

## Profile SFR-21

### MECANA

### FRANCE

#### GENERAL INFORMATION

NAME OF THE FACILITY MECANA (MEChAnical Tests facility in sodium (NA))  
ACRONYM MECANA  
COOLANT(S) OF THE FACILITY Sodium  
LOCATION (address): CEA Cadarache,  
13108 Saint Paul Lez Durance  
FRANCE  
OPERATOR CEA  
CONTACT PERSON O. GASTALDI  
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**STATUS OF THE FACILITY** In operation  
Start of operation (date): 2018

**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 objective of MECANA concerns the realization of some mechanical testing under hot sodium. As this kind of tests can concern very different items and with rather short experiment duration, the driving idea for designing MECANA was the development of a new test facility with the operational flexibility of a glove box and the sodium testing capabilities of a loop (high temperature, sodium purification) allowing to change rapidly test configuration (easy opening of the test section without air ingress into the circuit). This test device would consist of a conventional base sodium loop with

storage, purification unit, two sodium test pots, and the upper portion would be incorporated in a large glove box inerted by argon.

This facility handles sodium with a high chemical quality obtained through an active purification system. The classical subsystems of such sodium facility are present: storage vessel, cold trap, plugging indicator... The atmosphere above sodium surface is composed of Argon which its pressure is regulated at a slight overpressure, to prevent air ingress. Two operating modes are envisaged: the test pots can be completely closed allowing to reach the highest operating temperature or only partially closed with a limitation of the operating temperature to 200°C.

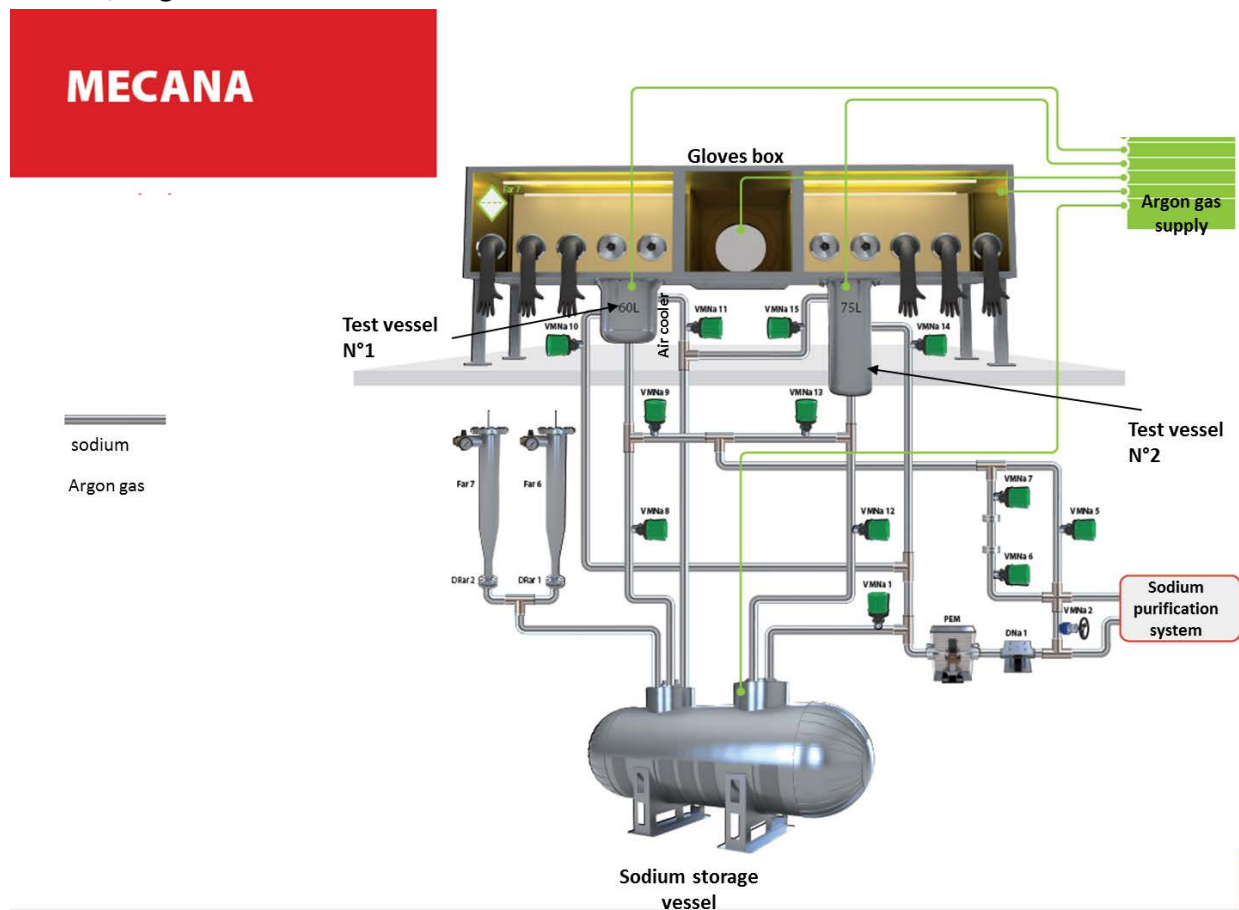
It is foreseen to connect some other sodium experimental pots to the storage and purification used as common resources.

This facility was put in operation but the end of June 2018.

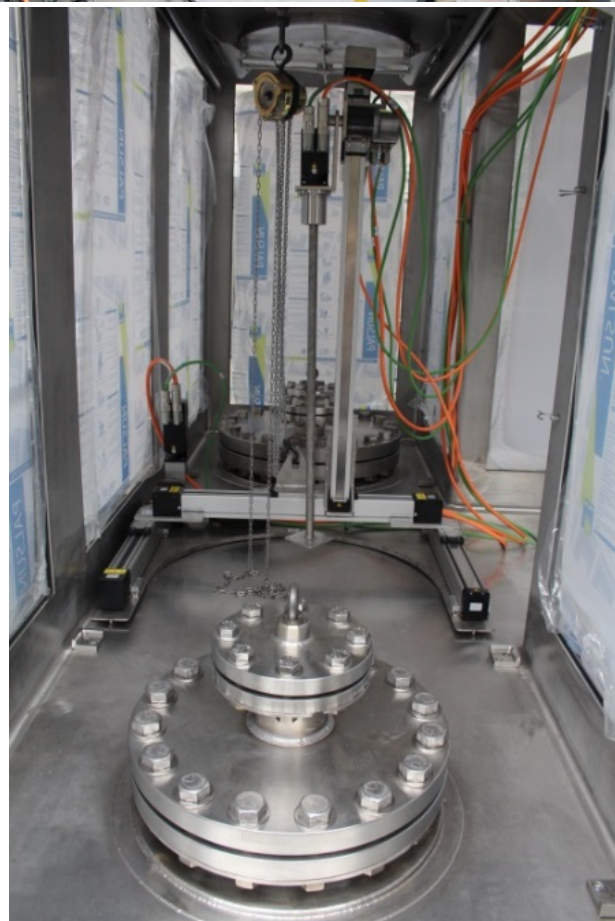
### Acceptance of radioactive material

No

### Scheme/diagram



3D drawing/photo



## Parameters table

Coolant inventory	430 L
Power	<a href="#">Click here to enter text.</a>
Test sections	
TS #1	<u>Characteristic dimensions</u> Maximum sodium capacity: 60 liters Inner diameter: 500 mm Total height of the vessel: 700 mm
	<u>Static/dynamic experiment</u> Static or dynamic experiments can be achieved
	<u>Temperature range in the test section (Delta T)</u> 150°C to 425°C
	<u>Operating pressure and design pressure</u> Maximum operating pressure: 0.5 rel. bar
	<u>Flow range (mass, velocity, etc.)</u> 2 m <sup>3</sup> .h <sup>-1</sup>
TS #2	<u>Characteristic dimensions</u> Maximum sodium capacity: 75 liters Inner diameter: 250 mm Total height of the vessel: 1700 mm
	<u>Static/dynamic experiment</u> Static or dynamic experiments can be achieved
	<u>Temperature range in the test section (Delta T)</u> 150°C to 425°C
	<u>Operating pressure and design pressure</u> Maximum operating pressure: 0.5 rel. bar for sodium circuit and 5 mbar for gloves box part.
	<u>Flow range (mass, velocity, etc.)</u> 2 m <sup>3</sup> .h <sup>-1</sup>
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: 1 m <sup>3</sup> /h and impurities level < few ppm and impurities content evaluation by a plugging indicator) Possibility to control the bubbles content inside the sodium
Instrumentation	Thermocouples Argon pressure measurement Sodium pressure measurement Inductive level probes Electromagnetic flowmeters

## COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

NA

**PLANNED EXPERIMENTS (including time schedule)**

First years of experiments will concern ISIR testing in particular, defect detection with immersed transducer.

After the first year of operation, a new system able to inject calibrated gas bubbles cloud in sodium will be implemented on this loop and used to develop and validate the acoustic techniques to characterise bubbles cloud into sodium (implementation of the test section is planned in 2019).

**TRAINING ACTIVITIES**

Yes

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

O. GASTALDI 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