U.S. General Services Administration

Federal Standard 833S

COACH BUSES

SIN 396 – 49 ADULTS, COMMUTER

SIN 397 – 57 ADULTS, COMMUTER

SIN 398 – 56 ADULTS, TOURING

SIN 397E – 56 ADULTS, FULL-ELECTRIC

SIN 398E – 54 ADULTS, FULL-ELECTRIC, LOW-ENTRY

July 7, 2023

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 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)

396 - 49 ADULT, HEAVY-DUTY, INTERCITY, COMMUTER COACH
397 - 57 ADULT, HEAVY-DUTY, INTERCITY, COMMUTER COACH
398 - 56 ADULT, OVER-THE-ROAD, TOURING COACH
397E - 56 ADULT, FULL-ELECTRIC, HEAVY-DUTY, COACH BUS
398E - 54 ADULT, FULL-ELECTRIC, HEAVY-DUTY, COACH BUS, LOW-ENTRY

2. APPLICABLE DOCUMENTS

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 TAG AXLE

-Must be follower type and with unloader or lift function.

3.1.2 AUXILIARY BRAKING

-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.

3.1.3 DRIVE AXLE

-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.

3.1.4 DRIVESHAFT

-Driveshaft protection shall comply with FMCSR 393.89

3.1.5 FRONT AXLE

-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.

3.2 BODY & CHASSIS

3.2.1 BODY CONSTRUCTION

-The buses under this specification shall be of commercial square-bow, high-floor, semi-monocoque construction with pass-through underbody storage compartment.

3.2.2 BODY EXTERIOR

-Tires shall not protrude beyond exterior body sidewall.

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

3.2.3 BODY EXTERIOR LENGTHS

-Overall length measurements indicated in AutoStandards/Autochoice shall be from the rear most to front most body or component surface. Length measurement shall include bumpers. Only one body length shall apply to each Standard Item.

3.2.4 BODY EXTERIOR WIDTH

-This measurement shall be taken from the exterior vertical body surface of the primary body skin panel.

3.2.5 BODY FASTENER APPLICATION

-All fasteners 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 STRUCTURE

-Body Structure shall be of safety cage design. Wood shall not be used for structural framing.

3.2.8 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 stark 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.

3.2.9 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.

3.2.10 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.

3.2.11 INSULATION

-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 security system insulation

-Insulation as installed in bus shall have a minimum R-value of five.

-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

·Cavities between bows

·Front and rear caps

·Roof bow hat section

3.2.12 MAINTENANCE

-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.

3.2.13 MUD FLAPS

-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.

3.2.14 PASSENGER COMPARTMENT INTERIOR DIMENSIONS

-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.

3.2.15 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 three hundred.

3.2.16 RAIN SPLASH CONTROL

-Rain gutters, hoods, or lips shall be provided to prevent water from the roof flowing onto the passenger doors, side windows, and the door boarding area.

3.2.17 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.

3.2.18 TOWING DEVICES

-Front and rear towing devices shall be furnished.

-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 sharp 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

3.2.19 UNDERCOATING

-Underbody, fenders, skirts, and wheel-wells shall be undercoated. The exceptions to this requirement are plastic or polymer exterior parts not subject to deterioration or damage from road splash and debris.

3.3 BRAKES

3.3.1 AIR BRAKES

-The brake system, complete with all necessary components shall include:

·Air Storage Tanks shall be appropriately rated for application and mounted in such a way to maintain drains at the lowest point for proper water evacuation.

·Automatic Moisture Ejector the first air storage tank (wet tank) after the air dryer shall be equipped with a heated, automatic, moisture-ejector. All other air tanks shall be equipped with a brass or stainless steel, ¼-turn ball valve or spring-loaded manual pull valve drain. The moisture ejector shall be protected from debris damage or accumulation by shielding.

·Air Dryer with replaceable, spin-on cartridge, desiccant air dryer; spring loaded pull valve; Meritor Model SS1200 or Bendix AD-IS shall be furnished on all air systems and installed per compressor and air dryer manufacturer's recommendations.

3.3.2 AUTOMATIC STABILITY CONTROL

-Manufacturer's standard or option system shall be furnished as standard.

3.3.3 AUXILIARY BRAKING

One of the following two methods of auxiliary braking must be furnished as standard equipment.

1. Engine Compression Brake:

A system which opens all or some of the engine exhaust valves near the end of the compression stroke, thereby converting vehicle motion to a pumping loss (engine compression break). Combination of variable pitch turbo charger and partial exhaust valve cycle is also acceptable for this function.

Operator control shall be a dash mounted switch shall be provided to activate, modulate, or cut the brake augmentation. The switch shall be marked to indicate its position. When active, the system shall be automatically activated by means of conventional driving controls to apply retardation during vehicle deceleration, and deactivate in other operating modes

2. Internal Transmission Retarder:

Requires an internal to transmission, fluid operated, driveline retarder included in transmission package. Retarder shall function in a minimum of three levels and shall be controlled by the driver with a selector mounted to the upper dash panel in easy access for the driver. Retarder shall activate when throttle is lifted, and the unit has been selected on. Engine cooling system shall be upgraded to meet the increased cooling requirements.

3.3.4 SERVICE BRAKES

-Chassis OEM Antilock Brake System shall be furnished.

3.4 CEILING

3.4.1 FLOOR COVERINGS

-Ceiling panels shall be covered with medium grey padded, woven, stain resistant, industrial cloth fabric or carpet complying with FMVSS 571.302

3.5 DOORS AND WINDOWS

3.5.1 EMERGENCY EXITS

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

3.5.2 KEYS

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

-Duplicate keys shall be furnished with each bus.

3.5.3 PASSENGER DOORS

-Passenger door must be air powered and comply with ADA requirements.

-Shall comply with FMVSS 217

3.5.4 PASSENGER WINDOWS

-Fixed position, non-opening (except for emergency exits), and frameless.

-All windows which open (emergency exits) shall be fitted with latching devices.

3.5.5 STEPS

-Shall comply with ADA guidelines.

-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.

-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.

-Galvanized steel, stainless steel, aluminum, or other non-corroding material shall be used to construct the passenger stepwell.

-The material chosen for the stepwell construction must be compatible to the surrounding body structure.

3.5.6 STOWAGE COMPARTMENT

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

3.5.7 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.

3.5.8 WINDSHIELD DEFROSTING

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

3.5.9 WINDSHIELD WIPING AND WASHING

-Shall comply with FMCSR 393.78, and SAE J198

3.6 ELECTRICAL

3.6.1 120-VOLT SHORE 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.

3.6.2 ALTERNATOR

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

-The output values must meet or exceed those listed in the Minimum Requirements for each Standard Item.

3.6.3 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.

3.6.4 BATTERIES

-Minimum of three maintenance-free batteries

-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.

3.6.5 ELECTRICAL SYSTEM

-All wiring provided by the FSAM shall be copper.

-All wiring shall have type SXL or GXL elevated 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 elevated temperature looms with a rating of 300°F in areas exposed to elevated temperatures (i.e., engine compartment)

-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.

3.7 ELECTRONICS/AUDIO VISUAL

3.7.1 RADIO

-AM/FM with USB, Aux, or Bluetooth Input radio shall be furnished with an integrated public address system consisting of a handheld microphone with button control.

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

3.8 ENGINE ACCESSORIES

3.8.1 AIR CLEANER

-Dry type with manual reset, progressive type air restriction indicator included in the engine intake air system.

3.8.2 AUTOMATIC ENGINE IDLE SHUTDOWN

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

3.8.3 COOLANT HEATER

-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.

3.8.4 HIGH-IDLE CONTROL

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.

3.8.5 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.

3.9 ENGINES

3.9.1 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.

3.9.2 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.

-Engine compartment heater hoses shall be equipped with 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.

3.9.3 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.

3.1 EXTERIOR

3.10.1 LICENSE PLATES

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

3.10.2 EXTERIOR LUGGAGE COMPARTMENT

-The underbody luggage compartment must be pass-through design.

-Compartment doors must be electric or air locked.

-Compartment measurements shall include only undeveloped area and exclude any supports or structural members.

-Compartment must be illuminated by multiple lamp assemblies that activate when the access door or doors are opened.

3.10.3 EXTERIOR MIRRORS

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

-Mirror mounting hardware shall be made of corrosion resistant materials.

-Motorized remote controlled and heated surfaces with controls located in driver's area for both flat and convex 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

-Motorized remote controlled and heated surfaces with controls located in driver's area for both flat and convex 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.

3.10.4 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.

3.10.5 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.

3.11 FLOOR

3.11.1 FLOOR CONSTRUCTION

-Construction methods that employ plywood as a structural component of the floor shall use minimum 1/2" nominal thickness, water resistant plywood, Weyerhaeuser Structurwood Edge Gold, Advan Tech, or SpaceAGE Synthetics Inc Thermo-Lite Board Series 2600.

-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 floor fasteners shall be of corrosion resistant materials.

-Bottom surface of wood product flooring must be coated and sealed at a minimum with epoxy paint when not exposed directly to moisture. Areas subject to water spray must be coated with a waterproofing substance.

3.11.2 FLOOR COVERINGS

-The under-seat floor area and aisle shall be covered with minimum 2.2 mm ALTRO in colors Genome, Storm, Zeal, Cyber, Mineral or TARABUS colors Griffon, or Dune.

-The aisle and the entrance area shall be covered with the same material as used under passenger seats.

3.12 FUEL

3.12.1 FUEL SYSTEM

-Shall comply with FMCSR 393.65, 393.67, and 393.69

-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.
·Heated with thermostatic control
·The separator can be remote mounted or internal to the engine

3.12.2 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.

3.13 INTERIOR

3.13.1 AIR CONDITIONING INSTALLATION

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

-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.

-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.

-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.

-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.

3.13.2 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 evaluated 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 evaluated 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.

3.13.3 AIR CONDITIONING SYSTEM

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

-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. 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 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.

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

-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.

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

-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.

3.13.4 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

·Ignition switch

·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

·Engine coolant temperature overheat warning

·Engine low oil pressure indication

·Fuel level indicating gauge

·Transmission selector

3.13.5 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.

3.13.6 INTERIOR MIRROR

-Minimum of one non-glare type mirror shall be mounted inside the bus with a reflective surface area of not less than 57 square inches with rounded corners. Driver shall be able to view complete passenger compartment through interior mirror.

3.13.7 LAVATORY (SIN 398 ONLY)

-Manufacturer's standard forced ventilation enclosure and towelette or waterless gel dispenser for hand sanitizing.

-System furnished must include all plumbing, holding tanks, tank freeze prevention heaters, and ventilation system.

3.13.8 PARCEL RACKS

-Overhead luggage racks for left and right side shall be furnished with either open face or door closer type.

-When open face racks are furnished a retaining lip and stretch cord luggage retaining device shall be intrinsic to the design features. Minimum vertical clear opening shall be 9-inches with interior measurement vertical measurement of 9-inches. Air volume shall not be restricted or diverted when parcel rack contains passenger carryon items.

3.14 LIGHTS AND LIGHTING

3.14.1 EXTERIOR LIGHTING

-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.

-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.

-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.

-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.

-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.

-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.

-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.

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

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

3.14.2 INTERIOR LIGHTING

-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.

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

·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

·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.

3.15 SAFETY

3.15.1 BUMPERS

-Front and rear bumpers shall be manufacturer's standard

-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.

3.15.2 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 five 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 five of A-A-393.

-The fire extinguisher shall permit visual determination of charge.

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

3.15.3 STANCHIONS, BARRIERS, AND GRAB RAILS

-Barrier panels shall be furnished between the stepwell and the passenger seats and immediately behind the driver's area.

-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.

3.16 SEATS

3.16.1 DRIVER'S SEAT

The following features must be furnished as standard equipment:

·Grey weave fabric
·Triple Adjustable lumbar
·Adjustable bolsters
·Front cushion adjuster
·Rear cushion adjuster
·Adjustable cushion length
·Seat tracks minimum seat travel must be 7 inches.
·Right movable arm rest
·Seat height adjust with air cylinder suspension
·3-point belt system

3.16.2 PASSENGER SEATS

-Standard passenger seating shall be American Premier, Setra Nimbus, Freedman Amaya GT, or Kiel 2050.

-Seats shall be equipped with 3-point lap/shoulder belts.

-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 to the seat or panel immediately in front, shall be no less than 27-inches. At all seating positions in paired forward facing seats immediately behind other seating positions hip-to-knee room shall be no less than 27-inches.

·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.

3.17 SUSPENSION

3.17.1 FRONT SUSPENSION

-Front suspension shall be equipped with at least one air spring per axle end and not less than one suspension-leveling valve.

-Front air springs shall deflate by driver command to allow for front kneeling feature. 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.

3.17.2 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.

3.17.3 REAR SUSPENSION, DRIVE AXLE

-Air spring with at least one spring per axle end and not less than one suspension-leveling valve.

3.17.4 REAR SUSPENSION, TAG AXLE

-Air spring with at least one spring per axle end.

3.18 TIRES AND WHEELS

3.18.1 TIRES

-Shall comply with FMVSS 571.119 and 571.120

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

3.18.2 WHEELS

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

3.19 TRANSMISSION

3.19.1 PERFORMANCE

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

-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.

-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.

3.19.2 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

3.20 WALLS

3.20.1 FLOOR COVERINGS

-Standard interior walls shall be covered with medium grey color padded, woven, stain resistant industrial cloth fabric or carpet complying with FMVSS 571.302.

3.21 ELECTRIC DRIVE (FULL-ELECTRIC SINS ONLY)

3.21.1 ELECTRIC DRIVE

-The electric drive system shall provide power to enable the proposed buses to meet the defined acceleration, top speed, gradeability, 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.

3.21.2 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.

3.21.3 DRIVER INTERFACE

-Driver interface shall include selection of desired direction, throttle, and visual indicators of faults. Alarms requiring immediate or indicating planned automatic shutdown shall also be audible. All interfaces shall be ergonomically designed.

3.21.4 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, diagnostic systems, and environment controls of a commercial design for transit duty. This system shall be designed to provide a load-leveling function in the propulsion system. 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 and upgraded.

-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.

3.21.5 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.

3.21.6 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, 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 and be fully compliant with SAE J1766, and all other applicable standards. 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.

3.21.7 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. Charging inlets shall be provided on both the street and curb sides of the bus.

3.22 PROPULSION SYSTEM (FULL-ELECTRIC SINS ONLY)

3.22.1 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 and be operated on the stated duty-cycle for a period of 12 years without a structural failure. 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.

3.22.2 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.

3.22.3 PRIMARY TRACTION MOTOR

The bus shall have a permanent magnet (PM) traction motor. The PM motor shall be designed for 300,000 miles of operation without failure or deterioration in performance.

3.22.4 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, HVAC, defroster, 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. 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.

3.22.5 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 keyed/identified such that mismatch is not physically possible. Reconnecting the subject connector (s) will not automatically restore the connection to the energy storage module; a system reset will be required.

3.22.6 ENERGY STORAGE SYSTEM

The Energy Storage System (ESS) shall be of a commercial design capable of operating in a transit environment.

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.

3.22.7 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.

3.22.8 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. In the event of a fire onboard a bus, fans shall be automatically turned off.

3.22.9 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.

3.22.10 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.

3.23 MISCELLANEOUS

3.23.1 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

3.23.2 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.

-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.

3.24 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 and have minimal 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.

3.25 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

3.26 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.

3.27 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.

3.27.1 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.

3.27.2 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.

3.28 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.

3.29 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 five 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 it's 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.

3.30 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.

3.31 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.

3.32 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.

3.33 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.

3.34 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.

3.35 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 evaluated 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 evaluated. 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

Smarter Solutions

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