

6.x.6. Overcurrent protection

6.x.6.1. The test shall be conducted in accordance with Annex 8[G] of this Regulation.

6.x.6.2. Acceptance criteria;

- 6.x.6.2.1. During the test the tested device shall exhibit no evidence of;
- (a)electrolyte leakage
 - (b)rupture
 - (c)fire
 - (d)explosion

The evidence of 6.3.6.2.1 a) to d) shall be checked by visual inspection without disassembling the tested device.

6.3.7. Overcharge protection

6.3.7.1. The test shall be conducted in accordance with Annex 8H of this Regulation.

6.3.7.2. Acceptance criteria;

- 6.3.7.2.1. During the test the tested device shall exhibit no evidence of;
- (a)electrolyte leakage
 - (b)rupture
 - (c)fire
 - (d)explosion

The evidence of 6.3.7.2.1 a) to d) shall be checked by visual inspection without disassembling the tested device.

6.3.7.2.2. After the test, the isolation resistance measured in accordance with Annex 4B of this Regulation shall not be less than 100 Ω /Volt.

6.3.8. Overdischarge protection

6.3.8.1. The test shall be conducted in accordance with Annex 8I of this Regulation.

6.3.8.2. Acceptance criteria;

- 6.3.8.2.1. During the test the tested device shall exhibit no evidence of;
- (a)electrolyte leakage
 - (b)rupture
 - (c)fire
 - (d)explosion

The evidence of 6.3.8.2.1 a) to d) shall be checked by visual inspection without disassembling the tested device.

6.3.8.2.2. After the test, the isolation resistance measured in accordance with Annex 4B of this Regulation shall not be less than 100 Ω /Volt.

Annex 8[G]**Overcurrent protection**

1. PURPOSE

The purpose of this test is to verify the performance of the overcurrent protection. This functionality, if implemented, shall interrupt or limit the overcurrent to prevent the REESS from any severe events caused by overcurrent.

2. INSTALLATIONS

[This test shall be conducted either with the complete REESS or related subsystems of the REESS including the cells and their electrical connections that is able to deliver working voltage of the REESS.] [If the electronic management unit for the REESS is not integrated it is optional by the discretion of the manufacturer, to install such control unit.]

3. PROCEDURES

General test conditions

The following condition shall apply to the test:

- a) the test shall be conducted under standard ambient temperature of 20 ± 10 °C or at higher temperature if requested by the manufacturer.
- b) at the beginning of the test, the state of charge of tested device shall be adjusted to a value in the upper 50% of the normal operating state of charge range.
- c) at the beginning of the test, all internal and external protection devices which effect the function of the tested device and are relevant for the outcome of the test shall be operational.

At the beginning all relevant main contactors for charging and discharging and the contactor for **active driving possible mode** shall be closed. If this cannot be done in one test, then two or more tests shall be conducted.

To create an overcurrent situation, the positive and negative terminals of the TESTED DEVICE shall be connected to each other. The connection shall consists of a resistor with a constant resistance that ensure a current flow, which is initially **[1.5]** times higher than the maximum current for constantly normal operation, but not exceeding **[2]** times the maximum current for constantly normal operation, specified by the manufacturer.

This overcurrent condition is continued until the operation of the protection function to interrupt or limit the overcurrent is confirmed or for at least one hour after the tested device external case temperature has stabilised, which means that the temperature varies by a gradient of less than 4°C through 1 hour.

Annex 8H

Overcharge protection

1. PURPOSE

The purpose of this test is to verify the performance of the overcharge protection. This functionality, if implemented, shall interrupt or limit the charge current to prevent the REESS from any severe events caused by a too high SOC as specified by the manufacturer.

2. INSTALLATIONS

This test shall be conducted, under standard operation conditions without any failure, either with the complete REESS (this maybe a complete vehicle) or related subsystems of the REESS including the cells and their electrical connections.

The test may be performed with a modified tested device as agreed by the manufacturer and the technical service. These modifications shall not have negative influence of the test results.

3. PROCEDURES

General test conditions

The following condition shall apply to the test:

- a) the test shall be conducted under standard ambient temperature of 20 ± 10 °C or at higher temperature if requested by the manufacturer.
- b) at the beginning of the test, all internal and external protection devices which effect the function of the tested device and are relevant for the outcome of the test shall be operational.

At the beginning all relevant main contactors for charging shall be closed.

External charge control of the test equipment shall be disabled.

The tested device shall be overcharged with a charge current of at least [1/3C] rate but not exceeding the maximum current within the normal operating range as specified by the manufacturer.

Charging shall be continued until

- the TESTED DEVICE (automatically) interrupts or limits the charging or
- external case temperature has stabilised, which means that the temperature varies by a gradient of less than [4°C through 1 hour]

Annex 8I

Overdischarge protection

1. PURPOSE

The purpose of this test is to verify the performance of the overdischarge protection. This functionality, if implemented, shall interrupt or limit the charge current to prevent the REESS from any severe events caused by a too low SOC as specified by the manufacturer.

Exemption from this test shall be allowed where the design of the RESS is such that it is not possible to discharge the RESS below a given limit specified by the manufacturer. In this case the manufacturer shall provide evidence to the technical services to prove that any subsequent *maximum discharge* and standard charge will not lead to any situation described in the acceptance criteria in paragraph 6.3.8.2.

2. INSTALLATIONS

This test shall be conducted, under standard operation conditions without any failure, either with the complete REESS (this maybe a complete vehicle) or related subsystems of the REESS including the cells and their electrical connections.

The test may be performed with a modified tested device as agreed by the manufacturer and the technical service. These modifications shall not have negative influence of the test results.

3. PROCEDURES

General test conditions

The following condition shall apply to the test:

- a) the test shall be conducted under standard ambient temperature of 20 ± 10 °C or at higher temperature if requested by the manufacturer.
- b) at the beginning of the test, all internal and external protection devices which effect the function of the tested device and are relevant for the outcome of the test shall be operational.

At the beginning of the test [all relevant main contactors] shall be closed.

Perform a standard discharge with at least 1/3 C rate but but not exceeding the maximum current within the normal operating range as specified by the manufacturer.

Discharging shall be continued until;

- the tested device (automatically) interrupts or limits the discharging or
- external case temperature has stabilised, which means that the temperature varies by a gradient of less than 4°C through 1 hour.

Direct after termination of the discharging the tested device shall be charged with a charge current of at least 1/3C rate as specified by the manufacturer, if not inhibited by the tested device.

After the cahрге the tested device shall be observed for 1 h at the ambient temperature conditions of the test environment. The test ends after the observing time.