

Profile SFR-41

SAMRAT

INDIA

NAME OF THE FACILITY	<u>S</u> caled <u>M</u> odel <u>R</u> eactor <u>T</u> hermal Hydraulics Test Rig
ACRONYM	SAMRAT
COOLANT(S) OF THE FACILITY	Water
LOCATION (address)	Fast Reactor Technology Group (FRTG), Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, India
OPERATOR	FRTG, IGCAR
CONTACT PERSON (name, address, institute, function telephone, email)	Dr. P. Selvaraj, Director, Fast reactor Technology Group, Indira Gandhi Centre for Atomic Research, Kalpakkam - 603102, India, +91 44 27480083, pselva@igcar.gov.in

STATUS OF THE FACILITY	In Operation
Start of operation (Year)	2002

MAIN RESEARCH FIELD(S)	<input type="checkbox"/> Zero power facility for V&V and licensing purposes
	<input type="checkbox"/> Design Basis Accidents (DBA) and Design Extended Conditions (DEC)
	<input checked="" type="checkbox"/> Thermal Hydraulics
	<input type="checkbox"/> Coolant Chemistry
	<input type="checkbox"/> Materials
	<input type="checkbox"/> Systems and components
	<input type="checkbox"/> Instrumentation & ISI & R

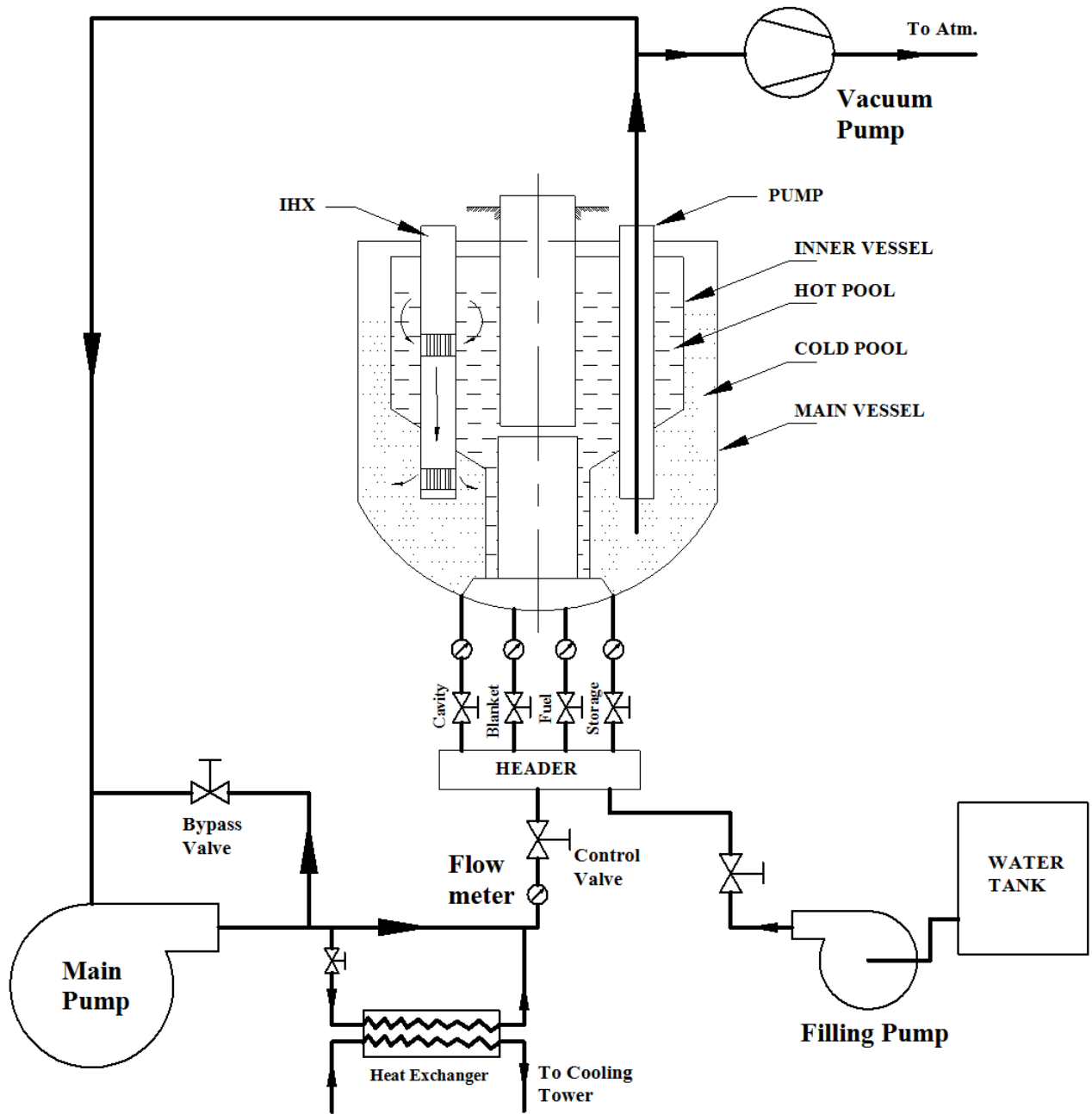
TECHNICAL DESCRIPTION

Description of the facility

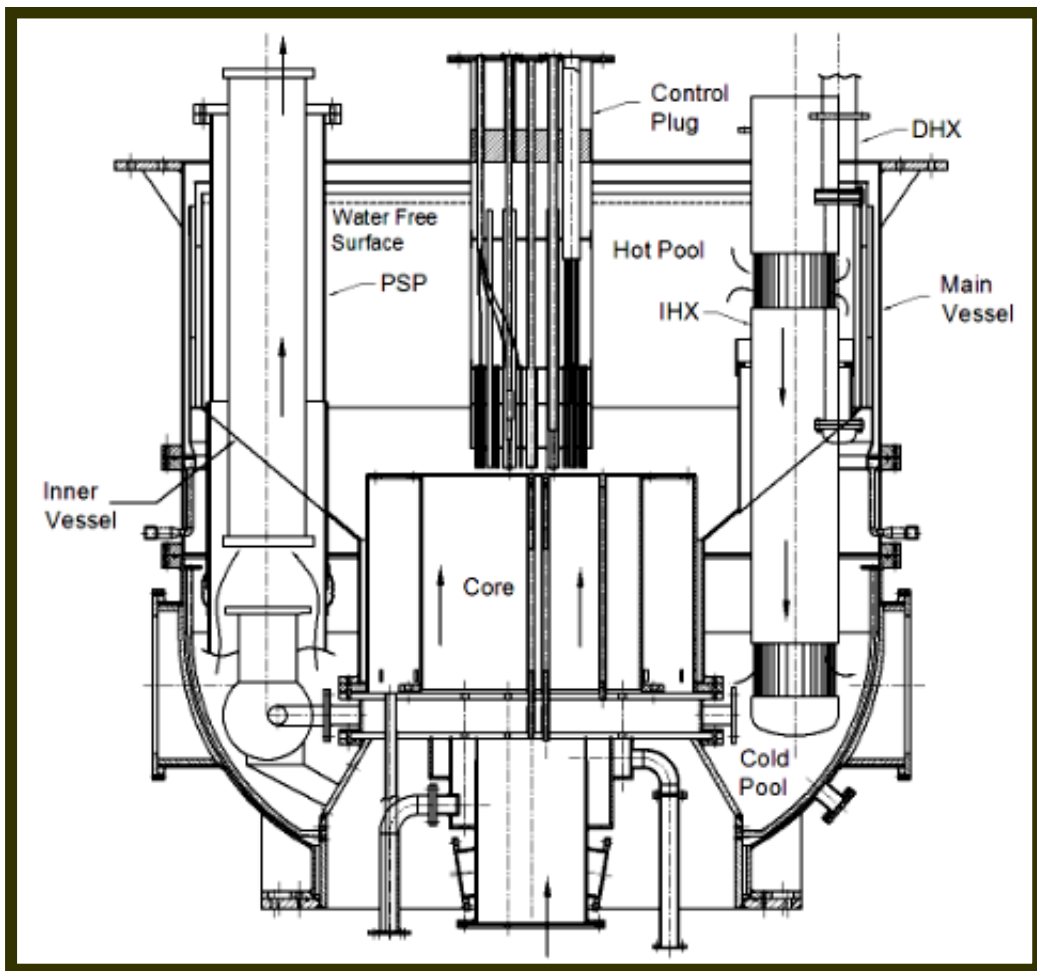
This is a model of PFBR primary pool with geometrical scale factor of 1:4. The purpose of this facility is to carryout various thermal hydraulic and Flow Induced Vibration (FIV) studies for thermal hydraulic design validation of PFBR primary circuit as well as assessment of flow induced vibration of various reactor primary circuit components. Two large pumps each having capacity of 1200 m³/h at 10 bar caters the required flow rate. Plate type heat exchangers are provided to maintain the water temperature during study. This facility has provision to fix rod type heaters with controller for carrying out thermal transient studies. This facility is also equipped with a dedicated control room with data acquisition system to acquire data during experiments.

Acceptance of radioactive materials – No

Scheme/Diagram of the loop



3D Drawing/Photo



Parameters Table

Coolant inventory	Model + loop : 20 m ³ ; Reservoir Tanks: 50 m ³
Power	Maximum power requirement for pump operation: 1 MW, Heater Power: 200 kW
No. of test section	One
Operating temperature range	30 °C to 70 °C
Operating Pressure Design Pressure	Operating Pressure: 10 bar Piping design Pressure: 15 bar
Flow range	40 m ³ /h to 2400 m ³ /h
Coolant chemistry measurement and control (active or not measured parameters)	Use of potable water, pH is controlled
Instrumentation	Resistance Temperature Detector, Pressure Gauge, Thermocouples, Pressure transmitters, Averaging pitot tube flow meters, Rotameters, Accelerometers and strain gauges for FIV measurements, Data acquisition system and control system

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

Experimental studies to investigate various thermal hydraulic and FIV phenomena related to PFBR hot pool and cold pool have been completed. Some of the major studies are; gas entrainment phenomena from hot pool free surface, mapping of flow pattern in hot pool and around the IHX inlet window, measurement of temperature fluctuation in the vicinity of above core structural materials, thermal stratification studies, temperature evolution in the hot pool during safety grade decay heat removal by decay heat exchanger, Inner vessel instability studies etc. All these experimental results have been used to validate the thermal hydraulic design of PFBR primary circuit components. The FIV measurement data have been used to assess the components design against structural integrity. This model and test facility has been used to develop passive devices to mitigate gas entrainment from PFBR hot pool free surface which is a major achievement of this test facility.

PLANNED EXPERIMENTS (including time schedule)

All the planned studies for PFBR have been completed. Presently this test facility has been kept reserved to support the ongoing commissioning activities of PFBR

TRAINING ACTIVITIES

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

REFERENCES

Nil