

Profile LFR-17

KYLIN-II M

CHINA

GENERAL INFORMATION

NAME OF THE FACILITY KYLIN-II Material Corrosion and Coolant Technology Loop

ACRONYM KYLIN-II M

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 ShushanhuRoad, 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

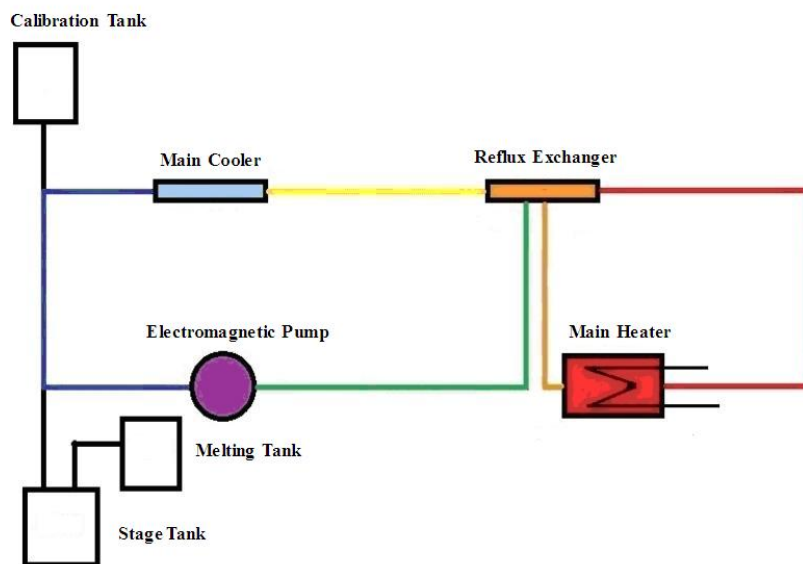
The KYLIN-II Material Corrosion and Coolant Technology Loop materials test loop is a non-isothermal system with flowing pure lead and lead-bismuth alloys, which was designed and constructed with the main aim of the long-term corrosion experiments on candidate materials of lead-based cooled reactors in ADS system. the online purification and oxygen control systems were also installed in order to explore the key technologies of lead-based reactors. The design activities were started in the second half of 2011. Two years were consumed to

build KYLIN-II materials test loop, which was commissioned at the end of 2014. It is mainly for the corrosion test of structural materials in flowing liquid metal, and till now, more than 8000hrs corrosion experiments has been performed in this loop.

Acceptance of radioactive material

No

Scheme/diagram



3D drawing/photo



Parameters table

Coolant inventory	300L
Power	300kW
Test sections	
TS #1 and TS #2	<u>Characteristic dimensions</u> Inner pipe diameter of TS pipe: 25mm Overall length of TS pipe:1.5m
	<u>Static/dynamic experiment</u> Forced convection driven by EMP

	<u>Temperature range in the test section (Delta T)</u> Isothermal test section in the range of 450~550°C
	<u>Operating pressure and design pressure</u> 0.2MPa/ 1.6MPa
	<u>Flow range (mass, velocity, etc.)</u> Max. velocity : 3m/s
Coolant chemistry measurement and control (active or not, measured parameters)	Oxygen control system (gas and solid) Purification system(cold trap and magnetic trap)
Instrumentation	Thermocouples, pressure transducer, electromagnetic flowmeter, venturi flowmeter, level meter.

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

- ✓ Gas phase oxygen test and oxygen sensor test in flow LBE
- ✓ Corrosion tests of structural materials of CLEAR-I for more than 8000hrs under oxygen controlled condition

PLANNED EXPERIMENTS (including time schedule)

Experiments:

- ✓ Corrosion tests of structural and surface treated materials
- ✓ Investigations and benchmarking of corrosion/precipitation and system kinetics models
- ✓ Investigations on the applicability of “gas or solid oxygen control system” in large loops
- ✓ Performance of oxygen sensor
- ✓ Investigations on the applicability of “cold trap” and “ magnetic trap” in large loops

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)

Shujian Tian, Zhizhong Jiang, Lin Luo. Oxidation behavior of T91 steel in flowing oxygen-containing lead-bismuth eutectic at 500°C. Materials and corrosion. 2016, 67:1274-1285

Yanqing Wang, Qunying Huang, Bin Wu etc. The performance of Pt/air oxygen sensors in stagnant Pb-Bi eutectic at high temperatures. Nuclear Science Technology 2014, 25, 060602