

WHY

Temperature shock with splash water of lithium-ion batteries for electric vehicles in the world's largest test centre for high-voltage batteries

HOW

Turnkey solution
According to VW 80000:2017 LV124 K-12

WHAT

Mobile unit for use in temperature and climate chambers Machine unit, control system, pump system
Splash nozzle rack

WHY - The challenge.

FEV Group GmbH has built the world's largest development and test centre for high-voltage batteries for electric vehicles in Saxony-Anhalt. A wide variety of environmental simulation tests are carried out on 15,500 sqm and in around 70 facilities.

These include tests that check the function of the energy storage units in the event of shock-like cooling by gushing water, for example when driving through a puddle. For the tests, lithium-ion batteries are heated up to operating temperature and then repeatedly flooded with 0 to 4 °C cold water. According to the test standard, the water must contain ultrafine Arziona dust. Dust deposits on or in the test specimen after the test indicate leaks. The water tank must therefore be designed to distribute the dust evenly and ensure a homogeneous dust-water mixture at the outlet of the splash water nozzle. The components of the test system that are in contact with the test medium must be designed to be robust and dust-proof. The cold supply is provided by the central refrigeration system.



HOW - The idea.

A mobile gushing water system was designed that can be used in suitable temperature and climate chambers. For this purpose, a machine unit with an insulated surge water tank, pump and process technology is placed outside the chamber. Inside the chamber, a flushing nozzle rack with five nozzles is set up, over which the test material is flushed.

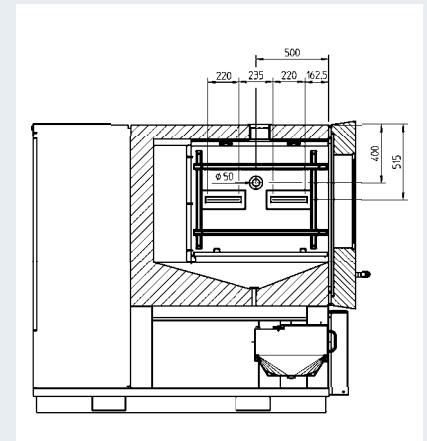
In order to achieve the desired uniform dust-water mixture, the surge water tank was equipped with a special pump system. The water is fed into the tank from below and continuously circulated by the pumps.



WHAT - The solution.

The two-part hydropeaking system consists of a machine unit for the supply, control and regulation of the entire system and a hydropeaking nozzle rack for the standard-compliant hydropeaking of the test specimens.

The mobile surge nozzle rack is placed inside the test chamber. Five nozzles with a surge water flow rate of 1 to 1.3 l/s spray the test specimen horizontally for 3 seconds. The rack is approx. 2,600 mm wide and 1,955 mm high and enables the entire width of the test specimens to be flooded.



Selected Product: Mobile splash water system
consisting of various individual components

The mobile machine unit with castors contains the refrigeration unit, the switch and control cabinet as well as the pump system and the surge water tank. The machine unit outside the test chamber and the surge nozzle rack in the test chamber are connected to each other via bushings.

Design features:

- Mobile testing technology, applicable in different test chambers
- Realisation of a special construction project with the help of standard components
- Control variables with digital display: test cycles, cycle time, water temperature, nozzle selection
- Electronic acquisition and recording of all operating and test data for the creation of electronic test reports via the SIMPATI[®] control software

