



---

## Effect of temperature and surface treatment on SCC initiation in Alloy 182 weld metal under BWR/HWC conditions

**Aleksandra TREICHEL<sup>1</sup>, Stefan RITTER<sup>2</sup>, Hans-Peter SEIFERT<sup>2</sup>, Sannakaisa VIRTANEN<sup>3</sup>**

<sup>1</sup> *Paul Scherrer Institut, Switzerland*

<sup>2</sup> *Paul Scherrer Institute, Switzerland*

<sup>3</sup> *Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*

The Ni-base Alloy 182 is widely used in light water reactors as weld filler metal to join the low-alloy steel reactor pressure vessel to both wrought Ni-based alloys (e.g., Alloy 600) or austenitic stainless steels (e.g., AISI 304L or 316L) by manual shielded metal arc welding. Several stress corrosion cracking (SCC) incidents occurred in Alloy 182 dissimilar metal welds in boiling water reactors (BWRs) during the last decades, which affected the safe and economic operation of nuclear power plants. Therefore, the SCC initiation behaviour of such weld metals is investigated systematically in a research project at PSI. In BWRs a rather wide range of temperatures is present (feed water: approx. 200 – 220°C, reactor water: 274 – 288°C) and the temperature generally has a strong effect on the SCC behaviour in Ni-base alloys. Thus, temperature effects on the SCC initiation behaviour are studied. Because SCC mitigation methods often involve surface modifications, different surface treatments (electropolishing and grinding) are also examined on their SCC initiation properties.

First results on the influence of temperature and surface condition on the SCC initiation behaviour of Alloy 182 weld metal in hydrogenated high-purity, high-temperature water using accelerated constant extension rate tensile (CERT) tests with flat tapered specimens are presented. A clear trend for higher SCC initiation susceptibility in Alloy 182 towards higher temperatures could be identified, whereas the influence of the surface treatment is not fully conclusive yet.