

New design of a reversible hydride storage vessel

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For ten years French tritium laboratory uses metal hydride storage beds with LaNi₄Mn for process gas (HDT mixture) absorption desorption and for both short and long term storage. This material has been chosen because of its low equilibrium pressure and of its ability to retain decay helium 3 in its lattice. First version of a reversible hydride storage vessel (namely FSH 400) has been presented in a previous paper¹. The FSH 400 is filled with LaNi₄Mn granules within a stainless steel container. This design is aimed at storing low tritium content mixtures (less than 3% of tritium) and for supplying processes with HDT gas. Lifetime of the vessel varies from 1.2 years to more than 25 years depending on the application and regarding storage reversibility. The current version of storage vessel has been modified in order to improve the thermal exchanges and to allow the heating of the material above 400°C. This new version could increase its lifetime. It could then permit to use this storage vessel for extended applications. This paper will present the 3D modelling results (of the thermal exchanges and of repartition of hydrogen in the material during cycling) of the current storage vessel, which have led to its new design. A prototype of the new vessel will also be presented.

1: I. Moysan *et al*, Helium effects on tritium storage materials, Fus. Science and Tech., Vol 54, number 1, 2008.