

Water Chemistry

User Specific Laboratory Loop and Autoclave Tests

The Framatome Technical Center Water Chemistry team offers comprehensive studies on phenomena encountered in nuclear power plants cooling systems as well as tailored solutions for special customer requests related to aqueous corrosion

You require assistance for material or process qualification? You need to understand the mechanisms behind an aqueous corrosion related phenomenon you observed at your installations?

You would like to conduct parametric laboratory studies at low or high temperature under simulated plant conditions? The Framatome Technical Center Water Chemistry team will support you in a wide range of topics:

- Autoclave tests with temperatures up to 400 °C including assistance in choosing the right test conditions (e.g. primary or secondary side chemistry) and test specimens (material, geometry)
- Laboratory loop tests under secondary side conditions (temperature, pressure, flow rates, geometry etc.) to study the most important impacts on clogging of steam generators
- Qualification tests of steam generator tubing in respect of kinetics of cation release
- Simulation of the transport of corrosion products in primary and secondary cooling systems including full monitoring of the concentration and chemical nature of the chemical elements
- Modelling of the behavior of corrosion products under cooling system conditions
- Electro polishing and nickel coating of metal surfaces
- High temperature hydrogen probe fabrication
- Corrosion of metallic specimens (Ni-based alloys, Zr alloys, stainless steel) in high temperature water: Growth of oxide layers
- Role of thermal flux and nucleate boiling on deposit formation on oxide layers and fuel rods

- Electro kinetic factors in deposit formation
- Colloids in HT water – impact of different particle sizes on corrosion product transportation and deposit in primary and secondary circuits
- Fabrication and characterization of test specimens to monitor chemical cleaning operations
- Studies on the injection of nanoparticles into the primary cooling circuit in case of severe accidents
- Parametric experiments on primary pump seal fouling in a dedicated test loop
- Development of specific mock-ups



EMILIE test loop – parametric studies of secondary side steam generator clogging

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



Static autoclaves, fully instrumented for aqueous corrosion testing of all kinds of materials at high temperature under primary and secondary side conditions



Understanding aqueous corrosion phenomena in primary and secondary circuits of nuclear power plants is the key to dose rate reduction, longer lifetime of components and cost reduction

Our services and equipment at a glance:

- 4 Stainless Steel test loops to simulate corrosion product transport and deposit at HT
- 2 titanium test loops for the conditioning of corrosion product free test solution
 - e.g. cation release experiments with very low corrosion product background concentration requirements
- 20 Stainless Steel autoclaves for HT testing of oxide formation and parametric studies (hydrogen concentration, chemistry, etc.)
- Complete monitoring during testing of all parameters of importance for a specific testing like temperature, pressure, pH, conductivity, oxygen, hydrogen, corrosion potential, corrosion product concentrations
- Fully equipped analytical chemistry (ICP-MS, ICP-AES, FTIR, IC, etc.)
- Metallographic analysis in Framatome Technical Center
- Zeta potential measurements

Comprehensive services in Framatome Technical Center

Benefit from our long-time experience in the field of Water Chemistry and Aqueous Corrosion. Our team of expert engineers and technicians is at your disposal to provide services tailored to your needs. We will team up with you to cover all aspects of your project. The services we offer include project management, test planning and execution as well as detailed monitoring during the test and physicochemical characterization and reporting after the study. We also have access to a large network of experts and subcontractors within and outside Framatome to provide you with the best possible results.

Professional consulting for all kinds of water chemistry issues and fast realization of experiments or analyses.

Your Benefits at a Glance

- Innovative testing technology at your disposal to fit your needs in aqueous corrosion testing
- Profit from Framatome know-how in all NPP related to aqueous corrosion phenomena
- Individual planning of test series to fit your needs
- Experienced team of expert engineers and technicians will help you to succeed with your R&D

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