

Overtemperature protection test

Proposal from Sweden

- Autoliv
- Scania
- SP
- Volvo

Over-temperature protection test

Purpose: The purpose of this test is to verify the function of the protection measures against internal overheating during the operation in the event of a single failure of the thermal control or cooling of the RESS. This functionality, if implemented, shall interrupt or limit the of the RESS to prevent from any further related severe events caused by over-temperature

Comments:

• *Simply expressed, the test shall verify that the RESS is not used in an over-temperature state. We believe that the test procedure should try to simulate the most probable scenario ending up in a over-temperature state, i.e. heating by dynamic load rather than passive heating of the RESS.*

Over-temperature protection test cont.

Conditioning: The system shall be heated to just below the maximum working temperature limit by applying an electric load or by external heating (oven), with or without running cooling circuit. (Most likely the quickest way to heat the system is to have both an electric load and at the same time run the cooling with heated coolant media)

RESS with cooling systems distributing coolant media with a given temperature independent of ambient temperature shall have the cooling systems shut off. If this kind of RESS cannot operate with its cooling system shut off, the RESS shall be heated to [TBD] °C above maximum working temperature.

Comments:

- The "Maximum working temperature" needs to be defined. The maximum working temperature may be well above the normal operating temperature window.*
- Preheating to this temperature reduces the total test time.*
- Allowing the cooling medium to work as a heat source makes it possible to test RESS that cannot operate without the cooling system turned on.*

Over-temperature protection test cont.

Load phase: Raise the internal temperature of the RESS with an electric charge/discharge profile, determined by the manufacturer with a suitable stress level for the particular RESS under test. The load cycle may be a driving cycle or a constant current cycle.

The cooling circuit can be shut off or be running with the cooling media heated to a temperature above maximum working temperature.

RESS with cooling systems distributing coolant media with a given temperature independent of ambient temperature shall have the cooling systems shut off. Load cycling of the RESS starts as soon as the temperature has stabilized at the predecided temperature. The system shall prohibit further use of the RESS either by shutting down or not accepting charge or discharge current in order to satisfy the test requirements.

Comments:

- The charge/discharge load required to generate a suitable stress level for the RESS will depend on the type of RESS, for example an energy optimized pack behaves differently from power optimized pack and therefore the load profile should not be defined by the procedure.*
- Testing is required and can be performed on all RESS, as described in methodology.*

Over-temperature protection test cont.

Termination: The test is interrupted when:

1. The RESS shuts down or limits the charge or discharge current due to high temperature,

OR

2. The RESS has been above maximum working temperature and under dynamic load for more than 4hr

When the RESS has cooled to a temperature within the normal operating temperature window, standard cycle shall be performed in ambient temperature, if not inhibited by the RESS.

Comment:

Acceptance requirements as in 6.3.9.2.