



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.
H-1158-BUDAPEST, VASGOLYÓ UTCA 2-4. HUNGARY

VEIKI-VNL Ltd.

VEIKI-VNL Electric Large Laboratories Ltd. is an independent accredited testing member laboratory of Short-circuit Testing Liaison (STL) and a product certification body. The testing activities started in 1950s when Hungarian government decided to found the Institute for Electrical Power Research (VEIKI).

We are accredited by the Hungarian Accreditation Board (NAT) as a testing laboratory according to ISO/IEC 17025 and as product certification body according to ISO/IEC 17065. Our quality management system is conforming to the requirements of ISO 9001 and the environmental management follows ISO 14001 which are certified by the Hungarian Standards Institute. Testing facilities of VEIKI-VNL Ltd. are unique in Hungary, and cover the whole range of power network equipment. Our company consists of four laboratories as High Voltage Laboratory, High Power Laboratory, High Current Laboratory, laboratory for testing of equipment of nuclear power plants (LOCA Laboratory) and the Certification Office. Main activities of VEIKI-VNL Ltd. are laboratory tests, diagnostics, product certification and research & development.



HIGH-VOLTAGE TESTS

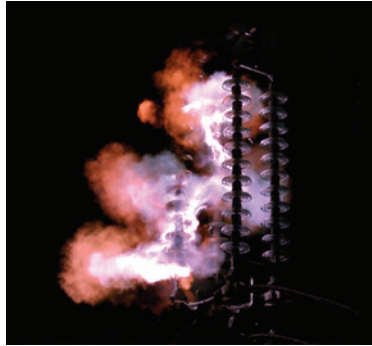


The testing activity of the High Voltage Laboratory covers the dielectric tests, RIV and corona tests and partial discharge measurements on equipment, cables, cable accessories, insulators, insulator sets and fittings for overhead lines and substations. The impulse voltage tests can be carried out in the indoor testing hall up to 1800 kV_{peak} and in the outdoor test site till 3400 kV_{peak}. The maximum available power frequency voltage is 700 kV_{rms} in the indoor testing hall and 1400 kV_{rms} in the outdoor test site.

MAIN PARAMETERS:

Power-frequency voltage (Continuous current: 1 A)	1400 kV _{rms}
Direct voltage (100 mA)	200 kV _{DC}
Lightning impulse voltage (0.5-5 / 10-100 μs)	3400 kV _{peak}
Switching impulse voltage (250 / 2500 μs)	2800 kV _{peak}
Steep front wave voltage	3000 kV _{peak} /μs
Superimposed single-phase voltages:	
▪ Power-frequency voltage + lightning impulse voltage	1000 kV _{rms} + 3400 kV _{peak}
▪ Power-frequency voltage + switching impulse voltage	1000 kV _{rms} + 2800 kV _{peak}
▪ Power-frequency voltage + power-frequency voltage	700 kV _{rms} + 360 kV _{rms}
Three-phase synchronizing generator:	1000 V _{rms} , 1000 A
Three-phase generator with adjustable frequency	100 Hz, 1000 V _{rms} , 3 × 25 A
Single-phase transformer for RIV and partial discharge tests (500mA)	700 kV _{rms} , 3 pC, 10 dBμV
Faraday cage (5m x 5m x 4m) for partial discharge test	60 kV _{rms} , 1 pC

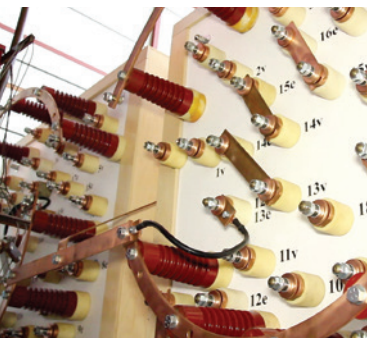
SHORT-CIRCUIT TESTS



The testing activity of High-Power Laboratory covers of short-circuit tests on different equipment as making and breaking tests, internal arc tests, power arc tests, short-time withstand current and peak withstand current tests supplied from 50 Hz power network. The synthetic apparatus of the laboratory provides the testing environment for high-voltage circuit breakers including short-line fault tests and terminal fault tests using single-phase current injection synthetic test circuit with D.C. recovery voltage.

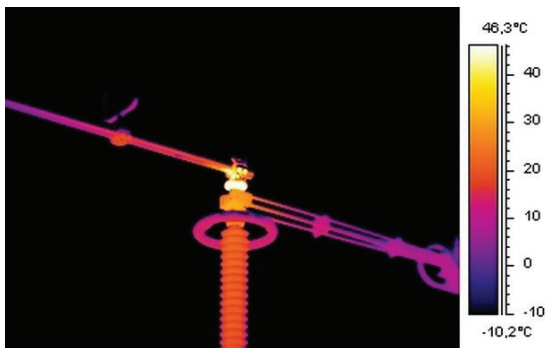
TESTING PARAMETERS:

Test frequency	50 Hz
Single-phase short-circuit power	max. 1000 MVA
Three-phase short-circuit power	max. 650 MVA
Synthetic short-circuit current breaking tests	
Highest TRV peak	330 kV
Highest short-circuit current parameters	50 kA _{rms} / 140 kA _{peak}
Parameters of artificial lines (SLF tests)	t _{dL} ≥ 100 ns
Power arc tests on insulator sets	max. 50 kA
Short-circuit tests on (bundled) overhead lines (with or without spacer-dampers)	max. 50 kA _{rms} on 62 m length max. 31.5 kA _{rms} on 135 m length max. 20 kA _{rms} on 250 m length
Short-circuit tests on spacer-dampers	max. 125 kA _{peak} on 62 m bundle length
Short-circuit tests on fittings for substations and overhead lines	max. 63 kA
Short-circuit tests on high-voltage surge-arresters	max. 50 kA
Short-circuit withstand tests supplied from low-voltage	max. 170 kA _{rms}
Short-circuit tests on transformers in three-phase circuit	U _{r-primary} ≤ 35 kV; S _n ≤ 16 MVA
Short-circuit tests on transformers in single-phase test circuit	35 kV ≤ U _{r-primary} ≤ 123 kV (145 kV) S _n ≤ 40 MVA
Short-circuit making and breaking tests on low-voltage apparatus	150 kA _{rms} /330 kA _{peak} at < 350V 110kA _{rms} /240 kA _{peak} at 430V-550V 55kA _{rms} /121 kA _{peak} at 690V-1100V



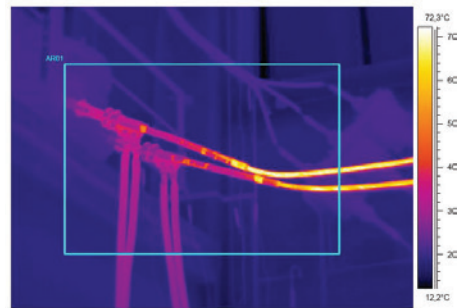
TEMPERATURE-RISE TESTS

Temperature-rise tests on equipment as transformers, switchgears, prefabricated substations, cables, conductors and fittings for substations and overhead lines are performed in the High-Current Laboratory up to 10 kA. Laboratory has individual supply for three-phase short-circuit tests with maximum power of 80 MVA such a way short-circuit and temperature-rise systems can be combined for special tests. Currents and more than 100 temperature magnitudes can be recorded using our analogue and digital measuring systems.



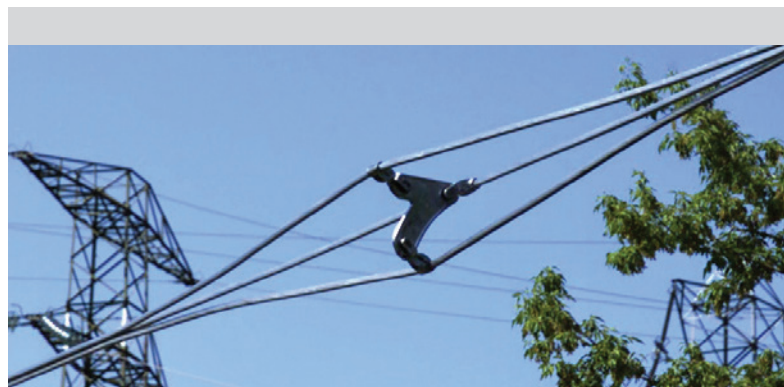
MECHANICAL TENSILE TESTS

Mechanical tensile tests on conductors, fittings and insulators can be executed up to 300 kN. Our laboratories have two tensile machines for stress-strain and breaking strength tests with lengths of 10 m (vertical) and 14 m (horizontal). The tensile machines have optional chambers for thermomechanical tests in temperature range of $-40^{\circ}\text{C} \div +50^{\circ}\text{C}$ and for electromechanical tests up to 100 kV. Mechanical tests in special test arrangement for bending, for torsion and for mechanical impact tests or higher mechanical loads can be achieved using individual structure.



TESTS ON OVERHEAD LINES AND ACCESSORIES

The laboratory is able to perform dielectric, corona and radio interference (RIV), short-circuit, temperature-rise, heat-cycle, sag-tension, lightning and mechanical tests as well as stress-strain, breaking, individual wire tensile, vibration, creep, sheave, galloping tests on overhead lines. Corona, RIV tests and numerous mechanical tests can be performed on accessories of the overhead lines like spacer-dampers and stockbridge-dampers.

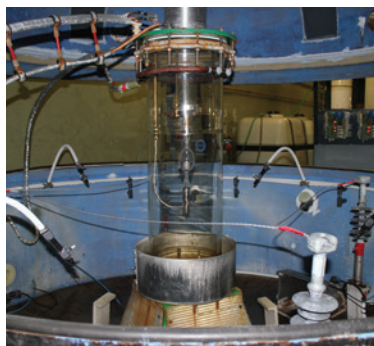
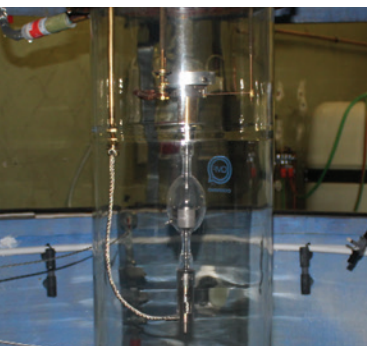


TESTS ON CABLES AND ACCESSORIES

Dielectric, temperature-rise, heat-cycle test, electrical ageing in dry or wet environment, short-circuit on core, screen and flammability test can be carried out on cables and cable accessories.

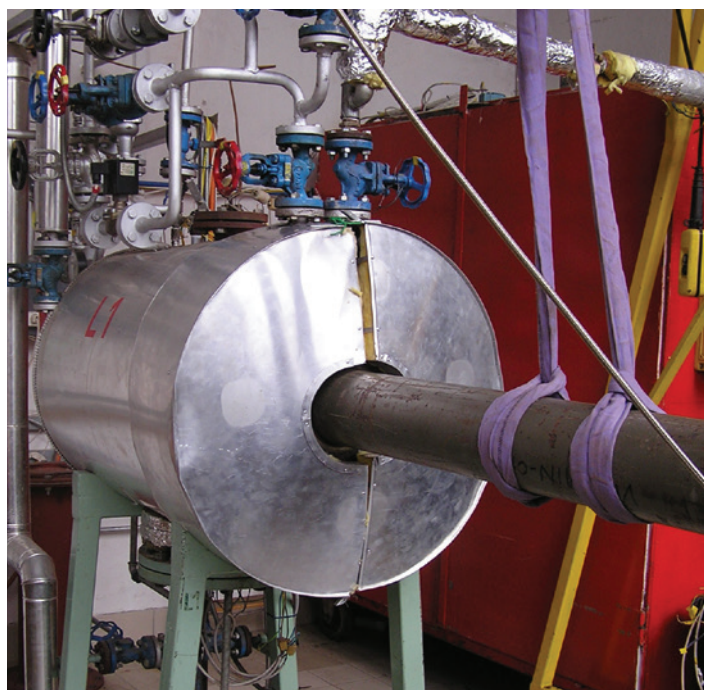
POLLUTION AND AGEING TESTS

Ageing, heat-cycle ageing, accelerated ageing test and pollution tests can be carried out in our laboratories on cables, fittings for conductors or substations, insulators or materials and on special equipment. There are hermitically closed test chambers for different tests in humidity, wet, salt fog, clear fog, high-temperature, low-temperature, high-pressure or high intensity UV environment, meanwhile the electrical properties of the test specimen can be monitored.



"LOCA" TESTS FOR NUCLEAR POWER PLANTS

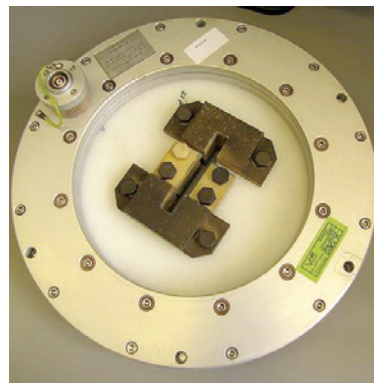
The purposes of the Loss Of Coolant Accident (LOCA) tests to verify the operability of electrical equipment in case of malfunction for areas require very high reliability as nuclear power plants. An occasional malfunction can be modelled in our accident simulation chambers with variable thermo hydraulic parameters (temperature, pressure, steam, high humidity and condensation).



DEVELOPMENT OF TESTING EQUIPMENT AND METHODS

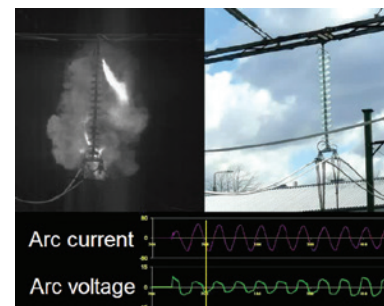
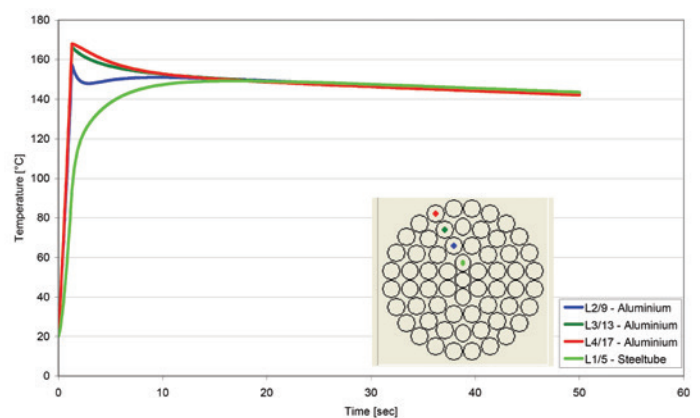
VEIKI-VNL Ltd. founded a division for serving the support of the measuring technique and develops new testing or diagnostics equipment and software as follows:

- Method and equipment for corrosion detection of ACSR conductors
- Method for power line diagnostics
- Software for the short-circuit temperature rise calculation of conventional and OPGW conductors
- Data base management and evaluation software for overhead line diagnostics
- Rogowski-coil current measuring system up to 200 kA with accuracy of 0.5%
- Michro-ohm meter with max. test current of 200 ADC with accuracy of 0.2%
- Modular multichannel optical transient recorder with sampling rate of 500 kHz with accuracy of 0.1%

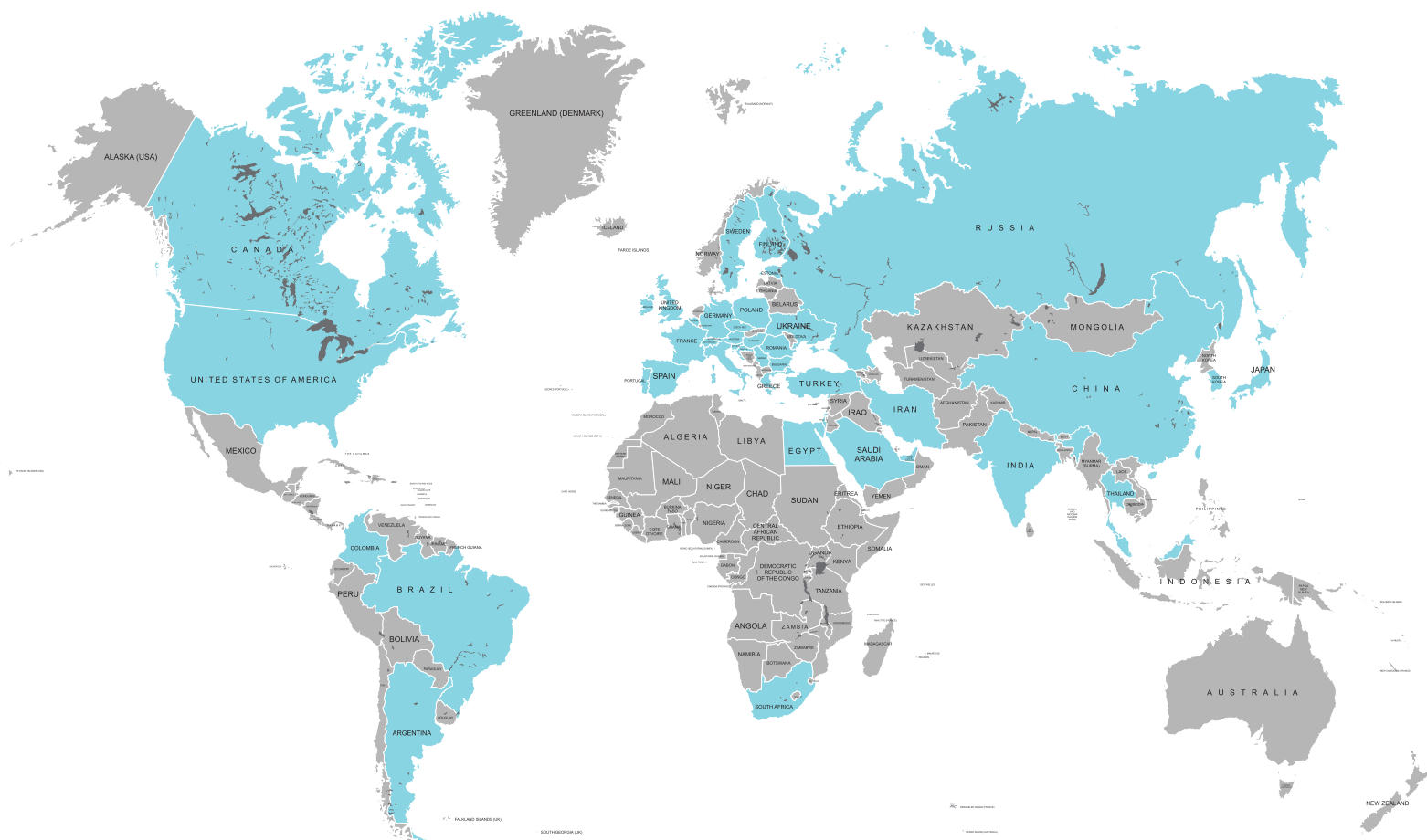


EXTRA SERVICES

- Binocular, image intensifier (photo multiplier) equipment and day-light UV camera for detection of visible corona
- Digital high-speed video camera up to 6000 fps (2000fps in full resolution) for evaluating flashovers and mechanical tests or the behaviour of the plasma channel during the power arc tests on insulator sets
- (Optical) pressure measurements during internal arc tests or breaking tests or for short-circuit tests on liquid-immersed equipment
- Infrared thermos vision camera for detecting hot spots on equipment



REFERENCES /PARTNERS



CONTACTS:

VEIKI-VNL Ltd.

H-1158-Budapest, Vasgolyó utca 2-4. HUNGARY

Phone: +36 1 417 31 57

Fax: +36 1 417 31 63

www.vnl.hu • vnl@vnl.hu

