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P2.012 Long-Pulse High-Power 170 GHz Absorbing Matched Load Tests and Developments

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The future EC systems will consist of several gyrotrons sources providing MW-level millimeter wave power at a frequency around or above 170 GHz. The development of matched loads is necessary to test the new sources, the components for the transmission lines and the launchers, and must ensure high qualification for compatibility with the nuclear environment. The load low reflectivity and high power-handling capability are mandatory for testing as well as for an accurate power measurement capability. The development at IFP and LTC of several compact high-power prototypes during the last decade led to a refinement of the overall design, resulting in the present low-reflectivity vacuum-compatible loads. The activity on loads is supported by F4E in view of the development of the EU gyrotron for ITER and required high power tests at QST (Naka, Japan). Qualification is now supported by new tests at SPC (Lausanne, Switzerland) using the FALCON test-bed designed to test components and the EU gyrotron prototype for the EC system of ITER. These high power tests, performed on the first CW prototype (provided with 16+16 cooling channels in parallel) highlighted the need to improve the mechanical, vacuum and hydraulic design to reach the final goal of 1000s at ~1MW. Two long-pulse loads with new technological solutions have been built for the Japanese ITER gyrotron at QST, while a modified version of the load, designed to test an equivalent input power of 2MW at QST, has been provided for FALCON.

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