

The final design of the ITER Interlock Discharge Loop Interface Boxes (DLIB) and its compliance with the IEC 61508 standard.

Monday, 5 July 2021 15:10 (10 minutes)

The Central Interlock System (CIS) is in charge of implementing the ITER Central Investment Protection Functions. A dedicated architecture based on hardwired loops will be responsible for the protection of the superconductive magnet system. These loops act in a transversal way connecting all systems directly involved in the protection of the magnets at the plant level. The base of the coordination between the hardwired loop and the different users is a common interface called DLIB (Discharge Loop Interface Box).

The IEC 61508 standard, which defines the 'Functional Safety' provisions for I&C systems, has been used as the guideline to define the lifecycle of the device, starting from the specification up to operation and maintenance of the Investment Protection Function performed by the DLIB.

The whole dependability of the DLIB has been improved and demonstrated through a detailed verification and validation process, including:

- Safety Integrity Level (SIL) analysis based on the FMEDA method
- Manufacturing tests to identify any issue related to the series production of the component.
- Early Stage Screening to identify latent defects.
- Qualification testing to identify any externally inducted defects.
- Accelerated life testing to emulate the end of life behavior of the DLIB.

The paper provides a summary for the whole process from the design up to the final validation of the Discharge Loop Interface Boxes (DLIBs) that will be used to coordinate the Fast Energy Discharge protection for the ITER magnet protection.

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Session Classification: Machine Control 2

Track Classification: Machine Control, Monitoring, Safety and Remote Manipulation