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Design of the ITER Electron Cyclotron Heating and Current Drive Waveguide Transmission Line T.S. BIGELOW, D.A. RASMUSSEN, Oak Ridge National Laboratory, M.A. SHAPIRO, J.R. SIRIGIRI, R.J. TEMKIN, MIT Plasma Science and Fusion Center, H. GRUNLOH, General Atomics, J. KOLINER, Department of Physics, Arizona State University — The ITER ECH transmission line system is designed to deliver the power, from twenty-four 1 MW 170 GHz gyrotrons and three 1 MW 127.5 GHz gyrotrons, to the equatorial and upper launchers. The performance requirements, initial design of components and layout between the gyrotrons and the launchers is underway. Similar 63.5 mm ID corrugated waveguide systems have been built and installed on several fusion experiments; however, none have operated at the high frequency and long-pulse required for ITER. Prototype components are being tested at low power to estimate ohmic and mode conversion losses. In order to develop and qualify the ITER components prior to procurement of the full set of 24 transmission lines, a 170 GHz high power test of a complete prototype transmission line is planned. Testing of the transmission line at 1-2 MW can be performed with a modest power (~ 0.5 MW) tube with a low loss (10-20%) resonant ring configuration. A 140 GHz long pulse, 400 kW gyrotron will be used in the initial tests and a 170 GHz gyrotron will be used when it becomes available. Oak Ridge National Laboratory, managed by UT-Battelle, LLC, for the U.S. Dept. of Energy under contract DE-AC05-00OR22725.

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