

Profile LFR-21

KYLIN-II NC

CHINA

GENERAL INFORMATION

NAME OF THE FACILITY KYLIN-II Thermal -Hydraulic Natural Circulation loop
ACRONYM KYLIN-II TH NC
COOLANT(S) OF THE FACILITY Lead-bismuth, Lead
LOCATION (address): Institute of Nuclear Energy Safety Technology (INEST), Chinese Academy of Sciences (CAS)
OPERATOR INEST
CONTACT PERSON (name, address, institute, function, telephone, email): Chao Liu, FDS Team, No.350 Shushanhu Road, Hefei, Anhui, China, INEST, CAS. +86 55165593681, Contact@fds.org.cn

STATUS OF THE FACILITY In operation
Start of operation (date): 2014

MAIN RESEARCH FIELD(S)

- Zero power facility for V&V and licensing purposes
- Design Basis Accidents (DBA) and Design Extended Conditions (DEC)
- Thermal-hydraulics
- Coolant chemistry
- Materials
- Systems and components
- Instrumentation & ISI&R

TECHNICAL DESCRIPTION

Description of the facility

KYLIN-II Thermal -Hydraulic Natural Circulation loop is a sub-loop of KYLIN-II with a rectangular shape. The loop mainly consists of two vertical pipes serving as riser and downcomer respectively, two horizontal pipes collecting the riser and downcomer, an expansion tank at the top, a heat source (HS) at the lower part of the riser, a heat exchanger (HX) at the upper part of the downcomer with the secondary oil loop. An electromagnetic flow meter will be installed at the lower horizontal pipe in next

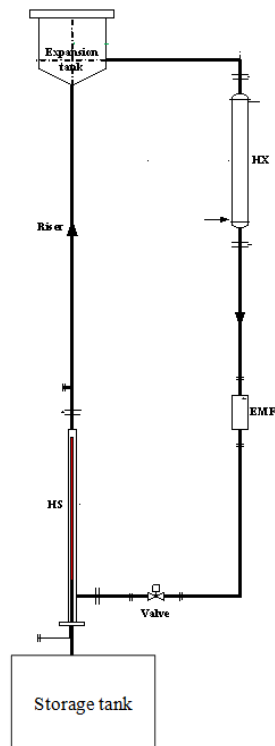
study. The loop is also designed to reserve a joint for gas injection at the downstream of the HS. The loop is foreseen to have two operation modes:

- a) Natural circulation;
- b) Gas-injection enhanced circulation.

Acceptance of radioactive material

No

Scheme/diagram



3D drawing/photo



Parameters table

Coolant inventory	50L
Power	24kW
Test sections	
TS #1	<u>Characteristic dimensions</u> Diameter of pipe 2.6cm; Length of HS 1.8m; Length of HX 1.5m
	<u>Static/dynamic experiment</u> Natural circulation
	<u>Temperature range in the test section (ΔT)</u> 250~500°C
	<u>Operating pressure and design pressure</u> 1MPa
	<u>Flow range (mass, velocity, etc.)</u> 0~0.5m/s (gas lift) 0.15m/s(NC)
Coolant chemistry measurement and control (active or not, measured parameters)	No
Instrumentation	Liquid level; Thermocouples; Induction flow meter

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

- Thermal hydraulics behavior of natural circulation or gas lift
- Heat transfer behavior of pin on natural circulation
- Validate of system codes, such as Relap5
- Steady experiment for natural circulation

PLANNED EXPERIMENTS (including time schedule)

- Transient experiment for natural circulation
- Heat transfer of pin on natural circulation
- Gas lift test

TRAINING ACTIVITIES

Training activities can be agreed with INEST for the operation of the experimental campaign under the supervision of INEST qualified staff.

REFERENCES (specification of availability and language)

- [1] Yang Li, Kefeng Lv, Liuli Chen, Sheng Gao, Qunying Huang, Experiments and analysis on LBE steady natural circulation in, Progress in Nuclear Energy, 2015, 81 (81) : 239-244
- [2] Chenchong Yue, Liuli Chen, Kefeng Lv, Yang Li, Sheng Gao, Yuejing Liu, Qunying Huang, Flow characteristics of natural circulation in a lead-bismuth eutectic loop, Nuclear Science and Techniques, (2017)28:39 DOI 10.1007/s41365-017-0187-x