

CABLE TYPE & ROUTINE TESTING

APPLICATION GUIDE





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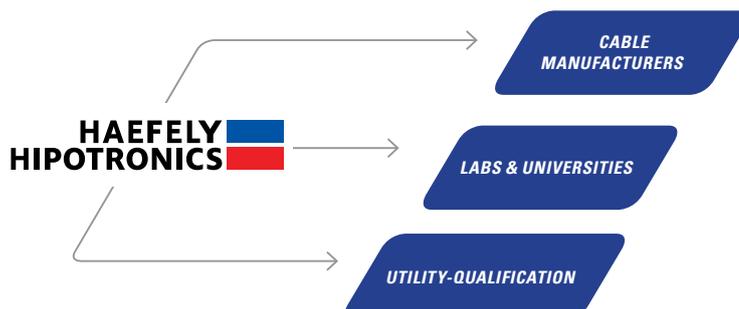
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MARKET SEGMENTS

CUSTOMER BASE FOR CABLE & WIRE TESTING

HAEFELY HIPOTRONICS has always been on the forefront for cable & wire testing. From our standard AC dielectric test systems to our resonant test systems, we have been able to provide solutions for testing of a wide range of high voltage cables.

We also offer cable terminations, water processing units, impulse generators, and complete test labs with shielded rooms (through our engineering package) - making us the largest high voltage cable test supplier to the cable industry.



PRODUCT LINE OVERVIEW

High voltage testing on cable and wire insulation is an important process for all cable manufacturers. A high voltage cable test includes AC withstand, partial discharge, DC hipot and much more.

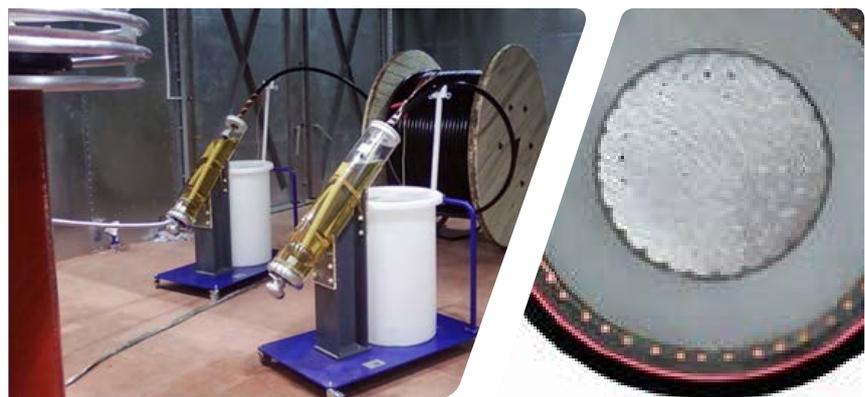
The main purpose of these high voltage cable tests is to verify the cable's insulation integrity before it is installed in the field. Today's cables must be able to carry higher voltages, weigh less and be more durable than in the past. This is exactly why high voltage test equipment is such a crucial aspect of the cable and wire industry.

	MSR SERIES	TSR SERIES	700 SERIES	UHVDC SERIES	SGSA/SGDA/SGVA	LV SERIES	DDX SERIES	2840 + NK
APPLIED AC	•	•	•					
ULTRA HIGH VOLTAGE DC				•				
IMPULSE					•			
HEAT CYCLE						•		
PARTIAL DISCHARGE	•	•	•	•			•	
POWER FACTOR / C TAN δ	•	•	•					•
DC HIPOT				•				

MODERN AND ACCURATE



For information about our new RSKF onsite variable frequency resonant test system designed for cable testing, visit our website and download the product guide.



APPLIED AC TESTING

SERIES RESONANT SYSTEMS (MSR & TSR)

The Modular Series Resonant (MSR) and Tank Series Resonant (TSR) high voltage test systems are designed to provide AC test power for cables with test requirements according to the latest IEC, AEIC and UL standards.

As part of a series resonant circuit, the MSR & TSR systems provide undistorted high voltage at source frequency for testing high capacitive loads. Moreover, the systems only require low, single-phase input power which results in lower installation and operating costs.

FEATURES

- ✓ Minimum power requirements
- ✓ Compact design
- ✓ Multiple Q values to meet a variety of operations
- ✓ Multiple configurations/tapping for different voltage classes

ACCESSORIES & OPTIONS

- Cable terminations
- PD measuring equipment
- Power factor / C tan δ measuring equipment
- Shielded room
- Engineering package for room design
- Air cushions for increased mobility (MSR)

	KV CLASS CABLE		SYSTEM RATING (kV)	ROUTINE TEST (R) TYPE TEST (T)
	Um (kV) Per IEC	Per AEIC		
TSR75-750	45	35	75	R
TSR100-1M0	66	46	100	R
TSR150-5M0	66	69	150	R
TSR200-2M0	138	115	200	R
TSR250-2M5	161	138	250	R
TSR350-6M0	230	230	350	R
TSR350-9M0	230	230	350	R
MSR500-16M0	375-400	⊖	500	R
MSR500-20M0	375-400	⊖	500	R
MSR600-60M0	500	⊖	600	R
MSR650-60M0	500	⊖	650	R
MSR700-24M5	500	⊖	700	R
MSR750-37M5	500	⊖	750	R
MSR800-4M8	500	⊖	800	T
MSR1200-7M8	500	⊖	1200	T

MODEL



*This is a list of standard models used for power cable testing. Please consult factory for different voltage and power ratings. Also note that standard input frequency is 50 or 60 Hz.

700 SERIES

HAEFELY HIPOTRONICS' 700 Series AC dielectric test systems are available in a wide range of voltage and power ratings to meet requirements for testing low and medium voltage cables.

The simple-to-use Tausch Screen PLC (TS-PLC) controller allows the user to manually control the system or program a test sequence. Data from tests can also be saved and exported with data acquisition software (optional).

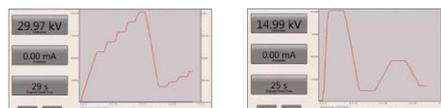
MODEL	kV CLASS CABLE		VOLTAGE RATING (kV)	CURRENT RATING (A)
	Um (kV) Per IEC	Per AIEC		
710-5	3.6	—	10	0.5
710-100	3.6	—	10	10
715-20	7.2	—	20	1.33
720-100	7.2	5	20	5
730-60	17.5	8	30	2
730-100	17.5	8	30	3.33
730-150	17.5	8	30	5
775-60	52	35	75	0.8

*This is a list of standard models used for power cable testing. Please consult factory for different voltage and power ratings. Also note that standard input frequency is 50 or 60 Hz.

700 SERIES



TOUCH SCREEN-PLC CONTROLLER



FEATURES

- ✓ Low impedance designs for power components
- ✓ Zero start interlock
- ✓ Up to 10 dwell steps possible
- ✓ Adjustable overload

ACCESSORIES & OPTIONS

- Data acquisition software
- Remote PLC controller
- Cable terminations
- Partial discharge measuring equipment
- Power factor / C tan δ equipment



ULTRA HIGH VOLTAGE DC TESTING

UHVDC SERIES

HAEFELY HIPOTRONICS' line of UHVDC test systems are designed to perform ultra high voltage DC insulation tests on cable in accordance with CIGRE 219, 496 & 189.

The UHVDC systems are built with standard interchangeable modules that allow for easy setup and cost-effective expansion for future DC cable testing requirements. The unique electrical and mechanical design minimizes floor space requirements, which allows for easy (dis)assembly and enhances mobility.

FEATURES

- ✓ Low ripple (< 3%) displayed real-time
- ✓ Quick polarity reversal meets latest standards
- ✓ Mobile system design
- ✓ Minimal footprint
- ✓ Expandable

ACCESSORIES & OPTIONS

- Low PD level specification
- Partial discharge measuring equipment
- Visible ground systems
- Casters or air cushions for increased mobility
- Standoff bleed resistors

PER CIGRE

	CIGRE 219 < 250 kV	CIGRE 496 < 500 kV	CIGRE 189 < 800 kV
8600-10/20	•		
8800-10/20	•	•	
81200-10/20	•	•	•
81400-10/20	•	•	•
81800-10/20	•	•	•

*Note that standard input frequency is 50 or 60 Hz.



IMPULSE TESTING

SGDA / SGVA / SGSA

We offer a wide range of impulse generators to meet your lightning impulse type test needs. Due to its unique design, transportation and assembly of SGDA/SGVA/SGSA systems are less time-consuming and less costly than other systems on the market.

HAEFELY HIPOTRONICS impulse test systems can also be upgraded in various ways to achieve different waveshapes or to increase your test voltage capabilities.

FEATURES

- ✓ Expandable (SGDA, SGVA)
- ✓ Low internal inductance
- ✓ Reliable and accurate testing
- ✓ Included lightning impulse resistors
- ✓ Protective safety grounding device

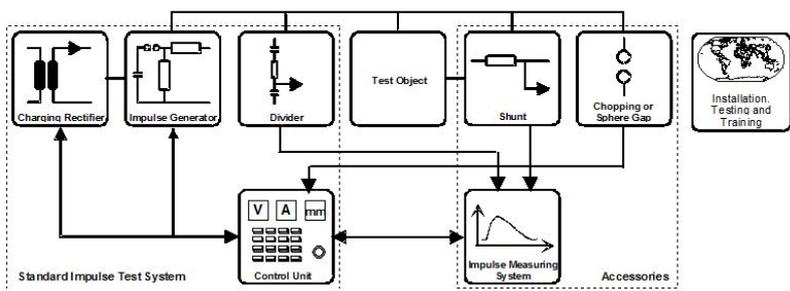
ACCESSORIES & OPTIONS

- Water terminations
- Additional series and parallel resistors
- Air cushions for increased mobility
- Set of resistors for switching impulse



	Um (kV) Per IEC	TEST VOLTAGE (kV)
SGSA 400-20	52	250
SGSA 600-30	72.5	325
SGSA 1000-50	123/145	550/650
SGDA 1200-60	170	750
SGDA 1800-90	245/300	1050
SGDA 2000-100	362	1175
SGDA 2400-120	420	1425
SGDA 2600-230	550	1550

*Note that standard input frequency is 50 or 60 Hz. Contact factory for SI option for CTT.

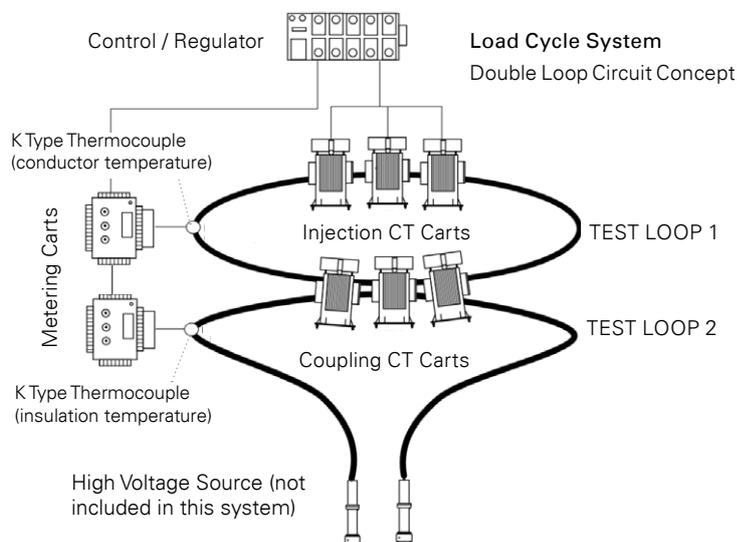


HEAT CYCLE TESTING

LV SYSTEMS

Our LV Heat Cycle Test Systems are designed and built for type testing of cable. These systems raise and control the temperature of a conductor to simulate the current loading conditions in an electrical circuit.

The heating is achieved by utilizing the test loop as the secondary winding of a current transformer for inductive heating.



FEATURES

- ✓ Mobile CT carts with castors
- ✓ Capacitive compensation
- ✓ Main power breaker
- ✓ Temperature set controls
- ✓ Integrated chart recorder
- ✓ Split core CT design for easy loading of cable

	VOLTAGE RATING (V)		CURRENT RATING (A)	NUMBER OF LOOPS
	(50 Hz)	(60 Hz)		
LV15-2000-1	12.5	15	2000	1
LV15-3000-1	12.5	15	3000	1
LV30-3000-1	25	30	3000	1
LV45-2000-1	37.5	45	2000	1
LV45-3000-1	37.5	45	3000	1
LV45-5000-1	37.5	45	5000	1
LV30-3000-2	25	30	3000	2
LV45-3000-2	37.5	45	3000	2
LV45-5000-2	37.5	45	5000	2
LV75-3000-2	62.5	75	3000	2
LV75-5000-2	62.5	75	5000	2

*Note that standard input frequency is 50 or 60 Hz.

GENERAL ACCESSORIES

CABLE TEST TERMINATIONS & WATER PROCESSING UNIT

HAEFELY HIPOTRONICS' Cable Test Termination Systems (CTTS) have earned the industry's confidence and have gained an image as first-class products. Following our philosophy of continuous product improvement, we have upgraded the entire product line.

The CTTS makes high voltage testing of cables fast and easy. Long-term ownership costs are low due to short peeling lengths for routine testing, interchangeable tubes with higher LI specification for impulse tests, and SI specifications. The **Water Processing Unit's (WPU)** state-of-the-art technology regulates the conductivity of water and serves as a cooling system. Thermal losses, which are generated in the CTTS during the cable test, are dissipated in the WPU to avoid overheating.

FEATURES

- ✓ Reduced peeling lengths and optimal preparation time
- ✓ AC, LI, & SI guaranteed specification
- ✓ Withstand voltage test possible at 20% higher than rated AC voltage

ACCESSORIES & OPTIONS

- ✓ Longer interchangeable tubes for higher LI & SI test levels
- ✓ C / tan δ testing point
- ✓ SI service package
- ✓ Remote control

MODEL	VOLTAGE AC (kV)		VOLTAGE LI (kV)	VOLTAGE SI (kV)	MAX. CABLE \varnothing (mm)
	200	450	—	—	
CTT 200	200	450	—	—	115, 130
CTT 250	250	550	—	—	115, 130, 165
CTT 350	350	750	—	—	115, 130, 165
CTT 400	400	950	—	—	130, 165
CTT 500	500	1200	950	—	130, 165
CTT 600	600	1500	1000	—	130, 165
CTT 700	700	1600	1100	—	165
CTT 800	800	1900	1200	—	165
CTT 1000	1000	On Request			



KEV

KEV Series cable test terminations are used for AC testing as well as partial discharge and tan δ measurements on plastic-insulated medium voltage cables.



FEATURES

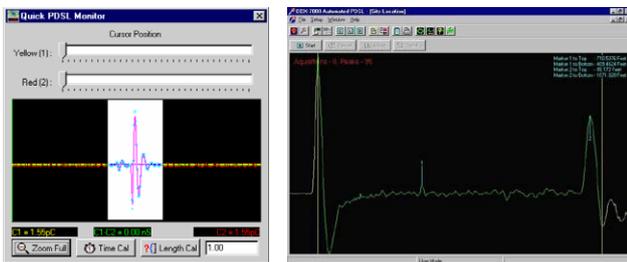
- Easy handling
- Short cable preparation times
- Quick set-up times

PARTIAL DISCHARGE

DDX7000 / 8003

The HAEFELY HIPOTRONICS DDX Digital Partial Discharge Detectors offer high accuracies, real-time displays and a user friendly interface.

The DDX7000 / 8003 models are specifically designed for the power cable industry and include PD site location technology.



FEATURES

- ✓ Easy operation
- ✓ Automatic calibration
- ✓ Real-time display
- ✓ Site location
- ✓ Advanced analysis capability

POWER FACTOR / C TAN δ

2840

The 2840 measuring bridge is designed for measurement of low dielectric losses and impedances of high voltage apparatus such as the insulation of bushings, transformers, generators and power cables.



FEATURES

- ✓ Accuracy capacitance 0.2%, $\tan \delta$ 1×10^{-5}
- ✓ Signal analysis capability
- ✓ Capacitive and inductive analysis
- ✓ Touch screen interface
- ✓ Manual or automatic operation

NK SERIES

The NK Series of SF₆ Gas-Insulated Standard Capacitors is used as a comparison standard when measuring capacitance and dissipation factor $\tan \delta$ of electrical apparatus and insulating materials.



ACCESSORIES & OPTIONS

- ✓ SF₆ filling device
- ✓ Connecting fittings
- ✓ Additional capacitance C₁₃ for capacitive divider voltage measurement

ENGINEERING PACKAGE

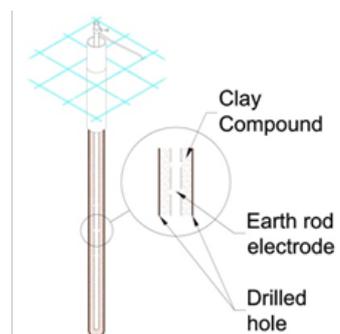
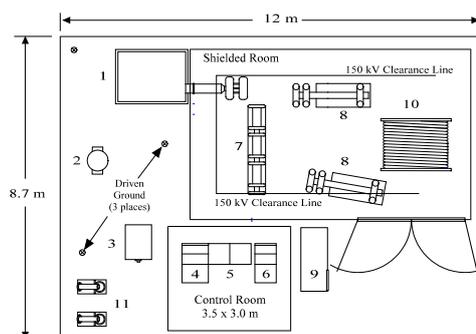
CABLE TESTING

The design of a high voltage test area will need to comply with the requirements to perform partial discharge (PD) measurements according to IEC, AEIC, UL and other high voltage standards. HAEFELY HIPOTRONICS offers experienced design and construction supervision of the high voltage test area to ensure that our customers can successfully measure partial discharge.

Below are just a few examples of what HAEFELY HIPOTRONICS includes in the **Engineering Package**. With our experience installing high voltage cable test systems and with our team of design and field service engineers around the world, we aim to ensure the best quality test area for the application.

WHAT'S INCLUDED:

- Shielded room, including design work (optional)
- Drawings of the proposed location of the test equipment
- Recommended grounding and conduit drawings for the test area
- Multiple visits to the customer site for review of drawings and construction progress
- Inspection of:
 - ✓ Steel reinforcement and ground provisions before pouring concrete floor
 - ✓ Conduit installation and other test area construction
 - ✓ Ground system for isolation level
 - ✓ Lighting and control room
- Operator training





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