# Profile SFR-90

# SSL-EMT

# LATVIA

## GENERAL INFORMATION

| | |
|---|---|
| NAME OF THE FACILITY | **S**mall **S**odium **L**oop for **EM** pump **T**esting |
| ACRONYM | SSL-EMT |
| MEDIUM (COOLANT(S)) OF THE FACILITY | Sodium |
| LOCATION (address): | LV-2169 Salaspils, Miera str.32, Latvia |
| OPERATOR | Institute of Physics University of Latvia (IPUL) |
| CONTACT PERSON(S) (name, address, institute, function, telephone, email): | Imants Bucenieks, LV-2169 Salaspils, Miera str.32, Latvia, IPUL, Senior Researcher, +371 26407570, Imants.Bucenieks@lu.lv |

**STATUS OF THE FACILITY** Under Construction
Start of operation (date): 2019

**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

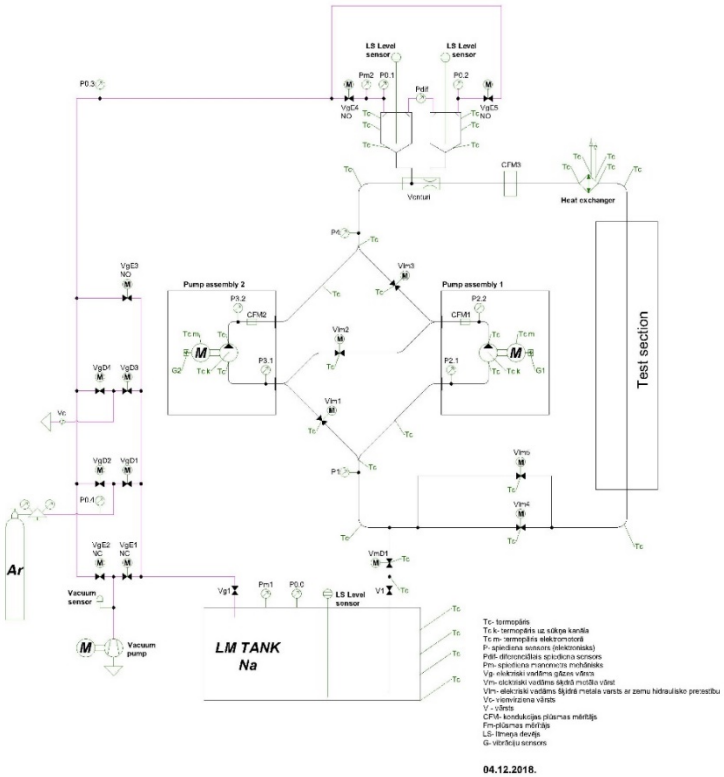
The facility SSL-EMT is a DN 54 mm liquid sodium loop. The loop is placed in a SS plate lined 240 m2 hall especially designed for exploratory development of liquid metal equipment. A good protected control room foreseen. The facility operates with an inventory of 50 L of sodium at temperatures up to 350°C. The loop contains two permanent magnet electro-magnetic (EM) pumps for testing series and parallel connection of pumps. A test section is foreseen in the loop for thermo-hydraulic experiments, for engineering and operational development of components and instrumentation and for testing of different materials used in liquid sodium techniques. All components to be in contact with the liquid metal are made of stainless steel. The facility includes storage tank under argon cover gas, an expansion tank, a cold trap and a cooler.

All components equipped with electrical heaters and thermal insulation. The operating status of the facility is monitored by thermocouples, pressure gauges, a Venturi tube, acceleration sensors and an electromagnetic flow meters.

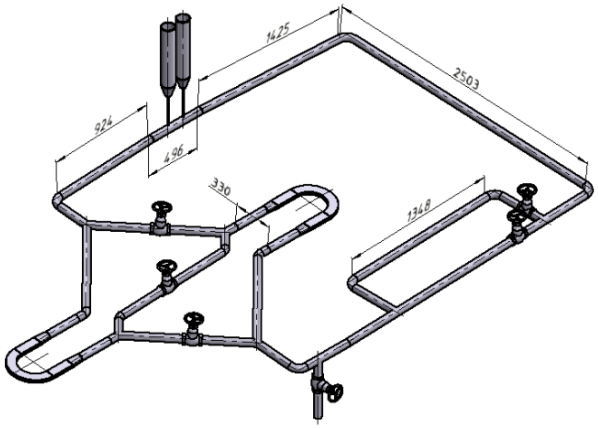
**Acceptance of radioactive material**

No

**Scheme/diagram**




**3D drawing/photo**




**Parameters table**

| | |
|---|---|
| Medium (Coolant) inventory | Liquid sodium – 50 L |

| | |
|---|---|
| Power | Hydraulic power 10kW |
| Test sections | |
| TS #1 | *Characteristic dimensions*<br>2.5 m |
| | *Static/dynamic experiment*<br>Static/dynamic |
| | *Temperature range in the test section (Delta T)*<br>Up to 350°C |
| | *Operating pressure and design pressure*<br>10 bar |
| | *Flow range (mass, velocity, etc.)*<br>10 L/s |
| Medium (Coolant) chemistry measurement and control (active or not, measured parameters) | Liquid sodium, coolant chemistry not controlled. |
| Instrumentation | Remote measurements from the control room. Main sensors: acceleration sensors, thermocouples, pressure transducers, including version with a Na contacting membranes (direct electric output); home-made electromagnetic flow meters of different type; calibrated Venturi tube; dynamic cover gas pressure controlling system probes. EM pumps control system. |

**COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS**

**PLANNED EXPERIMENTS (including time schedule)**

Development of control system for parallel and series connection of EM pumps – June – December 2019.

**TRAINING ACTIVITIES**

Training activities should be agreed with IPUL for the operation of the experimental facilities under the supervision of IPUL qualified staff.

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

1. I. Bucenieks, Modeling of induction rotary permanent magnet flow meters for liquid metal flow control, Magnetohydrodynamics, Vol. 50 (2014), No. 2, pp. 3 – 10.

2. L. Goldsteins, I. Bucenieks, L. Buligins, Possibilities of 3D numerical simulations of electromagnetic induction pumps with permanent magnets, Magnetohydrodynamics, Vol. 48 (2012), No. 4, pp. 623 – 635.

3. I. Bucenieks, Operation of EM induction permanent magnets pump as flow meter. 3rd International Workshop on Measuring Techniques for Liquid Metal Flows (MTLM 2015), Dresden, Germany, April 15 – 17, 2015.

4. L.Goldsteins, I.Bucenieks, L.Buligins, A simplified model of the centrifugal EM induction pump (CEMIP) with rotating permanent magnets, Magnetohydrodynamics, Vol. 50 (2014), No. 2, pp. 165 - 178.

5. I.Bucenieks, E.Platacis, O.Mikanovskis, A.Zik, V.Mehta, Spiral Type EM Induction Pump with Permanently Magnetized Rotor for High Pressure Heads, Magnetohydrodynamics, Volume 53 (2017), No. 2.