



KINECTRICS

Comprehensive Services for Grid Interconnection and Interoperability Testing UL 1741 SB

Project Objective

Kinectrics' state-of-the-art GridSim Power laboratory was selected by Caterpillar Inc. to perform certification type-testing on three of their multi-megawatt natural gas-powered synchronous generators to UL 1741 SB. Kinectrics performed the key electrical tests from the IEEE 1547.1-2020 standard.

The GridSim Power lab was specifically designed to test multi-megawatt Distributed Energy Resources (DER) to these standards. Kinectrics test engineers have been active members of the UL Technical Committee for UL 1741. As such the GridSim Power lab is well-positioned to support such leading-edge test programs for OEMs looking to bring ranges of certified products to market including inverters and battery energy storage systems.



Scope of Work

Kinectrics provided the client with a broad range of expert technical services to complete testing of the 3 natural gas generators, ranging in power from 750 kW to 2500 kW. In addition to the equipment and facilities required, project support involved:

- Customized test plans based on the unique products and requirements of IEEE 1547.1
- Protection, controls, and test automation
- Site support for storage, craning, setting up, commissioning and removal of the various gensets
- Installation and monitoring of state-of-the-art instrumentation and data acquisition in compliance with the standards and ISO 17025 calibrations
- Supporting Caterpillar and UL Solutions representative witnessing at our lab and remotely
- Providing technical feedback as needed in the UL 1741 certification process
- Test results in the UL prescribed format



The test plan, equipment specifications, layouts and procedures, were designed and planned by Kinectrics to meet all client specifications. The project testing scope included the following tests:

- IEEE 1547.1 5.3 Temperature stability
- IEEE 1547.1 5.4 Test for response to voltage disturbances
- IEEE 1547.1 5.5 Test for response to frequency disturbances
- IEEE 1547.1 5.6 Enter service
- IEEE 1547.1 5.7 Synchronization
- IEEE 1547.1 5.8 Interconnection Integrity
- IEEE 1547.1 5.11 Open phase
- IEEE 1547.1 5.12 Current distortion
- IEEE 1547.1 5.13 Limit active power
- IEEE 1547.1 5.14 Voltage regulation
- IEEE 1547.1 5.15 Frequency support
- IEEE 1547.1 5.16 Test for prioritization of DER responses
- IEEE 1547.1 5.17 Limitation of overvoltage contribution
 - 5.17.2 Load rejection overvoltage (LROV) test
- IEEE 1547.1 5.19 Persistence of DER parameter settings
- IEEE 1547.1 6 Interoperability tests
- UL 1741 50.8 Loss of control circuit

Value Added Results

Kinectrics worked closely with Caterpillar and UL to identify issues stemming from the inaugural use of the testing standards (UL1741 SB and IEEE1547.1-2020) with multi-megawatt synchronous generators. The work allowed the client's gensets to be the first synchronous generators that were certified to UL 1741 SB.

The client received highly-detailed documentation for Kinectrics' work on the project, including records of testing and all measurements/data recorded during testing.

For more information, contact:

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