ETA-GTP001

Revision 1
Effective June 2008

Vehicle Verification

Prepared by

Electric Transportation Applications

Prepared by: _____ Date:_____
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Approved by: _____ Date: _____
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Appendices

1 Objective

The objective of this procedure is to identify a common protocol to verify mandatory requirements for vehicles participating in GSEV America. Verification shall be completed prior to commencement of GSEV America testing activities.

2 Purpose

This procedure identifies mandatory vehicle requirements contained in the GSEV America Vehicle Specification, which shall be verified as part of GSEV America. Vehicles submitted for testing in GSEV America must meet all of these requirements for inclusion of the vehicle in GSEV America.

3 Documentation

Documentation addressed by this procedure shall be consistent, easy to understand, easy to read, and readily reproducible. Basis documents are referenced where appropriate. 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 complete this procedure will be knowledgeable of the GSEV America Technical Requirements.

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

4.3 Prior to commencing this activity, a meeting of the involved personnel will be held to discuss the following:

4.3.1 Data required

4.3.2 Data available

4.3.3 Data sources

4.3.4 Contingencies

4.3.5 Safety requirements.

4.4 Verification of all data shall be completed prior to testing to any procedure other than those required by this procedure to verify minimum (shall) requirements.

4.5 All documentation required to document the activities addressed by this procedure shall be completed, approved, and issued prior to commencing the testing it addresses.

5 Verification Requirements

The requirements in Section 5 are derived from the Hybrid Electric Vehicle (HEV) America Vehicle Specification. Vehicles participating in GSEV America shall meet these requirements. Vehicles which cannot meet the requirements defined by GSEV America can be accepted for testing but only as a prototype (non-production) vehicle.

Should a vehicle participate in GSEV America more than once, a new checksheet shall be completed each time it is presented. The testing authority may choose not to re-verify all items. Items not re-verified shall be documented in a Test Exception Report in accordance with ETA-GAC002, “Control of Test Conduct.”

Appendix A identifies all mandatory requirements of the GSEV America Vehicle Specification. Most mandatory requirements can be verified by a physical inspection or document review as described in Section 5.1. However, some mandatory requirements require measurement or dynamic test for validation. The methods for conduct of these measurements or dynamic tests are listed in Section 5.2.

5.1 Minimum Vehicle Requirements

Vehicle compliance with mandatory requirements of the HEV America Vehicle Specifications listed in Appendix A which are verifiable by inspection shall be recorded in Appendix A. Any requirements not fully met shall be indicated on Appendix A by marking “no” and completing a non-conformance report, Appendix B. The non-conformance report shall be transmitted to the vehicle supplier within 2 business days of issuance. Further verification of mandatory vehicle requirements verifiable by inspection (Section 5.1) may continue while a non-conformance report is unresolved. However, no testing (Section 5.2) shall proceed until all non-conformance reports concerning mandatory vehicle requirements verifiable by inspection (Section 5.1) are resolved such that Appendix A can be marked “Yes” for all such requirements.

5.2 Dynamic Verification Requirements

The following tests shall be conducted to verify mandatory requirements of the HEV America Vehicle Specification listed in Appendix A, which are not verifiable by inspection and require measurement or dynamic testing. The results of such measurement or testing shall be recorded in Appendix A. Any requirements not fully met shall be indicated in Appendix A by marking “No” and by completing a non-conformance report (Appendix B). The non-conformance report shall be transmitted to the vehicle supplier within 2 business days of issuance.

5.2.1 The tractor shall comply with all performance requirements over the full range of environmental factors specified in SAE ARP1247, Paragraph 3.6. This shall be verified by referring to the vehicle manufacturer's submittal to ensure

that the operating temperature range is at least as great as that specified in SAE ARP1247 and by noting any temperature related issues during the conduct of performance testing.

5.2.2 The electrical system shall consist of an appropriate size and type traction battery pack powering a compatible electric motor(s) through an electronic controller(s) to produce smooth acceleration and operation. This shall be verified during testing conducted under procedures ETA-GTP002, "Traction System Test" and ETA-GTP003, "Battery Capacity and Depth of Discharge Test."

5.2.3 The traction battery charger shall be appropriately selected to properly charge the traction battery and meet the requirements of the particular application. This shall be verified in conjunction with the conduct of ETA-GTP005, "Battery Charger Performance," Section 6.

5.2.4 The battery provided shall be of size and capacity to satisfy performance and accessory requirements. This shall be verified in conjunction with conduct of ETA-GTP003, Section 5.3.2

5.2.5 The traction battery shall be protected by a cover, which shall support at least 12 lb/ft^2. This shall be verified as follows:

5.2.5.1 Determine the location on the cover that comes closest to the top of the battery.

5.2.5.2 Place a piece of modeling clay at this point on the battery and close the cover so the clay is touching both the cover and the battery. Measure the height of the modeling clay to the nearest 0.1in.

5.2.5.3 With the clay in place and the cover closed, place a weight with dimensions such that it applies a pressure of 12 lb/ft^2 on the middle of the cover.

5.2.5.4 Remove the weight and the cover. Measure the depth of the modeling clay. Verify that the depth of the modeling clay is greater than or equal to 0.125in.

5.2.6 The electronic controller(s) and motor(s) shall be sized for the application and shall limit maximum battery discharge as specified in Section 3.2.1.5 to prevent degradation of battery life and abrupt loss of tractor operability. This limit shall be adjustable, repeatable, and accurate within 10% battery state of charge. This shall be verified in conjunction with conduct of ETA-GTP003, Section 5.3.1.

5.2.7 Vehicles shall not contain exposed conductors, terminals, contact blocks, or devices of any type that create the potential for personnel to be exposed to 60 volts or greater. This shall be verified as follows:

5.2.7.1 Each exposed conductor, terminal contact block, and device shall have its potential to ground and to battery positive and negative measured with a Volt-Meter verifying that voltage present at the exposed area is less than 60 volts.

5.2.7.2 Any device exhibiting a non-compliance (a voltage of 60 volts or greater) shall be clearly identified on a non-conformance report.

5.2.8 A propulsion power system operating at greater than 60 volts shall be isolated from the vehicle chassis such that leakage current does not exceed 20 mA with the battery connected. This shall be verified as follows:

5.2.8.1 Connect a test circuit as described in UL 2231-1 between the most positive propulsion circuit cable and chassis.

5.2.8.2 Using a voltmeter capable of accurately measuring low voltages (millivolts) measure the voltage across the circuit.

5.2.8.3 If the AC or DC readings are 0.5 MIU or greater, record the value and the non-compliance on a comment sheet.

5.2.8.4 Repeat Steps 5.2.8.1 through 5.2.8.3 with the test circuit connected between the most negative propulsion circuit cable and chassis.

5.2.9 Regenerative braking shall not adversely impact the tractor's braking stability, particularly on varying road surfaces. This shall be verified in conjunction with the conduct of ETA-GTP002 Section 5.4.1.

5.2.10 If chassis ground is used for the accessory power negative, it shall be isolated from the traction system by at least 500,000 ohms resistance. This shall be verified as follows:

5.2.10.1 Set a digital voltmeter (DVM) to measure resistance.

5.2.10.2 Connect the DVM between chassis and traction battery negative.

5.2.10.3 Verify the resistance is greater than 500,000 ohms.

5.2.10.4 Repeat Steps 5.5.01.2 and 5.5.10.3 with the DVM connected to traction battery positive.

5.2.11 The electrical/electronic systems shall incorporate proper shielding and filtering to ensure electromagnetic compatibility of the vehicle with any and all communication and navigation frequencies in and around the airport ramp areas in accordance with MIL-STD-461. This shall be verified in conjunction with procedure ETA-GTP004, "Electromagnetic Interference and Susceptibility Test", Section 5.4.

5.2.12 The tractor shall not be susceptible to externally-generated electromagnetic fields and shall comply with the applicable sections of SAE J551-1. This shall be verified in conjunction with conduct of ETA-GTP004, Section 5.3.

5.2.13 The tractor shall not be susceptible to electromagnetic fields from an on-board radio transmitter and shall comply with the requirements of SAE J551-12. This shall be verified in conjunction with the conduct of ETA-GTP004, Section 5.3.

5.2.14 It shall not be possible to drive the tractor when the tractor is connected to the charger. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.2.

5.2.15 Charging circuits shall be isolated from the vehicle chassis such that ground current from the grounded chassis does not exceed 20 mA at any time the vehicle is connected to an off-board charger. This shall be verified in conjunction with the conduct of ETA-GTP005, Section 5.7.

5.2.16 The manufacturer shall report the maximum static drawbar pull, with the traction battery at 100% and at 50% (+/-10%) state of charge. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.4.2.

5.2.17 The maximum tractor speed with no towed load shall be a minimum of 5 miles per hour. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.4.1.

5.2.18 The manufacturer shall report the maximum draw bar of the tractor at a speed of 4.0 miles per hour (6.0 kilometers per hour) with the traction battery at 100% and at 50% (+/- 10%) state of charge. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.4.3.

5.2.19 With the maximum dynamic drawbar applied, the controller, motor and battery shall be capable of continuous operation at 4.0 mph (6.0 kilometers per our) for at least 3 minutes without overheating or damage to the propulsion system. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.4.3.

5.2.20 The tractor shall be equipped with a dead man-type seat switch interlock that de-activates the traction circuit whenever the operator is not on the seat. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.4.

5.2.21 The dead man seat switch and its installation shall be designed to prevent false tripping due to driving over bumps or the operator leaning in any direction on the seat. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.4.10.

5.2.22 The traction system controller shall incorporate a “Static return to off” feature. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.5.

5.2.23 A handbrake interlock also shall be provided to prevent traction system operation unless the handbrake is disengaged. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.3.

5.2.24 Vehicles using HIGH VOLTAGE traction systems shall be equipped with a "master" switch that shall interlock controller propulsion functions and battery contactor(s), if any, to render the propulsion system inoperative. This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.6.

5.2.25 A manual service disconnect for vehicles using a HIGH VOLTAGE traction system also shall be required. It shall have the following characteristics:

- Manual action is required to break the connection
- The disconnection is physically verifiable
- The disconnection does not create exposed conductors capable of becoming energized while exposed
- The service disconnect is clearly marked and is accessible without the use of tools.

This shall be verified in conjunction with the conduct of ETA-GTP002, Section 5.3.7.

5.3 Optional Vehicle Requirements

The eGSE America Electric Aircraft Pushback Tractor Technical Specifications include many optional content and criteria for electric pushback tractors. These are indicated in the specification as "should" statements. This section of the vehicle verification procedure calls for the inspection and evaluation of the vehicle against those should statements as tabulated in Appendix B. Conduct testing to verify the following "should" requirements of the NEV America Vehicle Technical Specification not verified by specific Performance Test Procedures (ETA-NTPXXX). 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 a separate Test Procedure.*~~

6 Glossary

6.1 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.

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

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

6.4 Should – Items that require adherence if at all possible. Should statements identify preferred conditions.

6.5 Test Director – The individual within Electric Transportation Applications responsible for all testing activities associated with the EV America Performance Test Program.

6.6 Test Director's Log – A daily diary kept by the Test Director, Program Manager, Test Manager, or Test Engineer to document major activities and decisions that occur during the conduct of a Performance Test Evaluation Program. This log is normally a running commentary, utilizing timed and dated entries to document the day's activities. This log is edited to develop the Daily Test Log that is published with the final report for each vehicle.

6.7 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.]

6.8 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 EV America Performance Test Program. [Subcontract organizations may have similarly titled individuals, but they are not addressed by this procedure.]

7 References

ANSI Standard C101.1, 1986

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

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

ETA-GTP002, "Traction System Test"

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

ETA-GTP004, “Electromagnetic Interference and Susceptibility Test”

ETA-GTP005, “Battery Charger Performance”

GSEV America Vehicle Technical Specification Revision 1, April 15, 2002

Appendix A, Vehicle Minimum Requirements

Review Checklist (Page 1 of 7)

Vehicle Number: _____

GTP001 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
5.2.1	3.1.1	The tractor shall comply with all performance requirements over the full range of environmental factors specified in SAE ARP 1247, Paragraph 3.6.	Yes	No	N/A		
	3.1.2	The tractor should comply with the requirements of NFPA 505 and UL 583 for Type E, ES, EE, or EX vehicles. Manufacturer shall specify whether the tractor meets the requirements of Type E, ES, EE, or EX.	Yes	No	N/A		
	3.1.3	The manufacturer shall list and describe in detail specifically which aircraft the tractor will adequately service.	Yes	No	N/A		
	3.1.1.4	The manufacturer shall specify all area of non-compliance with SAE ARP4852.	Yes	No	N/A		
5.2.2	3.2	The electrical system shall consist of an appropriate size and type traction battery pack powering a compatible electric motor(s) through an electronic controller(s) to produce smooth acceleration and operation.	Yes	No	N/A		
5.2.3	3.2	The traction battery charger shall be appropriately selected to properly charge the traction battery and meet the requirements of the particular application.	Yes	No	N/A		
	3.2.1.1	The vehicle manufacturer shall specify all areas of noncompliance with SAE ARP1817.	Yes	No	N/A		
5.2.4	3.2.1.1	The battery provided shall be of size and capacity to satisfy performance and accessory requirements.	Yes	No	N/A		
	3.2.1.1	The vehicle manufacture shall provide the battery manufacturer's specifications including the 1-hour, 3-hour, and 5-hour discharge rating of the traction battery (in ampere-hours) and shall specify the battery discharge rate (in amperes) when operating under a load.	Yes	No	N/A		
	3.2.1.2	Means of restraining the traction battery in the lateral and longitudinal directions shall be provided.	Yes	No	N/A		
	3.2.1.5	The vehicle manufacturer shall indicate the depth of discharge below which the traction battery should not be discharged.	Yes	No	N/A		
5.2.5	3.2.1.6	The Traction battery shall be protected by a cover which shall support at least 12 lb/ft^2.	Yes	No	N/A		

Appendix A, Vehicle Minimum Requirements

Review Checklist (Page 2 of 7)

GTP001 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
	3.2.1.7	The traction battery and traction battery compartment shall be designed so electrolyte from the battery is captured in an auxiliary tray or the battery tray and not allowed to drain onto the ground. This requirement does not apply when sealed batteries are used.	Yes	No	N/A		
	3.2.1.8	Battery cable connectors shall be located so that they create no danger of igniting gases expelled during battery charging.	Yes	No	N/A		
	3.2.1.9	Manufacturer shall supply an MSDS for the battery and any materials used in the tractor that would not typically be found in an automotive shop.	Yes	No	N/A		
	3.2.1.10	Manufacturer shall specify recommended and maximum allowable battery weight (full-rated load).	Yes	No	N/A		
5.2.6	3.2.2.1	The electronic controller(s) and motor(s) shall be sized for the application and shall limit maximum battery discharge as specified in Section 3.2.1.5 to prevent degradation of battery life and abrupt loss of tractor operability.	Yes	No	N/A		
5.2.6	3.2.2.1	This limit shall be adjustable, repeatable, and accurate within 10% of the battery state of charge.	Yes	No	N/A		
	3.2.2.2	All wiring and components used in the high voltage propulsion system shall be of a “two-wire” design, using an insulated return wire rather than the vehicle chassis as ground, and sized in compliance with SAE J1673.	Yes	No	N/A		
5.2.7	3.2.2.3	Vehicles shall not contain exposed conductors, terminals, contact blocks, or devices of any type that create the potential for personnel to be exposed to 60 volts (nominal battery voltage) or greater.	Yes	No	N/A		
	3.2.2.3	Access to any HIGH VOLTAGE components shall require the removal of at least one bolt, screw, cover, or latch.	Yes	No	N/A		
	3.2.2.3	Devices considered being HIGH VOLTAGE components shall be clearly marked as “HIGH VOLTAGE.”	Yes	No	N/A		
	3.2.2.3	HIGH VOLTAGE cable and wire marking shall consist of orange insulation and/or orange sleeves or spiral wrapping as required by SAE J1673, Paragraph 3.5.3.	Yes	No	N/A		

Appendix A, Vehicle Minimum Requirements

Review Checklist (Page 3 of 7)

GTP001 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
	3.2.2.4	All HIGH VOLTAGE cable shall comply with the requirements of SAE J1654.	Yes	No	N/A		
	3.2.2.4	All LOW VOLTAGE battery cable shall comply with the requirements of SAE J1127.	Yes	No	N/A		
	3.2.2.5	HIGH VOLTAGE connectors (except charger power supply to vehicle) shall be keyed to prevent misconnection.	Yes	No	N/A		
5.2.8	3.2.2.7	A propulsion power system operating at greater than 60 volts shall be isolated from the vehicle chassis so leakage current does not exceed 20 mA with the battery connected.	Yes	No	N/A		
	3.2.2.8	Maximum regenerative braking settings shall be adjustable so maximum current returning to the traction battery pack can be set to avoid potential damage to thetraction battery pack or electrical components.	Yes	No	N/A		
5.2.9	3.2.2.9	Regenerative braking shall not adversely impact the tractor's braking stability, particularly on varying road surfaces.	Yes	No	N/A		
	3.2.3.1	Accessory power system shall be used to power the following:					
		a. Two sealed beam headlights on front of tractor (one each side)	Yes	No	N/A		
		b. Two tail lights on rear of tractor (one each side)	Yes	No	N/A		
		c. Two brake lights on rear of tractor (one each side)	Yes	No	N/A		
		d. Two back-up lights on rear of tractor	Yes	No	N/A		
		e. Emergency flashers	Yes	No	N/A		
		f. Floodlight for front and rear hitches or pickup device.	Yes	No	N/A		
	3.2.3.1	A horn shall be supplied.	Yes	No	N/A		
5.2.10	3.2.3.2	If chassis ground is used for the accessory power negative, it shall be isolated from the traction system by at least 500,000 ohms resistance.	Yes	No	N/A		
	3.2.3.2	The accessory power system shall be supplied from the main traction battery by an electronic DC-to-DC converter.	Yes	No	N/A		
	3.2.3.3	The vehicle manufacturer shall specify all areas of noncompliance with SAE J163, J561, and J858a.	Yes	No	N/A		
	3.2.3.4	Low-voltage wire shall meet the requirements of SAE J1128.	Yes	No	N/A		

Appendix A, Vehicle Minimum Requirements

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GTP001 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
	3.2.3.5	All electronic components shall be protected by an enclosure meeting the requirements of ANSI/NEMA 250-1997, Type 4 Enclosure.	Yes	No	N/A		
5.2.11	3.2.3.6	The electrical/electronic systems shall incorporate proper shielding and filtering, to ensure electromagnetic compatibility of the vehicle with any and all communication and navigation frequencies in and around the airport ramp areas in accordance with MIL-STD-461.	Yes	No	N/A		
5.2.12	3.2.3.6	The tractor shall not be susceptible to externally generated electromagnetic fields and shall comply with the applicable sections of SAE J551-1.	Yes	No	N/A		
5.2.13	3.2.3.6	Additionally, vehicles shall not be susceptible to electric magnetic fields from an onboard radio transmitter and shall comply with the requirements of SAE J551-12.	Yes	No	N/A		
5.2.14	3.2.4.1	It shall not be possible to drive the tractor when the tractor is connected to the charger.	Yes	No	N/A		
5.2.15	3.2.4.2	Charging circuits shall be isolated from the vehicle chassis so ground current from the grounded chassis does not exceed 20 mA at any time the vehicle is connected to an off-board charger.	Yes	No	N/A		
	3.2.4.3	Charge connector shall be prevented from being inadvertently connected to the controller or motor rather than the battery.	Yes	No	N/A		
	3.2.5.1	Electric systems shall comply with the requirements of SAE ARP1247, Paragraphs 3.13.1.2.5, 3.13.1.2.6, 3.13.1.2.9, 3.13.1.2.10, 3.13.1.2.12, 3.13.1.2.20, and 3.13.1.2.23.	Yes	No	N/A		
5.2.16	4.2	The manufacturer shall report the maximum static drawbar pull, with the traction battery at 100% and at 50% (+/- 10%) state of charge.	Yes	No	N/A		
5.2.17	4.3	The maximum tractor speed with no towed load shall be a minimum of 5 miles per hour.	Yes	No	N/A		
	4.3	The maximum tractor speed shall be settable by a controlled method.	Yes	No	N/A		

Appendix A, Vehicle Minimum Requirements

Review Checklist (Page 5 of 7)

GTP001 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
5.2.18	4.4	The manufacturer shall report the maximum draw bar of the tractor at a speed of 4.0 miles per hour (6.0 kilometers per hour) with the traction battery at 100% and at 50% (+/- 10%) state of charge.	Yes	No	N/A		
5.2.19	4.5	With the maximum dynamic drawbar applied, the controller, motor, and battery shall be capable of continuous operation at 4.0 mph (6.0 kilometers per hour) for at least 3 minutes without overheating or damage to the propulsion system.	Yes	No	N/A		
	5.1.1	Dash instrumentation shall include an hourmeter and an indicator light to warn the operator of a brake failure.	Yes	No	N/A		
	5.2.1	The tractor requirements shall comply with the requirements of SAE ARP 1247, Paragraphs 3.8, 3.9, and 3.10; SAE AIR 1375; and ANSI B56.9-1992.	Yes	No	N/A		
5.2.20	5.2.2	The tractor shall be equipped with a dead man-type seat switch interlock that deactivates the traction circuit whenever the operator is not on the seat.	Yes	No	N/A		
5.2.21	5.2.2	The switch and its installation shall be designed to prevent false tripping due to driving over bumps or the operator leaning in any direction on the seat.	Yes	No	N/A		
5.2.22	5.2.3	The traction system controller shall incorporate a “static return to off” feature.	Yes	No	N/A		
5.2.23	5.2.4	A handbrake interlock shall also be provided to prevent traction system operation unless the handbrake is disengaged.	Yes	No	N/A		
5.2.24	5.2.5	Vehicles using HIGH VOLTAGE traction systems shall be equipped with a “master” switch that shall interlock controller propulsion functions and battery contactor(s), if any, to render the propulsion system inoperative.	Yes	No	N/A		
	5.2.5	Contactors(s) used in conjunction with the master switch shall be capable of interrupting maximum rated controller/inverter current.	Yes	No	N/A		

Appendix A, Vehicle Minimum Requirements

Review Checklist (Page 6 of 7)

GTP001 Ref	T/S Ref	Requirement	Requirement Met			Initials	Date
5.2.25	5.2.5	A manual service disconnect for vehicles using a HIGH VOLTAGE traction system also shall be required. It shall have the following characteristics: • Manual action is required to break the connection • The disconnection is physically verifiable • The disconnection does not create exposed conductors capable of becoming energized while exposed • The service disconnect is clearly marked and is accessible without the use of tools.	Yes	No	N/A		
	5.2.7	Information regarding maximum towing speed shall be properly placarded on the dash and at the tow points if potential damage exists to the traction motor during maintenance towing at higher than recommended speeds.	Yes	No	N/A		
	6.1	Requirements of SAE ARP1247, Paragraph 3.12.5 shall be followed where applicable.	Yes	No	N/A		
	6.1	Systems and components requiring expertise not normally found with ground equipment mechanics shall have adequate troubleshooting charts and procedures.	Yes	No	N/A		
	6.2	The tractor shall be supplied with a service manual that includes the traction system, and which complies with the requirements of SAE AS4828.	Yes	No	N/A		
	6.2.1	The manual shall include a complete electrical schematic, wiring diagram and component location chart.	Yes	No	N/A		
	6.2.2	Instructions for removing the battery pack shall be adequately illustrated in the manual.	Yes	No	N/A		
	6.2.3	Any special tools or test equipment shall be identified in the manual and drawings or source of procurement documented.	Yes	No	N/A		

Appendix A, Vehicle Minimum Requirements

Review Checklist (Page 7 of 7)

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 Non-Conformance Report

(Page 1 of 1)

GSEV America **VEHICLE NON-CONFORMANCE REPORT** *(PLEASE PRINT USING A PEN OR TYPEWRITER)*	NCR Number:

DESCRIPTION OF NONCOMPLIANCE:

_____
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_____
_____

REFERENCES:	STEP DISCOVERED IN NONCOMPLIANCE:

DISCOVERY DATE:	TIME:	Vehicle VIN:

ORIGINATOR'S NAME: (Printed) (Signature)	DATE:	TIME:
TEST MANAGER'S NAME: (Printed) (Signature)	DATE:	TIME:
MANUFACTURER'S REPRESENTATIVE'S NAME: (Printed) (Signature)	DATE:	TIME:

DISPOSITION

DESCRIPTION OF RESOLUTION (INCLUDE THE ACTIONS TAKEN TO BRING THE VEHICLE INTO PROGRAM REQUIREMENTS):

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MANUFACTURER'S REPRESENTATIVE'S NAME: (Printed) (Signature)	DATE:	TIME:
TEST MANAGER'S NAME: (Printed) (Signature)	DATE:	TIME: