ETA-GAC006

Revision 1
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Receipt Inspection

Prepared by

Electric Transportation Applications

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Appendices

1 Objective

This procedure identifies a common protocol for the collection of verification data for each vehicle delivered to Electric Transportation Applications for testing. These activities shall be completed in conjunction with procedure ETA-GTP001, “Vehicle Verification” and prior to commencement of testing activities performed in accordance with procedures prepared by Electric Transportation Applications.

2 Purpose

This procedure identifies the verification (should) parameters that shall be recorded prior to Performance Testing of any ground support electric vehicle provided to Electric Transportation Applications. Additional verification requirements are addressed in Procedure ETA-GTP001, which shall be completed concurrent with and subsequent to this procedure.

3 Documentation

Documentation addressed by this procedure shall be consistent, easy to understand, easy to read, and readily reproducible. This documentation shall contain enough information to "stand alone;" that is, be self-contained to the extent that all individuals qualified to review it could be reasonably expected to reach a common conclusion, without the need to review additional documentation. Storage and retention of records shall be completed as described in ETA-GAC001, "Control, Close-out, and Storage of Documentation."

4 Prerequisites

4.1 Individuals assigned to verify completion of this procedure shall be conversant with the technical guidelines against which the vehicle is being inspected, the basic technologies involved, and familiar with the design configuration documentation as provided by the manufacturer of the vehicle being inspected.

4.2 Individuals assigned to complete this activity shall have received the appropriate training in accordance with ETA-GAC005, "Training and Certification of Personnel Utilizing ETA Procedures."

4.3 Prior to commencing activities controlled by this procedure, a meeting of the involved personnel shall be held to discuss, at a minimum, the following:

4.3.1 Data required

4.3.2 Data available

4.3.3 Data sources

4.3.4 Contingencies

4.3.5 Methods to ensure safety.

4.4 The verification of data may be completed at any time prior to the need for information being evidenced (e.g., the battery charging information is not needed until it becomes necessary to charge a vehicle's battery).

4.5 All documentation required to complete the activities addressed by this or other procedures shall be completed, approved, and issued prior to commencing the testing it addresses. In no case shall any document be used for official testing or data collection prior to its effective date.

5 Verification Requirements

This procedure shall be completed for each vehicle that is scheduled to be received for testing by Electric Transportation Applications. The vehicle must be present to obtain the required information.

5.1 Upon receipt of the vehicle, the following information and should requirements shall obtained by inspection of the vehicle and recorded in Appendix A:

5.1.1 Vehicle year of Manufacture and model designation

5.1.2 Vehicle manufacturer

5.1.3 Charger manufacturer

5.1.4 Motor manufacturer

5.1.5 Controller manufacturer

5.1.6 Vehicle is a conversion to electric

5.1.7 Brake type on front and rear wheels

5.1.8 The tire manufacturer

5.1.9 The tire model, size, and load rating

5.1.10 Transmission is single speed, multi-speed automatic or continuously variable

5.1.11 Battery pack voltage

5.1.12 Battery module weight

5.1.13 Number of modules in the battery pack

5.1.14 Battery pack weight.

5.2 Upon receipt of the vehicle, complete the Vehicle Receipt Checklist (Appendix B) by recording the required information. Measurements shall be taken and calculations made as required to complete the Vehicle Receipt Checklist. When complete, the Vehicle Receipt Checklist shall be compared with the information provided by the vehicle supplier (where available) and any discrepancies noted. If discrepancies are

significant to test conduct, a Non-Conformance Report (ETA-GAC002, "Control of Test Conduct," Appendix B) shall be issued and the discrepancy resolved with the vehicle supplier.

5.3 Take receiving pictures of the vehicle as required by Appendix B.

5.4 Appendix C identifies all optional (should) requirements of the GSEV America Vehicle Specification. Most optional requirements can be verified by a physical inspection or document review. However, some optional requirements require measurement or dynamic test for validation. The methods for conduct of these measurements or dynamic tests are listed in this section. Conduct testing to verify the following optional requirements of the GSEV America Vehicle Technical Specification not verified by specific performance test procedures (ETA-GTP002). Record the results of these tests in Appendix B. These tests may require installation of instrumentation. Testing with installed instruments may be delayed and conducted under separate test procedures.

5.4.1 Verify that the vehicle is capable of energizing and charging after being out of service and off charge for 16 days, beginning at 100% SOC, with no operator action, at ambient temperature from 40˚F to 120˚F. This requirement shall be verified by charging the vehicle to 100% SOC and allowing it to remian inorpartive for 16 days. This period may include incidental use to move the vehicle to and from a charigng locations. At the end of 16 days, place the vehcile on charge and verify that it charges fully.

5.4.2 Verify that the SOC indicator is accurate to ± 10% of full scale. This verification data shall be obtained from Section 5.3 of ETA-GTP003, "Battery Capacity and Depth of Discharge Test."

5.4.3 Verify the the hazard flashers will operate for at least 1 hour with the main propulsion battery disconnected. This requirement is verified by disconnecting the main propulsion battery from the auxiliary battery. Turn on the emergency flashers and verify that they operate for at least 1 hour.

6 Glossary

6.1 Battery Ampere-Hour Capacity - The capacity of a battery in ampere-hours determined as a function of the total discharge during performance of the capacity test in ETA-GTP003, Section 5.3.

6.2 Depth of Discharge (DOD) - The quantified percentage of discharge of a battery, in terms of ampere-hours, kilowatt-hours, or miles, expressed as a percentage of the total battery capacity in similar units.

6.3 Effective Date - The date, after which a procedure has been reviewed and approved, that the procedure can be utilized in the field for official testing.

6.4 Program Manager - As used in this procedure, the individual within Electric Transportation Applications responsible for oversight of the GSEV America Performance Test Program. [Subcontract organizations may have similarly titled individuals, but they are not addressed by this procedure.]

6.5 Shall - Items that require adherence without deviation. Shall statements identify binding requirements. A go, no-go criterion.

6.6 Should - Items that require adherence if at all possible. Should statements identify preferred conditions.

6.7 State of Charge (SOC) - For this testing, the SOC of a battery is defined as the expected residual battery capacity, expressed in amperes-hours, watt-hours, or miles, as a percentage of the total available. The 100% SOC basis (available ampere-hours, kilowatt hours or miles) is determined by the actual discharge capability of the main propulsion battery when discharged during performance of the capacity test in ETA-GTP003, Section 5.3.

6.8 Test Director - The individual within Electric Transportation Applications responsible for all testing activities associated with the GSEV America Performance Test Program.

6.9 Test Engineer - The individual(s) assigned responsibility for the conduct of any given test. [Each contractor/subcontractor should have at least one individual filling this position. If so, they shall be responsible for adhering to the requirements of this procedure.]

6.10 Test Manager - The individual within Electric Transportation Applications responsible for implementation of the test program for any given vehicle(s) being evaluated to the requirements of the GSEV America Performance Test Program. [Subcontract organizations may have similarly titled individuals, but they are not addressed by this procedure.]

7 References

GSEV America Technical Requirements

ETA-GAC001, "Control, Close-out, and Storage of Documentation"

ETA-GAC002, “Control of Test Conduct”

ETA-GAC005, "Training and Certification of Personnel Utilizing ETA Procedures"

ETA-GTP001, “Vehicle Verification"

ETA-GTP003, “Battery Capacity and Depth of Discharge Test”

Appendix A, Vehicle Supplier Review Checklist

(Page 1 of 2)

Vehicle Number: _____

GAC006 Ref	Parameter	Initials	Date
5.1.1	Vehicle year of manufacture:		
5.1.1	Vehicle model:		
5.1.2	Vehicle manufacturer:		
5.1.3	Charger manufacturer:		
5.1.4	Motor manufacturer:		
5.1.5	Controller manufacturer:		
5.1.6	Vehicle is a conversion to electric:		
5.1.7	Brake type on front and rear wheels:		
5.1.8	Tire manufacturer:		
5.1.9	Tire model, size, and load rating:		
5.1.10	Transmission type:		
5.1.11	Battery pack voltage:		
5.1.12	Battery module weight:		
5.1.13	Number of battery modules in pack:		
5.1.14	Battery pack weight:		

Appendix A, Vehicle Supplier Review Checklist

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Vehicle Number: _____

General Comments (initials/date):

Completed By:	(Printed Name)	(Signature)	(Date)
Reviewed By:	(Printed Name)	(Signature)	(Date)
Approved By:	(Printed Name)	(Signature)	(Date)

Appendix B, Vehicle Receipt Check List

(Page 1 of 2)

Vehicle Number: _____

Date Received:			Hours (hourmeter):				
Vehicle Year:		Vehicle Make:			Vehicle Model:		
Vehicle Serial Number:					Date of Manufacture:		
GVWR:		Front GAWR:			Rear GAWR:		
VEHICLE CONDITION AND INSTALLED OPTIONS							
Windshield Wiper		Turn Signals		Universal Charger		Cold Weather Option	
Heater Defroster		Hazard Lights		IWC Charge Inlet		Brush Wear Indicator	
Dome Light		Ramp Radio				Forward/Rear Seat	
Additional Significant Options / Accessories:							
Significant Body Damage / Corrosion:_____ _____							
VEHICLE WEIGHTS AS RECEIVED (w/MAX. FLUIDS)							
Left Front (lbs):		Right Front (lbs):		Total Front (lbs):		Percent Front:	
Left Rear (lbs):		Right Rear (lbs):		Total Rear (lbs)		Percent Rear:	
				Total Weight (lbs):			
VEHICLE WEIGHTS WITH MAXIMUM PAYLOAD (GVWR)							
Left Front (lbs):		Right Front (lbs):		Total Front (lbs):		Percent Front:	
Left Rear (lbs):		Right Rear (lbs):		Total Rear (lbs)		Percent Rear:	
				Total Weight (lbs):			

INSTALLED TIRES							
Tire Manufacture:				DOT Rated ☐ Yes ☐ No			
Tire Size:				Sidewall Inflation Pressure:			
☐ Standard Equipment ☐ Optional Equipment				Load Rating:			
VEHICLE EXTERIOR DIMENSIONS							
Overall Length (in.):		Overall Width (in.):			Overall Height (in.):		
Wheelbase (in.):		Front Track (in.):			Rear Track (in.):		
Rear Overhang (in.):		Other:					
TRACTION BATTERY							
Battery Manufacture:							
Battery Type:				Battery Model:			
Nominal Pack Voltage:		Maximum Pack Voltage:			Minimum Pack Voltage:		
Number of Modules:		Connection Scheme: Series Parallel Series-Parallel					
VEHICLE RECEIVING PHOTOGRAPHS							
Eight-Point Walk-Around:							
Front		Rear		Right Profile		Left Profile	
Right Front		Right Rear Quarter		Left Front		Left Rear Quarter	
Additional Misc:							
Dashboard Instrument Cluster		VIN			Tire Placard		
Console Instrument Cluster		FMVSS Certification Label			Battery Container		
Controller		Drive System Components			Battery Charger (Onboard)		
Battery Charger (Off Board)		Charger Connection			Misc. Placards		
Misc. Labels		Misc.( )			Misc.( )		
Misc.( )		Misc.( )			Misc.( )		

Appendix B, Vehicle Receipt Check List

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Vehicle Number: _____

MISCELLANEOUS
Verify that the state–of-charge indicator is accurate to ± 10% of full scale. ACCEPTABLE_____ UNACCEPTABLE_____ N/A_____
Verify that the vehicle is capable of energizing and charging after being out of service, off charge for 16 days. ACCEPTABLE_____ UNACCEPTABLE_____ N/A_____

General Comments (initials/date):

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Completed By:	(Printed Name)	(Signature)	(Date)
Reviewed By:	(Printed Name)	(Signature)	(Date)
Approved By:	(Printed Name)	(Signature)	(Date)

Appendix C, Vehicle Optional Requirements Review Checklist

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Vehicle Number: _____

GTP01 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
	3.1.2	The tractor should comply with the requirements of NFPA 505 and UL 583 for Type E, ES, EE, or EX vehicles.	Yes	No	N/A		
	3.1.4	The tractor should comply with SAE ARP 4852 where applicable.	Yes	No	N/A		
	3.2	Traction battery voltage should reflect the best design for duty cycle, vehicle speed, tractive effort, and minimum current losses.	Yes	No	N/A		
	3.2.1.1	The traction battery should comply with the requirements of SAE ARP1817.	Yes	No	N/A		
	3.2.1.1	Vehicle operational characteristics also should be considered when selecting the proper battery, such as the average amp-hour draw, any non-gassing requirements, and available maintenance personnel and facilities.	Yes	No	N/A		
	3.2.1.3	Vehicle manufacturer should supply battery manufacturer's recommended traction battery charging algorithm.	Yes	No	N/A		
	3.2.1.4	Vehicle manufacturer should supply traction battery maintenance requirements.	Yes	No	N/A		
	3.2.1.8	The location of battery cable connectors also should be convenient for charging while not subject to damage during battery removal or installation.	Yes	No	N/A		
5.4.1	3.2.1.11	Beginning at full charge, vehicles should be capable of operating and charging after being out of service in an ambient temperature between 40˚F and 120˚F and off charge for 16 days. No operator action should be required during this period.	Yes	No	N/A		
	3.2.2.3	HIGH VOLTAGE labels should be installed at any point the voltage can be accessed by the end user.	Yes	No	N/A		
	3.2.2.5	HIGH VOLTAGE connectors (except charger power supply to vehicle) should utilize latching devices to prevent inadvertent disconnection and should be moisture proof.	Yes	No	N/A		
	3.2.2.5	HIGH VOLTAGE connectors should comply with the requirements of SAE-J1742.	Yes	No	N/A		

Appendix C, Vehicle Optional Requirements Review Checklist

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Vehicle Number: _____

GTP01 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
	3.2.2.6	The tractor should utilize a single speed, multi-speed automatic, hydrostatic, or continuously variable transmission.	Yes	No	N/A		
	3.2.2.8	An arrangement for the controller to provide regenerative braking should be offered.	Yes	No	N/A		
	3.2.2.10	If a traction motor with armature brushes used, the motor should be easily accessible for brush inspection.	Yes	No	N/A		
	3.2.3.1	The warning horn should comply with the requirements of SAE J377.	Yes	No	N/A		
	3.2.3.2	The accessory power system should incorporate a "2-wire" design using an insulated return wire rather than the vehicle chassis as ground for isolation purposes.	Yes	No	N/A		
	3.2.3.3	Low-voltage connectors should comply with the applicable requirements of SAE J163, J561, and J858.	Yes	No	N/A		
	5.1.1	Dash instrumentation should include a state of charge indicator for the propulsion battery.	Yes	No	N/A		
5.4.2	5.1.1	Indications should be repeatable and accurate to +/- 10% of full scale.					
	5.2.6	The tractor should be designed for easy access to those areas that require frequent checks and/or servicing.	Yes	No	N/A		
	7.1	Optional cab accessories should include a windshield wiper, window heater/defroster, dome light, hazard light, turn signals, and provisions for a ramp two-way radio.	Yes	No	N/A		
	7.2	An indicator light on the dash to caution the operator of motor brush wear should be offered where applicable.	Yes	No	N/A		
	7.3	Cold weather option for the battery should be offered.	Yes	No	N/A		
5.4.3	7.4	Hazard lights that are capable of at least one hour of continuous operation in the event of shutdown or isolation of the propulsion battery pack or failure of the DC/DC converter system should be offered as required by SAE J1690.	Yes	No	N/A		

Appendix C, Vehicle Optional Requirements Review Checklist

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Vehicle Number: _____

GTP01 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
	7.5	Universal chargers, which communicate with the vehicle battery pack and capable of automatically charging a wide range of battery packs, should be offered.	Yes	No	N/A		
	7.5.1	A vehicle charge receptacle meeting the requirements of the IWC Electric Ground Equipment Conductive Fast Charge Specification should be offered.	Yes	No	N/A		
	7.5.2	The vehicle should incorporate a method to ensure that accessible receptacle high-voltage pins are not energized when exposed to human contact and during normal vehicle operation.	Yes	No	N/A		
	7.5.3	The charge receptacle should be located on the vehicle in a way that minimizes incidental connector "snags" after the operator removes the charge connector from the vehicle charge receptacle.	Yes	No	N/A		
	7.5.4	The battery to charger communications module should comply with the requirements of "CiA Draft Standard Proposal 418."	Yes	No	N/A		
	7.5.5	The vehicle-charger communication protocol should meet the requirements of "CiA Work Draft Proposal 419."	Yes	No	N/A		
	7.5.6	The charger should be capable of returning the battery from the maximum depth of discharge specified in Section 3.2.1.5 to 80% state of charge in less than 2 hours.	Yes	No	N/A		