

Tritium facilities for the LMJ cryogenic targets

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For the French Inertial Confinement Fusion (ICF) experiments carried out on the Megajoule Laser (LMJ), cryogenic target assemblies (CTAs) are manufactured and filled thanks to CEA Valduc (Dijon) tritium facilities. They will be moved at about 20 K into a transport cryostat for cryogenic targets, and will be driven from CEA/Valduc to CEA/CESTA (Bordeaux).

This paper deals with the description of the tritium facilities for the LMJ cryogenic target.

Twelve gloveboxes are needed to furnish 6 CTAs at the same time. These twelve gloveboxes make a relative independent set in the Valduc tritium building and have several functions:

- Preparation of the CTAs and the different vacuum vessels : A glovebox is being developed to insert six CTAs coming from the non nuclear target fabrication building from Valduc into a tritiated vacuum vessel. This is the entry of the tritium facilities for the LMJ cryogenic target.
Another glovebox is especially dedicated to the storage of all these tritiated vacuum vessels that are needed for the entry or the exit of the tritium facilities.
- Gaz storage and purification: Tritium must be optimally with no ^4He and ^3He , which are poisons for implosion experiments. Two gloveboxes (one for purification and one for storage) have been designed for the specific needs of the LMJ cryogenic target. Johnston Matthey Palladium membranes are used to separate hydrogen isotopes from helium.
- Filling and cooling the targets : The nominal filling process is permeation of DT at room temperature up to 1300 bars in a permeation cell. The temperature of the CP is then decreased to about 20K. Then, a low temperature around 20K must be maintained until the shot, while the CTAs are manipulated thanks to cryogenic grippers from CEA Valduc to LMJ facility. Five gloveboxes are needed to perform all these tasks. Some parts have been specially developed (cryogenic intensifier and permeation cell for the CTA filling, robot working under vacuum and handling a CTA cryogenic gripper).
- Transport targets at cryogenic temperature : A moving cryostat for the six CTAs transport at 20K between Valduc and LMJ facility was tested. This cryostat responds entirely to the ADR2005 specifications (European decree for dangerous goods transport on public roads).
- Redistribution procedure adjustment : A cryostat with very high performances installed in a glovebox allows establishing DT conformation procedures sent with each type of target.