means of a bridge plate or similar device.

2.2.4. Platform Deflection

The lift platform shall not deflect more than 3 degrees in any direction when tested in accordance with Durability Tests, Section 3.1.3.

2.2.5. Surface and Construction

The platform surface shall be constructed of material having sufficient structural strength, and that provides for visibility through the lift platform when the lift platform is in its stowed position. Lift platform surface shall be slip resistant. No metal screws are to be used in fabrication of platform assembly.

2.2.6. Edge Guards, Outer Barrier, and Inner Roll Stop

2.2.6.1. Platform Edge Guards: See ADA requirements contained in 49 CFR, Part 38.

2.2.6.2. Outer Barrier: The design of the folded barrier shall allow easy loading and unloading of the wheelchair and occupant by the operator. See ADA requirements contained in 49 CFR, Part 38.

2.2.6.3. Inner Roll Stop: See ADA requirements contained in 49 CFR, Part 38.

2.2.7. Handrails

See ADA requirements contained in 49 CFR, Part 38.

2.2.8. Platform Lighting

2.2.8.1. The bus body shall have a light providing sufficient illumination (at least 1 foot candle) of the lift platform at ground level to provide safe loading and unloading.

2.2.8.2. There shall also be a flush-mounted, dome-type light located on the inside ceiling of the bus above the lift opening. Both of these lights shall be controlled by a labeled switch located on or adjacent to the lift.

2.3 Structural Requirements

The structural elements of the wheelchair lift include those that support working loads and attach the lift to the bus. They do not include mechanical and hydraulic components associated with operation and control of the lift.

2.3.1. Lift Capacity

The wheelchair lift shall have a lift capacity of 800 pounds uniform load.

2.3.2. Structural Safety Factor

The structural safety factor shall be at least 3, based on the ultimate strength of the construction material.

2.3.3. Useful Life

When used and maintained in accordance with manufacturer recommended procedures, a wheelchair lift structure shall be designed to have a useful life equal to the useful life of the vehicle on which it is used.

2.3.4. Interface with the Vehicle

2.3.4.1. Installation of the wheelchair lift shall not reduce or in any way compromise the structural integrity of the vehicle and shall have a structural safety factor as specified in Structural Safety Factor, Section 2.3.2.

2.3.4.2. Attachment of the wheelchair lift, including any modification of the vehicle, shall not cause an imbalance of the vehicle that will adversely affect vehicle handling characteristics.

2.3.4.3. No part of the installed and stowed lift shall extend laterally beyond the normal width of the vehicle.

2.3.4.4. The lift shall not contact the door and/or door frame while in the stowed position or during deployment and normal operation.

2.3.4.5. When the drive motor and hydraulic pump are located inside the bus, they shall be installed in such a manner so as not to interfere with the movement of wheelchairs through the bus aisle. The unit shall be enclosed to prevent transported students from coming in contact with it and shall be readily accessible to service personnel for routine service and for maintenance. When hydraulic pump and drive motor are installed below the floor level, they shall be enclosed in a box accessible through a door installed in the body skirt.

2.3.4.6. Fold-out type lifts using full height stanchions must be installed so that a portion of main stanchion assembly(ies) or bracket(s) (if applicable) is secured to body sidewall by means of through-the-body, minimum 5/16 inches diameter, corrosion resistant grade 8 steel bolts and self-locking, corrosion-resistant nuts (2 bolts per stanchion assembly required). Parallelogram type lifts must provide for extra support or bracing under the floor where attached.

2.3.4.7. All lift mountings shall be secured with nuts, bolts, and lock washers. Lag bolts shall not be used in the mounting of the lift.

2.4 Mechanical and Hydraulic

Mechanical and hydraulic components include all parts of the lift drive or control systems that support the platform load during normal operation of the wheelchair lift.

2.4.1. Mechanical and Hydraulic Safety Factors

Mechanical and hydraulic components include all parts of the lift drive or control system that are subject to wear and degradation due to the operation of the lift, and include working parts, such as cables, pulleys, shafts, and chains that can be expected to wear and upon which the lift depends for support of the load.

2.4.1.1. The mechanical component safety factor shall be at least 6 based on the ultimate strength of the material.

2.4.1.2. Hydraulic components shall comply with all applicable Society of Automotive Engineers Standards. These Standards include, but are not limited to, the following:

SAE J 190 - Power Steering Pressure Hose - Wire Braided
SAE J 191 - Power Steering Pressure Hose - Low Volumetric
SAE J 514APR80 - Hydraulic Tubing Fittings
SAE J516JUN84 - Hydraulic Hose Fittings
SAE J517JUN85 - Hydraulic Hose

All other components that contain working fluid shall have a minimum burst pressure of at least 3 times normal design working pressure.

2.4.2. Platform Free Fall Limits

See ADA requirements contained in 49 CFR, Part 38.

2.5 Control Systems

2.5.1. Control Unit

2.5.1.1. The control unit shall be a console or box with combination operating and function switches.

2.5.1.2. The control unit location shall allow the lift operator to have an unobstructed view of the platform during lift operation and shall allow the lift operator to be on or off the vehicle during lift operation.

2.5.1.3. The control unit shall be located in a position that minimizes its damage during use of the lift. The control unit wiring loom shall be designed and installed to minimize the possibility of the wiring becoming entangled in the lift mechanism.

2.5.1.4. The control console shall have simple instructions on it that direct the operator regarding the lift operating procedures.

2.5.2. Control Functions

The complete wheelchair lift shall be fully automatic, including folding and unfolding of the platform.

The lift control system shall have at least 4 designated operating functions as defined:

2.5.2.1 Up - raises lift platform while maintaining an operating position.

2.5.2.2 Down - lowers lift platform while maintaining an operating position.

2.5.2.3 Fold - moves lift platform from an operating position to a stowed position.

2.5.2.4 Unfold - moves lift platform from a stowed position to an operating position.

2.5.3. Control Operating and Function Switches

2.5.3.1. The control system shall consist of integrated operating and function switches, such that selection of any function also operates that function.

2.5.3.2. The function integrated switches shall be labeled with the functions defined in “Control Functions, Section 2.5.2.” Labeling shall be engraved or otherwise made equally durable.

2.5.3.3. The integrated operating and function switches shall require continuous force to operate the lift, and release of the switches shall stop lift motion.

2.5.3.4. The integrated operating and function switches or inherent lift design shall not allow the operation of more than one function at a time.

2.5.4. Jacking Prevention

The control system or inherent lift design shall prevent the operation of the lift from jacking the vehicle and causing damage to the vehicle or the lift.

2.5.5. Interlocks and Safety Features

2.5.5.1. A door switch or interlock shall be provided to prevent operation of the lift if the lift door is closed and latched. In addition, a red or yellow warning light located in the driver’s area, easily visible from the driver's position, must be provided and shall be continuously illuminated or flashing if the lift door is not fully closed and latched and the ignition switch is on.

2.5.5.2. An inherent design feature of the lift shall prevent stowing or folding of the lift when the platform is occupied.

2.5.6. Wiring and Motor Requirements

2.5.6.1. Wiring shall be in accordance with SAE Recommended Practice SAE J1292 OCT. 81 and referenced Standards, except when good engineering practice dictates special conductor insulation.

2.5.6.2. Any power-up, power-down electrohydraulic lift shall be equipped with a permanent magnet type motor.

2.5.6.3. There shall be a ground strap installed on each lift pump motor from the motor to an adequate vehicle body or chassis ground point.

2.5.7. Lift Operational Requirements

See ADA requirements contained in 49 CFR, Part 38.

2.6 Manual Operation

The lift shall be provided with a manual backup system. The manual backup system shall include provisions for simple operation of each of the following functions under actual field conditions by a minimum fifth percentile adult female, in the event of emergency or power failure:

2.6.1 Rapid unfolding of the lift platform from the stowed position to floor level.

2.6.2 Lowering of lift from floor level to ground level (under rated load).

2.6.3 Raising of lift from ground level to floor level (under rated load).

2.6.4 Folding of lift platform from floor level to stored position.

No tools other than those provided and stored on the lift shall be required for manual operation. Releasing of the lift platform for manual unfolding and resecurement after manual folding shall be easily accomplished when the platform is in any stowed or partially stowed position during which failure could occur.

All instructions necessary to operate the manual backup system shall be provided in locations visible during manual operation and shall be clearly labeled. The lift platform outer edge barrier must be operable during manual operation of the lift.

3.0 TESTING, CERTIFICATION, INSPECTION, AND WARRANTIES

3.1 Design Tests

The tests defined in “Design Tests, Section 3.1” and any additional testing specified in ADA requirements shall be performed on one representative production unit of the wheelchair lift model purchased.

Unless otherwise specified, the lift shall meet the requirements given in “Technical Requirements, Section 2.0,” when attached to a fixture that simulates a bus installation and when supplied by electric, hydraulic, air, or other power source of output equal to that normally available on the bus. Only one representative production unit is required to be tested for certification, with all tests of “Durability Tests, Section 3.1” conducted on the same unit without any repairs or maintenance during the test other than that permitted by “Maintenance During Tests, Section 3.1.10.”

3.1.1. Durability Tests

The following tests shall be performed without failure and in the order given.

3.1.1.1. Vertical Cycling Tests. The lift platform shall be operated up and then down through its maximum vertical operating range for 15,600 cycles with a load of 800 pounds for the first 600 cycles and 600 pounds for the remaining cycles. The ambient temperature for the first half of the cycles in each of these tests shall be at least 110°F. The tests may be continuous or separated into groups of no less than 10 cycles with nonoperating periods of no more than 1 minute between each cycle in the group. The platform shall raise and lower smoothly throughout the test with vertical and horizontal accelerations not exceeding 0.3 g.

3.1.1.2. Deployment Cycling Test. The lift platform of an automatic lift shall be folded and unfolded for 10,000 cycles. The ambient temperature for the first half of the cycles shall be at least 110°F. The tests may be continuous or separated into groups and may have nonoperating periods between cycles as specified in "Vertical Cycling Tests, Section 3.1.1.1."

3.1.1.3. Combination Vertical and Deployment Cycling Test. The tests in "Vertical Cycling Tests, Section 3.1.1.1" and "Deployment Cycling Test, Section 3.1.1.2," may be combined into a single test that meets the minimum requirement of both tests.

3.1.2. Low Temperature Operation Test

After 16 hours of exposure to a temperature no higher than 20°F, the wheelchair lift shall be operated unloaded through 10 or more cycles of unfolding, lowering, raising, and folding and through 10 or more cycles of raising and lowering with an 800 pound load. Each cycle shall be separated by at least a 30 minute cooling period at a temperature no higher than 20°F. The lift shall meet all performance requirements while operating at the exposure temperature.

3.1.3. A static load of 600 pounds shall be applied through the centroid of a test pallet placed at the centroid of the platform. The platform shall be raised and lowered with this weight. During the lift operation the platform shall not deflect more than 3 degrees in any direction from the loaded position and its unloaded position.

3.1.4. Self-Damage Tests

The controls shall be held in operating position for 5 seconds after the unloaded lift meets resistance to its travel under each control position with any limit switch disabled. The test shall be performed twice at each lift position of unfold, fold, full up at floor level, and full down at ground level.

3.1.5. Power and Equipment Failure Test

A failure of power, chain cable, hydraulic hose, or air hose that allows the lift to deploy or the platform to lower shall be simulated. The wheelchair lift shall comply with Platform Free Fall Limits, Section 2.4.2., during this test.

3.1.6. Reserved

3.1.7 Static Load Test

A static load of 2,400 pounds shall be applied through the centroid of a test pallet placed at the centroid of the platform when the platform is positioned in its fully raised position. The length and width dimensions of the test pallet shall be 24 inches x 24 inches to correspond to the approximate outer dimensions of a wheelchair "footprint." The load shall remain on the platform no less than 2 minutes. After the load is removed, an inspection shall be made to determine if fracture has occurred.

3.1.8. Vehicle Interface Test

This test shall be or shall have been conducted on a lift installed in a representative vehicle model. A static load of 1,200 pounds shall be applied through the centroid of a test pallet placed at the centroid of the platform when the platform is positioned at its raised position. The length and width dimensions of the test pallet should be 24 inches X 24 inches. The load shall remain on the platform no less than 2 minutes.

3.1.9. Visual Inspection

At the conclusion of any test described in "Design Tests, Section 3.1" except "Static Load Test, Section 3.1.7" with all loads removed, the parts of the wheelchair lift or bus body, if applicable, shall show no condition of fracture, permanent deformation, wear that would exceed manufacturer's tolerances, perceptible impairment, or other deterioration that would be dangerous.

.

3.1.10. Maintenance During Tests

During the durability tests described in Section 3.1.1, the inspection, lubrication, maintenance, and replacement of parts (other than bulbs and fuses) may be performed only as specified in the manufacturer's maintenance manual for the lift and at intervals no more frequent than specified in the manual. Maintenance specified for certain time intervals shall be performed during the vertical cycling and deployment cycling tests at a number of cycles that is in the same proportion to the total cycles as the maintenance period is to 36 months. Certification of durability testing by the lift manufacturer shall include a record of all maintenance performed and parts replaced, including the number of cycles and time when each maintenance operation and parts replacement was performed.

3.1.11. Testing Certification

The wheelchair lift manufacturer and bus body manufacturer, as applicable, shall provide written certification of compliance with the tests specified in "Design Tests, Section 3.1." Certification shall be submitted to the Florida Department of Education.

3.2 Installation Certification

The body manufacturer shall submit with the bid written certification that the lift will be installed according to lift manufacturer's specifications and these specifications.

3.3 Warranty

A statement of warranty shall be provided with each lift assuring the quality of materials and workmanship of the product for at least 2 years from the date of acceptance by the final consumer. The warranty shall provide 100 percent coverage for parts. Also see **WARRANTIES, page 12.**

4.0 MAINTENANCE, TRAINING, AND SERVICE

4.1 Documents

A comprehensive operator's, maintenance, and parts manual(s) shall be provided for the lift with each bus. Parts manuals must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding part number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application listed in the drawing.

Any maintenance actions that, if done improperly, could result in an unsafe condition must be identified and clearly emphasized in the maintenance manual. All components that must be isolated or identified for ease of troubleshooting and diagnosis, such as electrical wiring and components or hydraulic lines, hoses, or valves, must be clearly identified in the service manual as to their specific functions and relation to other parts.

4.2 Maintenance and Inspection

Scheduled maintenance tasks shall be related and shall be grouped in maximum bus mileage intervals. Routine scheduled maintenance actions, such as lubrication and adjustments, shall not be required at intervals of less than 6,000 bus miles or 1,000 up and down lift cycles, whichever comes first, except for routine servicing performed during monthly inspections. Higher levels of scheduled maintenance tasks shall occur at even multiples of the lower level task schedules based on vehicle mileage.

4.3 Maintenance Accessibility

All systems or components serviced as part of the periodic maintenance of the lift, the failure of which may cause a safety hazard or a road call, shall be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved should be unnecessary. Relative accessibility of components, measured in time required to gain access, should be inversely proportional to frequency of maintenance and repair of the components.

4.4 Training

The successful body manufacturer shall be responsible for providing or arranging wheelchair lift service training as needed. This training shall include minimum 1 day training seminars on overall features, operation, preventive maintenance, diagnosis, and rebuild of wheelchair lifts offered through the bid. The seminars are to be conducted free of charge at district garage locations, arranged by the Department of Education and the successful bidder. At least 1 seminar on each given lift model shall be conducted per 5 school districts purchasing a bus or buses equipped with that lift.

5.0 WHEELCHAIR/OCCUPANT SECUREMENT SYSTEM

5.1 General Requirements for Wheelchair/Occupant Securement System

5.1.1 System shall be designed to accommodate positioning and securement of wheelchairs or other passenger-carrying devices in a forward-facing orientation, and shall be designed to allow maximum flexibility in front-to-rear positioning of different numbers and sizes of passenger carrying devices.

5.1.2 Each designated wheelchair space (for the purpose of determining seating plans and required space allowances) shall be a minimum of 50 inches longitudinally X 30 inches laterally. Each 50 inch section of required tie-down track may consist of two sections of track with neither section less than 16 inches long, and shall extend the full length of the wheelchair position with no gaps.

5.1.3 No stanchions or other obstructing devices may be installed on or above the floor in the wheelchair areas.

5.1.4 The overall system shall be required to meet the requirements of FMVSS 302 on Flammability of Interior Materials.

5.1.5 No sheet metal screws or lag bolts shall be used in the wheelchair/occupant securement system or body attachment points.

5.1.6 Occupant securement straps shall be black or other dark color and wheelchair securement straps shall be gray, beige, or other light color to distinguish the separate functions.

5.2 Technical Requirements for Wheelchair/Occupant Securement System

5.2.1 Wheelchair securement system shall have 4-point tie-downs, incorporating 4 flexible, adjustable straps to include the following: Tie-down straps and occupant securement shall be Sure-Lok kit numbers FF612-4C-7, FF612S-4C-7, or AL712S-4C-7, or Q'Straint kit number Q-8106-L, Q-8206-L or Q-8306-L, or equal approved by the Department.

5.2.1.1 The 4 straps shall each be retractor type and shall be interchangeable.

5.2.1.2 Each strap shall be equipped with a positive spring-lock type end fitting on floor end.

5.2.1.3 The system shall have multiple floor-mounted attachment points (longitudinal) to bus body or to attachment hardware for wheelchair securement straps. Attachment point hardware shall be equivalent to Sure-Lok or Q'Straint anodized flanged series L button track. To meet this requirement, 4 parallel sections of track shall be longitudinally mounted to the bus floor. The sections shall be located at approximately 4 inches, 13 inches, 24 inches, and 33 inches, respectively, from the body sidewalls, measured perpendicularly from the body interior sidewall to the center of each track. This track spacing must be adjusted as necessary in order that a 30-inch and 39-inch track seating seat will fit into this track system. Each 50 inch section of required tie-down track may consist of two sections of track with neither section less than 16 inches long, and shall extend the full length of the wheelchair position with no gaps. There may be a short break in the outer track to accommodate a fuel filler neck if required. This tracking system shall be inset into the required plywood floor (see "Diesel Noise Reduction Package, Section 11.0") such that it is flush with the bus floor. Trim pieces shall be added as necessary to cover all exposed flooring edges. Also see "Diesel Noise Reduction Package, Section 11.0," for requirements for plywood floors.

5.2.1.4 The securement system for the wheelchair shall be designed to meet the strength requirements specified in FMVSS 207 and, additionally, if occupant restraints are to be attached to wheelchair securement straps, to meet the requirements for seat belt anchorage strength specified in FMVSS 210. The specified wheelchair used to establish and test for these strength requirements shall be a Fortress 655 FS Standard Adult or equivalent (with batteries).

5.2.1.5 All floor tracking shall be anodized aluminum or other material of equal or better strength that will resist corrosion in Florida's environment.

5.2.2 Occupant securement system shall meet the following requirements and shall include the following equipment and features:

5.2.2.1 Occupant Securement System – See "Technical Requirements for Wheelchair/Occupant Securement System, Section 5.2.1."

5.2.2.2 System shall be equipped with a single-point, push-button quick disconnect for the lap belt sections and the lower end of the upper torso strap. Lap belt (if attached directly to floor) and upper end of shoulder strap shall have multiple attachment points (longitudinal) to bus body or attachment hardware. Attachment points are to be spaced at increments not to exceed 4 inches center to center. Attachment point hardware for lap belt (if applicable) shall be equivalent to Sure-Lok or Q'Straint Series L button track. Floor track requirements in "Technical Requirements for Wheelchair/Occupant Securement System, Section 5.2.1.3" are also applicable to this section. Attachment point hardware for shoulder strap shall be equivalent to Sure-Lok or Q'Straint Series L track (button track). Each 50 inch section of required tie-down track may consist of two sections of track with neither section less than 16 inches long, and shall extend the full length of the wheelchair position with no gaps and shall be positioned above the passenger windows.

5.2.2.3 Body attachment hardware on occupant straps shall incorporate positive spring lock-type end fittings or other means of providing positive securement and quick attachment or release.

5.2.2.4 Upper torso belt and each portion of lap belt shall be adjustable and shall accommodate the size and height range of occupants specified in FMVSS 209.

5.2.2.5 Occupant securement system shall be designed to meet the requirements of FMVSS 209 and 210 (also see "Technical Requirements for Wheelchair/Occupant Securement System, Section 5.2.1.4"). **Any reinforcement of body header area necessary to meet these anchorage requirements for occupant securement shoulder strap shall be provided the entire length of the passenger area on both sides of the bus to facilitate retrofitting of occupant securement systems by districts as needs change**.

6.0 MODESTY PANELS (CRASH BARRIERS)

6.1 There shall be a padded modesty panel (crash barrier) located immediately rearward of the lift if there are wheelchair spaces or regular seating located rearward of the lift and on the same side of the bus.

6.2 There shall be a padded modesty panel (crash barrier) meeting FMVSS and Florida spacing requirements located forward of all passenger seats that do not have another seat properly spaced in front of them. There shall be a padded crash barrier or seat in front of any wheelchair position unless it is contiguous with and behind another wheelchair position. The forward most barrier on both sides of the bus shall have a full width aluminized courtesy panel extending to the floor. If the right front of the passenger area immediately behind the stepwell is not equipped with a barrier due to placement of the wheelchair lift in that location, it shall be equipped with a padded stanchion from floor to ceiling with an aluminized modesty panel.

7.0 AISLE

The aisle leading from the wheelchair position to the emergency door shall be wide enough to allow a wheelchair to be moved between the 2 rows of seats in the event an emergency evacuation of the bus is necessary. The minimum required aisle width is 30 inches for buses with outside width of more than 90 inches and 28 inches for buses with outside width of 90 inches or less. 39-inch seats are acceptable forward of the wheelchair and lift positions.

8.0 SERVICE DOOR (REGULAR) ENTRANCE

8.1 Stainless grab rails shall be provided on each side of this entrance and shall be placed in such a manner as to afford easy accessibility to small children entering or leaving the bus. These rails shall extend low enough in the stepwell for an average 3 to 4 year old student to reach them while standing at ground level. Exception: Type A1 buses require only 1 grab rail.

8.2 When in open position, service doors shall not obscure any portion of grab rails.

9.0 SEATING ARRANGEMENTS

Flexibility in seating and spacing to accommodate special devices shall be permitted due to the constant changing of passenger requirements.

NOTE: Because of the wide variation in type, size, construction, and design of wheelchair lifts and wheelchair locking positions, the Department of Education reserves the right to inspect any wheelchair lift bus offered for sale to Florida district school boards and to reject any unit found to be unsafe, inadequate, or not suitable for use in transportation of students with disabilities.

10.0 UNIVERSAL HANDICAPPED SYMBOL FOR BUSES EQUIPPED WITH WHEELCHAIR LIFTS

All buses with wheelchair lifts shall have 2 universal handicapped stickers. Each sticker shall be reflective white on blue, minimum 6 inch x 6 inch displaying the universally recognized symbol for vehicles transporting persons with disabilities. One sticker shall be located on the center of the front bumper and the other sticker at the right rear of the bus below the 4 inch brake/tail light. Rear sticker shall be located below the emergency window on Type D rear engine buses.

11.0 DIESEL NOISE REDUCTION PACKAGE

All wheelchair lift equipped buses shall include a diesel noise reduction package as standard equipment, which shall meet all requirements of the “Diesel Noise Reduction Package” option listed in Section III, page III-24.

SECTION V

AIR CONDITIONER SPECIFICATIONS

TYPES A, B, C, AND D BUSES

SCHOOL BUS AIR CONDITIONER SPECIFICATIONS

TYPES A, B, C, AND D BUSES

The following specifications are applicable to all types of Florida school buses equipped with an air conditioner system and are in addition to all requirements for equipment in Sections I, II, III, and IV of this specifications document. This section is divided into three subsections. Subsection I covers Performance Specifications; Subsection II covers specific equipment requirements for Systems A and B; and Subsection III covers other requirements applicable to all buses. This specification consists of requirements for two separate designs: (1) System A and (2) System B (containing lighter components designed for a lighter duty cycle). Both systems must meet the performance requirements listed below.

I. PERFORMANCE SPECIFICATIONS

A. PERFORMANCE SPECIFICATIONS SYSTEM A AND B TYPES A, B, AND C BUSES (UP TO 35 FEET) AND SYSTEM B TYPE D REAR ENGINE BUSES

The installed air conditioner system shall cool the interior of the bus as outlined below, measured at a minimum of 3 points, located 4 feet above the floor at the longitudinal centerline of the bus. The 3 points shall be 1) 2 feet rearward from the front bulkhead, 2) at the midpoint of the body, and 3) 2 feet forward of the emergency door. There shall be at least one Department representative and one manufacturer representative in the bus during the performance test.

The test shall be performed under actual summer conditions in Florida, which consist of temperatures above 85°F, humidity above 50 percent with normal sun loading of the bus and engine operating at 1’250 ± 50 RPM. After a minimum of 1 hour of heat soaking, with the passenger windows open, the system shall be turned on and must provide a minimum 20°F temperature drop in the 20-minute time limit and maintain that temperature for at least 10 more minutes. If the outside ambient temperature is below 90ºF, then the temperature inside the bus must be reduced to 70ºF. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak shall be extended to 1 ½ hours. This testing method shall be the required minimum testing protocol.

Additionally, and at the Department's discretion, this test may be performed by 1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 110°F, 2) heat soaking the bus, which is at ambient booth temperature of 110°F with windows open for at least 1 hour, and, 3) closing windows, turning on the air conditioner with engine operating at fast idle, and cooling the interior of the bus by 30 degrees or more within a maximum of 20 minutes and maintaining that temperature for at least 10 more minutes while maintaining 110°F outside temperature. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak shall be extended to 1 ½ hours.

B. PERFORMANCE SPECIFICATIONS FOR SYSTEM A TYPE D REAR ENGINE BUSES

The installed air conditioner system shall cool the interior of the bus as outlined below, measured at a minimum of 3 points, located 4 feet above the floor at the longitudinal centerline of the bus. The 3 points shall be 1) 2 feet rearward from the front bulkhead, 2) at the midpoint of the body, and, 3) 2 feet forward of the end of the aisle. There shall be at least one Department representative and one manufacturer representative in the bus during the performance test.

The test shall be performed under actual summer conditions in Florida, which consist of temperatures above 85°F, humidity above 50 percent with normal sun loading of the bus and engine operating at 1’250 ± 50 RPM. After a minimum of 1 hour of heat soaking, with the passenger windows open, the system shall be turned on and must provide a minimum 25°F temperature drop in the 20-minute time limit and maintain that temperature for at least 10 more minutes. If the outside ambient temperature is below 95ºF, then the temperature inside the bus must be reduced to 70ºF. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak shall be extended to 1 ½ hours. This testing method shall be the required minimum testing protocol.

Additionally, and at the Department's discretion, this test may be performed by 1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 110°F, 2) heat soaking the bus, which is at ambient booth temperature of 110°F with windows open for at least 1 hour, and, 3) closing windows, turning on the air conditioner with engine operating at fast idle, and cooling the interior of the bus by 35 degrees or more within a maximum of 20 minutes and maintaining that temperature for at least 10 more minutes while maintaining 110°F outside temperature. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak shall be extended to 1 ½ hours.

C. PERFORMANCE SPECIFICATIONS FOR SYSTEMS A AND B TYPE D FRONT ENGINE BUSES

The installed air conditioner system shall cool the interior of the bus as outlined below, measured at a minimum of 3 points, located 4 feet above the floor at the longitudinal centerline of the bus. The 3 points shall be 1) 2 feet rearward from the front bulkhead, 2) at the midpoint of the body, and, 3) 2 feet forward of the end of the aisle. There shall be at least one Department representative and one manufacturer representative in the bus during the performance test.

The test shall be performed under actual summer conditions in Florida, which consist of temperatures above 85°F, humidity above 50 percent with normal sun loading of the bus and engine operating at 1'250 ± 50 RPM. After a minimum of 1 hour of heat soaking, with the passenger windows open, the system shall be turned on and must provide a minimum 15°F temperature drop in the 20-minute time limit and maintain that temperature for at least 10 more minutes. If the outside ambient temperature is below 90ºF, then the temperature inside the bus must be reduced to 75ºF. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak shall be extended to 1 ½ hours. This testing method shall be the required minimum testing protocol.

Additionally, and at the Department's discretion, this test may be performed by 1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 110°F, 2) heat soaking the bus, which is at ambient booth temperature of 110°F with windows open for at least 1 hour, and 3) closing windows, turning on the air conditioner with engine operating at fast idle and cooling the interior of the bus by 15 degrees or more within a maximum of 20 minutes and maintaining that temperature for at least 10 more minutes while maintaining 110°F outside temperature. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak shall be extended to 1 ½ hours.

The manufacturer shall provide facilities for Department of Education personnel and/or a purchasing school district representative to confirm that a pilot model of each bus design meets the above performance requirements.

D. A/C SYSTEM PERFORMANCE SPECIFICATION SUMMARY

BUS TYPE AND SYSTEM	**PARKING LOT TEST**		**HOT BOX TEST**
	ABOVE 90º AMBIENT	**Below 90º AMBIENT**	
TYPE A, B, C, AND SYSTEM B TYPE D REAR ENGINE BUSES	20ºF PULL DOWN	70ºF INSIDE	110ºF – 80ºF
SYSTEM A TYPE D REAR ENGINE	25ºF PULL DOWN	70ºF INSIDE	110ºF – 75ºF
TYPE D FRONT ENGINE	15ºF PULL DOWN	75ºF INSIDE	110ºF— 85ºF

- FAST IDLE (1250 RPM ± 50)
- 1 OR 1½ HOUR HEAT SOAK
- 20 MINUTES PULL DOWN / 10 MINUTES MAINTAIN

The manufacturer shall provide facilities for Department of Education personnel and/or a purchasing school district representative to confirm that a pilot model of each bus design meets the above performance requirements.

II. EQUIPMENT REQUIREMENTS

A. SYSTEM A EQUIPMENT REQUIREMENTS

1. Power Source and Compressor(s):

(a) Type A2, B, C, and D Front Engine buses shall have at least two compressors, two evaporators, and two condensers plumbed and wired separately in order to provide maximum redundancy. Type D rear engine buses shall have only one compressor and may have one or two evaporators and condensers.

(b) Compressor(s) shall be chassis engine-driven or electric motor driven. All compressors shall have the correct lubricating oil specified on a permanent tag attached to the compressor in a visible location.

(c) Any engine driven compressor used must have a minimum design life of at least 8,000 hours and a minimum displacement of 13 cubic inches.

(d) System shall be equipped with both a high pressure and a low-pressure switch to prevent compressor operation when system pressures are above or below recommended safe levels.

(e) Compressor(s) shall be mounted in the safest area possible. Compressors shall not be mounted below the chassis frame rails.

(f) Compressors with less than 23 cu. in. displacement shall be driven by a multi-groove poly-vee type belt and shall include a self-tensioning idler pulley to maintain proper belt tension.

(g) Electro-magnetic type compressor clutches shall have an anti-feedback device and shall be wired to receive at least 12 volts at all times when engaged.

(h) Type D rear engine buses shall have a transit duty type compressor of at least four cylinders, 24 cu. in. design, and displacement, with at least a 30,000-hour design life. The compressor shall be equipped with unloader type valves to maximize efficiency. Compressor shall be equipped with a sight glass to check oil levels, and manual refrigerant shut-off service valves for service. The transit compressor may be driven by a poly-vee type or a double vee type belt.

(i) Any system may use an electrically powered compressor in lieu of the aforementioned requirements.

(j) All units shall have an hour meter attached to the rear system compressor clutch activation circuit to accurately record the hours of operation.

2. Condenser(s), Evaporator(s), and blowers

(a) Condenser(s) shall be equipped with copper coils and aluminum fins except that any aluminum-coiled condenser provided by chassis manufacturer on Type A1 bus is acceptable.

(b) Roof-mounted condenser(s) are required on Type A2, B, C, and D buses. Condenser assembly(ies) shall include permanent magnet, ball bearing sealed motors for cooling fans, and case constructed of aluminum, fiberglass, or other noncorrosive material as specified for standard body sheet metal. Cases shall be impact resistant.

(c) Type D rear engine buses shall be equipped with roof-mounted evaporators and condensers, in a single assembly, located and designed for ease of service. Single assembly system shall be connected to full-length ducts on the left and right interior of the bus designed for even distribution of cooled air. Additionally, manufacturers may offer an option for a modular unit with roof-mounted condensers and inside ceiling mounted evaporators. All service connections must be inside the bus for easy access by technicians.

(d) The system shall be equipped with coated receiver tank, and high-pressure side (discharge) line check valves in order to prevent any oil return via slugging to the system's compressor. The unit's fans are to be constructed of high-impact grade material and are to be equipped with permanent magnet weatherproof sealed motors. All electrical connections are to be weatherproof.

(e) Type A1 buses shall be equipped as follows:

(1) Minimum of 2 evaporators required (1 front and 1 rear). Rear unit shall be ceiling or bulkhead mounted above emergency exit.

(2) Rear ceiling or bulkhead mounted evaporator shall blow air forward; front evaporator shall blow air toward the rear.

(3) Evaporator cases and/or ducting systems shall be equipped with diffusers that are adjustable.

(f) Type A2, B, C, and D forward control buses shall include an evaporator/blower assembly in the front area to direct air to the passengers in the front of the bus. In addition, the main evaporator assemblies shall be mounted at the rear of the bus. These buses shall also be equipped with a driver's in-dash evaporator/blower and ducting to channel cold air to the driver, or may have a separate evaporator/blower system in the driver's area to channel air to the driver only. Side-mounted evaporator assemblies and/or ducting may be used on any unit; however, a driver's unit is still required.

B. SYSTEM B EQUIPMENT REQUIREMENTS

1. Power Source and Compressor(s):

(a) Type A2, B, C, and D buses shall have at least two compressors, two evaporators, and two condensers plumbed and wired separately in order to provide maximum redundancy.

(b) Compressor(s) shall be chassis engine-driven. All compressors shall have correct lubricating oil specified on a permanent tag attached to the compressor in a visible location.

(c) Any compressor used must have a minimum design life of at least 8,000 hours and a minimum displacement of 13 cubic inches.

(d) System shall be equipped with both a high-pressure and a low-pressure switch to prevent compressor operation when system pressures are above or below recommended and safe levels.

(e) Compressor(s) shall be mounted in the safest area possible. Compressors shall not be mounted below the chassis frame rails.

2. Condenser(s), Evaporator(s), and Blowers

(a) Condenser(s) shall be equipped with copper coils and aluminum fins, except that any aluminum-coiled condenser provided by chassis manufacturer on Type A1 bus is acceptable. Aluminum-coiled microchannel condensers are also acceptable.

(b) Body skirt-mounted condenser(s) are acceptable on Type A2, B, C, and D buses. Condenser assembly(ies) shall include permanent magnet, ball bearing sealed motors for cooling fans, and case constructed of aluminum or other noncorrosive material as specified for standard body sheet metal. All condensers mounted under the bus body shall have ventilation from the exterior of the bus body via a grate in the body side skirt. Condensers shall have ducting or shrouding from the condenser to the grating at the body side to ensure the condensers do not recirculate the hot air leaving the condenser.

(c) System shall be equipped with a sight glass (at least one for each part of a split system) that is accessible and directly visible for checking the level of the refrigerant.

(d) Condensers shall be mounted to isolate them from vibration and excessive road shock. If condensers are skirt-mounted, then they shall be located forward of rear wheels on the left side of the bus whenever possible.

(e) Condensers shall be protected by splash shields. Buses with body-skirt mounted condensers are required to have mud flaps on all wheels and extra protection as necessary to ensure mud and road debris is directed away from the condensers.

(f) Type A1 buses shall be equipped as follows:

(1) Minimum of two evaporators required (one front and one rear). Rear unit shall be ceiling or bulkhead-mounted above emergency exit.

(2) Rear ceiling or bulkhead-mounted evaporator shall be designed and installed to ensure that air blows forward. Front evaporator shall blow toward the rear.

(3) Evaporator cases and/or ducting systems shall be equipped with diffusers that are adjustable.

(g) Systems shall include an evaporator/blower assembly in the driver's area to direct air to the driver and passengers in addition to the main evaporator assemblies mounted at the rear of the bus. Side-mounted evaporator assemblies and/or ducting may be used on any unit. Location of front evaporator **must provide for air directed at the school bus driver**.

III. SYSTEM REQUIREMENTS FOR ALL BUSES

1. Evaporators and Ducting:

(a) Evaporator cases, lines, and ducting (as equipped) shall be designed such that all condensation is effectively drained to the exterior of the bus below floor level under all conditions of vehicle movement without leakage on any interior portion of bus.

(b) Any evaporator or ducting system shall be designed and installed to be free of dangerous projections or sharp edges. Installation shall not reduce compliance with any Federal Motor Vehicle Safety Standard (FMVSS) applicable to the standard bus, including FMVSS's 217, 220, 221, and 222. Any ductwork shall be installed so that exposed edges face the front of the bus and do not present sharp edges.

(c) Any evaporators used must be copper cored, aluminum fins acceptable, except that front evaporator, if provided by Type A1 chassis manufacturer, may be aluminum cored.

(d) Air intake for any evaporator assembly(ies), except for front evaporator of Type A1, shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case. If evaporator case must be removed to service the filter, then cover must be removable without the use of tools.

(e) On wheelchair lift-equipped buses, evaporator and ducting (if used) shall be placed high enough that they will not obstruct existing or potential occupant securement shoulder strap upper attachment points. This clearance shall be provided along entire length of the passenger area on both sides of the bus interior to allow for potential retrofitting of new wheelchair positions and occupant securement devices throughout the bus.

(f) No portion of the air conditioner system may block the driver’s view through any window except that vertical covering in the rear corners of the bus interior for hoses and/or wiring may intrude on the rear quarter window by no more than two inches.

2. Controls, Wiring, Hoses, and Miscellaneous Hardware:

(a) All system operating controls, including on-off switch(es), blower switch(es), and thermostat control(s) shall be accessible to driver in seated position.

(b) Blowers shall be a minimum of two speeds or may be variable speed.

(c) No driver control switch or variable potentiometer may have an operating amperage above three amps. Manufacturers must use relays, transistors, or other load switching devices to ensure that control switches do not exceed three amps draw. When necessary, manufacturers shall include feedback protection in circuits that may cause feedback to another system.

(d) System shall be equipped with at least 1 manually resettable circuit breaker per side to provide overload protection for the main power circuit feeding the evaporator blowers, condenser fans, etc.; system control circuits shall also have overload protection, consisting of manually resettable circuit breakers. All wiring shall be copper, conform to current standards of the Society of Automotive Engineers, be coded by color or be hot stamped every three inches, and be insulated. All joints shall be soldered or joined by equally effective fasteners. All wires of 4 gauge or thicker and any accessory wire connected directly to the battery shall have soldered ends, and the ends shall be protected with heat shrink tubing. Air conditioner wiring and connectors, including any battery cables routed by the body manufacturer or A/C installer, shall be routed and protected to eliminate possibility of wiring and connectors becoming abraded, pierced by fasteners, shorted, or otherwise damaged during manufacture and use.

(e) All wiring, hoses, and lines shall be grommeted, routed, loomed with convoluted loom, and supported to reduce wear resulting from heat, chafing, vibration, and other factors. All holes through the body for routing of AC hoses or electrical connections must be sealed in a permanent and airtight manor.

(f) All Type B, C, and D buses equipped with air conditioner shall also be equipped with a fast idle system that will increase engine idle speed while the engine and air conditioner are operating and the transmission is in neutral. This system shall provide a fast idle speed of 1250 ± 50 RPM.

(g) All flexible refrigerant hoses and fittings shall be the Quick Click or E-Z Clip or approved equal system of hoses and end fittings. All connections shall be of an O-ring type design. All refrigerant hoses shall meet SAE J2064 (D, E, or F) requirements for refrigerant hoses.

(h) The total system shall be thermostatically controlled, with thermostats located at the evaporator assembly wired to remote thermostat control at the driver's location.

(i) Refrigerant shall be R 134a.

3. Body and Insulation:

(a) Bodies of air-conditioned buses shall be equipped with a diesel noise reduction package as standard equipment. See **DIESEL NOISE REDUCTION PACKAGE** in Section III for equipment specifications.

(b) All Type B, C, and D front engine bodies equipped with air conditioner shall also be equipped with a compartment mounted next to the battery box with external access for mounting circuit breakers and control circuitry for air conditioner.

(c) Type D rear engine buses are exempted from the requirement for an additional electrical compartment for air conditioner circuitry provided the air conditioner control boards are installed in the rear package shelf area in a covered box.

4. Warranty and Serviceability:

(a) Warranty - Air conditioner compressor applications must be approved in writing by the chassis engine manufacturer, stating that the installation will not void or reduce the engine manufacturer's warranty or extended service coverage liabilities in any way. **Also see Warranties, Page 12, and Appendix B.**

(b) Serviceability – All components requiring periodic servicing must be readily accessible for servicing including, but not limited to, the following:

(1) Refrigerant service ports (high and low pressure).

(2) Sight glass(es) - must be directly visible.

(3) All systems are to be equipped with a minimum sixteen (16) cubic inch filter/drier. Drier is to be comprised of a bead-type desiccant compatible with R 134a, and a screen type filter. Both of the filter/drier's connections are to be O-ring type.

(4) Expansion device(s).

(5) Drive belts - for replacement and adjustment.

(6) System manually resettable circuit breakers.

(7) Evaporator air filters – removable and serviceable without the use of tools.

(8) All major component serial numbers - must be readily visible.

(c) Parts and Service Manuals - Shall be provided for entire system including, but not limited to, compressor(s), wiring (includes wiring diagram) evaporators, condensers, controls, hoses, and lines. Parts catalog shall include a price list and must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application illustrated on the drawings. Service manual shall include an overall A/C system diagram with component plumbing, locations, and identities indicated for diagnostic purposes.

(d) Parts and Tools Availability - All system parts and required special service tools must be readily available, and a list of suppliers shall be provided to each school district shop purchasing that brand of air conditioner.

(e) Suspension Capacity and Ground Clearance - Ground clearance at the lowest point of the air-conditioning system shall be no less than the ground clearance of the bus at the step well. Any special chassis gross axle weight rating (GAWR) requirements required to maintain ground clearance or to ensure adequate suspension capacity must be indicated by the body manufacturer for each configuration of air-conditioned bus. Standard GAWRs are contained in the chassis sections of Florida School Bus Specifications; any of the above-mentioned special GAWR requirements for air-conditioned buses must be provided to the Department of Education before bids on those buses will be considered.

(f) Installed air conditioner system shall not reduce compliance of the finished bus with any Federal Motor Vehicle Safety Standard, including FMVSS 217, 220, 221, 222, and 301.

(g) Air conditioner system manufacturer shall provide information and data as needed to assist the Department of Education in establishing chassis engine performance requirements and in determining chassis electrical components or specifications that may be needed to accommodate the additional electrical demands imposed by the air-conditioning system.

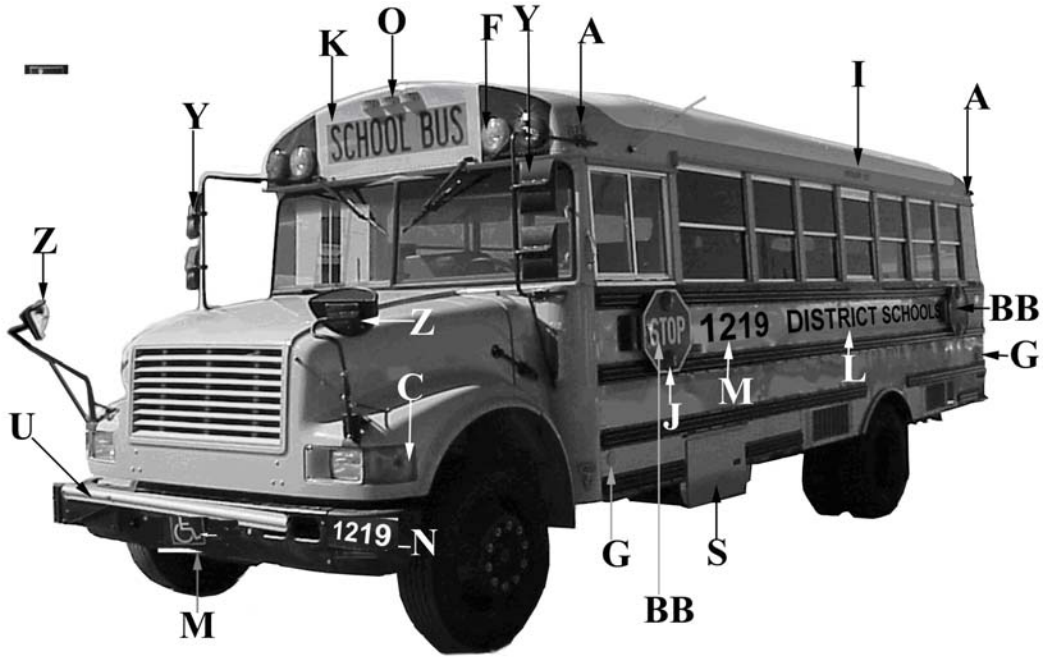
(h) All air conditioner systems used on Type A2, B, C, and D Florida school buses shall be rated in BTUs using the International Mobile Air Conditioning Association, Incorporated (IMACA) Recommended Procedure 250 for vehicle air conditioner systems. Ratings shall be based on the procedures and conditions listed in Procedure 250 for rating condition "CITY." The following Type A2, B, C, and D school bus sizes shall have the following <u>minimum</u> BTU ratings for installed air conditioner systems:

29 – 47 capacity - 78,000 BTUs
48 – 66 capacity - 106,000 BTUs
67 – 89 capacity - 120,000 BTUs

These ratings shall not be construed to be recommended ratings, nor do these ratings relieve the manufacturer of the responsibility to meet the air conditioner performance requirements previously listed in this section.

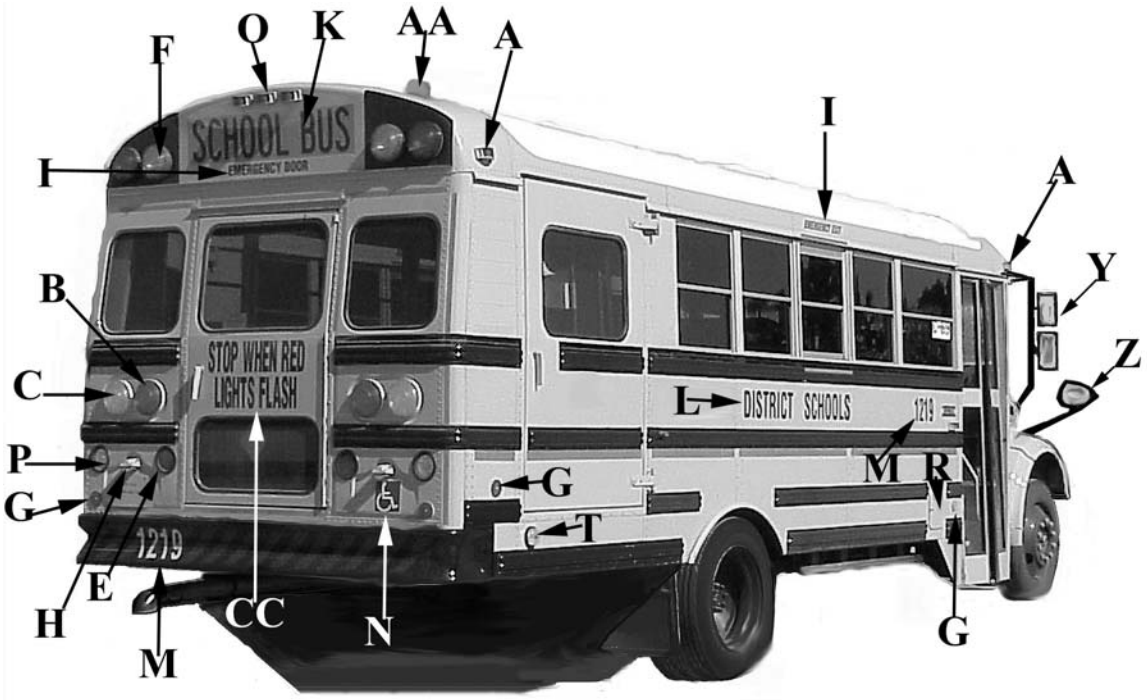
APPENDIX A

MINIMUM LETTERING AND LIGHTING



MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A	Clearance Lights	L	(Name of District) District Schools, Each Side, Belt Line
BB	Octagonal Stop Arm	M	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
C	Front Turn Signals, (amber lenses)	N	Bus Numbers
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design Quartz Halogen Bulb	O	Identification Lamps
G	Reflectors	S	Battery Box
I	Emergency Exit	U	Pupil Crossing Arm
J	Double-Faced Flashing Red Lights	Y	"Euro-Style" Rear View Mirror System (not as pictured)
K	SCHOOL BUS, Front And Rear, 8 inch letters on retroflective yellow background	Z	Cross/Side View Mirror System



MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A	Clearance Lights	M	Bus Numbers
B	Seven-inch LED Brake/Tail Lights	N	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
C	Seven-inch LED Turn Signals (amber lenses)	O	Identification Lamps
E	Four-inch LED Stop / Tail Lights	P	LED Back-up Lights
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design Quartz Halogen Bulb	R	Fuel Door
G	Reflectors	T	Wheelchair Lift Landing Light
H	License Plate Lamp	Y	“Euro-Style” Rear View Mirror System (not as pictured)
I	Emergency Exit Signs	Z	Cross/Side View Mirror System
K	SCHOOL BUS, Front and Rear, 8 inch letters on retroflective yellow background	AA	Roof-mounted White Flashing Strobe Light
L	(Name of District) District Schools (each side, belt line)	CC	Rear Door Lettering

APPENDIX B

WARRANTABLE AIR CONDITIONER SYSTEM ITEMS

Warrantable Air-Conditioning System Component List:

Control System(s)	Air-Conditioning System Control Assembly(ies)
	Air-Conditioning System Control: Switch(es), Wiring, Relay(s), Resistor(s), Rheostat(s), Cable(s), Lever(s), Knob(s), and Illumination Components
Refrigerant Compressor	Assembly
	Refrigerant Compressor Mounting Bracket(s) and Hardware
	Refrigerant Compressor Pulley/Clutch Plate Assembly
	Refrigerant Compressor Clutch Coil Assembly
	Refrigerant Compressor Clutch Coil Control Wiring and Connector(s)
	Refrigerant Compressor Drive Belt(s), Pulley(s), and Hardware
	Refrigerant Compressor Drive Belt Tensioner Assembly and Hardware
	Refrigerant Compressor Drive Belt Idler Assembly and Hardware
Expansion Valve	Assembly
	Expansion Valve O-Ring(s)
	Expansion Valve Inlet Screen
Orifice Tube	Assembly
	Orifice Valve O-Ring(s)
Refrigerant Line Filter	Assembly
	Refrigerant Line Filter O-Ring(s)
Evaporator Assembly	Assembly
	Evaporator Air Duct Assembly(ies)
	Evaporator Air Duct Register Assembly(ies)
	Evaporator Fan Motor Assembly(ies)
	Evaporator Fan Motor(s) Wiring, Connectors, and Switch(es)
	Evaporator Electrical/Electronic Components and Wiring
	Evaporator Fan Mount(s) Brackets and Hardware
	Evaporator Core Assembly
	Evaporator O-Rings
	Evaporator Drain Assembly
Condenser	Assembly
	Condenser Housing Assembly and Mounting Hardware
	Condenser Fan Motor(s)
	Condenser Fan Motor(s) Wiring, Connectors, and Switch(es)
	Condenser Electrical/Electronic Components and Wiring
	Condenser Fan Mount(s) Brackets and Hardware
	Condenser Core Assembly
	Condenser O-Ring(s)
Receiver	Assembly
	Receiver Dryer O-Ring(s)
Accumulator	Assembly
	Accumulator O-Ring(s)
Switch, Refrigerant, Low Pressure	Assembly
	Switch, Low Pressure, O-Rings
	Switch, Mounting Port, Schrader Valve
	Switch, Low Pressure, Wiring, and Connectors

Switch, Refrigerant, High Pressure	Assembly
	Switch, High Pressure, O-Rings
	Switch, Mounting Port, Schrader Valve
	Switch, High Pressure, Wiring, and Connectors
Service Port(s)	Schrader Valve(s)
	Cap(s)
	Cap Seal(s)
A/C System Wiring Harness	Assembly
	A/C System Wiring Harness, Wiring, Terminals, Connector(s), Electrical Overload Protection Component(s), Securement Components, and Anti-Chafing Components.
Refrigerant Hoses	Assemblies
	Refrigerant Hose
	Refrigerant Hose Fittings
	Refrigerant Hose Fitting O-Rings
	Refrigerant Hose Securement Components and Anti-Chafing Components
	Refrigerant Hose Heat Shield(s)
	Refrigerant Hose Fitting Clamp(s)

DEPARTMENT OF EDUCATION
DR. ERIC J. SMITH, COMMISSIONER
www.fldoe.org