

CHANCE[®]



WHERE RESEARCH SERVES POWER

ENGINEERING

www.hubbellpowersystems.com



Advancing Technology

The Chance laboratories advance technology through continuous research, development and testing of Chance products. The laboratories provide test services for utilities, other manufacturers and various clients in a highly confidential atmosphere.

Through constant upgrading and expansion, Chance laboratories remain a source for the latest in testing

expertise. The Research Center is integral to the Chance reputation as a leader in the development, improvement and performance verification of products which Chance supplies.

The Center provides short circuit, high voltage, heat run and mechanical testing services. Environmental and instrumentation labs, outdoor high voltage test



Testing Capabilities

High-Power Tests

- Fault Current Interruption
- Making Current
- Load Current Interruption
- Short Time and Momentary Current Carrying
- Magnetizing Current Interruption
- Capacitance Current Interruption
- "Short Line" Fault Interrupting
- Combination High Current-High Voltage

- Continuous Current Temperature Rise
- Load-Life
- AC Power Frequency
- Current Cycling

Dielectric Tests

- DC High Voltage
- Radio Noise
- Corona
- Impulse
- 60 HZ AC Withstand
- Oil Puncture

Additional Tests

- Radio Frequency

- Shielded Room
- Environment-Temperature, Humidity, Corrosion
- Mechanical
- Contamination
- M and E Ratings
- Material Analyses

Supporting Facilities

- Computerized Design and Manufacturing (CAD/CAM)
- Model Shop
- Assembly Facilities



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areas and auxiliary equipment such as high-speed video capability also are provided. A complete model shop, materials development laboratory, reproduction and microfilm facilities, as well as advanced computer capability, support Chance design and testing engineers in product development.



F. Gano Chance Engineering Research Center,
Centralia, MO, USA



Chance testing goes far beyond the gates of the Research Center. Extensive field testing of products is part of our R & D efforts.

Short Circuit Laboratory

The generator, vacuum circuit breaker and backup SF₆ circuit breaker were specially designed and built by General Electric, Holec and Cogener Alstom respectively. Various transformers are available for tests at voltages and currents not obtainable directly from the generator.

A synchronous closing switch, with adjustable closing angle, is used to initiate tests involving asymmetrical currents. Banks of reactors and resistors are

utilized for current limiting, impedance control and power factor determinations. The switch and the reactor and resistor banks were designed and constructed by Chance engineers.

Test data is immediately available from the laboratory's analog or digital instrumentation recording devices. These include Hioki recorder and Hi Techniques data acquisition systems.

Precisely controlled
circuit breaker operation lends
flexibility to
high-current testing.



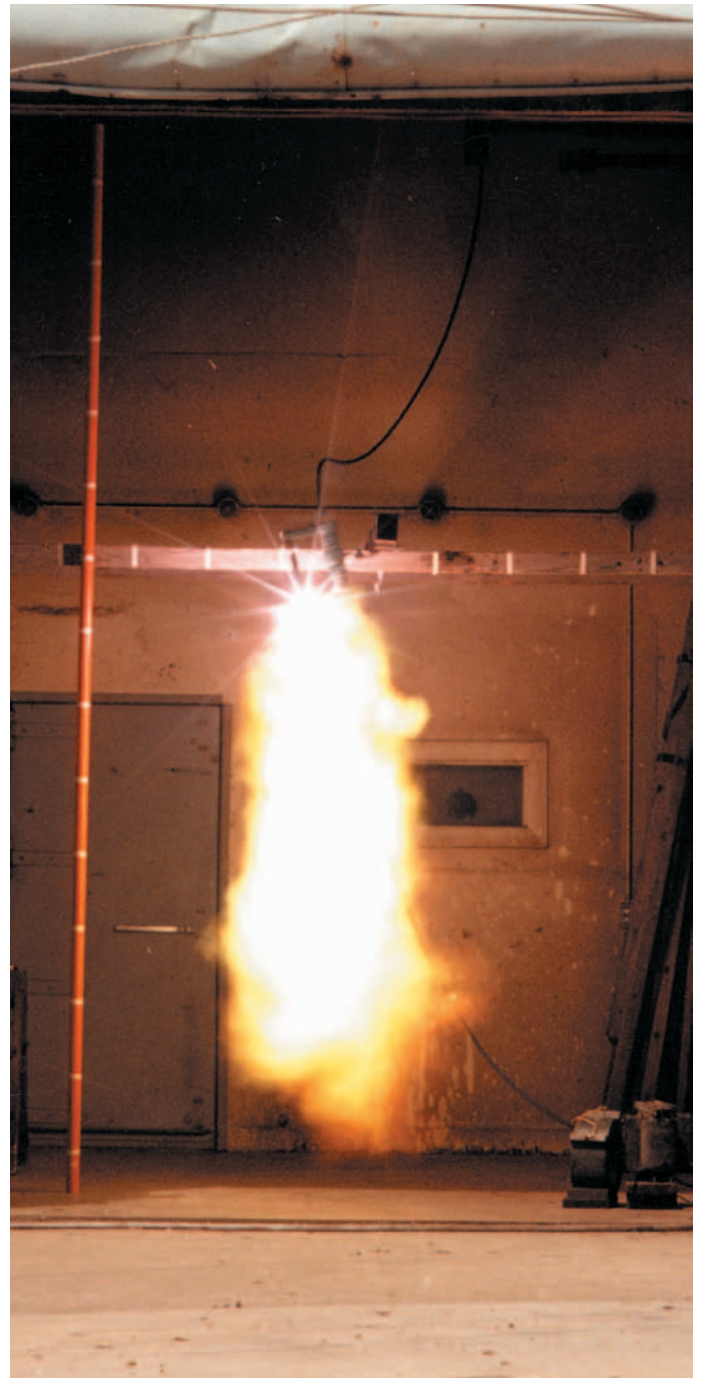
High-power 762 MVA
short circuit test
generator.

Fault-current closing and interrupting are among the tests performed on switchgear, transformers, grounding equipment, protective devices and underground distribution products. Power-follow arcing and fuse melting tests also are conducted in the short circuit laboratory.



Short circuit laboratory control room.

Interrupting test on cutout.



Available Maximum Voltages and Currents

Phases	Voltage (in KV)	Symmetrical Current	Asymmetrical Current	X/R Ratio
1	4.475	58,200	71,000	4.40
1	7.75	46,400	64,200	7.90
1	8.95	42,200	60,400	9.16
1	13.4	30,950	—	—
1	15.5	26,900	41,500	14.35
3	4.475	63,000	77,000	4.45
3	7.75	49,300	69,000	8.18
3	8.95	45,000	64,800	9.5
3	15.5	28,400	44,000	14.95

Maximum capability of the generator (excluding bus impedance): 762 MVA

Transformers: Single-phase or three-phase.

- A - 200 MVA at 13.8 kV/23.0, 34.5, 46.0 or 69 kV.
- B - 250 KVA at 12.47 kV/34.5 kV with normal taps.
- C - Current transformers, single-phase, 70 KA maximum for momentary and 3 second tests.

High Voltage Laboratory

The high voltage laboratory complex combines indoor and outdoor facilities. It is equipped to perform all types of dielectric tests such as 60 Hz withstand, flashover and lightning impulse. Other test capabilities include corona inception/extinction level, radio noise interference, insulated boom bucket truck certifications

and dielectric oil puncture.

A 2,400 kV impulse generator supplies the energy for lightning impulse tests. Designed for use at 1.2 x 50 micro-sec. wave-form as well as 1.5 x 40 micro-sec. wave-form, it is capable of steep wave tests with the rate of rise to 7,500 kV/micro-sec. Higher rates of rise are obtainable



Tests are typically performed in accordance with ANSI, IEEE, IEC or other standards.



High Voltage Test Facilities

IMPULSE TESTING

10 kV to 2,000 kV at 30 kJ maximum.
1.2 x 50 micro-sec. and 1.5 x 40 micro-sec. wave-form.
Steep wave testing to approximately 7,500 kV/micro-sec. nominal.

60 Hz TESTING

0 to 1,000 kV at 150 KVA maximum with variable rate of rise.
0 to 100 kV at 10 KVA mobile unit.

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under specific circuit conditions.

The high voltage laboratory also features two 60 Hz transformers for testing switchgear, cutouts, line insulators and other apparatus. One is a stationary unit used primarily for HV and EHV dielectric testing. The other is a mobile transformer for studies requiring less than 100 kV.

Appropriate instrumentation such as an impulse voltmeter and oscilloscope is utilized. Wet flashover tests incorporating demineralized water also are conducted here.



High voltage dielectric tests such as 60 Hz withstand, flashover and lightning impulse are frequently performed in the high voltage laboratory. Other capabilities include corona inception/extinction level, radio noise interference, insulated boom bucket truck certification and dielectric oil puncture.

RADIO INFLUENCE VOLTAGE TESTING

0 to 100 kV with Eaton Model NM-21FFT RIV Meter with old or new NEMA circuit.

CORONA TESTING

Visual corona tests either indoor or outdoor.

Mechanical Laboratory

Material structural integrity is verified in our mechanical laboratory. Tests involving tension, compression, torsion or cantilever are made to determine if materials qualify for product incorporation. Final product design also is tested to verify

the specifications of product, and its ability to meet ANSI, NEMA, ASTM or other required standards. Many tests are conducted in outdoor facilities. They include full-scale testing of conductor support members. Portable hydraulic pumps and anchor test rigs perform field testing.

Earth anchors and anchor rods are frequent subjects of high-torque testing.



Power screw 60,000-pound vertical test machine.



Environmental effects on products are determined using ultraviolet light, salt-fog and humidity tests. Temperature rise tests conducted here consist of two types of measurements: Maximum temperature reached under continuous current application and maximum temperature under load cycling.

Environmental tests allow measurement of ultraviolet and condensation attacks on products. Salt-fog tests are also conducted in the environmental laboratory.



Mechanical Laboratory Testing Machines:

Riehle HT-120, horizontal 120,000 pound hydraulic machine with one percent load holder and recorder. For tension, cantilever and beam loading.

Riehle PS-60, vertical, 60,000 pound screw-type machine with load pacer and recorder. For tension and compression tests.

Accessories: Extensionmeter and deflectometer for the PS-60 and autosyn pickup for the HT-120.

Detroit-modified, horizontal, 150,000 pounds hydraulic-tension machine. Capable of load cycling.

Baldwin BTE UTM 300,000 pound tensile tester with standard wedge grips and inserts for flat or round specimens.

Impact testing machines: Pendulum type, 680 ft.-lb.; Charpy type, 30 ft.-lb.; Cantilever (Izord type), 30 ft.-lb.; Weight drop type, variable weight and drop height (to 20 ft.).

Torque testing machine: 30,000 ft.-lb. hydraulic capable of reverse load-cycling applications.

Environmental Laboratory Testing Equipment:

Ultraviolet

Q.U.V. Accelerated Weathering Tester

Salt Fog

Atotech Model 23

Salt Fog Chamber

Humidity

Chance humidity chamber for 98 percent relative humidity.

Water Conditioning Equipment

Culligan Mixed Bed System

+ Duobed System

Omega Model PHH-25 pH meter

LaMotte Model CON6 conductivity meter

Environmental Chamber

Ecosphere Model ECH619 -50°C to +175 °C

Environmental Chamber

Ecosphere Model ECH 619 -50°C to 175°C + temperature cycle

Ovens

Forced air oven to 450° F

Muffle furnace to 2,000° F

Additional Testing Capabilities

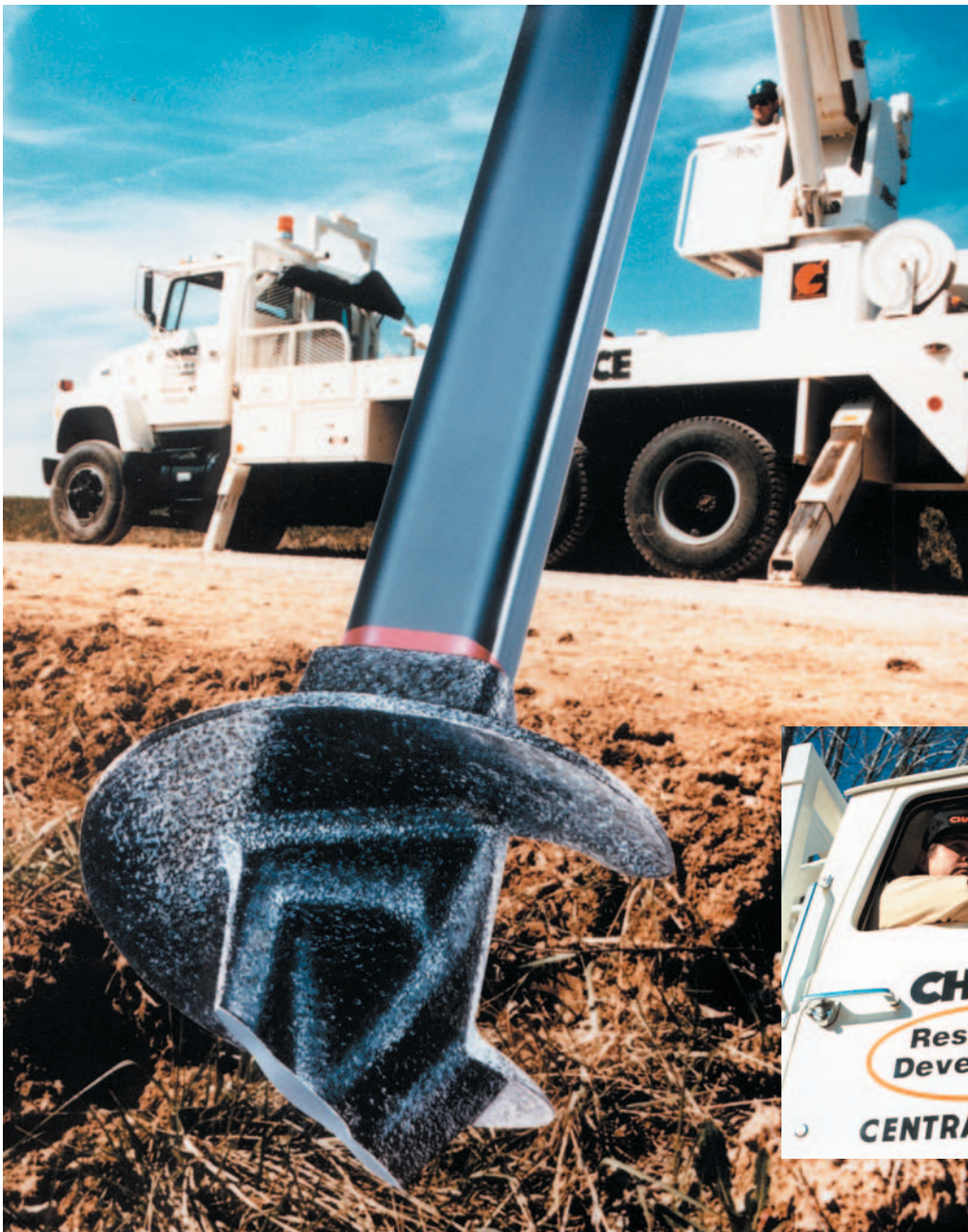


Temperature Rise

Tests on conductors, clamps and connectors are conducted in the heat-run laboratory. Automatic cycling, thermocouple measurements and resistance measurements are performed. Facility includes several variable power sources (667 A at 12 V to 4,000 A at 2 V and 50 A at 100 V to 2,000 A at 2.5 V) as well as digital and analog recording instruments for continuous or programmed test monitoring.

Instrumentation

Portable measuring and calibration/recording equipment is available for varied testing procedures throughout the Center. Instrumentation accuracy is traceable to the National Bureau of Standards.



Whether indoors or out, above or below the ground surface, Chance engineers conduct demanding tests on a wide variety of products.



About Hubbell Power Systems

Hubbell Power Systems (HPS) manufactures a wide variety of transmission, distribution, substation, OEM and telecommunications products used by utilities. HPS products are also used in the civil construction, transportation, gas and water industries. Our product line includes construction and switching products, tools, insulators, arresters, pole line hardware, cable accessories, test equipment, transformer bushings and polymer precast enclosures and equipment pads.

CHANCE[®] • 210 N. Allen Street • Centralia, Missouri 65240-1395 • Tel. (573) 682-5521 • Fax (573) 682-8475

Hubbell has a policy of continuous product improvement. We reserve the right to change design and specifications without notice.

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