

Profile SFR-16

DOLMEN

FRANCE

GENERAL INFORMATION

NAME OF THE FACILITY	DOLMEN (Double Latitude pour Maintenance En sodium (Na))
ACRONYM	DOLMEN
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 208, 13108 Saint Paul Lez Durance, FRANCE Sodium Technology and Components Project Manager +33 4 42 25 46 40 Olivier.gastaldi@cea.fr

STATUS OF THE FACILITY	In operation
Start of operation (date):	1980 and refurbished in 2013/2014

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 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

This facility is used for testing instrumentation, small components and under sodium repair technique, in sodium telemetry, under sodium visualization... and it can achieve preparation of sample for experiments done on other experimental devices (immersion and wetting in sodium).

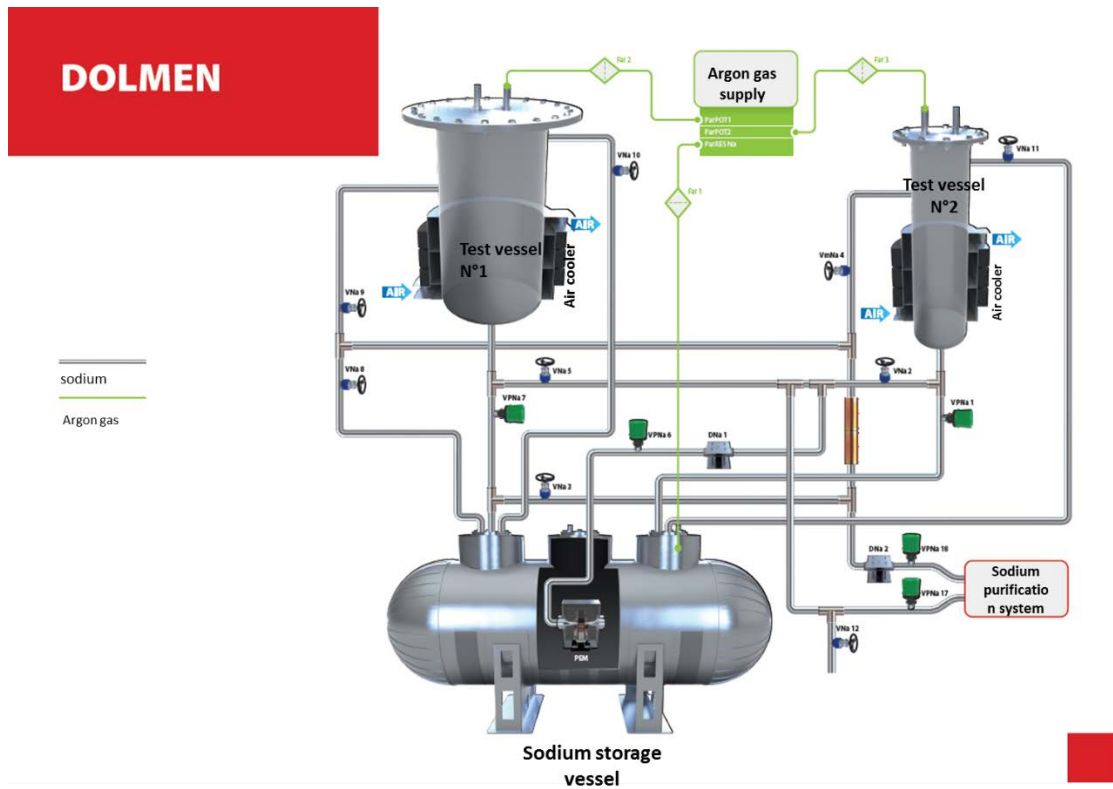
It is relatively large facility composed of 2 main tests section made of a large sodium pot (1500 L and 600 L) able to be operated up to 600°C. This facility handles sodium with a high chemical quality obtained through an active purification system. The classical subsystems of such sodium facility are

present: storage vessel, cold trap, plugging indicator... The atmosphere above sodium surface is composed of Argon.

Acceptance of radioactive material

No

Scheme/diagram



3D drawing/photo





Parameters table

Coolant inventory	Up to 3 m ³
Power	70 kW
Test sections	
TS #1	<u>Characteristic dimensions</u> Sodium capacity: 1500 L Diameter: 1080 mm And height: 2000 mm
	<u>Static/dynamic experiment</u> Sodium is quasi static in test section during the experiments
	<u>Temperature range in the test section (Delta T)</u> 250°C to 600°C
	<u>Operating pressure and design pressure</u> Operating pressure < 450 mbar
	<u>Flow range (mass, velocity, etc.)</u> Mass flow rate: 1500 L/h
TS #2	<u>Characteristic dimensions</u> Sodium capacity: 600 L Diameter: 600 mm And height: 2500 mm
	<u>Static/dynamic experiment</u> Sodium is quasi static in test section during the experiments
	<u>Temperature range in the test section (Delta T)</u> 250°C to 600°C
	<u>Operating pressure and design pressure</u> Operating pressure < 450 mbar
	<u>Flow range (mass, velocity, etc.)</u>

	Mass flow rate: 1500 L/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: 1 m ³ /h and impurities level < few ppm, and impurities content evaluation by a plugging indicator)
Instrumentation	Thermocouples Argon pressure measurement Inductive level probes Electromagnetic flowmeters

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

Since the beginning of the start-up of this facility, there are a lot of experimental campaigns.

Here can be mentioned some of them. DOLMEN has been used:

- to perform under sodium repair techniques
- to prepare many mock-ups for development of carbonation process
- to establish performance of telemetry with ultrasound techniques
- to test high temperature ultrasonic transducers up to 600°C
- to calibrate inductive level probes...

PLANNED EXPERIMENTS (including time schedule)

For the next years the main experimental campaign will be devoted to establish the performance of several sodium instrumentation devices: new high temperature ultrasonic transducers, matrix phased array ultrasonic transducers, electromagnetic transducers, but also some experiments to demonstrate the ability to make under sodium visualization. A specific remotely controlled mechanical harm (xyz movements) is developed and will be coupled to DOLMEN to realise this experimental program.

For longer terms, DOLMEN will be used for under sodium repair techniques testing. Some specific under sodium tools will be tested: cutting, laser ablation, welding...

TRAINING ACTIVITIES

Possible, but no specific program is planned.

REFERENCES (*specification of availability and language*)

F. BAQUE, L. MARTIN

Emersion of PHENIX Reactor Components from Liquid Sodium .Emersion Testing of PHENIX Reactor Components from Liquid Sodium.

ICONE 10 Tenth International Conference on Nuclear Engineering, April 14-18, 2002 Washington USA

F. BAQUE

Review of in service inspection and repair technique. Developments for French liquid metal fast reactors, Nuclear Technology, July, 2004

G. RODRIGUEZ., F. BAQUE, J.C. ASTEGIANO, "Evolution of Sodium Technology R&D Actions Supporting French Liquid-Metal Fast Breeder Reactors", Nuclear Technology, Volume 150, Number 1, April 2005, pages 3-15.

G. Gobillot, F. Baque, C. Lhuillier et al.,
"Ultrasonic techniques for improving inspection of sodium-cooled systems," Proceedings of the International Conference on Advancements in Nuclear Instrumentation, Measurement Methods and Their Applications (ANIMMA'09), Marseille, France, June 2009, Paper 80.

F. BAQUE, F. JADOT, J. SBILO, J.M. AUGEM, O. GASTALDI,
ASTRID In Service Inspection and Repair: review of R&D program and associated results
FR'13 Int. Conf., Paris March 2013

G. RODRIGUEZ, L. AYRAULT, J. DUMESNIL E. SANSEIGNE, F. DUJET, B. COLLARD, F. SERRE, C. JOURNEAU
Development of experimental facility platform in support of the ASTRID program, Proc of IAEA FR13 conference, Paris, France, march 4-7, 2013

O. GASTALDI, G. RODRIGUEZ, L. AYRAULT, B. COLLARD, J. DUMESNIL, F. DUJET, C. JOURNEAU, C. LATGE, E. SANSEIGNE, F. SERRE, I. TKATSCHENKO, G. WILLERMOZ
Experimental platforms in support of the ASTRID program: existing and planned facilities,
Proceedings of ICAPP 2014, Charlotte, USA, April 6-9, 2014, Paper 14060

G. Gobillot, E. Sanseigne, F. Baqué (CEA)
Under Sodium Imaging of SFR Internals – Five degrees of freedom under sodium transducer displacement system and associated images.
ANIMMA 2017 (Liège, Belgique, juin 2017)

Gilles Gobillot (CEA), Emmanuel Sanseigne (CEA), François Baqué (CEA), Ilyas El Khalloufi (CEA)
Under-Sodium Imaging of SFR Internals – Four degrees of freedom with a sodium transducer displacement system.
ULTRASONICS 2018, 11 au 14 juin 2018, Universidade nova de Lisboa

Kévin Paumel (CEA), Subassembly identification by ultrasound in sodium cooled fast reactors.
2018 IEEE International Instrumentation and Measurement Technology Conference (I2MTC),
14-17 May 2018, Houston, TX, USA.