Thermal Ageing of VVER Reactor Pressure Vessel Steel

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Abstract. This paper investigates the effect of the annealing process in reactor pressure vessel steel of VVER-440 which can lead to structural recovery or thermal ageing. Two annealing experiments were performed to observe the boundary between these two processes as there is no strict known limit to the annealing temperature or time for that. This is preliminary study for the DELISA-LTO project, where the long-term thermal stress from operation at about 300°C will be simulated by accelerated artificial annealing at increased temperature 420 - 450°C. The experiment showed that the optimal recovery temperature ranges from 450°C to 500°C and the optimal recovery time was probably around 30 hours for our small-sized samples. Prolonged annealing beyond 60 hours reveals new structural deterioration and precipitate formation which can indicate a start of the thermal ageing.

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