

MERELAVA FACILITY FOR TOP FLOODING MCCI EXPERIMENTS

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Abstract

MERELAVA is the new advanced facility of the PLINIUS severe accident platform of the CEA, designed to perform tests for top flooding studies. This facility stands on SSWICS-like experiments (ANL- OECD CCI programs) with objective to extend the study of water ingression cooling to mixture of oxide and metallic prototypical corium melt compositions, including uranium oxide. This configuration, representative of some reactor cases situations, should lead to different kind of coolability, due to other physical properties (i.e. conductivity, permeability and mechanical properties) of corium with a metallic phase compared to those of oxidic corium compositions.

The experimental device consists in an instrumented cylindrical test section made of a fixed upper part and a flexible and moving lower part containing the crucible for corium. Melting of corium is obtained thanks to a thermitic reaction. A quantity of 80 kg of powder should provide a pool of about 30 mm diameter and 15 mm thick. In order to determine the efficiency of top cooling (until 100 kg of water), the water vapor generated after corium flooding is quantified through a vapor line made of a condenser and water tank. The apparatus is equipped with two intermediate tanks. The first one operate in normal operation and enables to cool gases from thermitic reaction and to proceed to evacuation of hydrogen formed during this reaction as well as during flooding of metallic corium. The second tank operates in case of overpressure in the test section. The maximum pressure allowed during normal functioning is 4 bars.

The objective of the paper is to describe in detail the facility.

Keywords: Top flooding, corium, MERELAVA, experiment.