OUTGASSING MEASUREMENTS FOR THE ITER EC H&CD UPPER LAUNCHER

G. Aiello, A. Meier, T. Scherer, S. Schreck, P. Spaeh, D. Strauss, A. Vaccaro

Karlsruhe Institute of Technology, Association KIT-EURATOM, Institute for Materials Research I, P.O. Box 3640, D-76021 Karlsruhe, Germany

Corresponding author: gaetano.aiello@kit.edu

In most of applications involving both vacuum and high temperatures, outgassing of structural materials is a critical issue. For instance, this is the case of fusion test devices, where the gas released from the vessel walls contaminates the plasma.

Four upper ports in the ITER vacuum vessel are reserved for Electron Cyclotron Heating and Current Drive (EC H&CD) Upper Launchers (UL), which have to provide plasma MHD stabilization by localized deposition of high power microwave beams. The structural material foreseen for the UL is the 316L(N)-IG stainless steel. It has to withstand temperatures in the range 120-150°C during normal operation and 240°C during the baking process. One of the preferred manufacturing routes for the UL is the Hot Isostatic Pressing (HIP) which is a very sophisticated method to manufacture structural components of complex geometry with good mechanical properties. The materials for use in the ITER vacuum systems have to comply with the outgassing limits given in the ITER Vacuum Handbook, but no outgassing data for HIPed stainless steel are available in literature, thus they must be obtained by experimental measurements.

In this paper, measurements of partial outgassing rates are shown and discussed for stainless steel prototype samples AISI 316LN (on which the 316L(N)-IG is based) and AISI 317LMN, obtained by powder and solid HIPing process. A variant of the gas throughput method in vacuum systems was used for the measurements which were carried out over periods larger than 8 hours and at different temperatures.

"This work, supported by the European Communities under the contract of Association between EURATOM/CEA, was carried out within the framework of the ITER Goal Oriented Training Programme on Port Plug Engineering [under EFDA task agreement WP08-GOT-ITER-PPE]. The views and opinions expressed herein do not necessarily reflect those of the European Commission."