

## Profile SFR- 84

### LSTF

### INDIA

NAME OF THE FACILITY	LARGE SODIUM TEST FACILITY
ACRONYM	LSTF
COOLANT(S) OF THE FACILITY	Sodium
LOCATION (address)	Fast Reactor Technology Group (FRTG), Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, India
OPERATOR	FRTG, IGCAR
CONTACT PERSON	Dr. P. Selvaraj, Director, Fast Reactor Technology Group, Indira Gandhi Centre for Atomic Research, Kalpakkam – 603102, India, +91 44 27480083, <a href="mailto:pselva@igcar.gov.in">pselva@igcar.gov.in</a>
<b>STATUS OF THE FACILITY</b>	Under construction
Start of operation (Date)	2020
<b>MAIN RESEARCH FIELDS</b>	<input type="checkbox"/> Zero power facility for V&V and licensing purpose <input type="checkbox"/> Design Basis Accidents (DBA) and Design Extended Conditions (DEC) <input type="checkbox"/> Thermal-hydraulics <input type="checkbox"/> Coolant chemistry <input type="checkbox"/> Materials <input checked="" type="checkbox"/> Systems and components <input checked="" type="checkbox"/> Instrumentation & ISI & R

## TECHNICAL DESCRIPTION

### Description of the facility

Large Sodium Test Facility is a dynamic facility under construction that will be used to conduct full scale testing of FBR components at reactor operating conditions. This facility consists of two sodium storage tanks, three test vessels, sodium purification system, sodium heating and cooling system, an electromagnetic pump of 50 m<sup>3</sup>/hr capacity, Cover gas system, compressed air system etc. A basic design feature incorporated in the system is the ability to isolate any of the three test vessels from the rest of the facility, so that different test conditions (as needed) can be maintained in any or all test vessels and different operations of the test vessel, viz-filling/drainage or heating/cooling can be performed in a test vessel, while maintaining steady operation in other test vessels. As a first of its kind, Wireless sensor networking technology is planned to be adapted for communicating the data of temperature sensors and leak detectors of

this facility. Maximum temperature of loop operation is 600 °C and the material of construction of all the components and piping in the facility is SS 316 LN.

## ACCEPTANCE OF RADIOACTIVE MATERIALS – No

### Scheme / Diagram

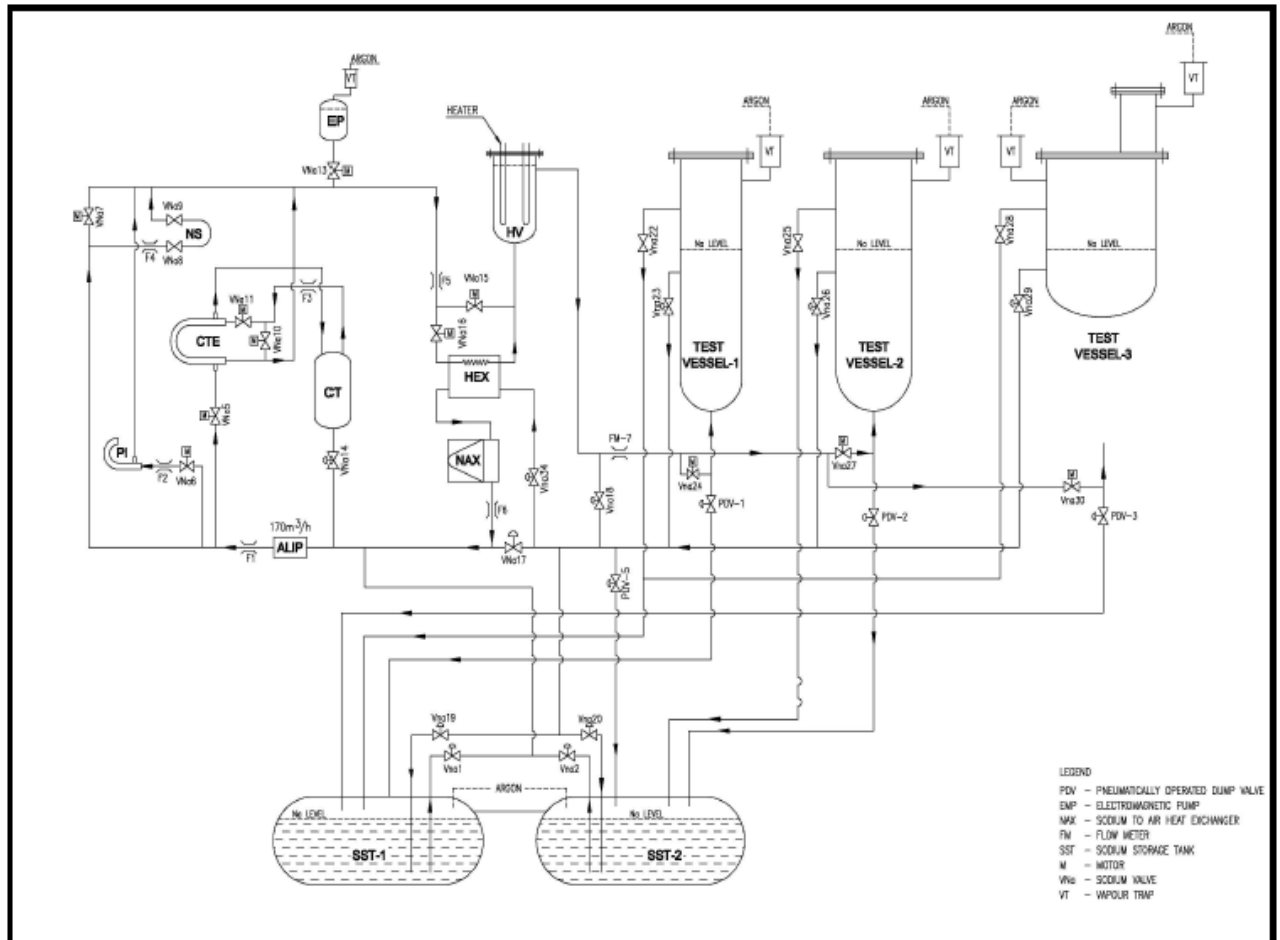


FIG. 1. Flow sheet of Large Sodium Test Facility

### 3D Drawing/Photo



FIG. 2. Photograph of STC building that houses LSTF

**Parameters table**

Coolant inventory	100 tonne
Power	Heater Vessel with a total power of 400 kW
No. of test sections	3
Test sections	
	<p><b><u>Characteristic dimensions</u></b></p> <p><i>Sodium Test vessel – 1:</i> Length = 14375 mm, Inner diameter = 1000 mm</p> <p><i>Sodium Test vessel – 2:</i> Length = 14375 mm, Inner diameter = 1500 mm</p> <p><i>Sodium Test vessel – 3:</i> Length = 3560 mm, Inner diameter = 6500 mm</p>
	<p><b><u>Static / Dynamic experiment</u></b></p> <p>Dynamic</p>
	<p><b><u>Temperature in the test section</u></b></p> <p>200 – 600 °C</p>

	<u>Operating pressure and design pressure</u> Operating pressure – 1.5 bar (g) Design pressure – 2 bar (g)
	<u>Flow range (mass velocity etc)</u> Sodium flow – 30 m <sup>3</sup> /hr
Coolant chemistry measurement and control (active or not, measured parameters)	Coolant is not active Coolant purity is maintained by cold trapping and monitored using online plugging indicator, and periodical sampling and analysis
Instrumentation	Thermocouples with Wireless Sensor Networking technology for temperature measurement. Wire type and spark plug type leak detectors, and sodium ionization detectors Wireless Sensor Networking technology for sodium leak detection. Mutual inductance type discrete and continuous level probes for monitoring sodium level. Permanent magnet flow meters for monitoring flow. Bourdon tube gauges for measuring cover gas pressure. Smoke detectors for fire detection.

## COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

Nil

## PLANNED EXPERIMENTS (including time schedule)

Testing of advanced shutdown mechanisms.

Testing of under sodium ultrasonic scanners.

Development & testing of devices and techniques for In-vessel Under Sodium Examination (INUSE)

Experiments on Sweep-arm scanner.

Calibration of sodium level probes.

## TRAINING ACTIVITIES

Training activities can be considered with IGCAR Kalpakkam for the operation of experimental campaign under the supervision of IGCAR qualified staff.

## REFERENCES

Nil