ETA-NAC006

Revision 2
Effective: May 1, 2002

Vehicle Verification

Prepared by

Electric Transportation Applications

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TABLE OF CONTENTS

Appendices

1.0 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-NTP011, “Receipt Inspection Procedure,” and prior to commencement of testing activities performed in accordance with procedures prepared by Electric Transportation Applications.

2.0 Purpose

This procedure identifies the verification (should) parameters that shall be recorded prior to Performance Testing of any Neighborhood Electric Vehicle provided to Electric Transportation Applications. Additional verification requirements are addressed in Procedure ETA-NTP011, “Receipt Inspections,” which shall be completed concurrent with and subsequent to this procedure.

3.0 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 Procedure ETA-NAC001, "Control, Close-out and Storage of Documentation."

4.0 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-NAC005, "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;

4.3.2 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.

5.0 Verification Requirements

This procedure shall be completed for each vehicle which is scheduled to be received for testing by Electric Transportation Applications. The vehicle must be present to obtain some of the required information (curb weight, vehicle heights, ground clearance, etc.). However, a significant amount of information concerning the vehicle may be obtained from data provided by the vehicle supplier (NEV America Vehicle Technical Specification Appendices A and B). As such, this procedure may be implemented upon receipt of the vehicle supplier information, but shall not be completed prior to actual inspection of the vehicle.

5.1 Review the vehicle supplier documentation. (NEV America Vehicle Technical Specification Appendices A and B) completed and provided by the vehicle supplier for the following:

5.1.1 All blanks have been filled in.

5.1.2 All data and submittals required have been provided.

5.1.3 For blanks which have either no entry or an “N/A” (or similar notation), note the specific entry that is incomplete and the reason the entry is incomplete (if known).

5.1.4 The Program Manager or the Test Manager shall be notified of any missing data. They shall notify the vehicle supplier of which data are missing, and request their assistance in obtaining it. All requests for data from vehicle supplier shall be made in writing, through the Program/Project Manager. At a minimum, all information required by a "shall" statement in the NEV America Vehicle Technical Specification shall be obtained from the vehicle supplier.

5.2 Upon receipt of the vehicle, the following information and should requirements shall verified by inspection of the vehicle and compared with the information provided by the vehicle supplier (NEV America Vehicle Technical Specification Appendices A and B). Such verification shall be noted in Appendix A and any discrepancies noted. If discrepancies are significant to test conduct, a Non-Conformance Report (ETA-NAC002 Appendix B) shall be issued and the discrepancy resolved with the vehicle supplier.

5.2..1 Vehicle Year, Make and Model

5.2..2 Vehicle manufacturer

5.2..3 Information shown on vehicle identification placard matches the vehicle as supplied and matches the information provided by the vehicle supplier

5.2..4 Number of seating positions

5.2..5 Charger manufacturer

5.2..6 Motor manufacturer

5.2..7 Controller manufacturer

5.2..8 Vehicle is a conversion to electric

5.2..9 Brake type on front and rear wheels

5.2..10 The tire supplied is standard or optional equipment

5.2..11 The tire manufacturer

5.2..12 The tire model, size and load rating

5.2..13 Vehicle exterior color

5.2..14 Vehicle interior color

5.2..15 Transmission is single speed, multi-speed automatic or continuously variable

5.2..16 Number of modules in the battery pack

5.2..17 Battery pack voltage

5.2..18 Weight of battery module

5.2..19 Battery pack weight

5.2..20 Vehicle batteries comply with requirements of NEC 625 and UL-2202 for charging in enclosed spaces

5.2..21 Low voltage connectors comply with the requirements of applicable SAE Standards

5.2..22 For vehicles with battery pack voltage (5.2.17) greater than 60 volts, HIGH VOLTAGE connectors utilize locking devices, are keyed to prevent mis-connection and are moisture proof.

5.2..23 HIGH VOLTAGE labels are present on any point voltage can be accessed by end user. (7.1)

5.2..24 Turn signals are provided as standard or optional equipment and are self-canceling

5.2..25 Vehicle is equipped with a fast charge connection.

5.3 Upon receipt of the vehicle the supplier has provided information in writing relating to following should requirements.

5.3.1. Information provided describes safety measures and safety-related design features, purpose and effect on reliability and performance. (1.3)

5.3.2. For conversion vehicles (5.2.7), braking and steering is similar to OEM models of comparable size/weight. (2.5)

5.3.3. Information provided specifies interior passenger and cargo dimensions/volumes and should describe weatherizing provisions for passengers and cargo. (3.2)

5.3.4. Information describes operation of regenerative braking system and interface with braking and anti-lock brake systems. (4.2)

5.3.5. (Missing from Appendix A TS) Vehicle drive train will not overheat at continuous operation at maximum vehicle speed. *Not tested (4.3)

5.3.6. Suppliers specify the voltage limits that limit the maximum battery discharge and describe how these limits are implemented. (4.4)

5.3.7. Supplier has provided details of battery pack including specific energy, power and discharge capacity to 80% DOD at one and three hour rates (6.1).

5.3.8. Supplier has provided results of battery performance tests or computer simulations (6.1)

5.3.9. Supplier has provided information regarding battery installation (including module connection) method of installation and removal, time required to install/remove and any special training, tools or equipment required for removal. (6.4)

5.3.10. Supplier indicated the DOD below which the battery pack shall not be discharged and indicates the specific parameters the controller/inverter utilizes to prevent over-discharge. (Supplier has supplied information regarding specific parameters of controller/inverter including Ah rating, module voltage, and battery pack voltage that are consistent with owner manual.)(6.3)

5.3.11. Supplier has supplied parallel battery pack information including charging algorithms required to prevent parallel strings from becoming unbalanced. (6.8)

5.3.12. Supplier has verified that charging method and algorithms do not impact battery warranties from Supplier or manufacturer. (6.10)

5.3.13. Supplier has provided information on grounding and isolation methods. (7.2)

5.3.14. Information from suppliers describes type, size and location of vehicle charging port. (8.4)

5.3.15. Supplier information specifies impact of optional equipment on range and payload for each option. (9.0) Such options may include:

5.3.15.1. Information on design features of vehicle heating system to maintain interior temperature of 65 degrees at ambient temperature of 10 degrees.

5.3.15.2. Information provides description of air conditioning system and verifies no CFC use.

5.3.15.3. Information describes design of pre-heating or pre-cooling system for passenger compartment to maintain temperatures during charging.

5.3.15.4. Information is provided for cold weather range extension system (if so equipped). This system is operated concurrently with charging system, and does not require manual intervention. It operates at all input voltages rated for charger.

5.3.16. Service and parts manuals include details on the design and operation of vehicle systems, as well as a list of additional or special maintenance tools required

5.3.17. Vehicle supplier should offer a training program for the purchaser's maintenance personnel covering vehicle safety and proper operation and maintenance of vehicles.

5.4 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 completing the Vehicle Receipt Checklist. When complete, the Vehicle Receipt Checklist shall be compared with the information provided by the vehicle supplier (NEV America Vehicle Technical Specification Appendices A and B) and any discrepancies noted. If discrepancies are significant to test conduct, a Non-Conformance Report (ETA-NAC002 Appendix B) shall be issued and the discrepancy resolved with the vehicle supplier.

5.5 Take receiving pictures of the vehicle as required by Appendix B

5.5 Review information provided by the vehicle supplier and the vehicle as supplied to confirm compliance with SAE-J1766, SAE-J1797 and 49 CFR 571.305 for battery and electrolyte containment.

5.6 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 Procedures.

5.6.1 Using a 5-inch cubic go/no-go block, with the vehicle loaded to GVWR and standing on a flat surface, when the block is in contact with the flat surface and passed beneath the sprung portions of the vehicle, the block does not contact any of the sprung portions of the vehicle.

5.6.2 Disconnect the main propulsion battery from the auxiliary battery. Turn on the emergency flashers, and verify that they operate for at least one hour. This will verify loss of the main battery pack and a failure of the DC/DC converter.

5.6.3 Verify that the State of Charge indicator is accurate to ± 10% of full scale. This verification data shall be obtained from Section 5.2 and Appendix D of ETA-NTP004.

5.6.4 Verify that the speedometer is accurate to ± 5% at 20 mph. This verification data can be obtained from Section 5.2 of ETA-NTP004.

5.6.5 Verify that acceleration from 0-20 mph is 6.0 seconds or less when operated with a payload of 332 pounds, and starting with the battery at 50% state of charge. This data can be obtained from Section 5.1 and Appendix A of ETA-NTP002.

5.6.6 Verify that the vehicle is capable of energizing and charging after being out of service and off charge for 16 days, beginning at 100% state of charge, with no operator action, at ambient temperature from 40 F to 120 F . This verification data can be obtained from section 5.3 of ETA-NTP008.

5.6.7 Verify that the vehicle is not affected by the drivers' operation of a hand held UHF radio transmitter while the vehicle is operating at 10 mph.

6.0 Glossary

6.1 Battery Ampere-Hour Capacity - The capacity of a battery in ampere-hours determined as a function of the total distance traveled by the vehicle during performance of the 25 mph Constant Speed Range Test portion of ETA-NTP004.

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

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

6.6 Should - Items which 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 or 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 to the requirements of the 25 mph Constant Speed Range Test portion of procedure ETA-NTP004.

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

7.0 References

7.1 NEV America Technical Requirements

7.2 ETA-NAC001, "Control, Close-out and Storage of Documentation."

7.3 ETA-NAC004, “Procedure for the Review of Test Results.”

7.4 ETA-NAC005, "Training and Certification of Personnel Utilizing ETA Procedures."

7.5 ETA-NAC007, “Control of Measuring and Test Equipment”

7.6 ETA-NTP004, “Electric Vehicle Constant Speed Range Test”

7.7 ETA-NTP011, “Receipt Inspection Procedure"

7.8 ETA-NTP008, "Battery Charging"

APPENDIX-A
Vehicle Supplier Review Check List
(Page 1 of 2)

Vehicle Number: _____

AC006 Ref:	T/S Ref:	Parameter:	Initials:	Date:
5.2.1	---	Vehicle Make		
5.2.1	---	Vehicle Model:		
5.2.1	---	Vehicle Year:		
5.2.2	---	Vehicle Manufacture:		
5.2.3	---	ID placard matches vehicle and supplier information		
5.2.4	3.1	Number of seating positions:		
5.2.5	---	Charger manufacturer		
5.2.6	---	Motor manufacturer		
5.2.7	---	Controller manufacturer		
5.2.8	3.2	Vehicle is a conversion to electric		
5.2.9	---	Brake type on front and rear wheels		
5.2.10	2.6	Tire supplied is standard or optional equipment		
5.2.11	2.6	Tire manufacturer		
5.2.12	2.6	Tire model, size and load rating		
5.2.13	---	Vehicle exterior color		
5.2.14	---	Vehicle Interior Color		
5.2.15	4.1	Transmission type		
5.2.16	---	Number of battery modules in pack		
5.2.17	---	Battery pack voltage		
5.2.18	6.4	Battery module weight:		
5.2.19	6.4	Battery pack weight:		
5.2.20	6.2	Vehicle batteries comply with requirements of NEC 625 and UL-2002 for charging in enclosed spaces		
5.2.21	7.7	Low voltage connectors meet applicable SAE Standard		
5.2.22	22	For vehicles with battery pack voltage greater than 60 volts (5.2.17), HIGH VOLTAGE connectors utilize locking devices, are keyed to prevent mis-connection and are moisture proof.		
5.2.23	7.1	HIGH VOLTAGE labels are present on any point voltage can be accessed by end user.		
5.2.24	7.5	Turn signals are provide		
5.2.25	8.3	Fast charge connection provided		

APPENDIX-A
Vehicle Supplier Review Check List
Check List (Page 2 of 2)

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 3)

Vehicle Number: _____

Date Received:				Odometer (miles):			
Vehicle Year:		Vehicle Make:			Vehicle Model:		
Vehicle Body Style:				Vehicle Color:			
Vehicle Identification Number:					Date of Manufacture:		
RESTRAINT SYSTEM DESCRIPTION							
Driver:		C.F. Pass:			R.F. Pass:		
L.R. Pass:		C.R. Pass:			R.R. Pass:		
VEHICLE CONDITION AND INSTALLED OPTIONS							
Air Conditioning		Power Steering		Power Brakes		Power Windows	
Power Door Locks		Cruise Control		Spare Tire		Front Wheel Drive	
Telescoping Wheel		Tilt Wheel		Front Disk Brakes		Rear Disk Brakes	
Power Seats		4 Wheel Drive		Anti-Lock Brakes		Regenerative Braking	
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 ATTITUDE MEASUREMENTS AS RECEIVED (CURB w/MAX. FLUIDS)							
Left Front (in):	at			Right Front (in):	at		
Left Rear (in):	at			Right Rear (in):	at		
VEHICLE WEIGHTS WITH PAYLOAD (RECEIVED CURB + 332 POUNDS)							
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 ATTITUDE MEASUREMENTS WITH PAYLOAD (RECEIVED CURB + 332 POUNDS)							
Left Front (in):	at			Right Front (in):	at		
Left Rear (in):	at			Right Rear (in):	at		
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):			
VEHICLE ATTITUDE MEASUREMENTS WITH MAXIMUM PAYLOAD (GVWR)							
Left Front (in):	at			Right Front (in):	at		
Left Rear (in):	at			Right Rear (in):	at		

APPENDIX-B
Vehicle Receipt Check List
(Page 2 of 3)

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 (On-Board)			
Battery Charger (Off Board)		Charger Connection		Misc. Placards			
Misc. Labels		Misc.( )		Misc.( )			
Misc.( )		Misc.( )		Misc.( )			
MISCELLANEOUS							
Bed Space or Volume Encroachment: ☐ Yes ☐ No							
Trunk Space or Volume Encroachment: ☐ Yes ☐ No							
Using a 5-inch cubic go/no-go block, with the vehicle loaded to GVWR and standing on a flat surface, when the block is in contact with the flat surface and passed beneath the sprung portions of the vehicle, the block does not contact the sprung portions of the vehicle. ACCEPTABLE_____ UNACCEPTABLE_____							
Disconnect the main propulsion battery from the auxiliary battery. Turn on the emergency flashers, and verify that they operate for at least one hour. This will verify loss of the main battery pack and a failure of the DC/DC converter. ACCEPTABLE_____ UNACCEPTABLE_____ N/A_____							
Verify that the State of Charge indicator is accurate to ± 10% of full scale ACCEPTABLE_____ UNACCEPTABLE_____ N/A_____							
Verify that the speedometer is accurate to ± 5% at 20 mph ACCEPTABLE_____ UNACCEPTABLE_____ N/A_____							
Verify that the vehicle is capable of energizing and charging after being out of service *(in 40-120 degree F)*, off charge for 16 days ACCEPTABLE_____ UNACCEPTABLE_____ N/A_____							

APPENDIX-B
Vehicle Receipt Check List
(Page 3 of 3)

General Comments (initials/date):

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