

## Thermal-Hydraulic Platform

Unique in the World

Unique in the world facilities for operating full-scale or scaled models to perform qualification tests of systems and components or to validate codes and calculations

### Challenge

Testing of components for qualification, design validation or for mechanical or thermal-hydraulic studies purposes requires well-equipped laboratories, qualified personal and a high-level quality management system.

### Solution

We offer a comprehensive testing platform. The thermal-hydraulic and components testing facilities comprise a total floor space of more than 2,000 m<sup>2</sup> and heights of up to 32 meters.

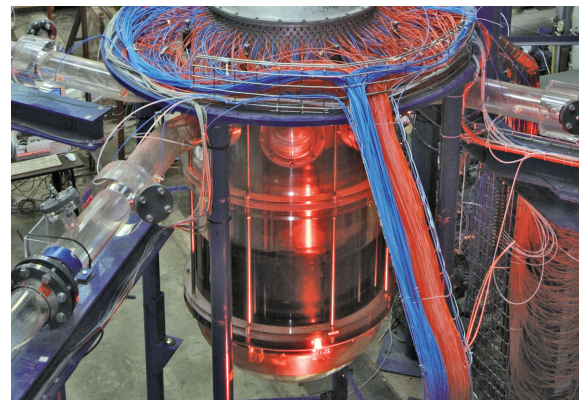
Following facilities are available:

- Crane capacities up to 100 t
- Thermal power supplies up to 25 MW
- Electrical power 20 MW
- Dose rate: 10<sup>-4</sup> x limit for unrestricted release
- Advanced measurement techniques.

Our accreditation as test and inspection body according to ISO 17025 and 17020 is valid for the following ranges:

Measurements	Measuring range
Temperature	0°C – 600°C; 600°C – 1,100°C
Pressure	7.5 Pa – 40 MPa
Volume flow	0.0005 m <sup>3</sup> /h – 100,000 m <sup>3</sup> /h
Mass flow	0.005 kg/h – 4,000 kg/s
Force	1 N – 10,000 kN
Torque	1 Nm – 50,000 Nm
Length	1 μm – 10 m
Velocity	1 mm/s – 100 m/s
Acceleration	0.05 g – 1,000 g
Current	1 μA – 85,000 A
Voltage	1 mV – 4 kV
Electrical power	up to 20 MW
Effective power	up to 420 kW
Weight	0.005 g – 3,000 kg
Insulating resistance	50 kΩ – 200 TΩ (10 V – 1,090 V)

**Your performance**  
is **our** everyday **commitment**



Scaled-model facility



Full-scale facility

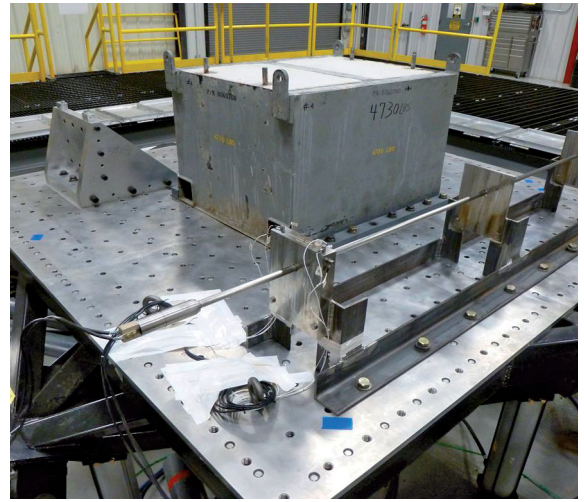
### Customer benefits

- Highly qualified, experienced scientists, engineers and technicians
- Knowledge base acquired over more than 40 years for high quality testing
- Technically convincing and economical solutions
- Reliable test results through accreditation as test and inspection body in accordance with ISO 17025 and 17020, accepted by ILAC

## Technical information

Our scope covers the following activities:

- **Qualifications tests**
  - Pumps
  - Valves
  - Instrumentation and control systems for loss-of-coolant accidents conditions
  - Steam generator components
  - Auxiliary system components
- **Systems tests**
  - Pressurized water reactor (PWR)/boiling water reactor (BWR) integral systems tests
  - Integral testing of sump strainer and downstream systems
- **Heat transfer and its limitations**
  - For severe accident conditions
  - For core flow with focus on fuel assemblies
  - Heat exchangers
- **Fluid dynamics and flow-induced vibrations**
  - Core flow and core components
  - Fuel assemblies
  - Singularities (T-junctions, etc.)
- **On-site activities**
  - On-site measurements of nuclear power plant components
  - Generation of databases
  - Component inspections



Mechanical test facility



Thermal-hydraulic test facility

## Some of our test loops

We operate the following test facilities:

- **KOPRA:** multifunction component test facility (fuel assemblies, control rod drive mechanisms, valves)
- **BENSON:** high-pressure thermal-hydraulic testing of separate effects
- **PKL:** large-scale test facility of a PWR primary loop with secondary side and auxiliary systems
- **PETER, BRIAN:** fluid dynamic test facilities (PWR and BWR fuel assemblies)
- **SUSI:** sump strainer test facility
- **APPEL:** sump test loop
- **GAP:** large valve test facility
- **INKA:** test facility for integral BWR tests
- **KATHY:** multifunction thermal-hydraulic test loop
- **HYDRAVIB:** vibratory validation of lower reactor pressure vessel (RPV) internals
- **ROMÉO & JULIETTE:** RPV flow distribution in upper and lower plenum
- **CALVA:** dynamic mechanical testing of components
- **MAGALY:** vibration behavior of rod cluster control assemblies and control rod guide assemblies for various flow conditions
- **Tri-axial seismic shake table:** 3.3 m x 3.3 m table platform, flexible mounting options for large equipment up to 9 tons

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