Case Study

weisstechnik realises air conditioning and solar simulation for test chamber for fuel cell vehicles

WHY	HOW	WHAT
Performance tests of fuel cell vehicles under various climatic conditions with increased thermal stress	First test chamber of its kind in the world Designed according to Chinese test standards ATEX safety concept included	Climate chamber with roller test bench for passenger cars Air-conditioning technology for the simulation of temperature and humidity Realistic simulation of sunlight

WHY – The challenge.

The Chinese state-owned testing company CATARC (China Automotive Technology & Research Center), based in Tianjin, ordered the world's first roller dynamometer for performance tests with solar simulation for fuel cell passenger cars.

The performance tests were to meet the requirements of Chinese automotive test standards. In order to test the thermal load of the vehicles due to solar radiation, the climatic test chamber was to be equipped with a solar simulation system.

Since hydrogen can outgas from fuel cells and sun simulation lamps are potential ignition sources, an ATEX safety concept was required.

HOW – The idea.

The air-conditioning technology is planned individually and designed according to the test requirements. Proven sun simulation radiators that cover the light spectrum of the sun are used for the sun simulation.

To ensure the required explosion protection, these are mounted on the chamber roof and separated from the test chamber by specially sealed filter disks. The radiation can enter the chamber unhindered. Mounting the emitters at a height of about four metres also ensures homogeneous irradiation and reproducibility of the test results.

The ATEX safety concept also includes a safety matrix, safety PLC, a special ventilation system, earthing of all components and a multitude of other detailed safety measures.

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WHAT – The solution.

The test chamber has internal dimensions of 8,500 x 17,000 x 5,000 mm (WxDxH). The integrated test system consists of an on-site roller dynamometer for passenger cars and the **weiss**technik climatic test chamber with air-conditioning system, sun simulation system, machine section and control cabinet.

In the test bench, vehicles up to SUV size can be tested at a temperature of -42 to +60 °C at humidity levels of 10 to 95 % under load. The cooling system of the test chamber works with powerful, environmentally friendly CFC-free refrigerants and can also be supplied in Europe with a very low GWP factor.

Selected Product:	**Climatic test chamber for roller dynamometer WK 722'/42-60/Ro**

For solar simulation, 27 particularly powerful radiators are installed on the roof of the test chamber. These ensure a maximum irradiation intensity of 1,200 W/m² at the reference point with a homogeneity of +/- 10 %. The radiation intensity is set via the Weiss SolarSimulation software.

The safety system includes standard safety measures such as doors with emergency release and customised measures such as a gas alarm system. In addition, special ATEX protective measures have been integrated to prevent hydrogen explosions.

Deisgn Features:

- weisstechnik Turnkey Services: Planning, construction, commissioning
- Vapour-tight, corrosion-free test chamber made of stainless steel with CFC-free insulation
- Solar simulation system installed on the test chamber roof
- ATEX safety concept for safe testing of fuel cell vehicles
- Connection of the test system to the S!MPATI® control software for easy programming and documentation

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