U.S. General Services Administration

Federal Standard 833S

SHUTTLE BUSES

LIGHT-DUTY

MEDIUM-DUTY

STANDARD, FULL-ELECTRIC, & LOW-FLOOR BUILDS

July 7, 2023

Note: This document covers both 200 (Basic) Series and 300 Series requirements

1. SCOPE, PURPOSE, & CLASSIFICATION

1.0 SCOPE

This standard is intended to simplify competitive procurement of commercial vehicles and achieve a practical degree of standardization within the federal fleet. The Government takes no exemptions to the laws and regulations for vehicles used on public roads and highways.

1.2 APPLICATION

This Standard does not include all varieties of the commodity indicated by the title but is intended to cover those vehicles generally acquired by the Government. Buses with standardized components and equipment are highlighted in this Standard. A selection of coded optional additional systems and equipment are included for agencies, divergent geographic and operational related needs.

1.3 COVERAGE OF BUS TYPES

The types of buses covered by this standard are listed below. Optional equipment appears in section Appendix A and beneath each relevant section in the requirements.
The item descriptions, minimums, options, and manufacturer data can be viewed on this website: www.gsa.gov/automotive. Click on the link for all standards and refer to Federal Standard 833.

1.4 CLASSIFICATIONS

- The individual bus configuration classifications are referred to by a Standard Item Number (SIN)

240L - 10 ADULT, LOW-FLOOR, 90-98 INCH WIDE, LIGHT-DUTY SHUTTLE BUS
241 - 12 ADULT, 90-98 INCH WIDE, LIGHT-DUTY SHUTTLE BUS, BASIC
241E - FULL-ELECTRIC, 12 ADULT, LIGHT-DUTY SHUTTLE BUS, BASIC
241N - 12 ADULT, 77-89 INCH WIDE, LIGHT-DUTY SHUTTLE BUS, BASIC
242 - 16 ADULT, 90-98 INCH WIDE, LIGHT-DUTY SHUTTLE BUS, BASIC
242E - FULL-ELECTRIC, 16 ADULT, , LIGHT-DUTY SHUTTLE BUS, BASIC
242N - 16 ADULT, 77-89 INCH WIDE, LIGHT DUTY SHUTTLE BUS, BASIC
243 - 20 ADULT, 90-98 INCH WIDE, LIGHT-DUTY SHUTTLE BUS, BASIC
246 - 24 ADULT, 90-98 INCH WIDE, LIGHT-DUTY SHUTTLE BUS, BASIC
247 - 28 ADULT, 90-98 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS, BASIC
341 - 12 ADULT, 90-98 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
341E - FULL-ELECTRIC, 12 ADULT, LIGHT-DUTY, SHUTTLE BUS
341N - 12 ADULT, 77-89 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
342 - 16 ADULT, 90-98 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
342E - FULL-ELECTRIC, 12 ADULT, LIGHT-DUTY, SHUTTLE BUS
342L - 16 ADULT, LOW-FLOOR, LIGHT-DUTY, SHUTTLE BUS
342N - 16 ADULT, 77-89 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
343 - 20 ADULT, 90-98 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
343E - FULL-ELECTRIC, 20 ADULT, LOW-FLOOR, SHUTTLE BUS, LIGHT-DUTY
343L - 20 ADULT, LOW-FLOOR, LIGHT-DUTY, SHUTTLE BUS
346 - 24 ADULT, 90-98 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
346L - 24 ADULT, LOW-FLOOR, LIGHT-DUTY, SHUTTLE BUS
347 - 28 ADULT, 90-98 INCH WIDE, LIGHT-DUTY, SHUTTLE BUS
347L - 28 ADULT, LOW-FLOOR, LIGHT-DUTY, SHUTTLE BUS
259W - 28 ADULT, 100-102 INCH WIDE, MEDIUM-DUTY SHUTTLE BUS, BASIC
260 - 32 ADULT, 94-99 INCH WIDE, MEDIUM-DUTY SHUTTLE BUS, BASIC
260W - 32 ADULT, 100-102 INCH WIDE, MEDIUM-DUTY SHUTTLE BUS, BASIC
263 - 36 ADULT, 94-99 INCH WIDE, MEDIUM-DUTY, SHUTTLE BUS, BASIC
263W - 36 ADULT, 100-102 INCH WIDE, MEDIUM-DUTY SHUTTLE BUS, BASIC
359W - 28 ADULT, 100-102 INCH WIDE, MEDIUM-DUTY, SHUTTLE BUS
360 - 32 ADULT, 94 TO 99-INCH, MEDIUM-DUTY, SHUTTLE BUS
360L - 32 ADULT, LOW-FLOOR, MEDIUM-DUTY, SHUTTLE BUS
360W - 32 ADULT, 100-102 INCH WIDE, MEDIUM-DUTY, SHUTTLE BUS
363 - 36 ADULT PASSENGER, MEDIUM-DUTY, SHUTTLE BUS
363W - 36 ADULT, 100-102 INCH WIDE, MEDIUM-DUTY, SHUTTLE BUS

2.1 FEDERAL SPECIFICATION

2.1.1 **ADA Transportation Vehicle Accessibility Guidelines (ADA) 36 CFR Part 1192**
2.1.2 **Federal Motor Vehicle Safety Standards (FMVSS) 49 CFR Part 571**
2.1.3 **Federal Motor Carrier Safety Regulations (FMCSR) 49 CFR Part 393**
2.1.4 **A-A-393A Commercial Item Description Extinguishers, Fire, Dry-Chemical**

2.2 NON-GOVERNMENT STANDARDS

2.2.1 ***Society of Automotive Engineers (SAE) Standards and Recommended Practices***

- J163 Low Tension Wiring and Cable Terminals and Splice Clips
- J198 Windshield Wiper Systems- Trucks, Buses, and Multipurpose Vehicles
- J381 Windshield Defrosting Systems Test Procedure and Performance Requirements
- J551 Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles
- J516 Hydraulic Hose Fittings
- J537 Storage Batteries
- J561 Electrical Terminals-Eyelets and Spade Type
- J588 Turn Signal Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width
- J589 Turn Signal Switch
- J673 Automotive Safety Glasses
- J686 Motor Vehicle License Plates
- J695 Turning Ability and Off Tracking-Motor Vehicles
- J844 Nonmetallic Air Brake System Tubing
- J910 Hazard Warning Signal Switch
- J1127 Battery Cable
- J1128 Low Tension Primary Cable
- J1149 Metallic Air Brake System Tubing and Pipe
- J1292 Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring
- J1908 Electrical Grounding Practice
- J2064 R134a Refrigerant Automotive Air-Conditioning Hose
- J2188 Commercial Truck and Bus SAE Recommended Procedure for Vehicle Performance Prediction

2.2.2 ***American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)***

- A03 Handbook, Chapter 9, Surface Transportation
- 37 Standard Methods of Testing for Rating Unitary Air-Conditioning and Heat Pump Equipment
- 41.1 Standard Methods for Temperature Measurement
- 41.2 Standard Methods for Laboratory Airflow Measurement
- 41.3 Standard Method for Pressure Measurement

2.2.3 ***American Trucking Association, Inc.***

- Technology and Maintenance Council (TMC) RP 803

2.3 ORDER OF PRECEDENCE

In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. However, nothing in this document supersedes applicable laws and regulations unless a specific exemption has been obtained

3. REQUIREMENTS

3.1 AXLES

3.1.1 DRIVE AXLE (MEDIUM-DUTY SINS ONLY)

-Powered rear wheels or four corner driven wheels.

-The vehicle maximum road speed shall be electronically governed between 68 and 75 mph.

-Differential and bearing lubrication shall be synthetic grease/fluid.

-A metal display tag shall be added to the differential fill plug indicating synthetic fluid.

3.1.2 DRIVESHAFT (N/A to 240L)

-Driveshaft protection shall comply with FMCSR 393.89

3.1.3 FRONT AXLE (MEDIUM-DUTY SINS ONLY)

-Wheel bearings and axle spindles shall be oil lubricated with a window for visual determination of oil level on non-drive axles or "Lubed for Life" permanently sealed unitized hubs shall be provided.

-Bearing lubrication shall be synthetic grease/fluid.

-A metal indicator tag shall be added to hub indicating synthetic fluid requirement. The tag is not required for unitized hubs with non-serviceable bearings.

3.1.4 GAWR

-The Gross Vehicle Weight Rating (GVWR) and individual axle Gross Axle Weight Rating (GAWR) shall not be exceeded when loaded with the specified number of passengers and baggage including the driver.

-GAWR calculation shall reflect maximum weight ratings as advertised by axle manufacturer and no higher rating of components shall be acceptable.

3.2 BODY & CHASSIS

3.2.1 BODY CONSTRUCTION

-The body shall have a metal cage-type frame with welded joints. The frame itself shall not be held together by rivets or adhesives.

-For SIN 240L, a lightweight modular composite bus structure on a purpose-built high strength steel lowered floor chassis, composite side panels and roof panels coupled with high strength aluminum structural joiner shall be acceptable.

3.2.2 BODY EXTERIOR

-Tires shall not protrude beyond exterior body side wall.

-Composite rubber fender extensions or molded high impact plastic body accents can be used to cover tire edge.

-Bus side outer panels shall be FRP or metal. The roof when not available as a metal surface can be of composite construction.

-Bus end caps can be of composite construction materials if not available in metallic.

3.2.3 BODY EXTERIOR LENGTHS

-Body measurement shall be exterior rear surface to front face of body. Length measurement shall include bumpers.

-Bus body lengths shall not be changed to accommodate space consuming optional equipment. Only one body length shall apply to each SIN.

3.2.4 BODY EXTERIOR WIDTH

-Overall width measurements indicated in AutoStandards shall be from the outermost body surfaces. Flared wheel wells do not count as a body surface for the purposes of this measurement.

3.2.5 BODY FASTENER APPLICATION

-All fasteners shall be corrosion resistant.

-If fasteners are used in the body, they shall be corrosion resistant.

3.2.6 BODY INTEGRITY

-The body, floor, roof, and panel joints shall be water and air resistant.

-All body seams shall be sealed and not permit dust or fume entry into passenger compartment.

-Body, hinge, and mirror mounting points shall be reinforced to prevent cracking and fastener or fastener device pull out.

3.2.7 BODY MOUNTING

-Cushion material shall be utilized between body and frame. Body can be floated but shall not include wooden spacer blocks.

-Reinforcements or filler blocks shall be used where mounting devices might otherwise deform frame flanges.

3.2.8 BODY STRUCTURE

-Body Structure shall be of safety cage design unless utilizing a lightweight modular composite bus structure on a purpose-built high strength steel lowered floor chassis with composite side and roof panels coupled with high strength aluminum structural joiners. Wood shall not be used for structural framing.

3.2.9 CAPACITY DECAL

-An instruction decal shall be applied to the forward bulkhead visible to all passengers and driver. The lettering shall be not less than 1-1/2 inch in height and in strong contrast to the interior background color.

-The message can be in a single line or two lines and must state "No Standees Permitted" or "No Standees" and "Maximum Passenger Capacity XX" or "Capacity XX Passengers". The two XX's shall represent the passenger capacities specified as standard and optional.

-Multiple decals can be used to accommodate this requirement with one displaying the no standees instruction statement and another displaying passenger capacity.

3.2.10 CORROSION PROTECTION

-All hardware shall be corrosion resistant.
-Fastener materials shall be compatible with materials being fastened.
-No bare metal permitted.
-All joints and connections of dissimilar metals shall be insulated to minimize effects of galvanic corrosion.

3.2.11 CURB WEIGHT

-The curb weight shall include the weight of the chassis and body with all attachments, accessories, standard and optional equipment, a full complement of fuel, lubricants, coolants.

3.2.12 INSULATION

-All bus and chassis manufacturers supplied insulation packages shall comply with FMVSS 571.302.

300 SERIES ONLY
-All bus and chassis manufacturer standard and optional insulation packages shall be supplied as standard and shall comply with FMVSS 571.302.
-Buses shall have all available firewall insulation
-Insulation as installed in bus shall have a minimum R-value of 5.
-When using insulation that is not spray urethane:

·The insulation material shall not be exposed to moisture including but not limited to wash downs.

·The insulation material shall not be exposed to the exterior including under bus body.
·The insulation material shall not be used in any manner for which it was not originally designed.
-Insulation shall fill all cavity areas and voids in:
·Outer and inner walls
·Outer and inner roof
·Roof bow hat section
·Front and rear caps

3.2.13 MAINTENANCE

-Mounting devices shall utilize fasteners that will minimize loosening, but which may require regular scheduled tightening.

-Interface of chassis and body, including all electrical, fluid, mechanical systems, and mounted equipment shall be in full accordance with the chassis manufacturer's "Body Builders Book" and published equipment technical data.

3.2.14 MUD FLAPS

-Mud flaps are required if the wheel wells do not have an integrated method of blocking debris thrown into the air by the rotating tire.

-Rubber composition mud flaps at all wheel ends shall extend to within 3 to 7 inches off the ground when suspension is at normal operating height and at curb weight.

3.2.15 PASSENGER COMPARTMENT INTERIOR DIMENSIONS

-The design of the bus and optional equipment shall permit access for routine servicing and shall permit access for replacement and adjustment of component parts and accessories with minimal disturbance of other components and systems.

-Interior hinged and fastener-secured access panels and doors for maintenance must:

·Use common tools to open and be flush with the surrounding materials.

·Be sealed to prevent entry of fumes and water into passenger compartment.

-Interior height should be measured from the floor to center peak of ceiling. Measurement minimum shall be maintained between the first and last vertical roof bows.

3.2.16 PAYLOAD AND GROSS VEHICLE WEIGHT

-The payload weight for adult passengers shall be calculated using 215 pounds per person and 215 pounds for the driver. These ratings include provisions for parcels and shall be considered an even weight distribution throughout the body.

-Wheelchair positions shall be calculated using 300 lbs. for each wheelchair position specified. When a wheelchair position includes convertible seating, the 215 pounds per seated person shall be included in the calculation instead of 300.

3.2.17 RAIN SPLASH CONTROL

-An integrated roof design for rain directional control shall be provided to prevent water from the roof flowing onto the passenger doors, side windows, and the door boarding area.

3.2.18 SOUND LEVEL

-The interior sound level when measured in accordance with FMCSR 393.94 shall not be greater than 82db.

-This requirement shall be expanded to include any location within the passenger compartment.

-All noise reduction methods available from body and chassis manufacturer shall be added to the standard package. Examples of noise reduction methods that may be included as standard include:

·Complete lining of stepwell treads and sides with multiple layer noise reduction matting

·Urethane foam underbody insulation

·Application of PPG Audio guard acoustical coating

·Underbody shielding

·Engine compartment and under hood noise control matting.

3.2.19 TOWING DEVICES

-Front and rear towing devices shall be furnished.

-For SIN 240L, a suitable frame member capable of securing and removing the vehicle from an off-road emergency shall be suitable ILO of towing devices.

-Front devices can be deleted if the chassis manufacturer incorporates a frame crush zone that prohibits attachment of the towing devices.

-If the bus cannot be lifted with the furnished hooks or loops without damaging body panels or the frame, a warning label shall be permanently affixed to the frame area immediately next to the towing devices and clearly visible to tow truck operator during recovery procedures.

Warning label shall be in high contrast to its surroundings to provide immediate recognition. The warning label shall read in bold letters no smaller than ¼ inch, "DO NOT LIFT BUS WITH TOW EYES. TOW EYES FOR FLAT GROUND MANEUVERING ONLY."

-Complete towing instructions shall be furnished with the operator's manual.

-Rear towing device(s) shall not provide a toehold for unauthorized riders

3.2.20 UNDERCOATING

-Unprotected underbody, fenders, skirts, and wheel wells shall be undercoated. The exceptions to this requirement are parts and surfaces that are constructed of or coated with corrosion protected materials (plastic, polymer, stainless steel, e-coat, Powder Coat, epoxy, etc.).

-Hot dip galvanizing shall also be acceptable on SIN 240L

3.3 BRAKES

3.3.2 SERVICE BRAKES

-Chassis OEM Antilock Brake System shall be furnished.

3.4 DOORS AND WINDOWS

3.4.1 EMERGENCY EXITS

-Shall comply with FMCSR 393.61, 393.62, 393.63, 393.92.

3.4.2 ENTRY RAMP (LOW-FLOOR SINS ONLY)

-Entry ramps shall comply with ADA guidelines and be surfaced with slip resistant and replaceable cover.

-All low floor buses shall not use steps for passenger entry other than that from the ground to the landing inside the door.

-An electric deploying and retracting wheelchair ramp shall be provided as standard equipment on all low-floor buses to allow for a no step entry from the ground to the bus interior when deployed. --SIN 240L buses may use a manually deployed ramp instead. The ramp can be vertically or horizontally stowed inside the bus.

3.4.3 KEYS

-Exterior access panels to the engine compartment, battery compartment, doors, and storage compartments shall be keyed. Passenger entry and exit doors can be electronically or mechanically locked.

-If engine compartment is not keyed, it should only be able to be opened with a release inside the vehicle

-Duplicate keys shall be furnished with each bus.

3.4.4 PASSENGER DOORS

-Passenger door shall comply with ADA requirements.

-Shall comply with FMVSS 217

3.4.5 PASSENGER WINDOWS

-Rattle proof and, when closed, waterproof and windproof.
-All windows that are used for emergency purposes shall be fitted with latching devices for emergency use.
-Provided with fingertip control, permitting ready opening and adjustment to various desired openings, unless the window is a fixed passenger touring window.

3.4.6 STEPS (N/A TO LOW-FLOOR SINS)

-Shall comply with ADA guidelines.

-Galvanized steel, stainless steel, or aluminum can be used to construct the passenger stepwell.

-The material chosen for the stepwell construction must be compatible to the surrounding body structure.
-Square vertical leading edge of stepwell shall have a flat surface to provide a positive seal where doors contact stepwell or otherwise provide a positive seal for doors to prevent intrusion of water, dirt, wind, etc.
-Exterior or interior surfaces shall be covered or coated with an insulator to reduce heat and sound transfer.
-Rubber or vinyl flooring will not be considered an insulating material for vertical surfaces. Undercoating will not be considered an insulator for the exterior of the stepwell.

3.4.7 TINTING

-Chassis manufacturer's tinted windshield shall be furnished.

-Windows on the bus sides and in the rear door shall be tinted a neutral color, complementary to the bus exterior.

-Windows over the destination signs shall not be tinted.

3.4.8 WINDSHIELD DEFROSTING

-Shall comply with FMVSS 571.103, FMCSR 393.79, and SAE J381

3.4.9 WINDSHIELD WIPING AND WASHING

-Shall comply with FMCSR 393.78, and SAE J198

3.5 ELECTRICAL

3.5.1 120-VOLT POWER (WITH 120VAC INTERIOR OPTIONAL EQUIPMENT ORDER)

All powered components requiring alternating current (ac) shall operate on 120-volt (v), 60 Hz.
-The power inlet connector shall be polarized and of the grounding type and shall be listed as suitable for the purpose.
-The power inlet connector shall be in a weatherproof housing with a spring-loaded and gasket sealed cover.
-The inlet connector shall be constructed and installed to guard against inadvertent contact by persons with parts made live. The inlet connector shall be provided with a grounding pole with a first to make and last to break contact. The supply equipment shall have sufficient rating to supply the load served.
-All electrical and heating materials shall be listed or labeled by a Nationally Recognized Testing Laboratory i.e.: UL/CSA/ETL and shall be installed in accordance with both the manufacturers' instructions and the National Electrical Code.

3.5.2 ALTERNATOR

-The maximum alternator RPM rating shall not be exceeded at the top governed engine RPM.

-The alternator shall be sized to carry the worst-case load with transmission in gear, and the engine at idle as described below:

·Air Conditioner fans operating at maximum speed.

·Air Conditioning Compressor clutch turned on.

·All interior and exterior lights on.
·Starting batteries at ¾ to full state of charge.
·Alternator housing temperature at 200 degrees Fahrenheit or higher.
-The output values must meet or exceed those listed in the Minimum Requirements for each Standard Item.

3.5.3 AUXILIARY INTERIOR POWER RECEPTACLE

-Shall be 12-volt powered with 10-amp minimum supply located in the driver's area.
-Receptacle shape shall be like a cigar lighter.

3.5.4 BATTERIES

-Batteries shall be mounted in a fully enclosed box made of a material intrinsically resistant to damage or corrosion due to battery acid exposure and capable of supporting the full weight of the batteries without assistance.
-The placement of the batteries should allow for complete visual inspection and service of terminals without removing battery cables.
-All components within the battery compartment shall be protected from battery electrolyte and gas corrosion.
-Only battery cables shall be connected to batteries.
-Battery cables shall be routed through dedicated holes in battery box independent of each other and insulated from abrasion by grommets.
-No spliced battery cables permitted. Cables shall be one-piece, stranded conductor with protective covering (jacket) pigmented red to indicate positive and black to indicate negative and shall be run from the positive battery terminal of the leading battery directly to the starter solenoid.

-Hood-mounted or cab-mounted OEM batteries meet the specification above

3.5.5 ELECTRICAL SYSTEM

-All wiring provided by the FSAM shall be copper.
-All wiring shall have type SXL or GXL high temperature cross-linked polyethylene, or better, insulation.

-The use of multi conductor or ribbon cables are permitted provided they are not exposed to under hood or under vehicle temperatures/conditions.
-The wiring shall be permanently color coded or marked the entire length of the wire.
-Wiring shall be routed in conduit or high temperature looms with a rating of 300°F.
-When cables are supplied by a component manufacturer to interconnect system components, these cables need not be continuously color coded/identified. They shall be coded/identified at the termination or interconnection points.
-All added wiring shall be in accessible, enclosed, protected locations and kept at least 6"

away from exhaust system components.

-All conduits, looms, and wiring shall be secured to the body or frame with insulated metal cable straps.

-All apertures on the vehicle shall be properly grommeted for passing wiring.

-All items used for protecting or securing the wiring shall be appropriate for the specific application and be standard automotive, aircraft, marine, or electronic hardware.

-Cable ties shall not be used to support harnesses but may be used for bundling purposes.

-Electrical panels that are accessible to accidental contact shall have a protective cover, shield, etc. to prevent shorts that can result in injury, fire, or damage to the electrical system.

-All plastic materials shall be UV resistant, and metal supports corrosion resistant:

·P-clamps - Clamps shall be corrosion resistant with a neoprene, Viton, or silicone insulator.

·Saddle-supports - Formed metal support with smooth radius edges designed to carry no less than twice the weight of the harness it supports.

·Cable clamps - Die-formed, radius-edge, corrosion-resistant metal cable clamps and can only be used in bus interior or engine compartment in areas not subject to wetting by rain or road spray. Plastic clamps can only be used in areas not exposed to heat that could exceed their working limits.

·Button-cable ties - Saddle Mounts and button ties utilizing cable ties are an acceptable method of supporting chassis and body wiring and hoses. Cable ties shall be UV resistant, and the support method used shall be rated for at least twice the weight of the component supported.

·Nylon tie-wraps with push-wings - an acceptable method of securement in completely enclosed spaces (inside roof and walls). Method must be rated for at least twice the weight of wire supported.

-Electrical circuit board panels and components that are susceptible to accidental contact shall have a protective cover, shield, or enclosed/dedicated compartment to prevent accidental shorts that can result in injury, fire, or damage to the electrical system.

3.6 ELECTRONICS/AUDIO VISUAL

3.6.1 RADIO / PA SYSTEM

-(200 SERIES ONLY) AM/FM with USB, Aux, or Bluetooth Input radio shall be furnished.

-Minimum of two premium quality speakers shall be provided for every three rows of seats but not less than four speakers.

-(300 SERIES ONLY) AM/FM with USB, Aux, or Bluetooth Input radio shall be furnished along with a public address system consisting of a handheld microphone with button control.

-(300 SERIES ONLY) The PA system does not need to be integrated into the factory radio; however, it should still use the primary speakers

3.7 ENGINE ACCESSORIES (N/A TO FULL-ELECTRIC SINS)

3.7.1 AIR CLEANER (300 SERIES ONLY)

-Dry type. Diesel engine vehicles shall have manual reset, progressive type air restriction indicator included in the engine intake air system.

3.7.2 AUTOMATIC ENGINE IDLE SHUTDOWN (MEDIUM-DUTY SINS ONLY)

-Engine shall shutdown automatically after a 300 second idle period when the transmission is in the neutral position. Shutdown command can be overridden when the air conditioning is switched to on.

3.7.3 COOLANT HEATER (300 SERIES ONLY)

-All engines shall be equipped with a 120-volt AC coolant heater located in the engine block. Heater shall be engine manufacturer's standard or optional equipment.

3.7.4 HIGH-IDLE CONTROL (DIESEL ENGINES)

Automatic engine high-idle control shall:

·Be preset to operate at an elevated rate not to exceed the maximum rate permitted by engine manufacturer.

·Operate (engage) when switched to the "ON" position and the transmission in "NEUTRAL" or "PARK" (applicable to design furnished).

·Operate (engage) when the air conditioning is operating and the transmission in "NEUTRAL" or "PARK".

·Not rely on manual on/off switch position to elevate idle. A low voltage sensing controller can be used to accommodate this requirement in lieu of immediate idle up when A/C is activated.

·Disengage when the service brake pedal is pressed, or the transmission in-gear position is selected.

3.7.5 HOUR METER (DIESEL ENGINES)

-All diesel engine buses shall be equipped with hours of operation readout readily accessible without the use of special equipment located in the dash panel. Internal to gauge cluster readout is acceptable.

3.8 ENGINES (N/A TO FULL-ELECTRIC SINS)

3.8.1 AIR POLLUTION CONTROL

-The vehicle and engine shall confirm to 40 CFR Subchapter C-Part 86"Control of Emissions from New and In-use Highway Vehicles and Engines," as evidenced by an EPA certificate of compliance.

-Vehicles shall also comply with all pollution control requirements for the State of destination. -Certificates of compliance shall be made available upon request.

3.8.2 COOLING SYSTEM

-Cooling system shall be charged with extended life coolant.

-All coolant hoses and lines shall meet or exceed the requirements of SAE J20 D2.

-All hoses and lines shall be securely attached with constant-tension or thermoplastic clamps. Hoses and lines shall not be permitted to rub components that may eventually lead to a coolant leak.

-Passenger compartment heater hoses shall be equipped with manual or electric full-flow valves located in a protected location to permit complete shutoff of engine coolant flow to heating units. The location of manual valves shall be indicated with a label stating the purpose of the valves such as "Heater Shutoff Valves" and located to be visibly obvious.

3.8.3 ENGINE COMPARTMENT

-Engine compartment shall be readily accessible for servicing and routine maintenance of engine and engine components.

-All fluid locations shall be accessible with standard funnels, pour spouts, and automatic dispensing equipment.

-All lubricant sumps shall be fitted with magnetic-type external, drain plugs if available from the component manufacturer as standard or optional.

3.9 EXTERIOR

3.9.1 LICENSE PLATES

-Front and rear license plate mounting provisions shall be furnished and comply with SAE J686.

3.9.2 STOWAGE COMPARTMENT (N/A to 240L, 241N, 242N, 341N and 342N)

Provision shall be made for lockable weatherproof stowage of tire changing tools and tire chains.

3.9.3 EXTERIOR MIRRORS

-Exterior mirrors shall be corrosion resistant stainless steel or composite plastic.

- (300 SERIES ONLY) Motorized remote controlled and heated surfaces with controls located in driver's area for flat mirrors. Heat and position control switch(s) shall be "Marked to Indicate Function" and located in the driver's area. Heating function shall be automatically deactivated when the ignition switch is turned to the "OFF" position. A Pictogram can be used to identify mirror switches and functions.

3.9.4 EXTERIOR PAINT

-The standard exterior color of buses shall be bright white unless otherwise specified by option in paragraph 3.25.

-Roof shall be painted bright white regardless of optional color choices.

3.9.5 OTHER PLATES AND DECALS

-Dealer identification decals and placards shall not be applied to vehicle exterior. Bus manufacturer decals are permitted so long as they do not interfere with other required or specified markings.

3.10 FLOOR

3.10.1 FLOOR CONSTRUCTION

-Interior sub-floor shall be metal or composite, covered with not less than a minimum of 5/8-inch nominal thickness, marine grade plywood, with all ends sealed. Alternative synthetic materials may be acceptable.

-Top surface must be not less than a grade B with bottom no worse than a grade C.

-All wood and wood product ends shall be sealed and securely fastened to the metal stringers prior to be covered with matting.

-All surfaces exposed to weather shall be coated with a waterproofing substance such as undercoating or epoxy surfaces.

-All floor fasteners shall be of corrosion resistant materials.

3.10.2 FLOOR COVERINGS

Floor covering shall be permanently bonded to the sub-floor and shall be impervious to temperature changes. Bonding or adhesive material shall be waterproof, including joints and seams, and shall be of the type recommended by the manufacturer of the floor covering material.

3.10.3 WHEEL-HOUSINGS

-Wheel-housings, which protrude into the passenger compartment, shall be covered with the same matting used under the seats or a material equal in durability as the flooring material. The wheelhouse shall be designed in shape and strength so it may be used as a footrest.

3.11 FUEL (N/A TO FULL-ELECTRIC SINS)

3.11.1 FUEL SYSTEM

-Shall comply with FMCSR 393.65, 393.67, and 393.69

- (MEDIUM-DUTY SINS ONLY) All diesel engines shall be furnished with a fuel/water separator with the following attributes:

·Replaceable filter element or cartridge rated no larger than 30 microns.

·Drain valve that allows for water and debris to be drained from lowest point of unit.

·Water sensor for warning light.

·The separator can be remote mounted or internal to the engine

3.11.2 FUEL TANK(S)

-When the tank filler cap is located behind body skin, a hinged access door shall be furnished.

-Fuel fill(s) shall permit filling of tank(s) with only the nozzle end of the fuel handle.

-Fuel filler cap(s) shall be attached with a cable or chain to prevent loss.

-Fuel type shall be indicated on the body skin immediately next to fill cap or on the inside face of the fuel fill door. The words "Ultra Low Sulfur Diesel" must be included when applicable.

3.12 INTERIOR

3.12.1 AIR CONDITIONING INSTALLATION

-System components shall not interfere with or adversely affect chassis OEM and bus body systems, components, function, reliability, and fit.

-All lines, hoses, cables, wires, and harnesses shall be rigidly supported at distances not greater than 20-inches. Cable ties or straps of any kind shall not be used to support any lines or hoses. UV-resistant cable ties are acceptable only for bundling.

-All line, hose, cable, and wires shall pass-through grommeted holes.

-All body penetrations shall be sealed with an elastomeric sealing compound if grommeting alone cannot provide a tight seal against the entry of water, fumes, or dust into the passenger compartment.

-All mounting hardware shall be stainless steel or other corrosion resistant materials.

-No sheet metal screws shall be used in mounting equipment within contact of hoses.

-System charging and monitoring access ports shall be in areas where they will not be subject to damage from foreign objects while bus in motion. Ports shall be readily accessible without the need to remove components or permanently secured panels.

-Installation of the evaporator(s) and ancillary equipment inside the vehicle shall be mounted away from the head impact zone as specified in FMVSS 222.

-System shall be installed on the assembly line in accordance with the A/C manufacturer's documented instructions.

-Condenser(s) shall be fit with a recirculation guard to aid fresh air flow across coils.

-Skirt mounted condensers shall be designed and located to prevent road debris and water splash from clogging or damaging the condenser.

3.12.2 AIR CONDITIONING PERFORMANCE

-The BTUH/HR capacities shall be based upon the SAE individual component ratings including compressor, evaporator, condenser, and all ancillary refrigeration components.

-The evaporator shall be tested at 80 degrees F dry bulb/ 67-degree F wet bulb in 37 degrees F saturated evaporating refrigerant temperature versus air entering the evaporator.

-Condenser shall be tested at 95 degrees F with saturated refrigerant temperature as 45 degrees delta T.

-The following test must be used to validate air-conditioning performance:

·The bus must be heat soaked to 100 degrees F for not less than two hours in a controlled environment prior to testing.

·A relative humidity of 50% shall be maintained in the test chamber during testing.

·The system must cool the interior of the bus from 100 degrees F to 70 degrees F in no more than 30 minutes with the engine at an elevated RPM and all standard components of the bus and climate control system installed during the test.

·Interior temperature must be measured at not less than three points inside the bus along the centerline and located four feet above the floor.

·The minimum three points of measure shall be (1) three feet above the center pint of the horizontal driver seat surface, (2) at the longitudinal midpoint of the body, and (3) three feet forward of the aisle end.

·The temperature probes inside the bus must be within +/3 degrees F of the average temperature at the conclusion of the test.

3.12.3 AIR CONDITIONING SYSTEM

-The system shall be electronically controlled and have the capability of self-diagnostics.

-Evaporator fan speed control and thermostat setting shall be digital and located in driver area.

-Minimum diagnostic outputs and system protections shall include high pressure, low pressure.

-The passenger compartment air conditioning system, excluding the OEM dash unit, must have the system manufacturer's recommended filter/drier and a refrigerant moisture indicating sight glass located to be readily viewable.

-All air shall pass through the evaporator filter system.

-Condensation drains shall be enough to evacuate all water accumulated in evaporator and prevent standing water.

-All system components subject to corrosion from moisture shall be aluminum, copper, stainless steel, galvanized, or epoxy coated.

-Condenser(s) can be skirt or roof mounted as standard.

-Evaporators can be free blow, ducted, or a combination to attain an even air flow and temperature environment.

-The system capacity must be calculated as follows: (1) add together all evaporator capacities, (2) add together all condenser capacities, (3) add all compressor capacities. The BTUH/HR capacity stated must be the lowest added value.

-Automatic tensioning compressor drive belt(s).

-Refrigerant compressor shall be a V-Type four or six cylinder or screw type transit compressor with an oil sump independent of the refrigerant system.

-Bus manufacturer's highest output BTUH/HR system shall be furnished as standard.

-Independent dash air conditioning must be furnished as standard equipment.

-Added refrigerant compressors can be a swash plate type with not less than 163 cc / 10 CID displacement.

-The compressor input RPM must not be exceeded at full engine RPM.

-The BTUH/HR capacity stated must be the lowest added value. Dash air conditioning system must be added to the passenger compartment lowest added value and considered part of the total Air Conditioning Output listed in the Minimums for each Standard Item.

-The chassis manufacture's dash defroster system shall not be tapped into as part of the passenger compartment cooling.

3.12.4 CEILING

-(200 SERIES ONLY) The ceiling interior shall be manufacturers standard complying with FMVSS 571.302.

-(300 SERIES ONLY) The ceiling interior shall be covered with medium grey color padded, woven, stain resistant industrial cloth fabric or padded-vinyl complying with FMVSS 571.302.

3.12.5 DRIVER'S AREA

-Driver's area shall include as a minimum:

·Shall comply with FMCSR 393.51

·All switches and controls shall be marked with easily read identifiers

·Push button start is acceptable if the power supply to the switch is controlled by a keyed switch or electronic recognition.

·Tilt steering wheel/column (except SIN 240L)

·Engine coolant temperature overheat warning

·Engine low oil pressure indication

·Fuel level indicating gauge

·Transmission selector
·Air pressure gauge and warning buzzer
·Ignition switch

3.12.6 HEATING

-Passenger compartment heating shall be provided using heat exchangers integrated into the air conditioning system or by radiant heaters located along the interior walls.

-All buses shall have a means of heating the air in the passenger door stepwell.

3.12.7 INTERIOR MIRROR

-Minimum of one non-glare type mirror shall be mounted inside the bus with a reflective surface area of not less than 80 square inches with rounded corners. Driver shall be able to view complete passenger compartment through interior mirror.

3.12.8 STOWAGE COMPARTMENT (N/A to 240L, 241N, 242N, 341N and 342N)

-The bus manufacturer's largest forward bulkhead compartment shall be furnished. Compartment shall be used to store the fire extinguisher, and safety triangles.

-If all components will not reasonably fit, GSA Engineering will determine a suitable location in conjunction with the manufacturer during the first production vehicle inspection.

3.12.9 WALLS

-(200 SERIES ONLY) The standard interior walls shall be manufacturers standard complying with FMVSS 571.302.

-(300 SERIES ONLY) The standard interior walls shall be covered with medium grey color padded, woven, stain resistant industrial cloth fabric or padded-vinyl complying with FMVSS 571.302.

-The standard interior walls for item 360L shall be white to light grey melamine surface.

3.13 LIGHTS AND LIGHTING

3.13.1 EXTERIOR LIGHTING

-All exterior lights shall be grounded with an insulated wire.

-The ground lead shall not be secured by the lamp fixture mounting screws or hardware.

-A terminal shall be attached to the wires by a simple mechanical crimp-type process that conforms to SAE J163.

-Ground terminal lugs shall be solder plated, cadmium, tin or zinc plated.

-Ground terminals should be clustered and shall be accessible for servicing.

-A serrated paint-cutting terminal shall be utilized to make proper contact when used on painted surfaces.

-When two wire lights are not commercially available, then ground return connections may be made to vehicle structure, frame or engine using the ground-return system (one wire systems per SAE J1292).

-Lights and reflectors shall not be mounted on rub rails or vehicle bumpers unless recess protected.

-All buses shall be equipped with three-wire combination side marker/turn signal lamps.

-The lamp shall be positioned below the passenger windows, nominally center of body or forward to the rear of the passenger door and driver's side window.

-All exterior housings of lamps, switches, electronic devices, and fixtures shall be corrosion resistant and weatherproofed.

-All exterior lights on the vehicle shall comply with ADA 1192.31, FMCSR 393.11, 393.19, 393.22, 393.23, 393.24, 393.25, 393.26, and SAE J589, and J910.

-All lights or powered components mounted on hinged covers or doors shall have a flex loop secured at both ends to allow for normal opening of cover without damaging wires.

-Clearance lamps shall be low-profile design or body recessed to prevent damage from tree limbs. -Armor shields shall not be supplied to protect lighting unless supplied commercially as standard equipment.

-(300 SERIES ONLY) The following exterior lighting shall be Light Emitting Diode (LED): rear tag, tail, stop, turn, clearance, and door area ground/curb illumination.

-Exclusions to LED requirement are wheelchair door area and ground lighting, headlamps, and other lights that cannot be replaced by a LED due to a design only available in incandescent or when multiple LED assemblies cannot be used to take the place of an incandescent fixture due to space limitations.

-LED lighting shall have a minimum 5-year warranty.

-Reflectors must be a sticker type flexible material. The sticker must use cube corner elements to reflect light such as 3M Diamond Grade. Rigid plastic stick on or screw-on reflectors are not permitted.

-A two wire LED marker lamp can be used in place of the three-wire combination light so long as the illumination spread is nominally 270 degrees wide and the lamp is configured to operate as a marker continuously and then flash when driver requested, acting as a side turn signal.

-Ground and step illumination shall be furnished to meet ADA guidelines. Lamps shall activate when the passenger entry or exit door is open.

3.13.2 INTERIOR LIGHTING

-Interior illumination shall meet or exceed requirements of ADA 1192.31.

200 SERIES ONLY

-Bus manufacturer's standard equipment.

-Standard overhead interior lighting can be incandescent and shall be switched on when the entry door is opened and off with the door closed. The power circuit shall be limited to a maximum of 5 minutes on-time regardless of door position. A manual override switch may be provided to allow the driver to always leave the interior lights on so long as the ignition key is in the run or auxiliary position.

-Minimum of one dome light over the driver area controlled independently of other interior lighting with a separate switch.

-Bus manufacturer's standard equipment.

-Standard overhead interior lighting can be incandescent and shall be switched on when the entry door is opened and off with the door closed. The power circuit shall be limited to a maximum of 5 minutes on-time regardless of door position. A manual override switch may always be provided to allow the driver to leave the interior lights on so long as the ignition key is in the run or auxiliary position.

300 SERIES ONLY

-Interior lighting shall include:

·Minimum one row of SMI TRANSIT LF light emitting diode (LED) light fixtures installed center of aisle or integrated into overhead parcel racks when requested by option.

·The fixtures shall extend as far to the rear of the bus and as far forward as possible in continuous joined assemblies.

·A gap is permitted in the lamp assemblies when obstructions such as roof hatches prevent continuous lengths. Lens material shall be polycarbonate. Lens material shall not drip flaming onto seats if burned. Lens shall be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used, they must be held captive in the lens.

·The light fixtures shall be powered when the passenger entry or exit door is opened. A manual override switch shall be provided to allow the driver to always leave the interior lights on so long as the ignition key is in the run or auxiliary position.

-White light emitting LED lamp assemblies can be used in place of the SMI fixtures with the number and brand of the fixtures at the discretion of the Contractor so long as the lamps meet the requirements of subparagraphs C and D. Lamps can be permanently sealed or contain replaceable elements.

-Minimum illumination values are below. All values must be measurable over the entire surface area.

·Center aisle surface- no less than 2-foot candles per square foot.

·Entry and exit stepwell surfaces or ramp surface as applicable, no less than 2-foot candles per square foot.

·All other interior passenger floor area surfaces, no less than 0.4-foot candles per square foot.

·The foot candle values listed in subparagraph "e" shall be measured using a light meter placed on the floor surface.

·A minimum of one LED dome light with no less than 4-foot candle output measured on top of the lower seat cushion shall be furnished over the driver's area controlled independently of other interior lighting.

-The passenger entry and exit doorstep lighting must activate when the door is open

3.14 SAFETY

3.14.1 BUMPERS

-Front and rear bumpers shall be manufacturer's standard metal

-Bumpers shall not contact body

-Bumpers shall be painted, e-coated, or anodized on all sides prior to installation.

-Back surface of bumper can be epoxy primed in the absence of top coating if not visible during normal operation.

3.14.2 EMERGENCY EQUIPMENT

-Shall comply with FMCSR 393.95

-Fire extinguisher mounted convenient to the driver.

-The fire extinguisher shall have an Underwriter's Laboratory rating of 2A 10 B:C or greater, shall be a minimum 5 pounds, shall have a hose, shall include a metal safety pin and wire, and shall conform to type I or type II, class 2, size 5 of A-A-393.

-The fire extinguisher shall permit visual determination of charge.

-Minimum of 10-unit type first-aid kit shall be furnished.

3.14.3 STANCHIONS, BARRIERS, AND GRAB RAILS

-Barrier panels shall be furnished between the stepwell and the passenger seats and immediately behind the driver's area except on SIN 240L.

-The installation of the driver's barrier shall not interfere with the full reward motion of the driver's seat.

-ADA compliant handrails are required at the front and rear of the passenger entrance shall be arranged to safely assist passengers entering or leaving the bus

-All stanchions and grab rails shall be ADA compliant stainless steel, epoxy coated, or padded injection-foam covered tubing. If padded tubing is used, the foam must meet all FMVSS requirements and be vandal resistant transit quality material. Opaque barriers shall be covered with the same material as the wall covering unless formed from injection molded plastic.

-All stanchions, barriers and grab rails shall be attached to tapping plates in walls, floor, and ceiling if no structural members are available.

3.15 SEATS

3.15.1 DRIVER'S SEAT

For 200 Series buses, OEM supplied driver's seat shall be furnished

300 SERIES ONLY

The following features must be furnished as standard equipment:

·Seat height adjust with air cylinder suspension

·3-point belt system

·Grey weave fabric

·Triple Adjustable lumbar

·Adjustable bolsters

·Front cushion adjuster

·Rear cushion adjuster

·Adjustable cushion length

·Back recline - minimum recline 9 inches or 23 degrees from full upright position with seat set in the center of seat track travel.

·Seat tracks - minimum seat travel must be 7 inches.

·Right movable arm rest

The driver's seating position must accommodate a 95th percentile male which is 6 feet 2 inches tall and weighs 223 pounds and a 5th percentile female at 5 feet tall and 110 pounds.

-EXCEPTION: If the OEM does not allow the replacement of OEM seats due to safety reasons, the driver's seat does not need to meet all the specifications below. During the first article inspection, we will require documentation from the OEM which supports your claim. The features that are missing from the seat will also need to be indicated on the clarifications tab.

3.15.2 PASSENGER SEATS

-Passenger seating shall comply with FMVSS 571.217 and 222 seating and leg room requirements.

-Hip-to-knee room, measured from the front of one seat back horizontally across the highest part of the seat cushion, at the center of the seat, to the seat back or panel immediately in front shall be no less than 27-inches at all forward facing seating positions.

-Foot room, measured at the floor forward from a point vertically below the front of the seat cushion to an obstruction such as the driver barrier, shall be no less than 12 inches.

-Seats immediately behind the wheel housings may have foot room reduced, provided the wheelhouse is shaped so that it may be used as a footrest.

-3-point restraints shall be supplied if required under FMVSS for bus GVWR.

-Seats mounted over wheel wells may be equipped with non-retractor type seat belts if it is not possible to install the required under seat retractors.

-The required passenger count for the low floor buses may be met by a combination of standard seating and single folding or flip and fold seats in the wheelchair locations. When using single folding seats in the wheelchair locations they can be doubles or triples at the bus manufacturer's discretion

-Partial perimeter seating is acceptable for low floor models where it is not practical to use forward facing seats due to passenger comfort issues.

3.16 SUSPENSION

3.16.1 GROSS VEHICLE WEIGHT RATINGS

-Vehicle GVWR's shall be the chassis manufacturer's published ratings.

-Component and vehicular ratings shall not be increased to meet the requirements of this Specification.

-When published ratings are not available, verification of rating shall be made available upon request by the Government.

3.16.2 FRONT SUSPENSION, LOW FLOOR

-Applicable to Standard Items 342L, 343L, 346L, 347L, 360L

-The switch to kneel the suspension must be in the driver's area and not readily accessible to the passengers.

-When the command to kneel is activated a warning light and audible signal shall announce the vehicle is lowering down.

-An interlock must prevent the vehicle from moving until the air springs are at normal operating height.

3.16.3 REAR SUSPENSION, LOW FLOOR

-Applicable to Standard Items 342L, 343L, 346L, 347L, 360L

-Air suspension with curbside kneeling function.

-Safety interlocks to prevent vehicle movement with deflated air springs

3.16.4 FRONT SUSPENSION, MEDIUM-DUTY SINS

-Manufacturer's standard spring material and design.

3.16.5 REAR SUSPENSION, MEDIUM-DUTY SINS

-Manufacturer's standard spring material or air suspension.

3.17 TIRES AND WHEELS

3.17.1 TIRES

-Shall comply with FMVSS 571.119 and 571.120

-Tubeless, steel belted radial tires with highway tread and a minimum speed rating of 75 mph.

3.17.2 WHEELS

-Wheel/Tire size and ply rating shall be the same for all wheels/tires.

-Shall be manufacturer's standard color

3.18 TRANSMISSION (N/A TO FULL-ELECTRIC SINS)

3.18.1 PERFORMANCE

-Transmission shall be automatic with a minimum of 5 forward speeds.

-Fluid shall be synthetic if available from OEM. Allison transmissions shall be equipped with TES-295 approved fluid. Transmission shall be labeled on its exterior to indicate the type of fluid installed.

-Transmission ratings shall be selected to meet or exceed the maximum horsepower and torque ratings for the engine specified. The net torque capacity and the net power rating of the transmission shall meet or exceed the output ratings of the engine in all gears.

3.18.2 SHIFT QUALITY & DRIVABILITY

-The overall drivability of the vehicle should not be negatively impacted by the transmission:

·No bumps or vibrations should be felt while shifting

·There should not be a significant delay when downshifting for more torque

·The gears should not be audible during a shift

3.19 ELECTRIC DRIVE (FULL-ELECTRIC SINS ONLY)

3.19.1 ELECTRIC DRIVE

-The electric drive system shall provide power to enable the proposed buses to meet the defined top speed and operate all accessories, while still maintaining passenger comfort and providing a smooth ride. electric drive input torque rating shall exceed motor output torque. the drive system shall be rated to operate at the GVWR of the bus.

-The electronic drive shall have on-board diagnostic capabilities, be able to monitor functions, store and time stamp out-of-parameter conditions in memory and communicate faults and vital conditions to service personnel. The electronic drive shall contain built-in protection software to guard against severe damage. A diagnostic reader device connector port, suitably protected against dirt and moisture, shall be provided in the driver’s area.

3.19.2 BUS INTERFACE

-The system controller shall be the point of interface to the bus electrical platform and the preferred communication path shall be serial data (J-1939, CAN). The system controller shall also be capable of communication to a variety of on-board device controllers, including but not limited to, ABS, drive motor(s), and other.

3.19.3 DRIVER INTERFACE

-Driver interface shall include state of charge, range remaining, distance traveled, and average efficiency (kWh per mi). All interfaces shall be ergonomically designed.

3.19.4 ENERGY STORAGE SYSTEM

-The Energy Storage System (ESS) shall be of a commercial design. The ESS shall be designed, sized, and selected to ensure that the bus performance specifications, compatibility with charging, and other related requirements are met or exceeded, bearing in mind cost benefit and reliability variables as they relate to the characteristics of the different battery types. The power source for the vehicle shall be derived from established battery technology purpose built for bus propulsion applications that has a field-proven track record of safe, reliable, and durable operation in similar traction applications.

-The energy storage system shall be composed of batteries along with associated power electronics interface and controls, and diagnostic systems. The energy storage devices used, and their arrangement shall be selected and sized to meet bus performance specifications and design goals, including long cycle life, low life-cycle cost, safety, maintainability, durability, and simple, robust diagnostics.

-The energy storage system shall monitor and control the operating conditions within each module, including voltage, current, and temperature. This system shall include over-current and over-temperature protection features that disconnect current to and from the energy storage modules in the event of an over- temperature or over-current condition, and de-rating performance (limits current) in the case of an over temperature condition.

-The energy storage system shall be capable of being replaced.

-Offerors shall include complete descriptions of all life cycle testing procedures used to validate the life of batteries used at the proposed charging rates, charge durations, and expected ambient temperatures and operating profiles. Offerors shall include documented results of life cycle testing and certification of battery life cycle testing by independent testing agency.

3.19.5 THERMAL MANAGEMENT

-If necessary, to maintain thermal management of the energy storage system under the ambient operating conditions required herein, the energy storage system shall be furnished with a self-contained, manufacturer approved, refrigerated cooling system dedicated only to the thermal management of the energy storage system. A warning light shall be supplied on the driver's panel indicating abnormal operational conditions (i.e.: excessive battery compartment temperature, loss of airflow, loss of power) within the energy storage device cooling system. This cooling system shall be rated to provide the required thermal management under the ambient operating conditions required herein and shall be manufactured and installed in compliance with the specifications and requirements of the manufacturer.
-The thermal management system should also provide heating to precondition battery packs and maintain optimal operating temperature during use.

3.19.6 ELECTRICAL SAFETY SYSTEM

-A high voltage interlock monitoring and activation system shall be used to determine intentional or unintentional opening of high voltage circuits or enclosures and automatically neutralize all devices capable of or producing high voltage power. This system shall be fully compliant with SAE J1673, SAE J2344 and other applicable standards, and shall be active when the master run switch is in the OFF/CL/ID position and shall monitor all components and associated cabling within the system. When the master run switch is in the RUN/night position, the monitoring system shall provide an audible and visual warning on the driver's panel and provide for automatic shutdown of the high voltage system if a shutdown event occurs. The high voltage system includes all bus platforms operating above 50 VDC or 25 VAC and any variety of modulated currents to/from power electronic converters.

-An electrical isolation fault detecting system shall monitor the level of isolation between the high voltage system (positive and negative) and the bus chassis. The designed safety characteristics shall be supplemented using properly labeled and located safety tags and plates in accordance with SAE J1654 and J1673.

-The High-Voltage (HV) battery system design shall be a holistic integrated system with safety set as the absolute top priority. The HV cables shall utilize industry standard shielding and insulation, cabling shall be routed and secured to avoid chafing with other cables and components. The HV battery system shall also require a low-voltage interlock circuit that will automatically de-energizing the HV system if a HV box is opened. The vehicle controls system shall monitor all major components inside each battery pack as well as provide an overall battery system controller and an overall bus system controller.

3.19.7 ENERGY STORAGE SYSTEM CHARGING

-The energy storage unit shall be isolated from the passenger compartment to prevent any intrusion of liquids or gasses relating to the energy storage unit into the passenger compartment. At least one charging inlet shall be provided.

3.20 PROPULSION SYSTEM (FULL-ELECTRIC SINS ONLY)

3.20.1 PROPULSION SYSTEM

The bus shall be powered by a battery electric propulsion system. Function and operation of the bus shall be transparent to the bus driver and passengers. The Contractor shall assure that the bus structure can successfully accept the installation of the propulsion system. At a minimum, the propulsion system shall comply with applicable local, state, and/or federal emissions and useful life requirements, as a zero-emission bus.

3.20.2 PROPULSION SYSTEM SERVICE

The propulsion system shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. Contractor shall provide all specialty tools and diagnostic equipment required for maintaining the Propulsion System in accordance with Special Tools List.

3.20.3 PRIMARY TRACTION MOTOR

The bus shall have a permanent magnet (PM) traction motor.

3.20.4 PROPULSION SYSTEM CONTROLLER (PSC)

The PSC regulates energy flow throughout system components to provide motive performance and accessory loads, as applicable, while maintaining critical system parameters (e.g., voltages, currents, temperatures, etc.) within specified operating ranges. The controller shall monitor and process inputs and execute outputs as appropriate to control the operation of all propulsion system components. The overall propulsion system and PSC shall include and manage support systems such as, steering, air, etc.

The PSC shall be the hub for all propulsion system device to device communication, to include traction motors, energy storage, charging equipment and power switching electronics, and interface to other vehicle systems via SAE J1939 or other CAN networks that follow SAEJ1939. The PSC shall provide the following functionality:

Storage of the application file necessary to execute propulsion system commands.
Storage of the buses data file generated on a day-to-day basis, to include Incidents and alarms, monitoring, and diagnostics information, & wireless communications

The system shall include current / power sensors at strategic locations throughout the propulsion system.

The system shall include sensors at strategic locations, such as, temperature, voltage, pressure.

The system shall protect the traction motor(s) against progressive damage. The system shall monitor conditions critical for safe operation and automatically de-rate power and/or speed.

The system shall include a sub-system capable of monitoring the level of connectivity between all propulsion components and associated cabling/connectors to the buses chassis and low (12/24) voltage systems to insure isolation. The energy storage module shall have automatic means/devices of disconnect and one manual capable of interrupting the positive and negative connections within the module enclosure and rated for disconnect at maximum current.

The system shall have an interlock that prevents engagement when the charger is connected to the traction battery.

The PSC shall be equipped with an electronically controlled management system, compatible with multiplex wiring systems and either 12-or-24volt electrical systems.

3.20.5 POWER ELECTRONICS/INVERTER

The PSC shall execute instructions and system commands to the propulsion system components via a power electronics inverter. Circuitry for this device (s) shall include all necessary fuses/breakers such that the conductors, components, and bus are adequately protected and safe. Connection points shall be labeled to avoid mismatch.

3.20.6 ENERGY STORAGE SYSTEM

The primary charging of the energy storage system shall be provided from a stationary charging station conforming to all UL standards and SAE J1772 CCS. The energy storage system shall also make use of regenerative braking. The Energy Storage System shall comply with UN/DOT 38.3 orUL2580 or UL1642 requirements for lithium batteries or similar standards for non-lithium batteries.

The Contractor shall deliver the buses with an installed, fully functioning ESS. The ESS shall be fully formed, installed, and tested in accordance with the manufacturer's recommended practices. The ESS design, including containers, module bracing systems, thermal-management systems, battery-management systems, watering/venting systems, interconnections, fusing, and traction- controller and charger interfaces shall be completely described in the proposal. The proposal shall include a detailed analysis of expected battery performance in the Design Operating Profile.

The charge cycle and cycle life shall be stated in the proposal and a life-cycle cost analysis of the proposed battery system in the specified application shall be provided.

Offerors shall include complete descriptions of all life cycle testing procedures used to validate the life of batteries used this application at the proposed charging rates, charge durations, and expected ambient temperatures and operating profiles. Offerors shall include documented results of life cycle testing.

3.20.7 ENERGY STORAGE SYSTEM SAFETY

The Energy Storage System shall be installed to optimize interior space and vehicle weight distribution. The ESS shall be load distributed within the bus to equalize weight between the wheels on the same axles and to achieve appropriate weight distribution between axles so as not to adversely affect handling of the bus. The ESS shall be positioned to maintain safety and not be impacted in side-impact crash scenarios.

3.20.8 COOLING SYSTEM

The cooling system shall be of sufficient size to maintain power electronics and the ESS at safe continuous operating temperatures, in accordance with the power electronics system component manufacturers' cooling system requirements and recommendations.

The cooling system shall be automatically controlled under normally encountered operating and charging conditions. Thermal management shall be continuously monitored during all periods of charge and discharge with appropriate safety interlocks installed to react to adverse conditions as stated in SAE-J1772.

Air intakes shall be properly positioned and configured to minimize the intake of water, road dust, and debris and shall be adequately filtered.

In the event of a failure of the cooling system while charging, the charge system shall be disabled and a visual alert shall be activated on the dashboard, the reset of which shall require the deliberate action of maintenance personnel. In the event of a failure of the cooling system during bus operation, an audible and visual alert shall be activated on the dashboard, the reset of which shall require the deliberate action of maintenance personnel.

3.20.9 REGENERATIVE BRAKING

The bus shall have a regenerative braking system to aid in the reduction of wear on the brakes and to help extend the range of the vehicle through energy recapture. The vehicle shall employ regenerative braking as the accelerator pedal is completely released.

3.20.10 REGENERATIVE BRAKE MANAGEMENT

The system shall include a means of maintaining dynamic braking (braking retardation) that is designed to prevent overcharging of the batteries. This same feature may be a component of the overall liquid cooling system loop and offer a means of supplementing heat for use at the main HVAC heater core and/or defroster.

3.21 MISCELLANEOUS

3.21.1 OPERATION MANUALS & 1398 FORM

-Operation manuals shall be furnished with each bus.

-The Contractor shall fully complete and affix a GSA Form 1398 to the vehicle in the Driver's area. The exact location shall be agreed upon during the First Production Vehicle Inspection by both the Contractor and GSA Quality Assurance Branch Representative assigned to the facility

3.21.2 SERVICING AND ADJUSTING

-Prior to acceptance of the vehicle by the Government, the Contractor shall inspect, service and adjust each vehicle for operational use in accordance with an approved manufacturer's prescribed pre-delivery servicing form.

- The in-transit mileage accumulation on vehicles driven from the assembly plant to the receiving location shall be recorded and the start of warranty coverage adjusted to begin once the bus reaches the destination address.

-Full-electric vehicles shall be trailered to the destination address and shall be driven on-site for a minimum of 25 miles prior to acceptance of the vehicle.

-The areas to be inspected and adjusted, if necessary, shall include as a minimum:

·All fluids and fuel tank(s) shall be full.

·Alignment of headlights.

·All engine adjustments.

·Electrical and brake systems.

·Filling and charging of batteries.

·Alignment of front wheels.

·Inflation of all tires.

·Complete lubrication of body, chassis, engine and running gear with grade of lubricants recommended for the ambient air temperature at the delivery point.

·Servicing of the cooling system with a solution of ethylene glycol type antifreeze and water in equal parts by volume.

·Servicing of the windshield washer reservoir with water and appropriate additives.

3.22 GENERAL WORKMANSHIP REJECTION STANDARDS

The following shall be reason for rejection:

·A rough, sharp, or unfinished edges, burrs, seams, corners, joints, cracks, and dents. Sharp corners and edges shall be either rounded or padded to prevent injury to personnel.

·Interior cleanliness: vehicle interior should not contain trash or manufacturing debris (spare screws, bolts, rivets, etc.).

·Panels, non-uniform with edges that are not radiused, beveled, etc.

·Final stage manufacturer's paint shall be free of dirt, runs, sags, orange peel, "fisheyes", blisters, bubbles, chips, scratches, cracks, gouges, over-spray, peeling, chemical stains, water spots, and any other imperfection or lack of complete coverage.

·Body panels or components that are uneven, unsealed, or contain cracks, dents or have voids.

·Misalignment of body fasteners, glass, viewing panels, light housings, items with large or uneven gaps or spacing and doors, body panels, and hinged panels.

·Improper body design or interface with the chassis that could cause injury during normal use or maintenance.

·Improperly fabricated, routed, supported, or secured hoses, wires, wiring harnesses and mechanical controls.

·Loose, vibrating, abrading body parts, components, or subassemblies.

·Interference of chassis components, body parts, doors, etc.

·Leaks of any gas or fluid lines, (AC, coolant, oil, etc.)

·Sagging, non-form fitting upholstery or padding.

·Incomplete or incorrect application of rust proofing/undercoating.

·Inappropriate or incorrect use of hardware, fasteners, components, or methods of construction.

·Incomplete or improper welding, riveting. Welded, bolted, and riveted construction utilized shall be in accordance with the highest standards of industry using certified welders.

·Improper body design or interface with the chassis substructure that could cause injury during normal use or maintenance, and which fail to provide access to perform routine or mandatory repairs or maintenance on vehicle electrical and mechanical systems. In addition, the improper combination of options by their combination and installation are inherently incompatible regarding function or safety.

·Visual deformities and equipment malfunctions.

·Lack of uniformity and symmetry where applicable.

·Unsealed appurtenances or other body components, gaskets, etc.

·All exterior surfaces shall be smooth and free of wrinkles and dents.

·In addition, any deviation from the requirements or any other item, whether stipulated herein, that affects form, fit, function, durability, reliability, safety, performance, or appearance shall be cause for rejection.

3.23 IDENTIFICATION OF VEHICLES

The Contractor must show the applicable GSA Purchase Order number on the carrier's freight bill or other document used in the delivery of vehicles awarded f.o.b. destination under this solicitation. This information is essential to the consignee for identification purposes. Vehicles will not be accepted by the Government without this identifying number

3.24 CERTIFICATE OF ORIGIN OR BILL OF SALE

The manufacturer's Certificate of Origin or Bill of Sale for each vehicle procured shall be provided to the purchasing agency. The front of the document shall show the applicable RPN number shown on the Motor Vehicle Delivery Order. Non-OEM resellers must reassign the document to the purchasing agency listed in the Consignee Mailing Address shown on the Motor Vehicle Delivery Order. The document shall be forwarded to the Consignee Mailing Address shown on the Vehicle Delivery Order prior to shipment. Vehicle title/registration and safety/emission tests are the responsibility of the requisitioning agency.

3.25 WARRANTY REQUIREMENTS

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement, the Contractor shall warrant and guarantee to the Government each complete bus vehicle and specific subsystems and components according to the following provisions. The Contractor shall be fully responsible for warranty administration for all warranty periods. The Contractor shall have an authorized service representative assigned to assist the Government warranty administration.

3.25.1 COMPLETE BUS VEHICLE

The Contractor shall warranty and guarantee the bus for the same time and mileage durations as publicly published and furnished to non-Government buyers. The Contractor shall be responsible for all defects, parts failure, or malfunction due to design, construction or installation errors, defective workmanship, and missing or incorrect parts. The warranty period shall begin upon delivery and acceptance at the final delivery point and exclusive of accumulated drive away mileage. The Contractor shall be fully responsible to ensure the bus is delivered free of defects and in ready of use condition at the time of delivery. If the vehicle is found to have deficiencies the Contractor will resolve those prior to final delivery.

3.25.2 SUBSYSTEM AND COMPONENTS

If the Contractor receives from any supplier or subcontractor additional warranty coverage on the whole or any component of the vehicle, in the form of time and/or mileage including any pro rata arrangements, or the Contractor generally extends to his commercial customers a greater or extended warranty coverage, including anti-corrosion, powertrain, or emission, the Government shall receive corresponding warranty benefits if warranted by their manufacturer for a period longer than that required by the contract.

3.26 EXCEPTIONS TO WARRANTY

The warranty shall not apply to scheduled maintenance items and items furnished by the Government, except as far as such equipment may be damaged by the failure of a part or component for which the Contractor is responsible.

3.27 DETECTION OF DEFECTS

If the Government detects a defect within the warranty periods, it shall promptly notify the Contractor's representative. Additionally, warranty repairs shall begin no more than three business days or 5 calendar days after vehicle has been presented for repairs. If the repairs have not been approved by the Contractor within that period of 10 days, the Government shall consider the contractor, and its authorized service center in breach of the contract, and the government may exercise all remedies including, but not limited to, seeking a third party to repair the vehicles and demand reimbursement for all related expenses from the contractor that sold the vehicle to the government.

3.28 SCOPE OF WARRANTY REPAIRS

-The offeror must disclose all restrictions placed upon the Government to comply with the warranty coverage.

-The offeror must operate a factory authorized parts and service center (to include 3rd party factory approve cross service agreement subcontractors) within a 100-mile geographic radius of the destination delivery location to support the commercial warranty. The contractor is required to disclose whether they can meet this requirement within five (5) working days of the receipt of the requisition/order to the contracting officer/contracting specialist.

-The offeror must disclose whether they offer towing and transport services at no cost to the Government during the factory warranty period. If there is an additional charge for this service, the offeror must indicate the per mile transport charge.

-All factory installed components that have a commercial warranty that exceeds the Federal minimum "bumper to bumper" commercial warranty provided by the manufacturer, shall be itemized by part/component noun name and manufacturer.

3.29 FLEET DEFECTS

A fleet defect is defined as cumulative failures of any kind in the same components in the same or similar application where such items are covered by the warranty and such failures occur within the warranty period in at least 10 percent of the vehicles delivered under this contract. The Government shall have final approval of corrections or changes under these conditions.

3.30 INTENDED USE

The Government in transporting personnel or cargo intends the vehicles covered by this Standard for general non-tactical use. Intended operation is on paved roadways with some semi-improved road surface use.

3.31 REPAIR PARTS AND SERVICE

Continuous operation of the buses is of utmost importance. It is necessary that the Contractor be able to render prompt service by furnishing a list of branch offices or agencies where complete stocks of repair parts are maintained and can be secured within a reasonable time after ordering by part number from the manufacturer's part books. Parts such as body panels, window assemblies excluding glass panels and windshields, doors, seats, seat covers, engines, and transmissions must be shipped within 30 days from order. All other parts must be shipped within 10 days from order. Parts shall be available for a period not less than 10 years from the date of delivery.

3.32 DOMESTIC USE

When vehicles are used within the fifty States of the United States, the District of Columbia, Puerto Rico, American Samoa, Guam, The Republic of Palau, the Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, the Republic of the Marshall Islands , and the Virgin Islands, the warranty shall include the furnishing, without cost to the Government (FOB contractors nearest dealer or branch to vehicle's location or station), of new parts and assemblies to replace any that failed or malfunctioned within the warranty period. In addition, when the Government elects to have the work performed at the contractor's plant, branch, dealership, or with the contractor's approval (i) to correct the supplies itself; or (ii) to have them corrected by a commercial garage facility; the cost of the labor involved in the replacement of the failed or malfunctioned parts or assemblies shall be borne by the contractor.

3.33 FOREIGN USE

When vehicles are used outside the fifty States of the United States, the District of Columbia, Puerto Rico, and the Virgin Islands, the warranty shall include the furnishing of new parts or assemblies to replace any returned to the Contractor by the Government that failed or malfunctioned within the warranty period. The replacement parts or assemblies shall be delivered by the Contractor to the port of embarkation in the United States operator may locate and read it easily.

4. QUALITY ASSURANCE & WARRANTY

4.1 VERIFICATION

The Contractor shall verify compliance to the requirements herein prior to first vehicle production release. Verification may be in the form of drawings, instructions, test results, vendor documentation, certifications, or design analytical data. Acceptance of designs by the Government does not relieve the Contractor from responsibility to meet all the requirements and specifications herein, whether reviewed by the Government or not. It shall be the Contractor's responsibility to assure all production documentation results in the production of vehicles that follow these requirements and specifications.

4.2 FIRST PRODUCTION VEHICLE INSPECTION

The first vehicle produced under this Standard for each Standard Item Number shall be inspected by the Contractor at his plant under the direction and in the presence of Government representatives.
The purpose of the inspection shall be to confirm vehicle conformance with the contract.
Acceptance of the first production vehicle shall not constitute a waiver by the Government of its rights under the provisions of the contract.

4.2.1 VEHICLE WEIGHT

The vehicle shall be weighed to determine the curb weight and the distribution on the front and rear axles.

4.2.2 ROAD TEST

Vehicle shall be examined, and road tested by the Contractor, less payload, on highways and roads for not less than 10 miles to assure that the vehicle will operate in accordance with the contractual requirements

4.2.3 WATER SPRAY TEST

All buses must be water tested. The manufacturer's standard test shall be used. The Government reserves the right to require more stringent testing if in-service water issues are encountered. The frequency of testing may be reduced, and the process modified at the discretion of the GSA Industrial Operations Analyst based on a history of previous successful tests.

There shall be no significant water leakage into the bus interior or exterior compartments with the following exceptions:

- A minimal amount of water can enter at the passenger entry and exit door seals so long as there is a designed path to move the water out of the bus without the door having to be opened and the water shall no collect or puddle at any point. The bottom step shall be the only one location in the well area to get wet when water does enter during normal operation of the bus.
- A minimal amount of water can enter at any window that is not a fixed-position, non-vented type. Water that enters from a slider rail or at a glass pane joint must be routed through a deliberately designed exit path and not puddle or allow the passenger compartment to get wet. Water that has entered must not flow across glass surfaces at any time

4.2.4 FAILURE

Failure of the first production vehicle to meet requirements of the contract shall be cause for the Government to refuse acceptance of all vehicles under contract until corrective action has been taken.

4.3 INSPECTION OF PRODUCTION VEHICLES

The Contractor's inspection system shall at a minimum assure that the vehicle conforms to the physical and dimensional requirements and is capable of meeting performance requirements specified herein.
For each vehicle under contract, the Contractor shall make available to the Government, at the point of final acceptance records acceptable to the Government indicating that the servicing, adjusting, and water spray test have been accomplished.

5. NOTES

5.1 ORDERING DATA

This standard reflects information on commercially available buses which have been segregated into classes to provide for competitive acquisition. This information is reflected as side-by-side model comparisons on the General Services Administration's website. Purchasers must use the AUTOCHOICE web site accessible at: www.gsa.gov/automotive to select vehicles, colors, and delivery options.

5.2 DEVIATION FROM FEDERAL STANDARD

An Agency requesting a vehicle or equipment not identified in Auto Choice should consult with the Contract Specialist for the assigned commodity to determine availability. All requests for systems and equipment not identified in the Standard are reviewed by GSA Engineering to determine the appropriate application.

5.3 CHANGES AND NOTICES

Requests for changes or additions to the Federal Vehicle Standard, along with rationale, should be sent to the General Services Administration, 1800 F St NW, Washington, DC 20006, for appropriate action. The requesting agency will be informed of the action taken.
Military Review Activities:

- Air force 84-99
- Army – AT – CE
- Navy – YD – MC
- Defense Logistics Agency
- CIVIL COORDINATION & PREPARING ACTIVITY:
- GSA-FSS-FFAE
- CIVIL AGENCY REVIEWING ACTIVITIES:
- Agriculture-FS-ARS-NRCS-APHIS
- DC Government
- Interior BLM-Reclamation
- State AID
- Transportation – CG
- Treasury – IRS – Sec. Svc. – Customs – ATF
- Energy – BPA
- Commerce – NOAA
- Justice – INS, FBI
- EPA, TVA, VA
- Army – Air Force Exchange Service

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This document may be downloaded at no cost from the Internet at:
WWW.GSA.GOV/AUTOMOTIVE

Comments, information, and questions should be sent to:
Chief, Automotive Engineering & Commodity Management Branch (QMDAA)
Office of Motor Vehicle Management
General Services Administration
1800 F St NW
Washington, DC 20006
Telephone: 703.605.2277