

High-Current Connector Qualification

Karlstein High-Current Source

Investigation of aging and/or temperature distribution under extreme high-current loads up to 20 MW/80 kA

Challenge

The reliability of mechatronic systems depends, amongst other aspects, on the quality of its electrical connectors. The usage of qualified connectors reduces the risk of system shutdowns or total loss of the system.

Renewable solar and wind energies lead to a high increase of demand for electrical connectors that are operated with high currents.

Additional loads on the electrical connections are often of a thermal, mechanical and climatic nature, depending on the foreseen application. These have to be applied as closely as possible to the real application during the qualification program. Physical, chemical and mechanical loads on the connector cause an increase of the contact resistance and therefore heat generation inside the connector. This results in a loss of contact force which favours an increase of friction corrosion and the creation of non-conductive oxide layers.

Solution

Aging or long-term tests under full electrical loads improve the operational reliability and lifetime of high-current electrical connectors. The high-current connector systems are installed in a busbar. Upon customer request, additional loads can be applied. For example, climatic conditions can be simulated around the high-current connector to accelerate the aging process and reduce the test time and/or mechanical loads in order to, amongst other things, simulate connecting cable forces.

The 20 MW electrical power supply consists of three transformers directly connected to the national grid. They can be operated in parallel, row or mixed mode to drive more voltage or current.

The electrical insulation resistance of the high-current connector is monitored continuously by means of a redundant and diversified current as well as voltage measurements. Thus, it is possible to detect short-term as well as drift of insulation resistances. FLIR (Forward Looking Infrared) imaging supports the test evaluation.



Karlstein High-Current Source: power supply with rectifier

Customer benefits

- High-current connector tests, e.g. solar or wind energy applications
- Highest flexibility: test setup can be adapted to customer needs; fine tunable high current for maximum 20 MW/80 kA
- More than 30 years of experience with Karlstein High-Current Source for highest test quality
- Reliable test results through accreditation as test and inspection body in accordance with ISO 17025 and 17020, accepted by ILAC

Your performance
is **our** everyday **commitment**

Technical information

High currents are applied to electrical connection systems. They can be steady-state over a long time or fine tunable according to the customer's needs, e.g. ramps, sine waves, load cycles. The entire system is calibrated traceable to national standards.

Characteristics

- Three possible configurations
 - Maximum 20 kA, 0–420 V
 - Maximum 40 kA, 0–240 V
 - Maximum 80 kA, 0–180 V
- Up to 20 MW
- Steady-state or freely tunable high-current supply up to 10 Hz
- Rectifier system for DC current
- FLIR system for temperature distribution visualization
- In-house analytical investigations, e.g. scanning electron microscope, metallography

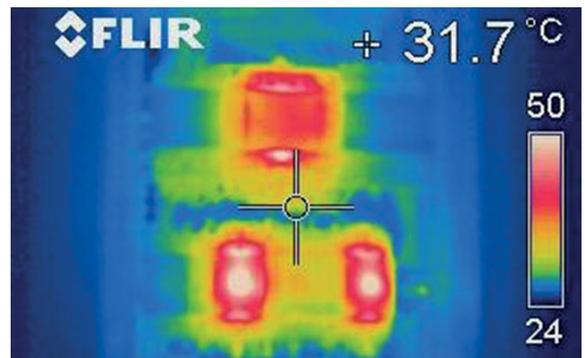
Software features

- Freely configurable recording frequencies
- Freely configurable limiting values
- Real-time visualization of data
- Automated data backup each day
- All configuration and data stored in log file
- Data storage and export

Accredited Test Laboratory
under the terms of DIN EN ISO/IEC 17025:2005



Karlstein High-Current Source: Sample test bench



Karlstein High-Current Source: connector test

Key figures

The Karlstein High-Current Source has been continuously used and upgraded for more than **30** years

In order to detect unexpected errors or results, this system is connected to a notification system; it informs the responsible test engineer **24/7**

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