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DESIGN REALIZATION TOWARDS THE QUALIFICATION TEST OF ITER COLD CIRCULATOR

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Cold circulators, part of ITER Cryo-distribution system, have now reached to a stage of final qualification to demonstrate the design to cater the maximum mass flow and operational demands of the toroidal field (TF) superconducting magnet of ITER with a very high isentropic efficiency. The design of the TF cold circulators are now complete, gratifying additionally the operational requirements of poloidal field & central solenoid superconducting magnet as well as the cryopumps towards the fulfillment of standardization aspects.
Management of physical and functional interfaces has been identified as one the most critical aspect towards the final performance of ITER cold circulator. Mechanical, instrumentation and control as well as utilities are recognized as physical interfaces; whereas, operating modes of the cold circulator as an integrated component in the Test Auxiliary Cold Box (TACB) is the functional interface. All the interfaces of cold circulators have been analyzed with the help of optimized interfacing parameters of TACB and test facility at JAEA, Naka, Japan during the course of design finalization of two numbers of TF cold circulators as well as a TACB.
Testing at the warm conditions after completion of precise manufacturing of cold circulators will be performed before final integration into the TACB in order to fulfill the Japanese as well as European regulatory requirement simultaneously. Components forming the pressure boundaries, such as the in-cryostat casing as well as on-cryostat mounting flange of cold circulators have been separately manufactured, tested and certified in order to mitigate the envisaged risk during the manufacturing processes. The paper will elaborate the methodology of interface management and control, analysis performed towards the interface management and preliminary test results towards the qualification test of the ITER cold circulator.

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