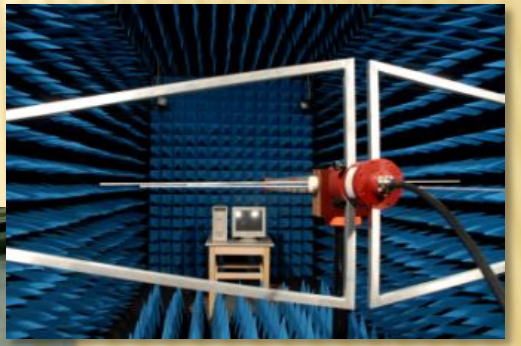
NATIONAL INSTITUTE FOR RESEARCH-DEVELOPMENT AND TESTING IN ELECTRICAL ENGINEERING

I C M E T



CRAIOVA

Short history

• **ICMET Laboratories Department** (HV & HP) was built within1968-1974, extended in 1978 and 1981 as part of **CIMAE** (Electrotechnical Industrial Group) based in Craiova at ELECTROPUTERE

• Essential contribution for the implementation of 220 and 400 kV insulation classes in Romania

• Registered in 1982 at OMPI Geneva (World Intellectual Group) based in Craiova at **ELECTROPUTERE**

• From 1990: Independent government-owned Research, Development & Testing National Institute for Electrical Engineering (self-financed) under aegis of **Ministry of National Education and Scientific Research.**

Mission. New Activity Fields

ICMET Laboratories Department acts as a competence center in the field of research, development and testing and quality certification for electric equipment, permanently engaged in innovative certification contained in the research platforms of European Union, nationally and internationally recognized by accreditations got at European level in the field of high voltage, high current tests and electromagnetic compatibility.

Accreditations and acknowledgments

RENAR
Romanian
Accreditation
Association
www.renar.ro

High Power
Testing Laboratory
LI – 004
lmp@icmet.ro

Low and High Voltage
Testing Laboratory
LI – 1036
lit@icmet.ro

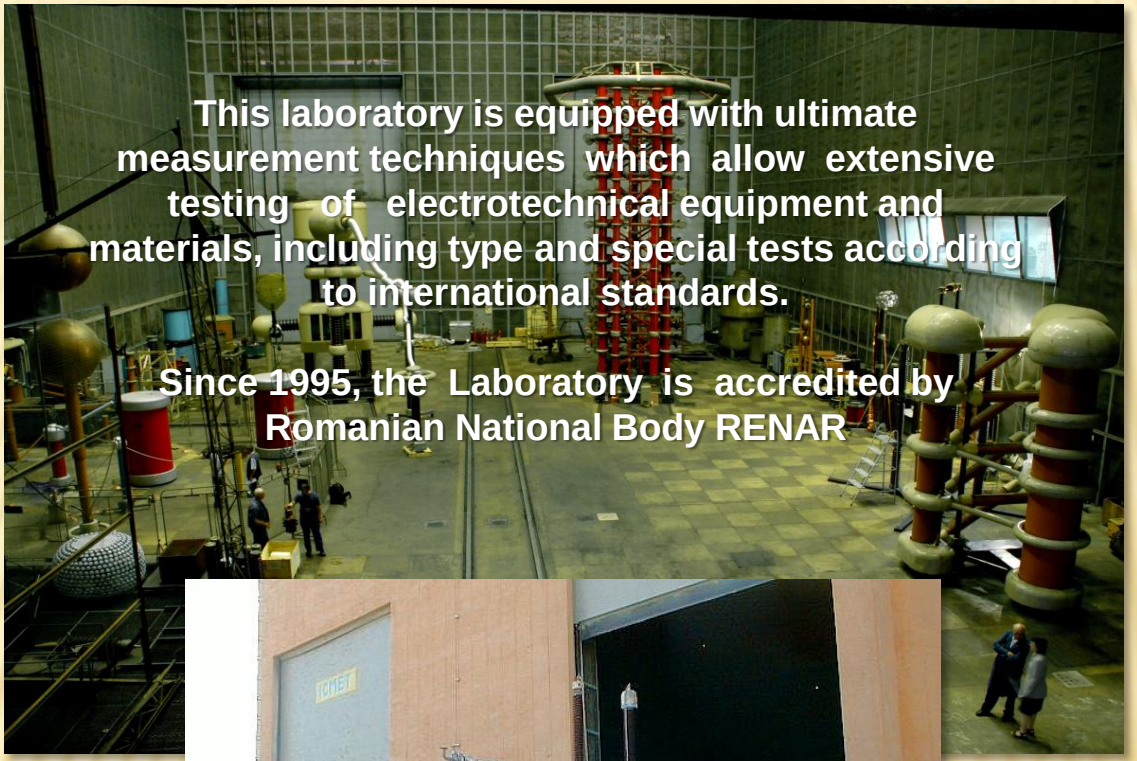
The Laboratories have been accredited by
Romanian National Body RENAR
(member of **ILAC** and **EA**)

- **MRC Romanian Movement for Quality**
  - Quality Management System – ISO 9001: 2008
  - Environment Management System - ISO 14001: 2005
  - Occupational Health and Safety Management System - OHSAS 18001: 2008
- **Member of LOVAG**
- **Applicant member of STL**
- **Acknowledgments**

ANRE Romanian Energy Regulatory Authority
www.anre.ro

TRANSELECTRICA Romanian Power Grid Company
www.transelectrica.ro

Activities in Low & High Voltage Laboratory



This laboratory is equipped with ultimate measurement techniques which allow extensive testing of electrotechnical equipment and materials, including type and special tests according to international standards.

Since 1995, the Laboratory is accredited by Romanian National Body RENAR

High Voltage Tests

IMPULSE	
lightning [kV]	switching [kV]
4200 (336kWs)	2600
700 (4.9kWs)	300

AC

(25 to 150) Hz

[kV]	[A]
1200	1.2

50 Hz

[kV]	[A]
200	1.0
350	1.0

(25 to 150) Hz three phases

[kV]	[MVA]	(min)
15; 35; 110	5	2

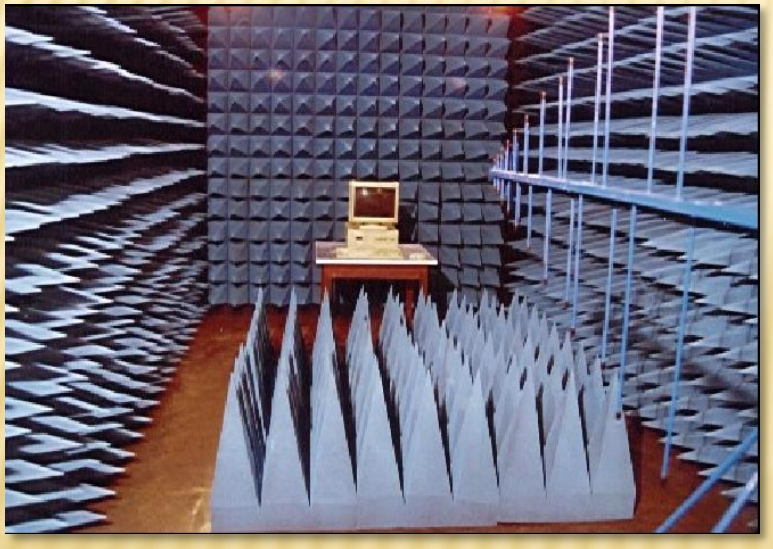
DC	
[kV]	[mA]
1100	30

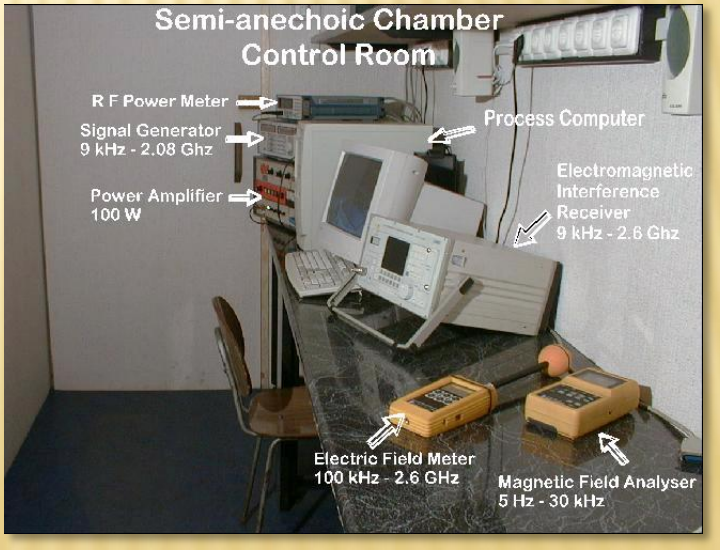
➢ High voltage tests for HV equipment (transformers, cables, switchgear, GIS etc.)

- Full wave and tail chopped wave voltage impulse tests at voltages up to 4200 kV and energy 336 kWs
- Applied voltage tests at frequencies between 25 and 150 Hz up to 1200 kV
- Single and three-phase induced voltage tests, 5 MVA, 2 min.
- DC voltage tests up to 1100 kV 30 mA
- Aperiodic switching impulse tests up to 2600 kV
- External insulation test under artificial rain for equipment up to 550 kV rated voltage
- Partial discharge and radio interference measurements
- Combined voltage tests: LI - AC, SI - AC, DC - LI, DC – SI
- Electrical & mechanical test of polymer insulators, salt fog ageing inclusively
- Instrument transformers error before and after short circuit testing
- Partial discharge measurement at instrument and power transformers by electric and ultrasonic method
- Power transformer and cables dielectric spectroscopy
- Checking windings mechanical condition of power transformers by **FRA** method
- Humidity assessment for large power transformer insulation system

EMC Tests

This facility is the most important EMC Laboratory in Romania.
In 2000 the semi-anechoic chamber was put into operation, the first of this kind in Romania.
The immunity tests, conducted disturbance and radiated disturbances measurements are performed at present according standards.





Low Voltage Tests

Main testing equipment

- **Safety compact tester:**
  - HV generator up to 5 kV AC;
  - PE resistance measurement up to 0,5Ω
- **Impulse generator 1.2/50µs** up to 20 kV
- **Digital megohmmeter** up to 5 kV
- **Power clamps** up to 2 kA
- **Digital thermometer** with PT 100 probe
- **Pendulum and spring hammers**

Main tests LV Directive 2006/95/EC

Dielectric tests:
- insulation resistance
- dielectric strength
- clearances and creepage distances

Protection against electric shock:
- PE circuit test
- marking

Operating tests:
- power and current measurement
- heating

Mechanical impact tests

Products to be tested

- LV switchgear and controlgear assemblies
- Auxiliary and control circuits of HV switchgear and controlgear
- Household appliances
- Information technology equipment
- LV switchgear and controlgear
- Electrical equipment of machinery
- Handheld tools
- Audio and video apparatus
- Electrical equipment for measurement, control and laboratory use
- Electrical toys

Mechanical and Environmental Tests

- **MECHANICAL TESTS** (tensile, bending, torsion, compression)
- **FIRE HAZARD TESTING**
- **ENVIRONMENTAL TESTS**
- **SALT FOG TEST**
- **SPECIAL TESTS**

• water penetration test at electric cables
• waterproof test (ingress of moisture)
• sulfur dioxide test with general moisture condensation
• determination of the indentation hardness of plastics, rubber and ebonite (shore hardness)

- **DIELECTRIC TESTS AND PHYSICAL-CHEMICAL DIAGNOSIS OF ELECTRO-INSULATING SOLID MATERIALS**

Calibration Laboratory

High Voltage

Measured quantity / Calibration item	Range
DC Voltage	350 mV to 1000 kV
AC Voltage	1 V to 1200 kV
Lighting impulse	25 kV to 1800 kV
Switching impulse	25 kV to 500 kV
Impulse charge q	2 pC to 2000 pC

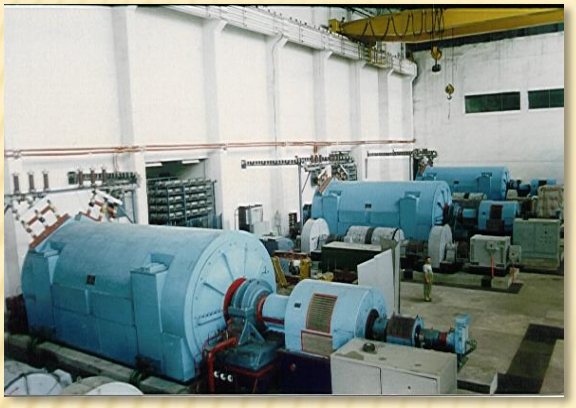
High Currents

Measured quantity / object under calibration	Range
High alternating current/ shunt and Rogowski coil	up to 140 kA_{eff} up to 350 A_{peak}
Resistance/ shunt resistor	From 4 μΩ to 200 4 μΩ

Electromagnetic field

Measurand/calibration item	Measuring range
HF electric Field Strength E/ HF Electric Field Strength Meters	10 V/m – 60 V/m
Magnetic Flux Density B/ Magnetic Flux Density Meters	10 mT≤B<900mT

Activities High Power Laboratory



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Direct Testing Circuit

Three short-circuit generators type TI - 100 - 2, 2500 MVA 12 kV, 120 kA, 50 Hz with parallel operation possibility

The parameters of medium and high voltage apparatus tests have the following ranges:

Three - phase tests:	Single - phase tests:
12 kV - 170 kA	12 kV - 170 kA
72.5 kV - 25 kA	123 kV - 25 kA
	170 kV - 15 kA

Parameters of low voltage apparatus tests and of short-time withstand current tests:

Three - phase tests:	Single - phase tests:
500 V - 135 kA/5s	500 V - 320 kA/5s
860 V - 80 kA/5s	2000 V - 80 kA/5s

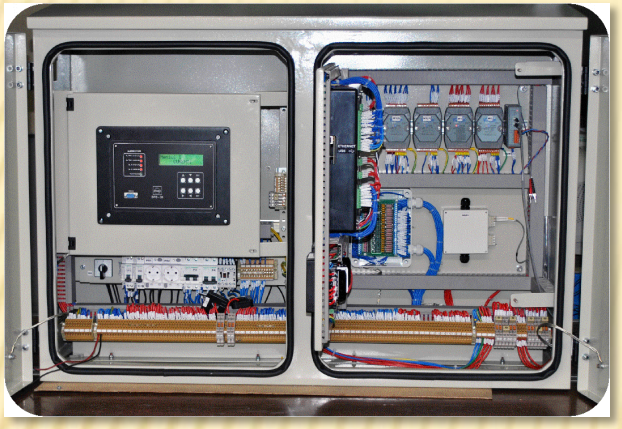
High speed making switches type VA - 12 M;
12 kV; 120 kA; accuracy ± 5° el.

OFFERED SERVICES

- Switching capacity test of the MV and HV circuit breakers, safety fuses, switch disconnectors and MV contactors
- Dynamic and thermal stability test of HV and LV apparatus, line elements, cables and prefab cells
- Ability to withstand the dynamic effects of short-circuit test of transformers rated up to 120 MVA
- Temperature rise tests of the current path of electric apparatus, line components, bars, with rated current up to 10 kA AC
- Temperature rise tests on power transformers, reactors and instrument transformers
- Mechanical endurance test for circuit breakers, disconnectors and contactors
- Measurement of the switching overvoltage level at the disconnecting of inductive and capacitive loads in networks up to 420 kV
- Short-circuit tests on surge arresters and short-circuiting and earthing systems
- Internal arcing tests on switchgear, prefabricated substations and instrument transformers
- AC Power arc tests on insulators for overhead lines

Research & Development Division for Electric Equipment and Energy Efficiency

Products and Services



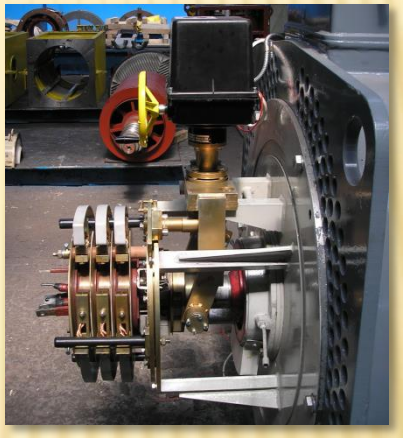
Monitoring and diagnosis systems for power transformers

Unique Romanian provider of products and services for Big-Blaster air cannon systems

Equipment and technologies for Vibratory Stress Relief

Research & Development Division for Electric Equipment and Energy Efficiency

Autotransformer with fine control of the output voltage



Equipment for slip ring short-circuiting and brush lifting for electric induction motors

Metallic and architectural shielded rooms

Accessories for power transformers: air filters, oil flow gauge/indicator, oil detection system

Performing energy audits according to the Guide for elaboration of energy audits, approved by the Decision no. 2123/23.09.2014 of ANRE President (Romanian Energy Regulatory Authority)

Consultancy and technical assistance for climatic tests (hot-cold limit temperatures and ice) on medium and high voltage electric equipment

HV Interlaboratory Comparison

EU - COPERNICUS
ERB-CIPA-CT 940137
1996

Comparative Measurements with **HIGHVolt** TRMS:
DC, AC, LI, SI

Project Manager: HighVolt Dresden

FP 5
SMT4-CT98-2270
1998-2002

Traceability and Mutual Recognition of Impulse Voltage Measurements: LI

Project Manager: Tech. Univ. Helsinki

DKD Ringvergleich

2002

Comparative Measurements with **ICMET** TRMS:
DC, AC, LI, SI

Project Manager: **PTB** Braunschweig

STL High-Current Inter-Calibration Project
2012

Inter-comparison tests of the STL reference shunt and the shunt owned by **ICMET**

Project Manager: **ST L**

International Cooperation

PTB **1991-2007**	**Force Calibration Lab** Dr.D.Peschel, Dr.A.Sawla **High Voltage Lab** Dr.K.Schon **High Frequency Lab** Prof.J.Glimm, Dr.T.Schrader
IEH Karlsruhe **1991-2004**	**IEH** - Prof.A.J.Schwab, Prof.T.Leibfried, Prof.A.M.Miri EMC, Transients in Power Transformers, Seismic Phenomena, Diagnosis & Monitoring
NTUA Athens **1996-1998**	**EE Faculty** - Prof.I.Stathopoulos PD Measurements
TU Eindhoven **1996-1998**	**EE Faculty** - Prof.G.Damstra HP Measuring Technique, Synthetic Tests
TU Berlin **2004**	**IEH** - Prof. W. Kalkner On line PD Measurement, Clamping Forces in Transformers
IEH Karlsruhe **2004-2006**	**IEH** - Prof. T. Leibfried Methods for on-site testing of transformers Experimental data processing
NIKDIM Kazanlak **2005-2012**	**NIKDIM** - Maria Georgieva Tests for verifying the breaking capacity of fuses Switching tests on load break switches
Univ. Paul Sabatier **Univ. Poitiers** **France** **2008-2016**	Internship in collaboration with University of Craiova Faculty of Electrical Engineering

Acces to ICMET Craiova

By plane (International Flights):

- Craiova - 4 Km
- Bucharest (240 Km to Craiova)
- Sibiu (225 Km to Craiova)
- Timisoara (330 Km to Craiova)

By car:

- from Belgrad - 360 Km
- from Budapest - 661 Km
- from Istanbul - 834 Km
- from Sofia - 320 Km

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