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P2.152 Design and structural analysis of ITER thermal shield under transportation environment

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Thermal Shield (TS) in ITER tokamak reduces heat loads from vacuum vessel and cryostat to superconducting magnet structure. Its delivery is scheduled to begin from September 2018 including TS Main Components (TSMC) and manifold pipes. Unlike to other components in ITER tokamak, most of TSMC have slender structure with panel thickness of 20 mm. Due to its structural uniqueness, TSMC cannot be secured on packing box directly since forces caused by lashing ropes may induce undesirable deformation and structural damage during transportation environment. Therefore, transportation jigs are required to support and fasten TSMC. These jigs are secured to packing box instead of TSMC. In this paper, structural design and safety assessment of TSMC transportation jigs are presented. The scope of this study will be focused on the Vacuum Vessel TS (VVTS) and Lower Cryostat TS (LCTS) firstly based on the procurement plan. Finite element analysis has been carried out to estimate the safety of transportation jigs. In the structural analysis, following loadings are considered for assembled TSMC and jig: 1) Road transportation, 2) Sea transportation considering shipping route from Korea to ITER site, 3) Lifting with crane and 4) Dynamic effect of lifting crane and slings. Using the results of finite element analysis, following items are checked: a) Deformation of TSMC and jig, b) Structural safety of jig frame and c) Structural safety of lifting lugs and connections including bolts and joints. According to these analyses, several transportation jigs and their joint connections are reinforced in order to satisfy safety regulations. The views and opinions expressed herein do not necessarily reflect those of the ITER Organization.

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