

## Profile SFR-11

NADYNE

FRANCE

### GENERAL INFORMATION

NAME OF THE FACILITY	NADYNE
ACRONYM	NADYNE
COOLANT(S) OF THE FACILITY	Sodium
LOCATION (address):	CEA Cadarache, 13108 Saint Paul Lez Durance FRANCE
OPERATOR	CEA
CONTACT PERSON (name, address, institute, function, telephone, email):	O. GASTALDI CEA Cadarache Building 710, 13108 Saint Paul Lez Durance, FRANCE Sodium Technology and Components Project Manager +33 4 42 25 37 87 Olivier.gastaldi@cea.fr
STATUS OF THE FACILITY	Under Design
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

This test section is one of the three test sections of the CHEOPS facility (NAIMMO, NADYNE, NSET). The CHEOPS facility is under design and will be able to realise experiments from the first half of 2019. CHEOPS is devoted to the development of the

ASTRID innovative components and completes efficiently the PAPIRUS facility, due to the large scale components which could be tested. CHEOPS includes its own cleaning facility which is called STALACMITES.

The NADYNE test section is a small tank which will permit to develop core elements (fuel assembly, safety components, ...) in similar nominal conditions than those of the ASTRID reactor (except neutron flux) and in incidental conditions. In effect, some short tests (100 seconds) can be realised at high temperature (until 700°C) to ensure the design and the performance of safety components. In nominal conditions, the loop allows to realise some endurance tests and transient tests (duration: 100 seconds – batch operating).

This test section is mutualised with the NAIMMO test section, so both test sections have the same storage tank, purification system, pump, heater and cooler (all the “standard” sodium technology). So CHEOPS facility includes two sodium loops : the NAIMMO / NADYNE loop and the NSET loop.

### **Acceptance of radioactive material**

No

### **Scheme/diagram**

### **3D drawing/photo**



*FIG. 1. Overall view of CHEOPS Facility*

## FUTURE FACILITIES

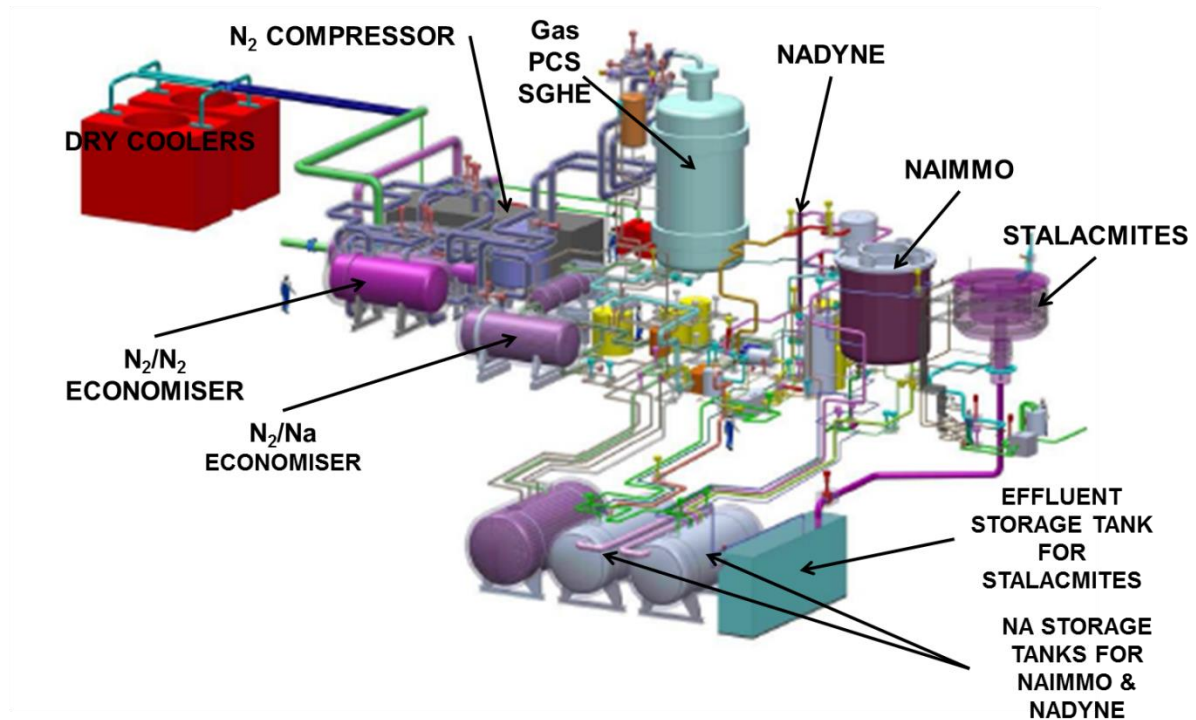


FIG. 2. Overall scheme of CHEOPS Facility

### Parameters table

Coolant inventory	Sodium inventory : 10 tonnes
Power	300 kW
Test sections	
TS #1	<u>Characteristic dimensions</u> Diameter : 300 mm Height : 5000 mm
	<u>Static/dynamic experiment</u> Dynamic experiments
	<u>Temperature range in the test section (Delta T)</u> Until 700°C
	<u>Operating pressure and design pressure</u> <b>Operating pressure : 5 bars</b>
	<u>Flow range (mass, velocity, etc.)</u> 200 m <sup>3</sup> /h
Coolant chemistry measurement and control (active or not, measured parameters)	Active coolant quality measurement and control (purification with a cold trap on a by passed flow: 10 m <sup>3</sup> /h and impurities level < few ppm, and impurities content evaluation by a plugging indicator )

Instrumentation	Thermocouples Argon pressure measurement Sodium pressure drop in the test section Inductive level probes Sodium flowmeters
-----------------	--

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

### **PLANNED EXPERIMENTS (including time schedule)**

The experiments planned are concerning the test of all types of subassemblies and shutdown systems with steady state and transients conditions in the thermal-hydraulics point of view.

Several years of experiment are planned after the facility start-up.

### **TRAINING ACTIVITIES**

The time schedule is not yet established. So, only the planned experiments will be listed hereafter :

- Development of core elements (fuel assemblies, control rods, ...)
- Development of safety components

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

1. GASTLADI O. and al. Experimental platforms in support of the ASTRID program: existing and planned facilities at CEA, ICAPP 2015 NICE, FRANCE, MAY, 3-6, 2015 – Paper 15126