NUCLEAR RESEARCH INSTITUTE

Operational Support of Power Facilities Department
Integrity and Technical Engineering Division

CORROSION AND AUTOCLAVE TESTS OF METALLIC MATERIALS

Autoclave vessel with different sets of metal samples

Value for customers

- Evaluating of the water chemical regime in order to maintain proper chemistry and condition of the circuit with regard to the lifetime of the materials and entire systems.
- Evaluating of the corrosion rates and set of the mitigation actions/ measures based on the results obtained.
- Testing of the various metallic materials and components, in order to ensure safe operation and long components service life.
- Evaluation of the materials behavior and related processes under various operating or transient (abnormal) conditions (“aggressive” environments – O_2, Cl, SO_4, Na, K and etc).

Applications

- Calculation of the corrosion rates and prediction of material damages (such as fatigue, deformation, corrosion, cracking) and evaluation of their overall lifetime.
- Determination of initiation and propagation mechanisms of material damages and the development of corrosion processes for operational conditions and transient circuit conditions (***p*** up to 20 MPa, ***T*** up to 310°C, static and also dynamic conditions).
- Analyzes and evaluations of a wide range of materials in accordance with technical standards (ČSN, STN, ASTM, ASME standards) and using various evaluation instrumentation (SEM, TEM, LOM microscopy, chemical analyses and etc.).

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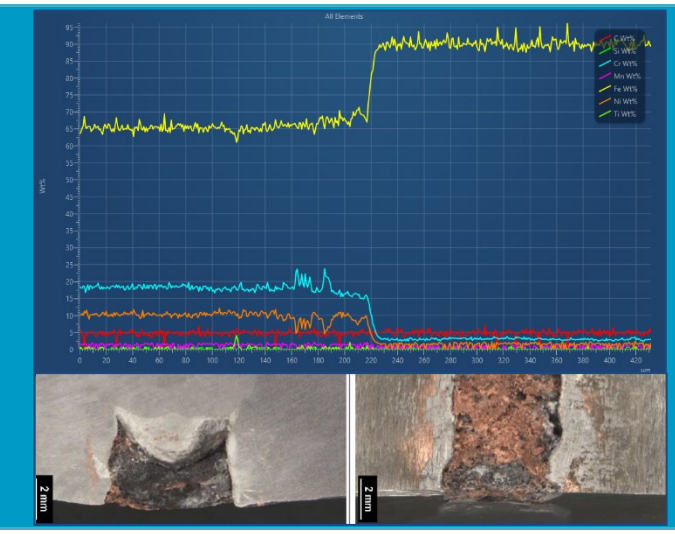
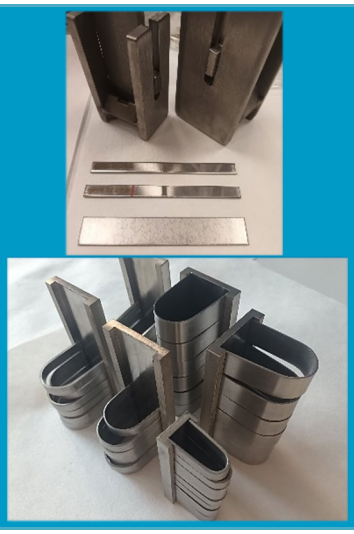
What we offer

- Detailed knowledge of the materials, construction and manufacture technology.
- Statistical data evaluation and prediction of the material damages, damage mechanism and corrosion rate.
- Detailed knowledge of the corrosion processes of a various materials.
- Preparation of the special/ specific types of specimens, holders, tools and instruments.
- Development of the complete tests and testing conditions. Development of the testing methodologies.
- Calculation of local residual stresses and deformations.
- Complete material and qualification assurance. Test laboratory accredited by Czech Accreditation Institute, p.s.c.
- Work under Quality assurance system according to ČSN EN ISO/IE C 17025 in agreement with ISO 9001.
- Transfer of operational experience from other VVER NPPs.

Our references

- Integrity and Technical Engineering Division manages a joint international project „Database of Secondary Circuit Regimes and SG Tube Damage“.
- Participation at Regional Project IAEA focused on „Improvement of primary circuit component integrity“ (RER/4/024) in Ukraine.
- HOR (Hide-Out-Return) analyses (i. e. impurity inventory inside SG crevices) for NPP Dukovany and NPP Temelin and evaluation of their effect on material properties.
- Analyses of deposit layers removed from heat exchange tube surface and material surfaces (NPP Dukovany, NPP Jaslovské Bohunice, NPP Greifswald, NPP Temelin).
- SG maintenance of all Czech and Slovak SGs, feed water collector modifications, blowdown modification, material and weld analysis of the SG primary collectors.
- Analyzes of primary and secondary weld joints and base materials (pipeline systems) for NPP Mochovce, NPP Dukovany, power plant Vresova.





Various images of metallic specimens, holders and analysis records

Exposure autoclave with a volume of 12,0 liters (p_{max} - 20MPa, T_{max} - 310°C) with a pressurized water loop