framatome

# INKA Test Facility

## Integral Test Facility for Boiling Water Reactor Passive Safety System

### A test facility for containment safety concepts under accidental conditions, for supporting experimental analysis of specific scenarios and for supplying data for code validation

## Challenge

Numerical codes modeling systems and containment are often used to analyze accidental scenarios in light water reactors. These computer codes use thermal-hydraulic correlations that are derived from active safety systems. With the use of passive safety systems, however, the need to validate and optimize these codes arises.

## Solution

The INKA test facility, more than 30 meters high, has been built by the Component Qualification Laboratory to test and demonstrate the performance of the passive safety systems of boiling water reactors. The specific design is derived from the KERENA reactor (3,370 MW thermal).

With its extensive instrumentation (presently about 300 measurement parameters can be recorded), INKA is a unique test facility for simulating accidental scenarios in the containment and for providing data in order to further improve system and containment modeling codes for all light water reactors.

INKA uses three vessels to represent the containment of modern boiling water reactors: the flooding pool vessel, the drywell vessel and the pressure suppression pool vessel.

With this test facility we can offer you to perform tests on the following components:

- Emergency condenser to passively remove energy from the containment
- Containment cooling condenser to passively remove energy from the containment
- Passive core flooding system
- Fuel pool cooler
- Vent pipes
- Passive pressure pulse transmitter.

Integral tests are performed to simulate transient and loss-of-coolant accident scenarios. The powerful infrastructure of the Component Qualification Laboratory (e.g. Benson boiler) supplies the test facility.

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

INKA test facility in Karlstein, Germany

## Customer benefits

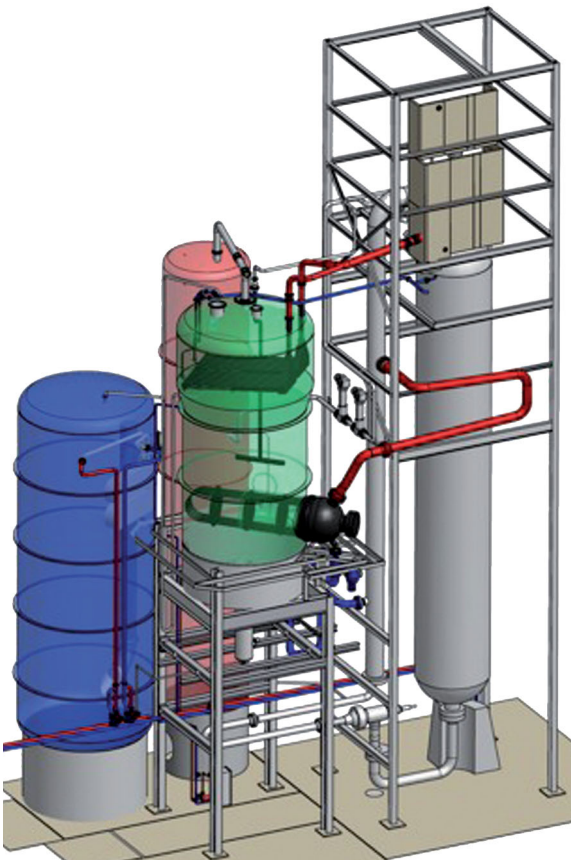
- Higher safety through experimental analysis of accident scenarios using active and passive safety components
- Higher reliability by validation of system and containment codes
- Extended possibilities with access to the Framatome thermal-hydraulic worldwide platform
- Reliable test results through accreditation as test and inspection body in accordance with ISO 17025 and 17020, accepted by ILAC

## Technical information

The test facility is equipped with the versatile DAKAR data acquisition system for recording temperatures, pressures and vibrations, among others. In cooperation with research institutes from Germany and Switzerland, further measurements have been implemented using thermo pin probes, void fraction probes and mass spectrometry.

**Additional fields of application**

- Long-term behavior in accident scenarios
- Heat transfer processes at water surfaces and stratification effects
- Condensation processes in pipes, e.g. containment cooling condensers and emergency condensers
- Influence of non-condensable gases on heat transfer capacities (separate analysis of individual systems or long-term effects in accident scenarios)
- Aerosol transport and deposition within containment
- Interactions and influences of various systems, active or passive, within the containment



Test set-up

## Features

- Unique test facility of this kind in the world for containment scenarios
- Scaling factors:
  - 1:24 in volume
  - 1:1 in height
  - 1:1 in component sizes
- Safety components:
  - Emergency condenser
  - Containment cooling condenser
  - Passive core flooding valve
  - Passive pressure pulse transmitter
  - Vent pipe, DN700
  - Fuel pool cooler
- Vessels:
  - Flooding pool vessel: 210 $m^3$
  - Drywell vessel: 190 $m^3$
  - Flow rate: 200 kg/s (saturated steam at 85 bar)
  - Pressure suppression pool vessel: 350 $m^3$
  - Reactor pressure vessel simulator: 125 $m^3$

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