

POPLU Pressure Testing and Performance

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The POPLU experiment will be evaluated for leakage and performance by the use of pressurization, to simulate the expected lifetime operation of a deposition tunnel end plug (100 years). The pressurization level has been targeted to be at least 4.2 MPa, representing the hydrostatic pressure at 420 metres underground. The pressurization was started after the concrete plug and components were emplaced and had gained sufficient strength as expected from the structural design. This includes both the concrete plug section castings as well as the injection grouting of the concrete-rock interface.

POPLU pressurization was done according to the pressurization plan until 10 bar pressure was achieved when small leakages were identified from grouting tubes, instrumentation wires and concrete-rock interface. During the following week the leakage decreased almost to half and pressure was increased to 12 bars. This increased the leakage which still stayed under preset limit of 0.1 l/min. Again the leakage decreased during the monitoring and the pressure was increased to 14 bars. This resulted in leakages over the preset limit and the pressurization was stopped and planning of actions to improve the tightness of the plug was started

To test possible wedging effect a fast pressure increase test was initiated. Before the test the plug was pressurized to 10 bars during which it was deaired. After this the pressure was increased as fast as possible to 42 bars. This was achieved in the following 24 hours. During pressurization total leakages increased and in the end were just under 10 l/min. Displacement sensors were indicating possible movement of the plug and to confirm this observation a series of rapid pressure changes were performed (42 bars - 5 bars - 42 bars). Each pressure increase was faster than previous, last one taking less than one hour to reach 42 bars. After this last increase the total leakage was about 2 l/min. Displacement sensors were showing movements during each pressure change, but the data needs to be thoroughly analysed before final conclusions.