



Contribution ID: 422

Type: **Poster**

INTEGRATION OF METALLIC SEALS ON CIRCULAR FLANGES FOR NEUTRAL BEAM FRONT END COMPONENTS

Tuesday 6 June 2017 13:40 (2 hours)

The Neutral Beam (NB) system for ITER is composed of two heating neutral beam injectors (HNBS) and a diagnostic neutral beam injector (DNB). A third HNB can be installed as a future up-grade. This paper will present the design solution of the sealed interface between the components so called 'Neutral Beam Front End Components'. The components to be considered are the Drift Duct, the Vacuum Vessel Pressure Suppression System box (VVPSS box), the Absolute Valve, and the Fast Shutter. These components connect the Neutral Beam vessels of the injectors to the Tokamak Vacuum Vessel. These components are connected with circular flanges bolted together. They are all first confinement barrier and by the way Safety Important Components classified. They must comply with stringent requirements in term of leak tightness and robustness. They are all classified RH class 3 that means that their life time shall comply with ITER life time without planned maintenance. In case of unlikely incidents or accidents, and regarding the results of Neutronic analysis in the Neutral Beam cell, the safety approach is to consider that all operations will be done fully remotely. It is not likely that it will be acceptable to allow human intervention.

The paper will describe the design of the interface solutions which have to be implemented between these components regarding the primary vacuum confinement and the remote maintenance operations. The IO baseline solution to ensure the confinement and the leak tightness at these interfaces was the lip seal weld. The design and manufacturing code chosen for the NB FEC is the RCC-MR. The Lip seal weld solution raised two main concerns which are the compliance with the RCC-MR code and the feasibility of the full remote maintenance operations. The cutting and re-welding operations of the lip seal weld have never been demonstrated without a human intervention. And the RCC-MR is not directly applicable (or not relevant) for the lip seal weld. It appears that the design of the lip seal weld raises a lot of open issues like feasibility, tests and full RH operations inside the NB cell. The solution with two metallic seals with a pumped interspace will solve all lip seal weld concerns. A complete study has been carried out to demonstrate the compliance of this solution in term of leak tightness requirement, feasibility of a full remote maintenance operations and improvements of testing and monitoring these key interfaces.

Eligible for student paper award?

No

Author: Mr URBANI, Marc (ITER Organization)

Co-authors: Mr GRACEFFA, Joseph (ITER Organization); Mrs BOILSON, Deirdre (ITER Organization); Mr CHAREYRE, Julien (ITER Organization); Mr ROUX, Kevin (ITER Organization); Mr CHOI, Chang-Hwan (ITER Organization); Mr BORNAREL, Thomas (Technetics group); Prof. LEDRAPPIER, Florent (Technetics group)

Presenter: Mr URBANI, Marc (ITER Organization)

Session Classification: T.POS: Poster Session T

Track Classification: Operations and maintenance