

## Profile LFR-19

### KYLIN-II TH FC

#### CHINA

#### GENERAL INFORMATION

NAME OF THE FACILITY KYLIN-II Thermal-Hydraulic Forced Circulation Loop  
ACRONYM KYLIN-II TH FC  
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 Chao Liu, FDS Team, No.350 ShushanhuRoad, Hefei, Anhui, China,  
(name, address, institute, INEST, CAS . +86 55165593681, [Contact@fds.org.cn](mailto:Contact@fds.org.cn)  
function, telephone, email):

**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

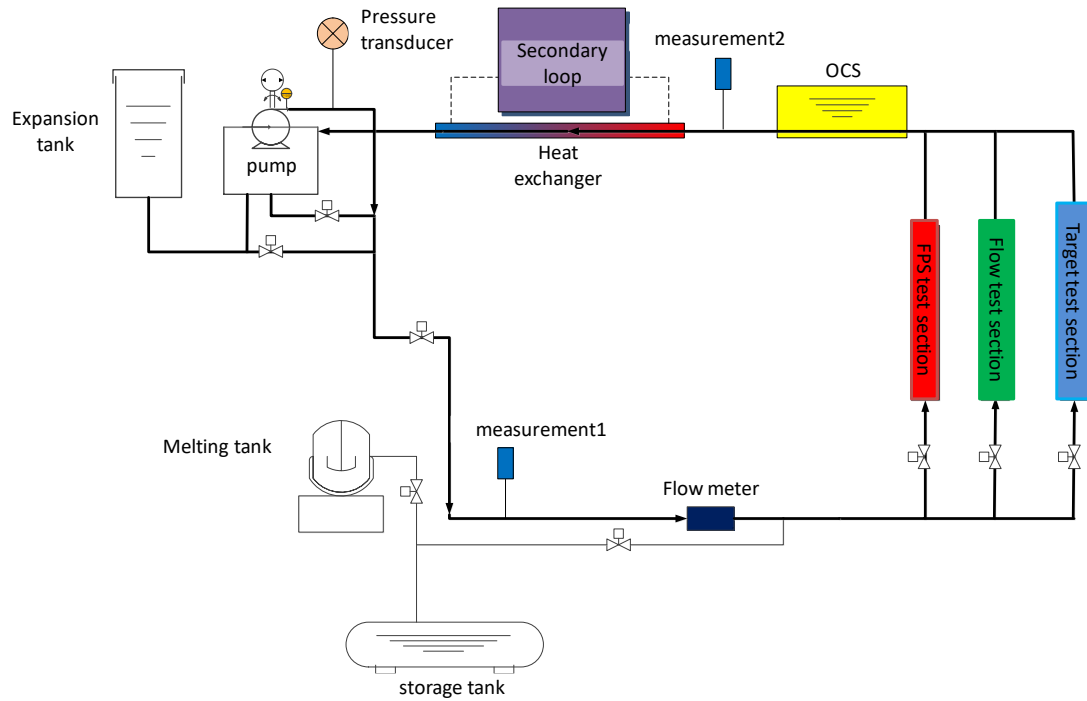
The KYLIN-II forced circulation loop is a typically rectangle facility. The main piping is made of 316L stainless steel in a standard DN65 size. A sump tank holds the complete LBE inventory (~7tons). The design temperature and pressure is 500<sup>0</sup>C and 12bar respectively. The maximum flow rate of the loop is 45m<sup>3</sup>/h. The KYLIN-II forced circulation loop is aimed

at the study of the hydraulic and components test related to reactors cooled by heavy liquid metal.

### Acceptance of radioactive material

No

### Scheme/diagram



### 3D drawing/photo



### Parameters table

Coolant inventory	700L
Power	300kW
Test sections	
TS #1	<u>Characteristic dimensions</u> <u>(1) 7-heated rod bundle test section</u> <ul style="list-style-type: none"> <li>● Diameter of main pipe: 76mm</li> <li>● Diameter of heat rods: 15mm</li> <li>● Number of rods: 7</li> <li>● Pitch of rods: 16.74mm</li> <li>● Diameter of helical wire: 1.64mm</li> <li>● Pitch of helical wire: 375mm</li> <li>● Heating power: 35kw</li> </ul> <u>(2) Full scale 61-unheated rod bundle test section</u> <ul style="list-style-type: none"> <li>● Diameter of heated rods: 15mm</li> <li>● Number of rods: 61</li> <li>● Pitch of rods: 16.74mm</li> <li>● diameter of helical wire: 1.64mm</li> <li>● Pitch of helical wire: 375mm</li> <li>● Heating power: NA</li> </ul> <u>(3) LBE window target test section</u>
	<u>Static/dynamic experiment</u> <u>dynamic experiment</u>
	<u>Temperature range in the test section (<math>\Delta T</math>)</u> 200°C-400°C
	<u>Operating pressure and design pressure</u> 8bar/ 12bar
	<u>Flow range (mass, velocity, etc.)</u> 0~100kg/s (0~2m/s)
	Coolant chemistry measurement and control (active or not, measured parameters)
Instrumentation	Thermocouples, Pressure transducer, Induction flow meters

### COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

- ✓ Resistance characteristics of 61-rod bundle

- ✓ Heat transfer of 7-rod bundle
- ✓ Heat transfer, pressure drop, cladding temperature on fuel pin assembly

#### **PLANNED EXPERIMENTS (including time schedule)**

- ✓ Experiments: Overall heat transfer coefficients and efficiency of heat exchanger
- ✓ Thermal-hydraulics model development and validation

#### **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] Liuli Chen, Kefeng Lv, Zhenwei Zhou, Sheng Gao, CFD Investigation on Local Flow Characteristics of Fuel Pin Supporting Rails for Wire-wrapped Fuel Assembly, International conference on nuclear engineering(ICONE), 2014.7.7-2014.7.11.
- [2] Kefeng Lv, Liuli Chen, Yuechen Chong, Sheng Gao, Qunying Huang, Experimental Investigation on Resistance Characteristics of Wire-Wrapped Fuel Assembly in Lead-Bismuth Eutectic, Nuclear Power Engineering, 2015, Vol.36. No.6(27-31)(Chinese).
- [3] Yong Li, Kefeng Lv, Liuli Chen, Sheng Gao, Qunying Huang, Analysis on Experimental Results of the Resistance of Fuel Assembly of CLEAR-I, Nuclear Safety, 2017, Vol. 16. No.1(70-74) (Chinese).