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# DEREST Test Loop

## Debris Retention System Test Facility

## Qualification of debris retention system performance taking pressure loss, chemical effects and downstream effects into account

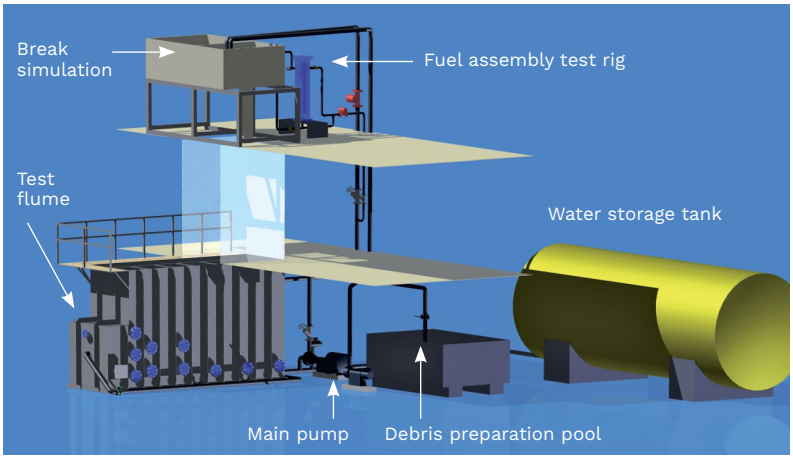
### Challenge

The debris retention systems are key components of pressurized water reactors (PWRs) to protect safety injection pumps and core components from clogging in the case of a loss-of-cooling accident (LOCA). The design of such retention system must be qualified.

### Solution

We provide an integral test facility to investigate the effects of debris-releasing processes that follow a LOCA in the reactor sump region and downstream of the sump strainers. The following parameters are investigated:

- Debris transport and sedimentation in the reactor sump
- Pressure loss caused by debris agglomeration on the sump strainer
- Influence of strainer geometry and size of the strainer openings on the pressure loss
- Ability to backflush the sump strainers
- Pressure loss caused by debris bypassing the sump strainer (downstream effects e.g. on fuel assemblies)
- Influence of erosion and corrosion (chemical processes) on pressure loss.




View of DEREST test facility

The best way to investigate all these topics simultaneously is with an integral test facility. The two main issues of deposition on strainers and downstream effects can be covered.

The integral test facility consists of:

- Leak region
- Test flume
- Recirculation pump
- Fuel assembly test rig
- Debris preparation pool.

### Customer benefits

- Flexibility: the test facility accommodates all designs for testing cost reduction
- 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

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## Technical information

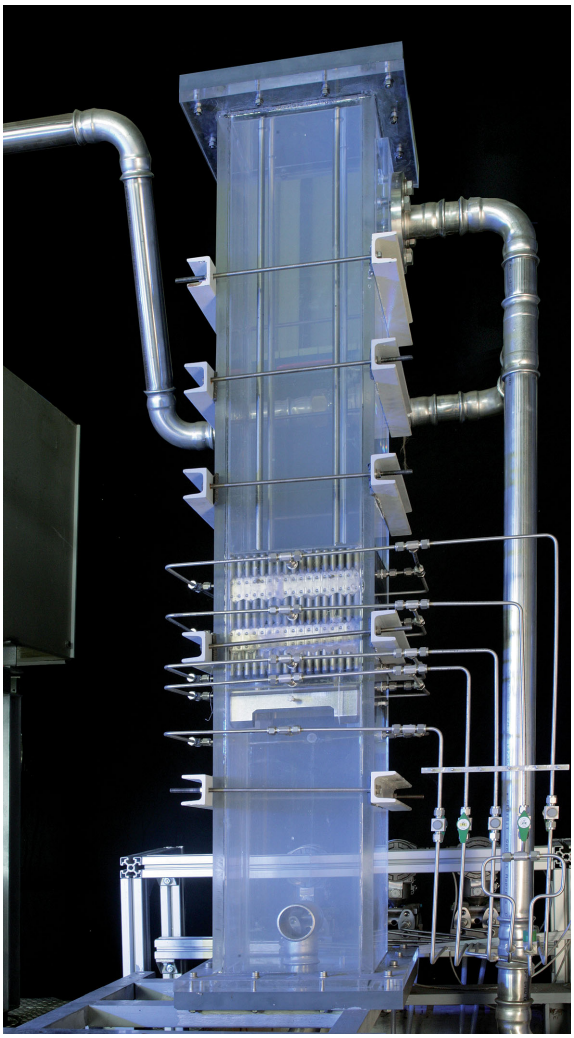
The flexible set-up of the facility handles all kinds of strainer designs. The leak simulation is designed according to the plant specific situation. The vertical 1:1 scaling correctly simulates the energy dispersion of the water falling from the leak.

Test duration varies from short-term tests, lasting several hours, to long-term tests, lasting up to 30 days.

The composition of the debris material and its injection sequence are adapted to the specific break scenario. Chemical effects such as boric acid or chemical substances added or produced in the long-term post-LOCA phase can be taken into account.

## Features

- Strainer design: all types
- Water volume: 25 m³
- Flowrate: maximum 50 kg/s
- Debris load: variable
- Debris type: all types
- Temperature: maximum 80°C
- Fuel assembly section: included
- Chemical effects: available
- Downstream effects: available



DEREST downstream fuel assembly test section

## References

Qualification tests have been performed for:

- all German PWR plants
- all debris retention system designs for EPR reactors.

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