



KINECTRICS

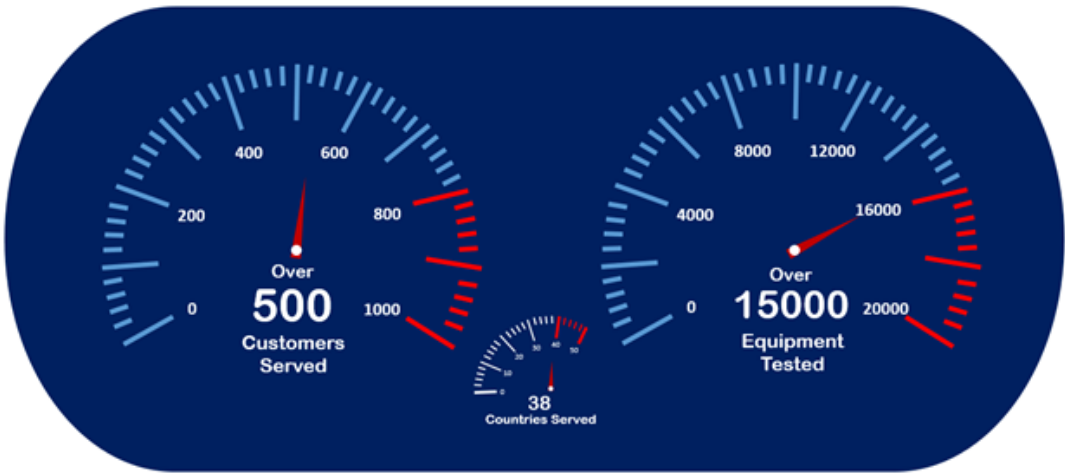
High Current DC Testing



Independent Confidential Quality Testing Services

- ✔ **Assure Quality Products**
- ✔ **Maximize Grid Reliability**
- ✔ **Ensure Product Safety**

Kinectrics high current lab offers high quality and reliable testing using its state-of-the-art equipment, calibrated instruments, and highly skilled engineers and technologists. From short circuit testing of transmission and distribution equipment to qualification of EV chargers and EV components, the high current lab is a trusted partner in providing independent third-party testing services to utilities, manufacturers, certification bodies, engineering firms, and end users.



For over four decades, Kinectrics has been at the forefront of testing transmission and distribution equipment. We have served over 38 countries and successfully completed testing for over 500 manufacturers and utilities from around the world. We have delivered over 4,000 projects to qualify high-quality products and instill confidence in your system reliability. This adds up to over 15,000 pieces of equipment tested in our High Current Lab.

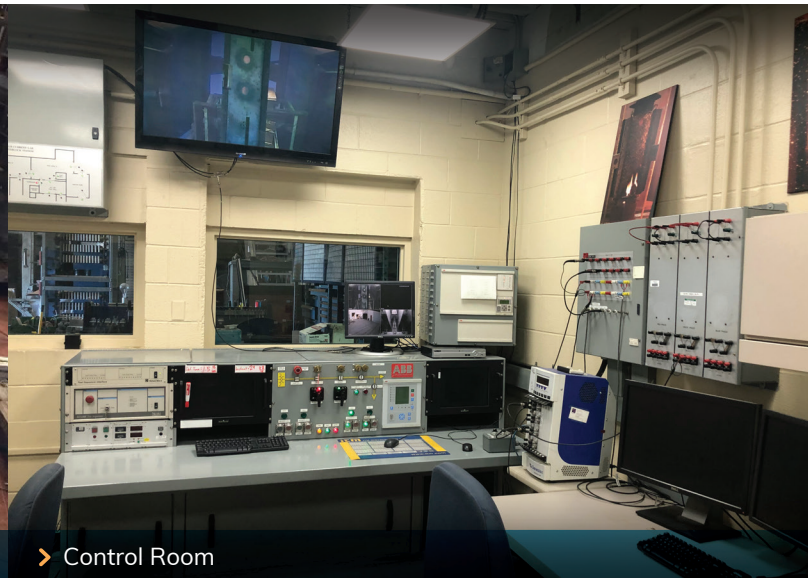
High Current Lab Test Capabilities

Test Capability	Voltage Range		Maximum Continuous Current	Maximum Short Time Current	Maximum Momentary Peak Current
60 Hz Continuous Current Test	Single Phase	Up to 75 V	16,000 A	---	---
		150 V to 2,400 V	4,000 A	---	---
	Three Phase	Up to 25 V	8,000 A	---	---
		300 to 1,200 V	4,000 A	---	---
60 Hz Momentary Current Test	Single Phase	50 V to 3,000 V	---	80,000 Arms	200,000 A
		3,000 V to 20,000 V	---	12,000 Arms	30,000 A
	Three Phase	300 V to 1,500 V	---	50,000 Arms	120,000 A
DC Current Test	Up to 2,000 Vdc		12,000 Adc	50,000 Adc	

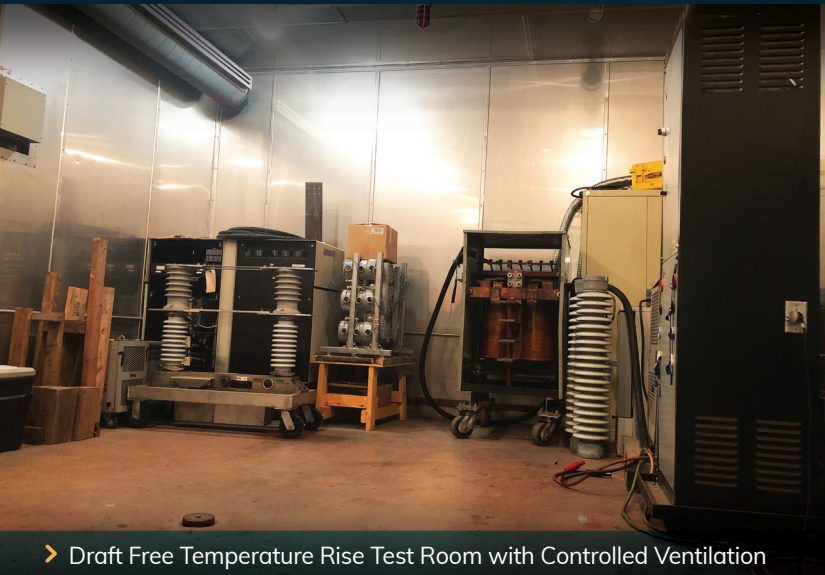
High Current Lab Features



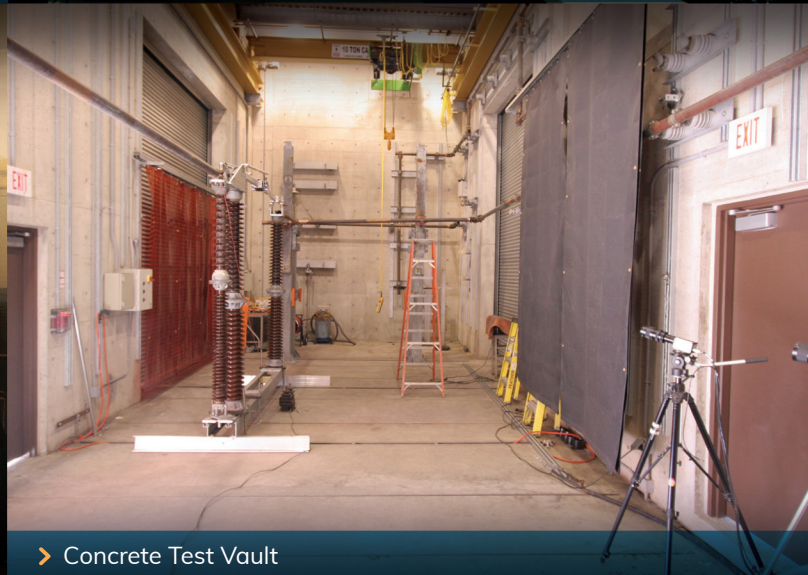
➤ DC Rectifier



➤ Control Room



➤ Draft Free Temperature Rise Test Room with Controlled Ventilation



➤ Concrete Test Vault

- Single phase, three phase, and DC test capabilities
- Directly fed from the grid
- Precision point-on-wave switching control to ± 0.1 mS
- Three custom-made sturdy supply transformers
- Programmable test sequencer
- Programmable protection relays
- 1 ks/sec high-speed video recording camera
- Modern control room
- Real-time monitoring of tests
- High-speed multichannel waveform recorder
- Comfortable client viewing areas
- Enclosed concrete test cell for destructive testing: 16 m (L) x 6 m (W) x 7 m (H) area
- Three explosion-proof concrete vaults

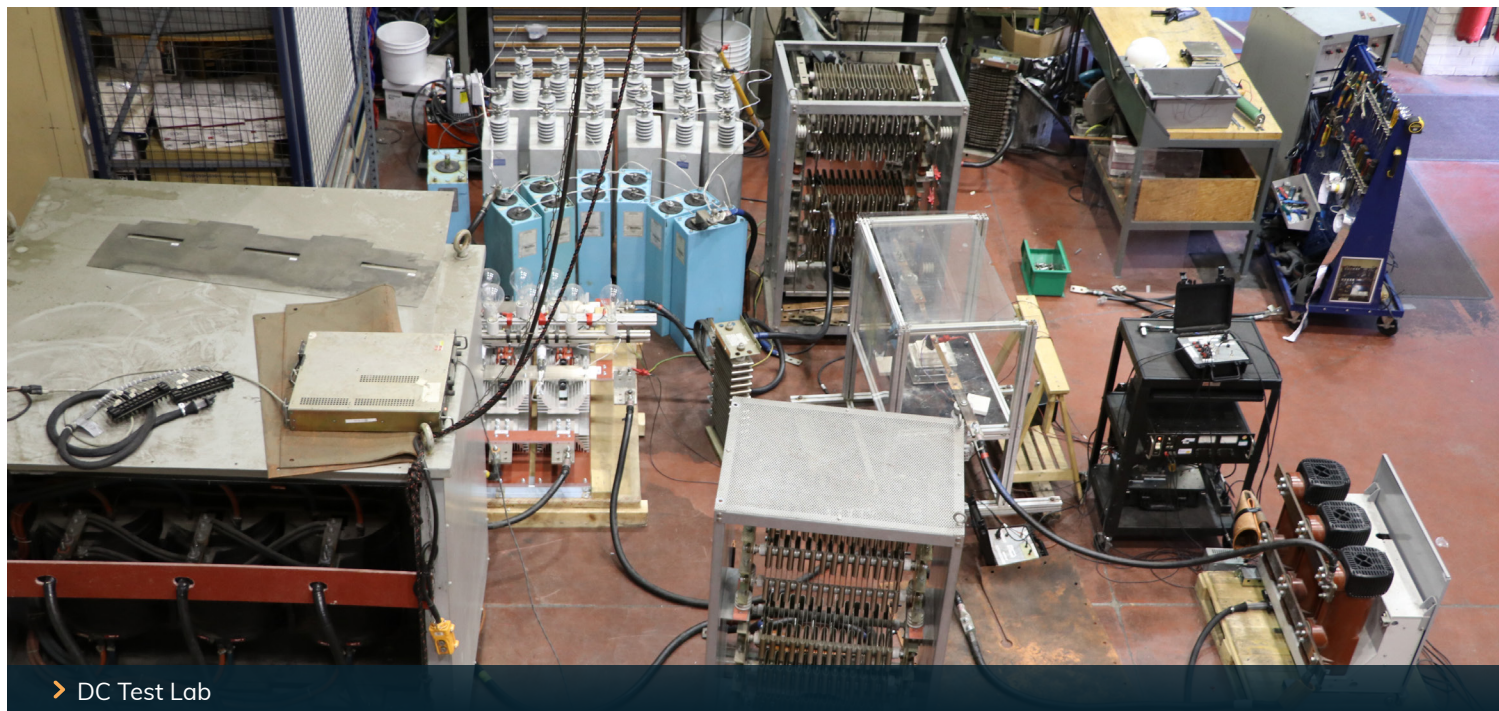
Kinectrics High Current Lab transformers are fed from the grid. As opposed to a generator fed current, the short circuit current generated from the grid is stiff, stable, and reliable, especially due to constant source impedance, unlike different transient, subtransient, and steady state reactance variations found in generators during short circuits. This eliminates the test current overshoot for the first few cycles, which is inevitable when using generators.

Services Offered - DC Testing

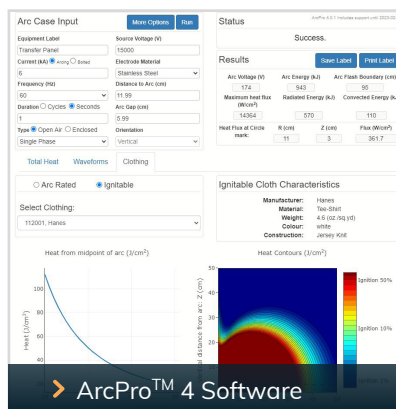
✓ DC Arc Flash Testing

✓ DC Testing for EV Components

✓ EV Charger



DC Arc Flash Testing



Objective

- Determine the thermal energy levels that may be present in the event of an arc flash incident at the exposed batteries terminals

Test Method

- Replicate industrial accident and real-world application scenarios to obtain data that closely represent the field conditions
- ArcPro™ 4: A physics-based software package for the calculation of radiated and convective thermal energy from electric arcs. ArcPro™ 4 considers arc current, arc duration, arc gap, worker's distance from the arc, and several other factors required in the accurate assessment of arc exposure. ArcPro™ 4 computations have been verified by live arc testing in Kinectrics' High Current Laboratory

Testing EV Components

Examples of tests performed

- Short circuit withstand tests
- Fault current making tests
- Current carrying capability tests
- Fault current interrupting tests
- Overload current switching tests
- Mechanical and electrical endurance tests

Why Test?

Short circuit tests on contactors, fuses, and pyros are performed to verify:

- An enclosure is not ruptured due to internal arc energy and electromagnetic forces. Also, the contacts of a contactor are not welded due to heat from the current or arcing in case of separation of its contacts
- Insulation integrity between live parts of the contactor remains within acceptable limits after exposure to fault conditions
- A fuse or pyro is capable of interrupting the fault current within acceptable time without rupture

Current carrying capability tests are performed on contactors to:

- Develop a curve of current versus time for the contactors with the objective of not exceeding the maximum temperatures on the contacts or causing damage to their structure

Fault current make and interrupt tests are performed on contactors to verify:

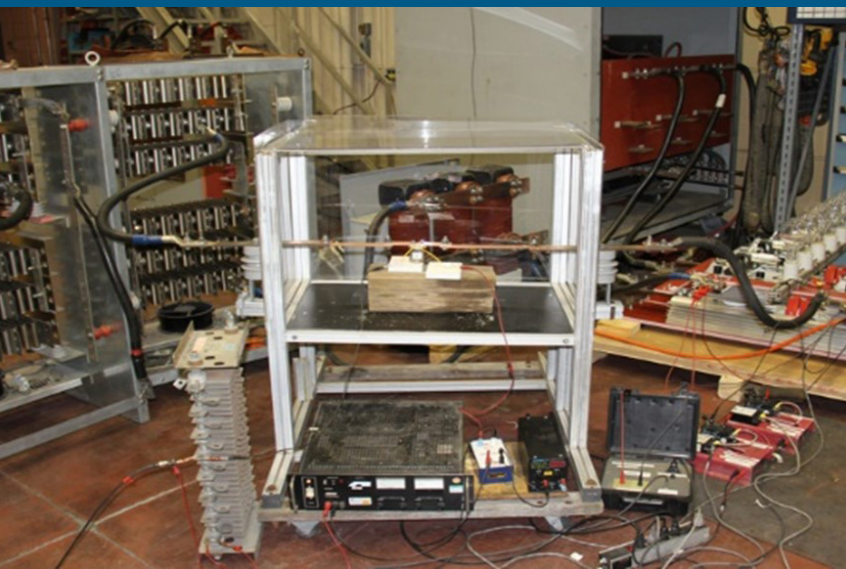
- No rupture, welding of contacts, or structural damage when closing into a faulty circuit
- Capability of the contactor to interrupt a fault current within acceptable time without rupture, welding of contacts, or structural damage
- Insulation integrity between live parts of contactors remains within acceptable limits after exposure to fault conditions

Overload current switching tests are performed on contactors to verify:

- Contactors are able to make and/or break overload currents for limited number of times without damage and loss of their insulation properties
- For manufacturers, to qualify, and in case of failures, detect failure mode of new components

Mechanical and electrical Endurance tests are performed to:

- Verify they can switch their rated load current and voltage for certain number of times without any structural damage or loss of insulation properties
- Verify their contacts open and close mechanism remains functional for thousands of open and close mechanical operations



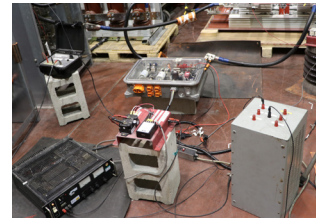
EV Power Distribution Unit (Junction Box)

- Short circuit withstand capability tests on buses, harnesses, and connectors
- Short circuit interrupt tests on fuses
- Protection coordination between contactors and fuses within the unit

Why Test?

Short circuit tests on junction boxes are performed to ensure:

- The fuses can detect the fault in the correct faulty branch and interrupt the current within the required limit.
- The buses, connectors, terminals, harnesses, and contactors can withstand the thermal and mechanical effects of a high short circuit current which is limited and interrupted by a fuse.

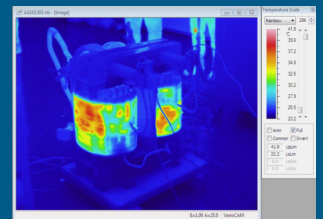


Testing EV Chargers

- CSA C22.2 No. 280/UL 2594
- CSA C22.2 No. 281.1/UL2231-1
- CSA C22.2 No. 281.2/UL2231-2

Why Test With Kinectrics?

- Provide a more reliable charging network with qualification tests
- Standards requirements are applicable to specific parts used in chargers
- Reliability is ensured by testing the complete product under realistic application & field conditions
- Better and more consistent quality of products
- With Kinectrics established inspection, safety, and quality procedures, consistent high quality test results are achieved on the products
- Test to find any abnormalities which may shorten the product life cycle
- Identify any safety related hazard due to the component malfunctioning
- Kinectrics high quality calibrated instruments ensure the most accurate and reliable test results



Environmental Tests:

- Water exposure test
- UV exposure test
- Chemical exposure test
- Dust test
- Moisture absorption resistance test
- Humidity conditioning test
- Sound measurement
- Resistance to corrosion test
- PVC compounds exposure test
- Tests on rubber compounds

Power Quality Tests:

- Harmonic distortion immunity test
- Electrostatic discharge immunity test
- Radiated electromagnetic field immunity test
- Immunity to conducted disturbances induced by RF fields test
- Electrical fast transient immunity test
- Magnetic field immunity test
- Capacitor switching transient test

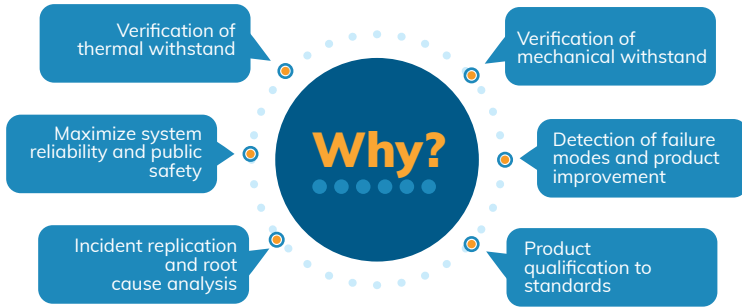
Electrical Tests:

- Enclosure leakage current test
- Capacity test
- Power factor measurement
- Temperature test
- Ground fault detection test
- Capacitor discharge test
- Abnormal tests
- Tests on charger transformer
- Short circuit test
- Component fault test
- Dielectric test
- Dew point test in humidity chamber
- Endurance test with load on plugs
- Forced ventilation test

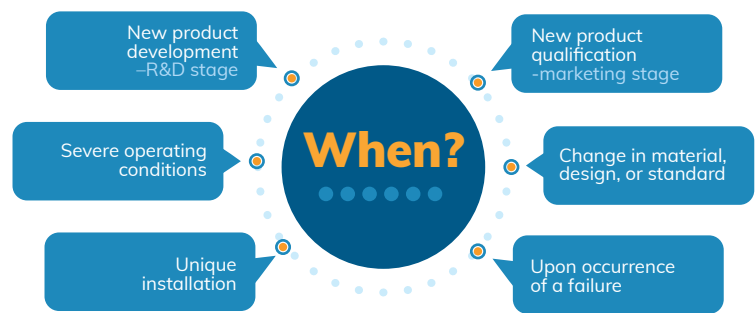
Mechanical Tests:

- Impact test on enclosure
- Vehicle drive over test
- Drop test
- Shock and vibration test (3 axes)
- Pull and push back strain relief tests
- EV cable secureness test
- Impact on glass cover test
- Crush test
- Tests for protection of users against Injury
- No-load endurance tests on plugs
- Polarization integrity test

Why Short Circuit Test?



When Short Circuit Test?



Commitment to Quality

Kinectrics is accredited to ISO/IEC 17025:2017 by the Standards Council of Canada (SCC).



Standards Council of Canada
Conseil canadien des normes

The SCC is a member of the International Laboratory Accreditation Cooperation (ILAC) and a signatory member of the ILAC's Mutual Recognition Arrangement (MRA).

Kinectrics' accreditation is recognized internationally and demonstrates our unrivalled technical capabilities to provide a full range of engineering and testing services for fiber optic cables.



Commitment to Safety

Kinectrics promotes a safe work environment and empowers all employees to create and maintain a safe and healthy environment. We believe that no task is so important that we cannot make the effort to do it safely.

Commitment to Our Customers

Our vision is to be the premier technical solutions provider from concept to completion. Our mission is to improve our customers' business by delivering sustainable and innovative life cycle management solutions to nuclear and electricity industries, through our facilities, processes, and people.

About Kinectrics

Kinectrics' origins can be traced to 1912. With over 100 years of delivering technical excellence, Kinectrics is the category leader in providing life cycle management services for the electricity industry. Trusted by clients worldwide, our experts in engineering, testing, inspection, and certification is backed by our independent laboratory and testing facilities, a diverse fleet of field inspection equipment, and an award-winning team of over 1,000 engineers and technical experts.

From initial design and type testing to operational deployment and maintenance services, Kinectrics collaborates closely with customers to ensure that utility assets perform safely, reliably, and efficiently throughout their entire life cycle.



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