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P3.050 Structural analysis of the ITER ex-vessel PPR components located in the Gallery

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The Plasma Position Reflectometry (PPR) diagnostic system (PBS 55F3) is planned to provide information related to the edge electron density profile and plasma position at four defined locations distributed both poloidally and toroidally in the ITER vacuum vessel.

The sections of the ex-vessel transmission lines (TL) in the Gallery, between the two secondary confinement barriers, are considered “captive components”. They are installed as close as possible to the ceiling, so that they are trapped by other systems installed below. Consequently, these sections must be installed before any other system running underneath and will not be accessible for replacement or repair once all these systems are installed.

The PPR system consists of five fully independent reflectometers grouped in three different paths, depending on the port through which are routed (Equatorial Port 10, Upper Port 01 and Upper Port 14), with different lengths and waveguide distributions. The waveguides in the Gallery are supported by several independent structural frames which are attached to the building. All the frames in the same route are quite similar among them, but they differ from those in the other routes.

The structural analysis strategy, based on this similarity, is to build a global model for each PPR route in the gallery in order to analyze global deformations, reactions on supports and identify the critical parts of the whole PPR system.

Based on the results obtained in the global model, detailed model has been built for critical components to carry out the thermo-mechanical analyses of every load combination and assess the structural integrity according to RCC-MR code.

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