

## Profile LFR-25

### MATLOO Pb

### CZECH Republic

#### GENERAL INFORMATION

NAME OF THE FACILITY Material research loop  
ACRONYM MATLOO Pb  
COOLANT(S) OF THE FACILITY Pb  
LOCATION (address): Hlavni 130  
250 68 Husinec-Rez  
Czech Republic  
OPERATOR Centrum vyzkumu Rez s.r.o., CVR  
CONTACT PERSON (name, address, institute, function, telephone, email): Lukas Kosek, Hlavni 130, 250 68 Husinec-Rez  
Czech Republic, CVR, Responsible HLM technology,  
+420 266 17 2684  
[lukas.kosek@cvrez.cz](mailto:lukas.kosek@cvrez.cz)

STATUS OF THE FACILITY Under Design  
Start of operation (date): End of 2015

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 experimental loop is designed for materials testing in heavy liquid metal environment. The loop will have two experimental sections with independent flow rates. The design flow speed for cylinder shaped specimens is in test section 1 is 1.5m/s and in section 2 0.8m/s at 550°C. The oxygen concentration will be adjusted by gas dosing, measured with oxygen sensors based on the Bi/Bi<sub>2</sub>O<sub>3</sub> reference electrode and it will be controlled by a Mass Flow

Control that automatically will switch the right amount of gas necessary to maintain the desired oxygen level.

The loop consists of a hermetic circulation pump P1 providing 2.5bar pressure in 1-2.5kg/s range, one main flowmeter F1 with high precision and two additional flowmeters F2 and F3 for flow splitting, an U- shaped heat exchanger E1 regenerating heat between hot and cold leg, a heater E2 controlling the temperature in hot leg, a mass exchanger D1 for the oxygen control system, an air cooler E3 controlling the temperature in cold leg and a cooled filter F1 for corrosion products separation and study. The filter is connected to the gas system for regeneration by reducing gas mixture. The storage tank B1 serve for melting Pb and for the loop filing. Oxygen sensors O1 – O5 monitors the oxygen content.

### Acceptance of radioactive material

No

### Scheme/diagram

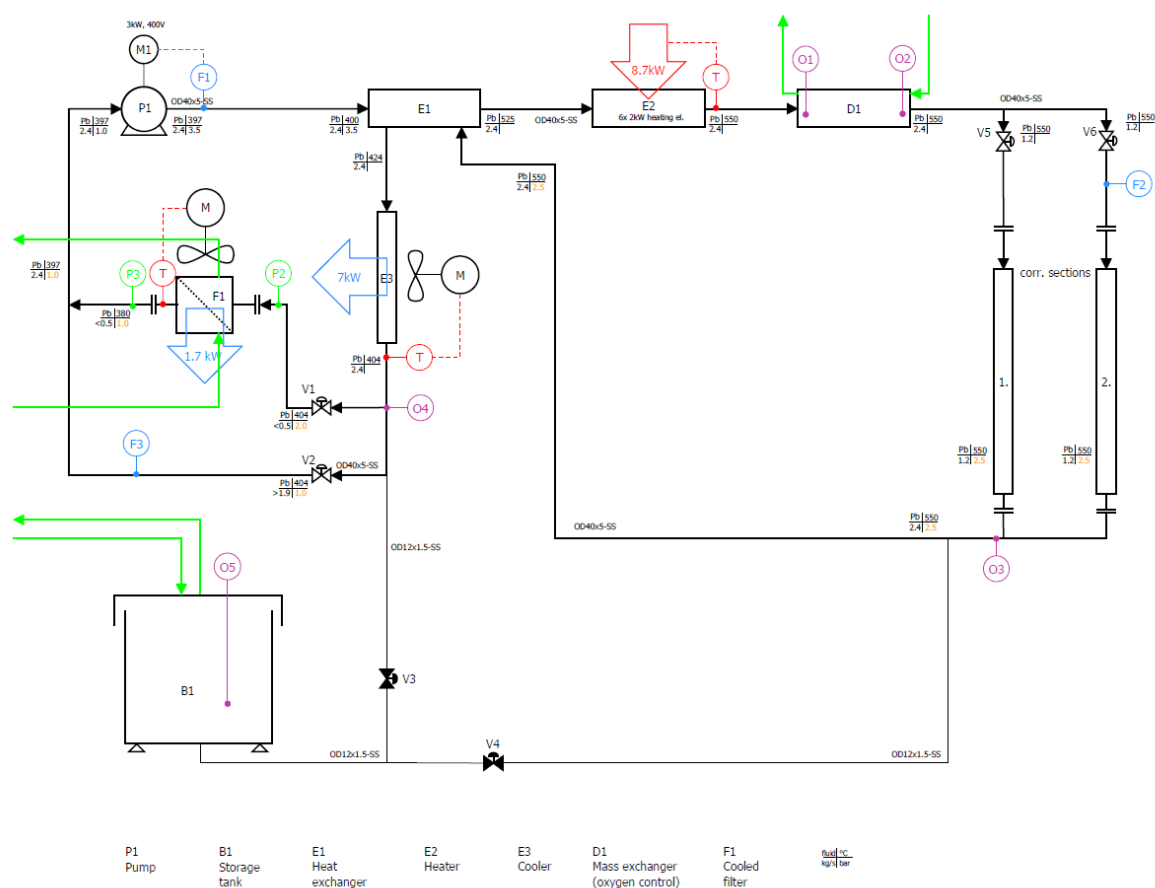


FIG. 1. Scheme of the MATLOO facility

### 3D drawing – preliminary loop layout

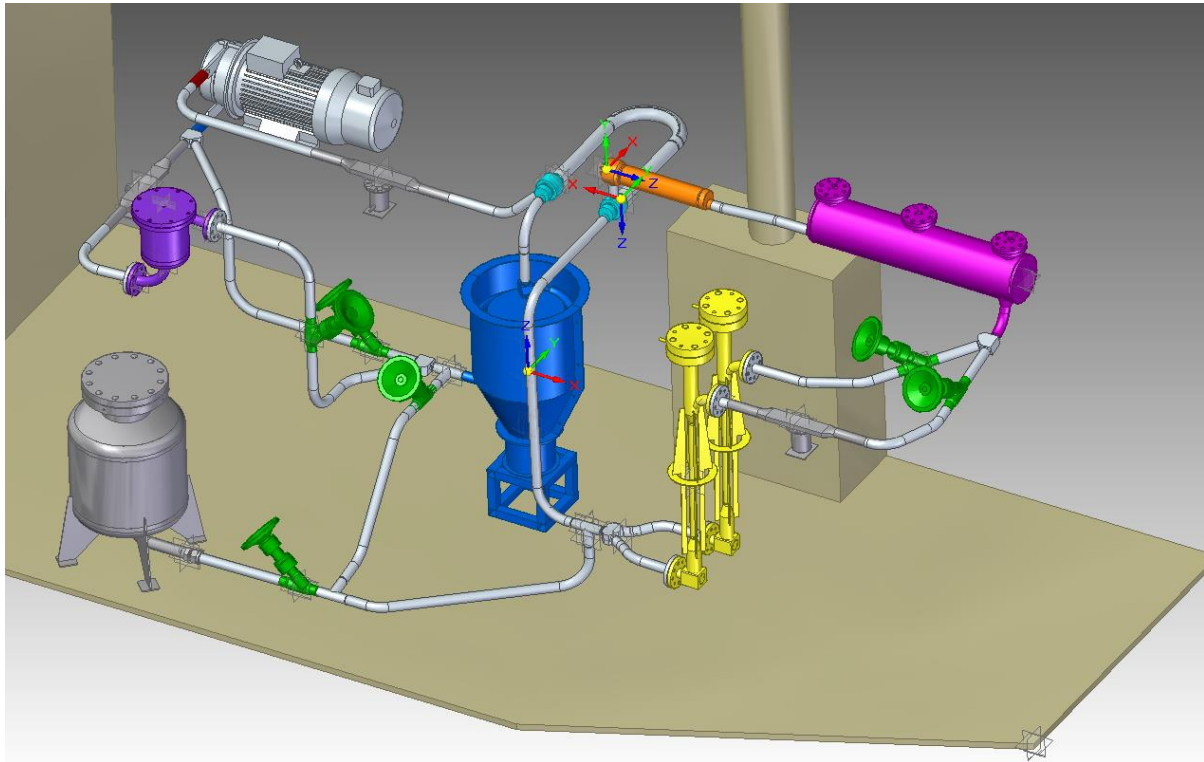


FIG. 2. View of the MATLOO facility

### Parameters table

Coolant inventory	~ 500kg
Power	50kW
Test sections	
TS #1	<u>Characteristic dimensions</u> 2x 60cm long tube, Section A ID = 13mm, Section B ID 16mm
	<u>Static/dynamic experiment</u> Dynamic
	<u>Temperature range in the test section (Delta T)</u> Max 550°C in test section
	<u>Operating pressure and design pressure</u> Hydraulic pressure at test section inlet 3.5bar
	<u>Flow range (mass, velocity, etc.)</u> 2.4kg/s total, flow velocity in the experimental section up to 1.5m/s
Characteristic T[°C]	Pump 400 Mass Exchanger 550 (=T@test section) Heat Exchanger □T=25

	Impurities removal □T=25
Coolant chemistry measurement and control (active or not, measured parameters)	Active oxygen control – Ar + H <sub>2</sub> / Ar + O <sub>2</sub> Cooled filter with H <sub>2</sub> regeneration and pressure drop measurement
Instrumentation	YSZ oxygen sensors Bi/Bi <sub>2</sub> O <sub>3</sub> , thermocouples, flowmeters, pressure transducers

## COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

NA

## PLANNED EXPERIMENTS (including time schedule)

**Commissioning:** for putting the loop into operation and training of operators in the new facility, various specimens will be tested for short- to long-periods. Jan2016 – Jul2016

On the process to apply for national grants for the characterisation of coatings, nanostructured and ODS materials.

## TRAINING ACTIVITIES

Internal training for operators

Available for training of external users, based on mutual agreement and planning

## REFERENCES (*specification of availability and language*)

NA