



Water Submersion Test for Rechargeable Energy Storage Systems

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard specifies the test procedure for evaluating the performance for Hybrid Electric Vehicle (HEV), Plug-in Hybrid Electric Vehicle (PHEV), Extended Range Electric Vehicle (EREV) and Electric Vehicle (EV) Batteries that are used in a vehicle environment.

1.1.1 Water Submersion. This test shall be used to evaluate the ability to meet vehicle rechargeable energy storage systems (RESS) performance metrics as referenced in GWM16390. The water submersion test verifies the immunity of the component to loss of seal that may lead to water ingress.

1.2 Foreword. This document provides the standard technical requirements for HEV, PHEV, EREV and EV batteries. A program-specific technical specification that is used in conjunction with this document may include additional program-specific requirements that are not referenced in this document and may supercede any requirements included in this document. In the case of any conflicts between this document and the program-specific technical specification, the program-specific technical specification takes precedence.

1.3 Applicability. This standard applies to all RESS for passenger or commercial vehicles and trucks. General Motors shall approve all changes to the format and/or content of this test standard.

Hybrid Controllers, Battery Disconnect Unit (BDU), and other internal electrical/electronic components are required to meet GMW3172.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3172 GWM16390

2.3 Additional References.

CG2762

miniBEV Subsystem Technical Specification (SSTS)

Voltec SSTS

3 Resources

3.1 Facilities. The test facilities and equipment shall be in good working order and shall have valid calibrations. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment. Appropriate equipment is required to complete the test procedure defined in Section 4 to acquire and store all necessary data. There may be additional data sources.

3.2.1 Equipment Parameters. Unless stated otherwise, the information in Table 1 defines the minimum test equipment parameters and tolerances to be used for all testing.

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Table 1: Equipment Parameters and Tolerances

Parameter	Tolerance
Test Fixture	Fixture should simulate accurately how the Device Under Test (DUT) attaches to vehicle and provide similar structure and support.
Test Time	30 minutes (minimum) + 1.5 minutes
Submersion Tank	Height of water submersion depth to be 300 mm, within ± 10 mm from ground line of the DUT.

3.3 Test Vehicle/Test Piece. This specification is for pack level testing only. If the DUT requires vehicle/body interfaces to properly seal or to provide structure, then appropriate vehicle level components need to be obtained and modified to fit within submersion tank dimensions and/or test to be executed at vehicle level.

3.4 Test Time. See CG2762.

Calendar time: Not applicable

Test hours: 0.5 hour

Coordination hours: Not applicable

3.5 Test Required Information. All limits imposed by the battery manufacturer shall be observed over the course of testing. Power, current, voltage, and temperature restrictions provided in written documentation by the manufacturer take precedence over any instructions given in this standard.

Additional customer requests or requirements must be provided in writing prior to start of test.

The ambient environment for the DUT(s) should be maintained in accordance with manufacturer specifications. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.6 Personnel/Skills. All personnel performing tests must have up to date training records in a high voltage training program.

3.7 Personal Protection Equipment (PPE). PPE, such as high voltage gloves, face shields, fire extinguishers, etc., shall be in good working order and available in the immediate area used in the execution of the testing.

4 Procedure

4.1 Preparation.

4.1.1 Additional customer requests or requirements must be provided in writing prior to start of test.

4.1.2 All DUTs should be subjected to an initial inspection, as defined by the requestor.

4.1.3 As no energy will be transmitted into or out of the RESS during the test, the state of charge (SOC) level is not critical. This standard only tests the integrity of the sealing system.

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