



Jules HOROWITZ Reactor

ERECTION OF THE REACTOR CORE VESSEL

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IGORR Conference





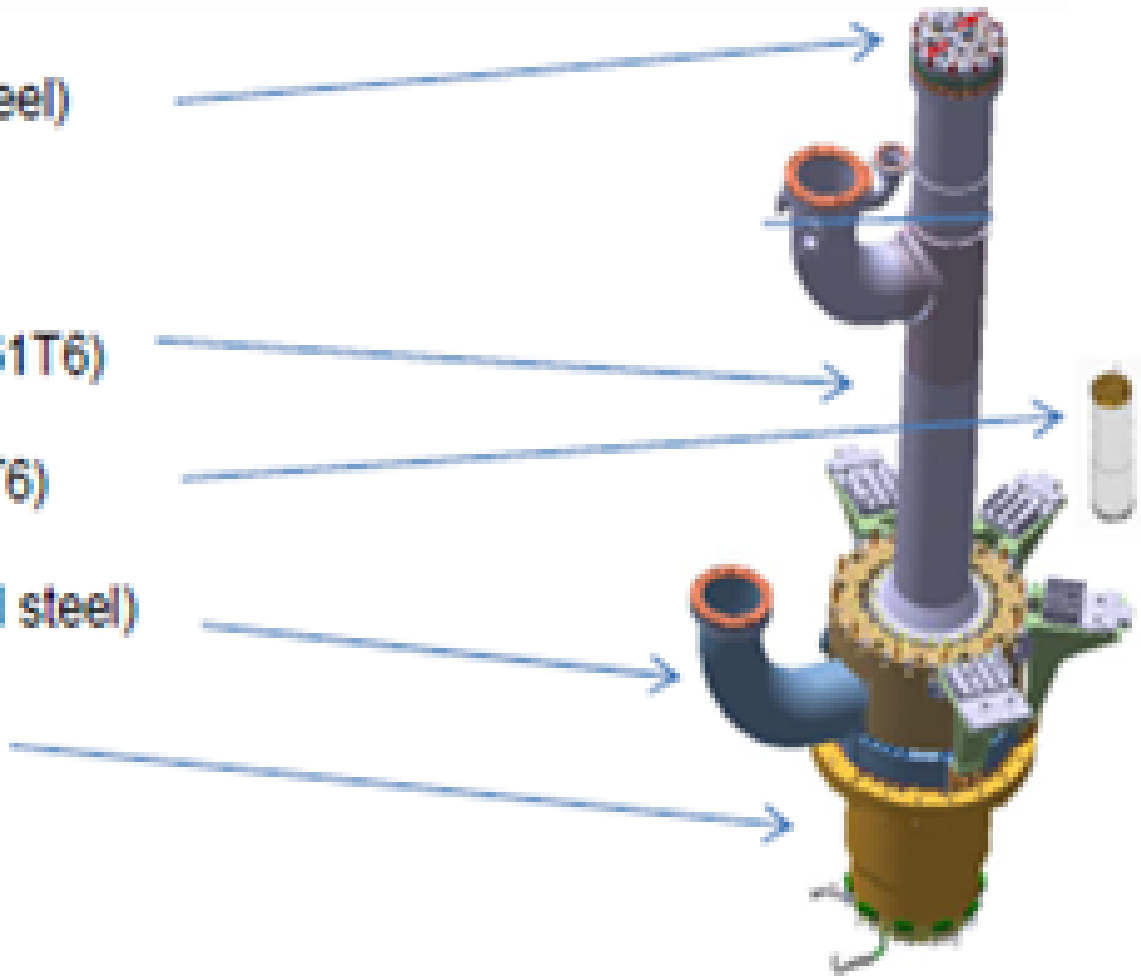
The JHR is a Material-Testing Reactor optimised to support the safe development of nuclear energy. With a maximum nuclear power of 100 MW, the reactor is designed to simultaneously accommodate a large number of core and reflector experiments, with a very large range of thermal and fast flux levels.

This research reactor is under construction at the CEA Cadarache site in France.

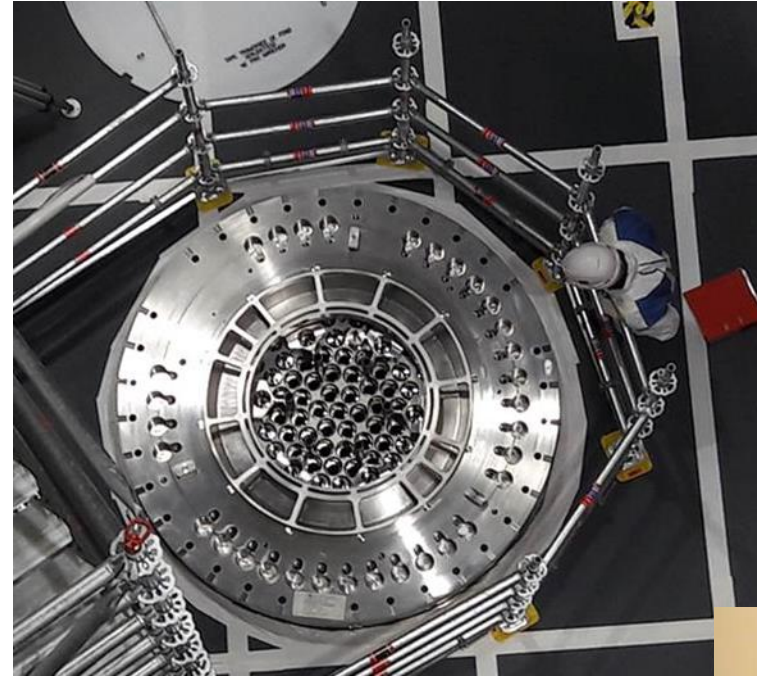
In November 2020, a major project milestone was reached: the installation on site of the reactor core vessel. This main step finalizes the first phase of the assembly of the pile-block including the bottom plug, water boxes, core vessel, fuel rack and closure head. This presentation will show you in detail the work performed to reach this successful milestone.



- Closure head (stainless steel)
- Core vessel (forged Al 6061T6)
- Fuel rack (forged Al 6061T6)
- Water Boxes (blank forged steel)
- Plug (blank forged steel)



View from the pool



View from the crypt

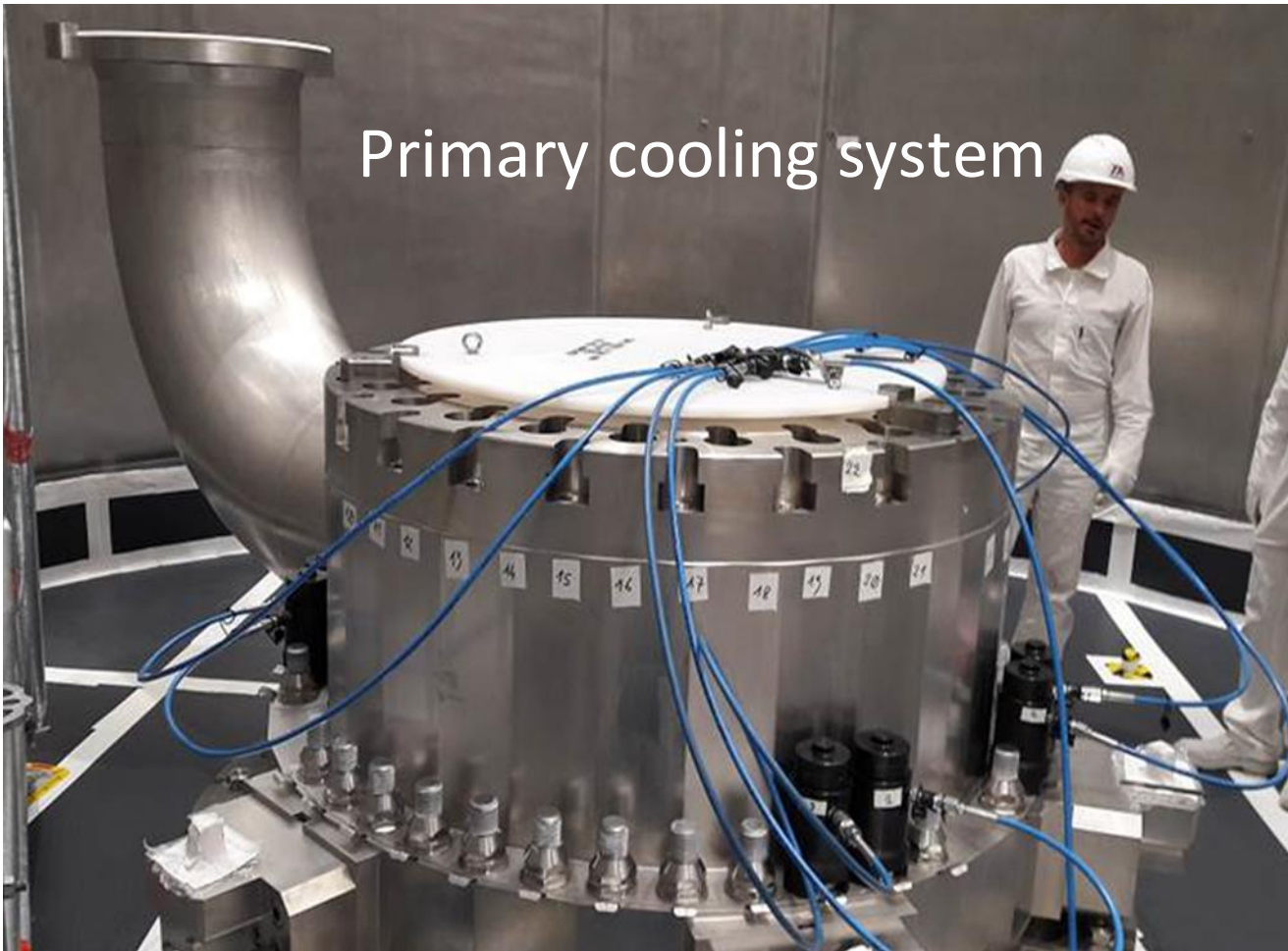


In September twenty nineteen (2019) the first pile-block equipment was received on site : the bottom plug

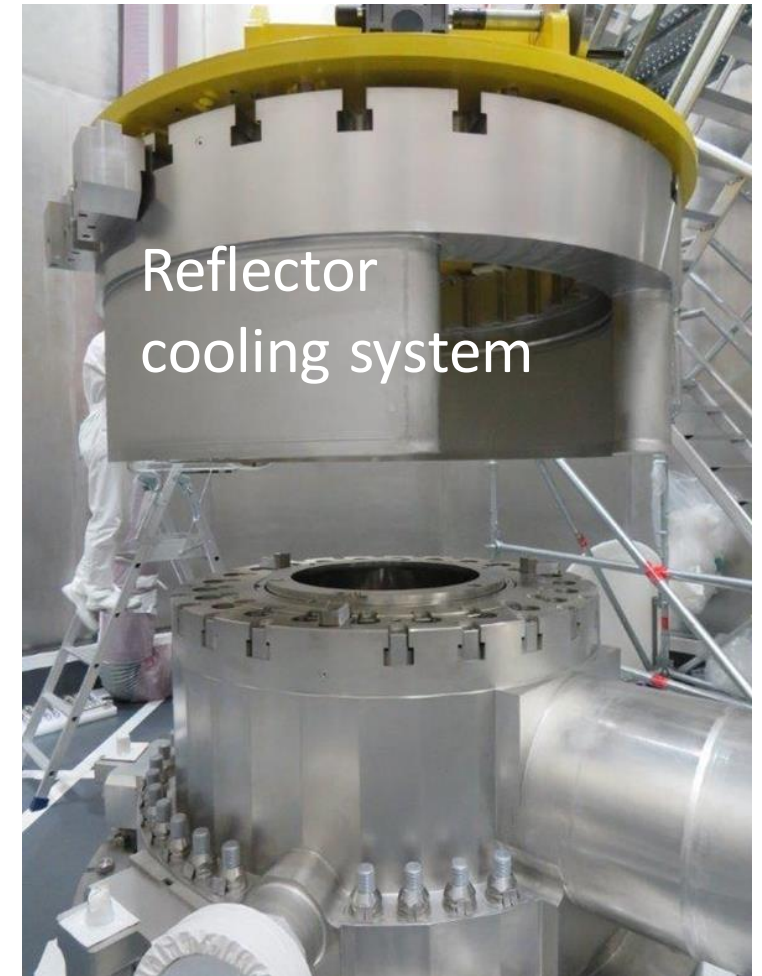
It allows the guiding of the control rods of the mechanisms, ensures the integrity of the 2nd containment barrier, contributes to the sealing between the water reactor pool and the crypt and limits the dose rate received by operators during crypt interventions.



Primary cooling system



Reflector cooling system



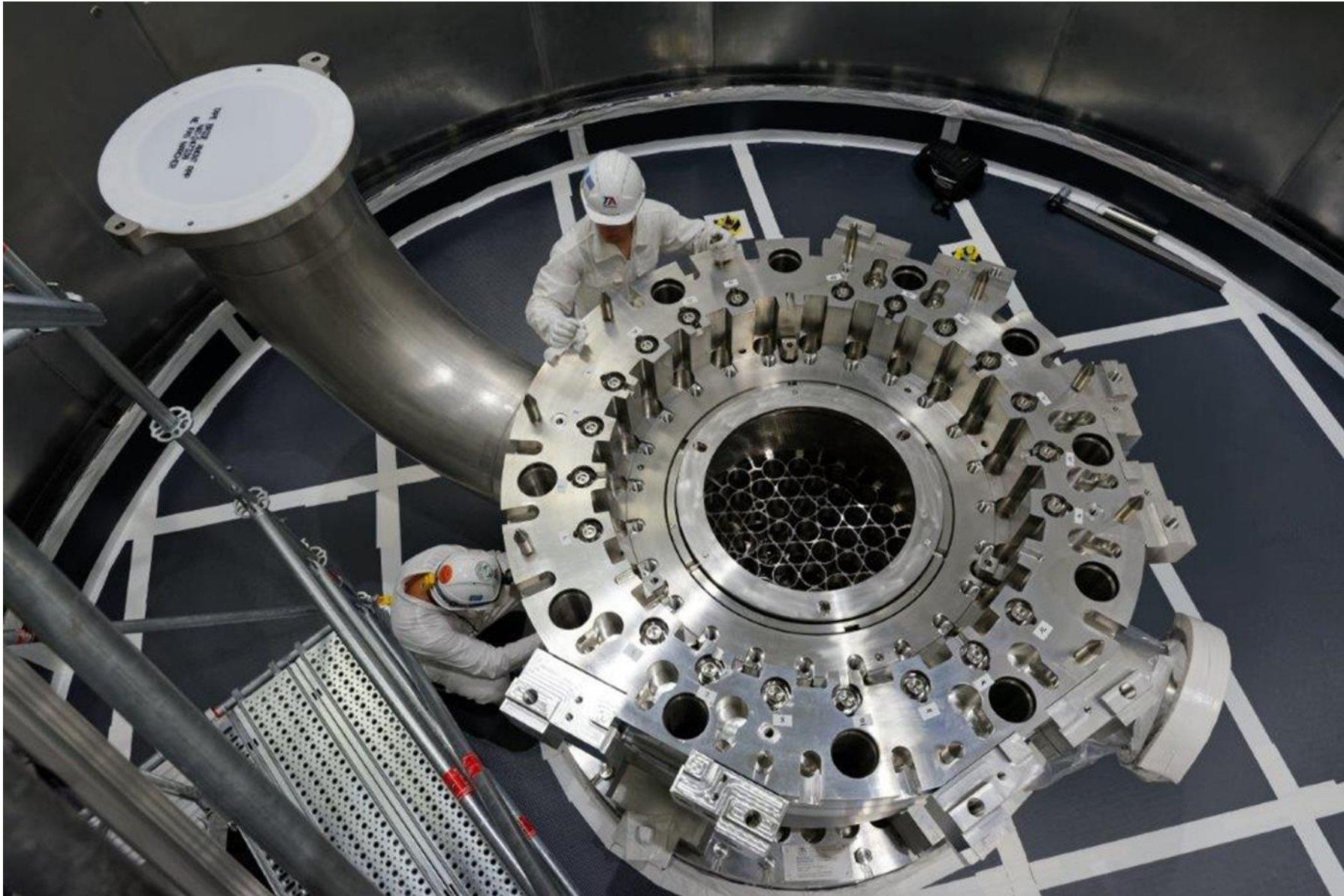
The primary cooling water box, channels the fluid to the core vessel. It accommodates the convergent as well as the stilling grid, which allows homogenising the speed of the fluid before its change in direction.

You can see the mounting of the first water box after visual control and clamping on the bottom plug.

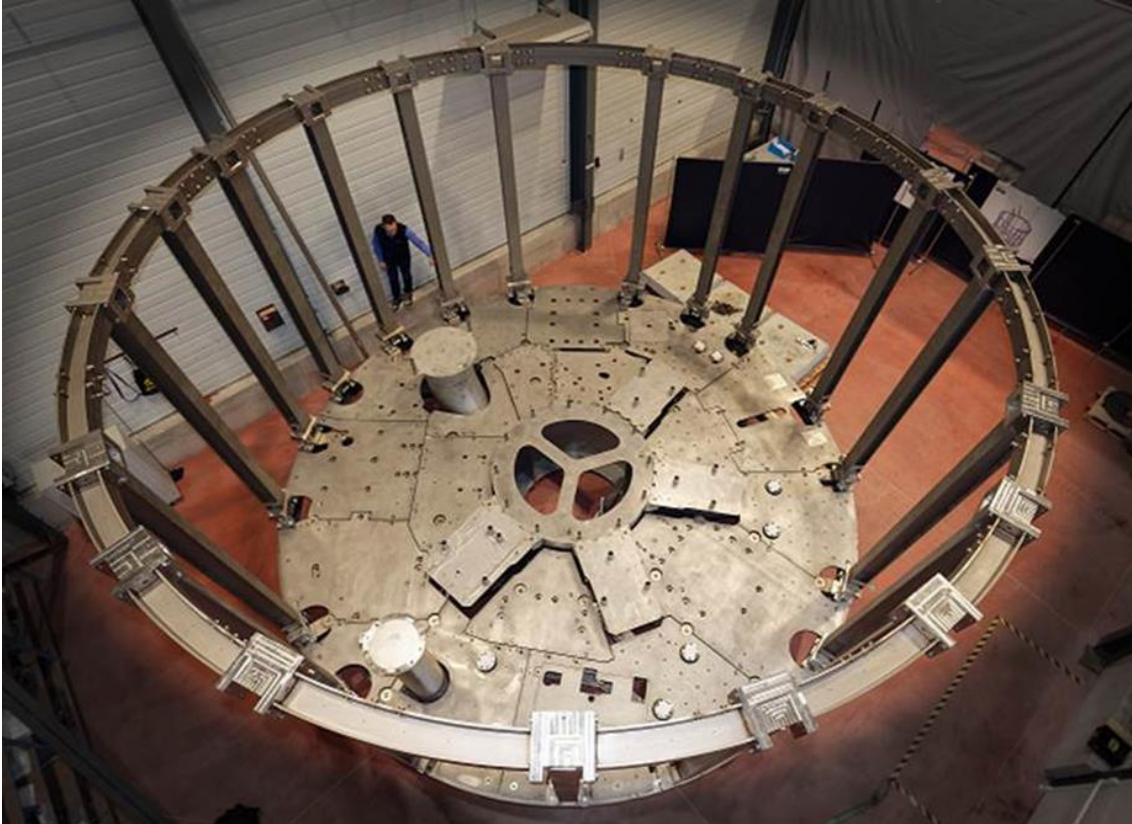
The reflector water box allows cooling of the pool and experimental devices. It supports displacement systems with chairs and fixing interfaces. In October the final clamping of the Reflector water box on primary cooling water box.



Water boxes (primary cooling system + Reflector)



Complete structure On subcontractor's workshop



Chassis on site (October 2020)



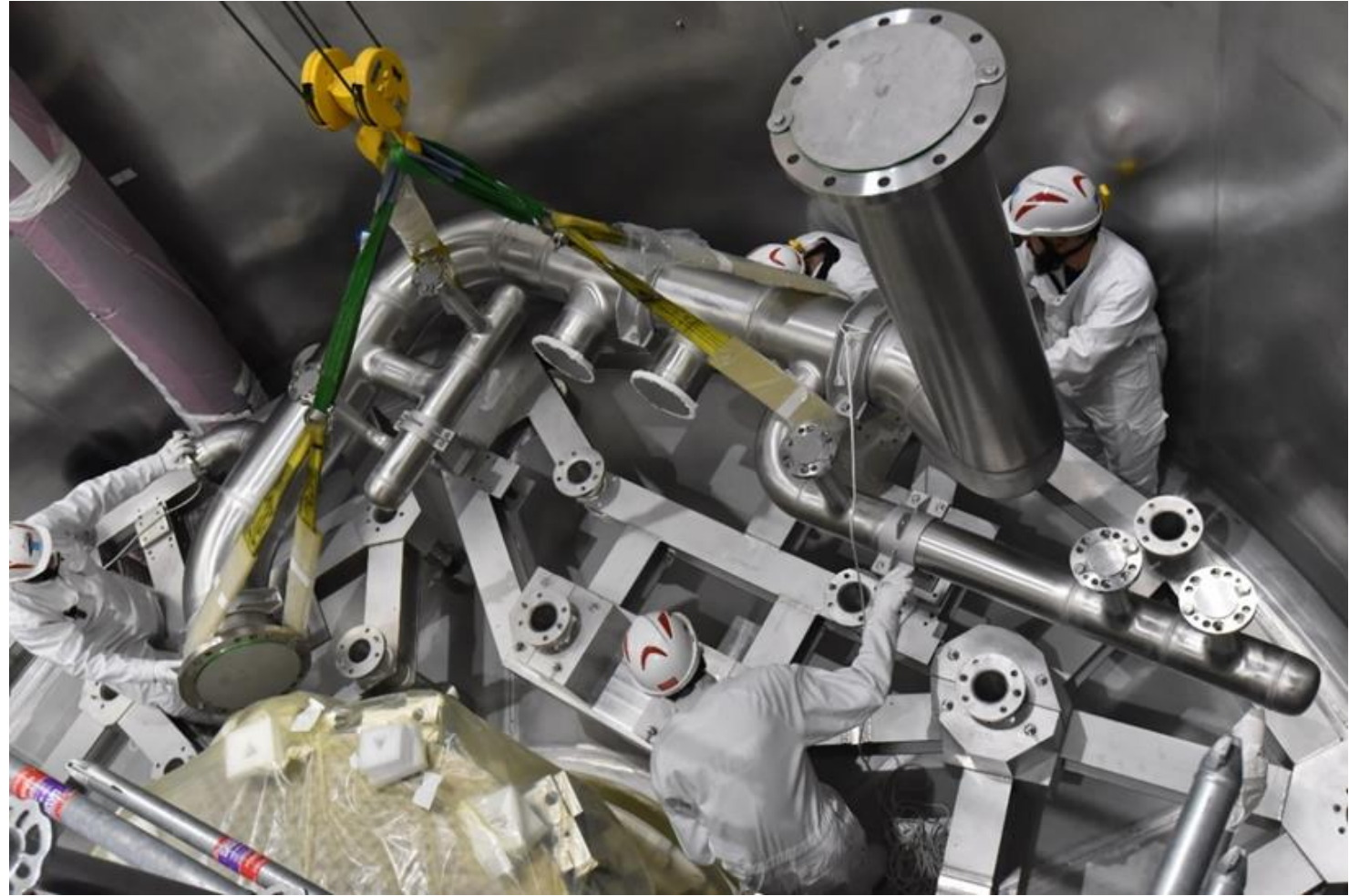
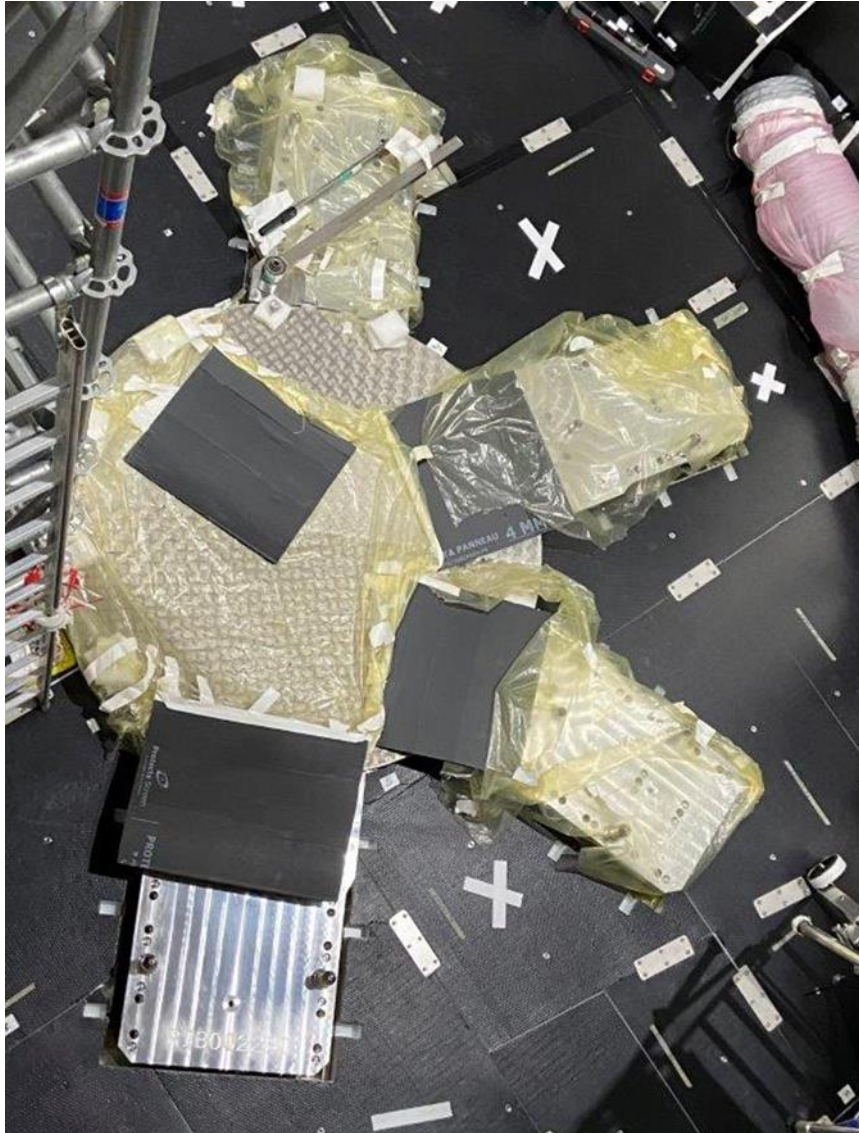
Before the installation of the rest of the equipment of the pile-block, we put in place the floor structure in reactor pool.

The floor structure of the reactor pool contains different element:

- Reflector suction & discharge piping,
- Chassis, Deck, low & high supports, column & hoop

The assembly of these elements in the pool took place between January and October 2020.





Reflector suction pipe

The 4 chairs of the 4 displacement systems





The core vessel contains the fuel elements, ensures the confinement of the primary coolant and contributes to the cooling of in-core irradiation devices (fuels, experimental devices, control rods). Made of a specific type of Aluminium, it participates in neutron performances.

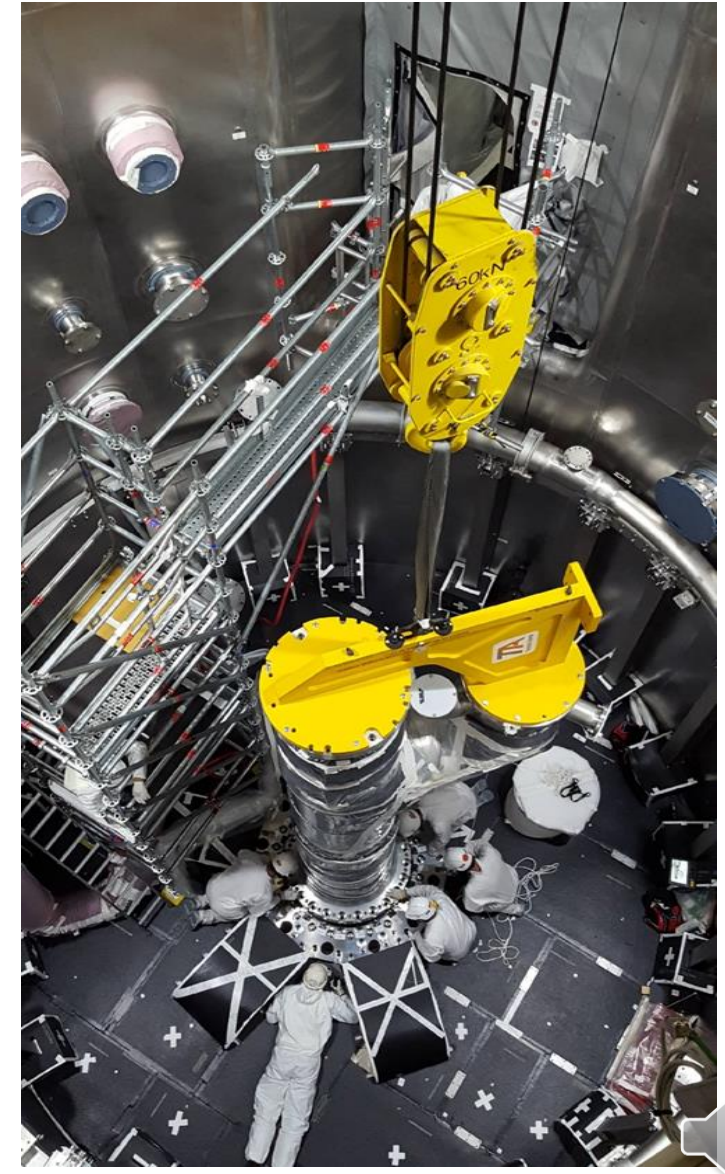
The mounting of the core vessel was carried out in several steps:

- Introduction in the hall
- Tilting to the vertical
- Introduction into the pool

Prior being allowed to perform these operations, strict cleanliness conditions had to be set up in the reactor's hall.

Operations have been carefully prepared to ensure safe handling.

Height: 5185mm
Diameter: 716mm
Thickness: 20mm
Weight : 2T
Material:
Aluminium 6061 T6 and Inox



Out



Introduction into the reactor's hall



Tilting



Introduction into the reactor's pool





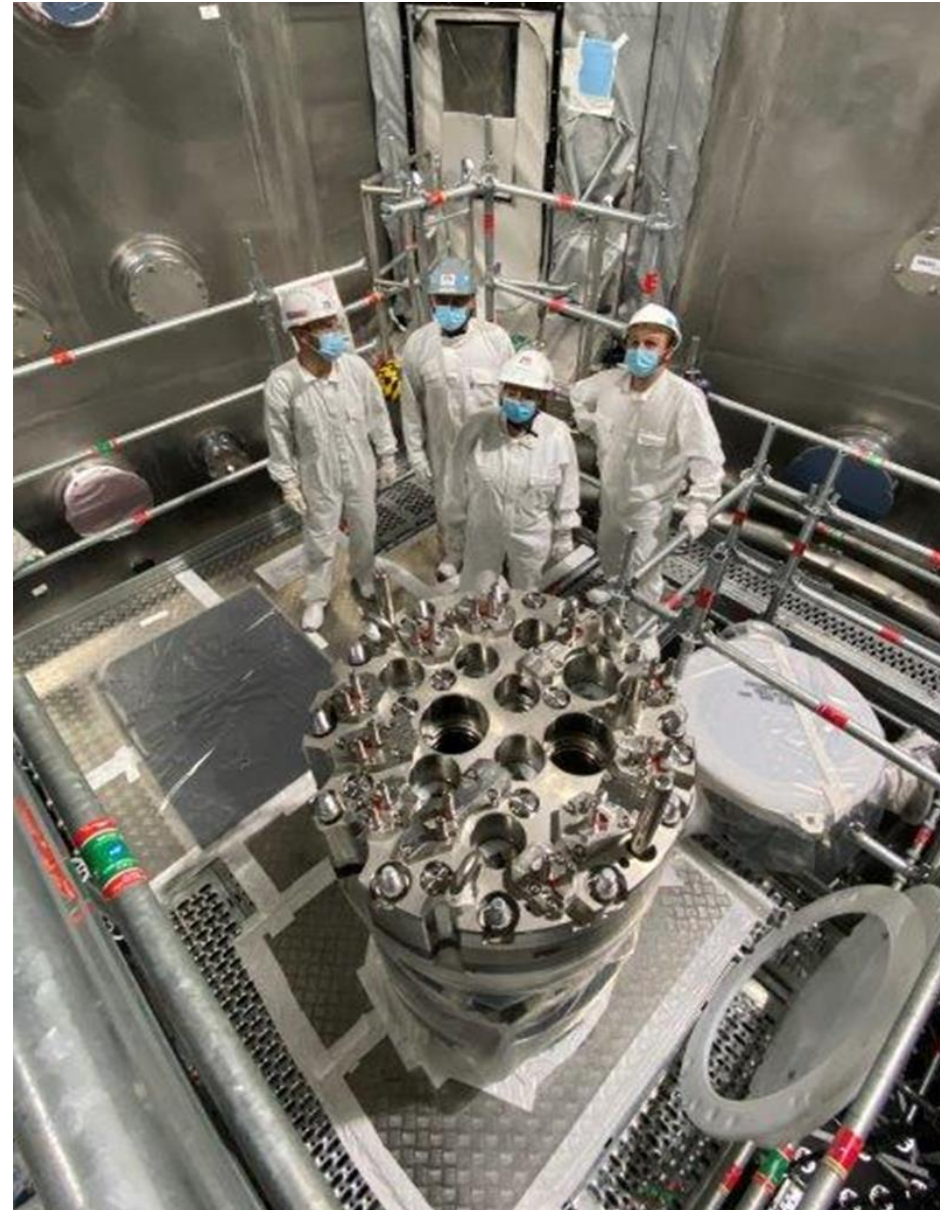
The fuel rack accommodates fuel element, inter-element mandrels, irradiation test specimens, core pressure loss and output pressure measurements.

The 1st equipment to be introduced in the core vessel was the fuel rack. This was achieved on January 26th, 2021



The closure head, mounted at the top of the vessel, must guarantee the confinement of the primary coolant during operation. It maintains and positions experimental devices and ensures anti-blow-out with a double lock. The closure head consists of massive mechanical parts and parts of precision mechanisms. The plates have many bores, holes and threads.

This step closed the 1st phase of the assembly of the JHR pile block at the end of January 2021.





Thank you for your attention

