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Short_Oral_13: Final design of the Fiber-Optic Current Sensor bundle in the ITER buildings

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The Fiber-Optic Current Sensor (FOCS) will be used in ITER to measure the total plasma current using Faraday effect. Sensing spun fibers will be placed around the Vacuum Vessel (VV) on a poloidal loop in two different VV sectors. To link the loop fibers with the reading instruments, placed several tens of meters away in electrical cabinets, a fiber bundle link is needed. This fiber bundle would start from the Tokamak Building port-cell, cross several rooms and end in the ITER Diagnostics building. The design of such bundle needs to fulfil the unique requirements of ITER buildings, some of them related to safety, such as non-propagation of smoke and fire, as well as maximum allowable leak rate, between two separate rooms. To this regard, the FOCS fiber bundle is classified as a Safety-Relevant (SR) component. To fulfil these requirements, and at the same time achieve a good design using as many Commercial Off The Shelf (COTS) components as possible, the fiber bundle design entailed a complete qualification procedure, aimed at benchmarking the use of the selected components against the required constraints. This paper presents the final design and qualification of the FOCS fiber bundle, from the applicable requirements to the final technical solution, benchmarked through careful qualification tests. Being the first work addressing qualification of Safety-Relevant fiber bundles in ITER buildings, this work is also considered to be relevant for current and future diagnostics in ITER using similar components.

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