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Testing and Qualification of Trailing Cable system for Prototype Fast Breeder Reactor

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Small and large rotatable plugs (SRP & LRP) are provided to facilitate in-vessel handling of core subassemblies using transfe arm. These plugs are rotated during refuelling of the reactor. The control & instrumentation signals and power to various systems / components located on the rotatable plugs are carried by cables and are connectied to their respective control panels located outside. Among large number of signals / power supply, some are needed during rotation of the plugs also. Trailing Cable System is conceived and designed to carry power/control cables whose continuity is to be ensured during rotations of SRP & LRP. The design requirement for trailing cable system is to accommodate twist of cables between the stationary roof slab and SRP by 540 deg. while maintaining their continuity, which otherwise is not possible.
The system is designed with a set of posts mounted one each on SRP & LRP and set of overhanging arms through which, cables are routed in a predetermined way. The overhanging arm bring the cables to the centre of SRP / LRP as the case may be and hence avoids pulling and bending of cables, instead results in twisting. The bunch of cables are freely suspended in the form of 'S' shape between roof slab centre and SRP centre with a vertical separation of 3 m between clamping points. The free length of cables is designed to accommodate the twist without causing entanglement of cables. Provisions are made to swing the system away for facilitating handling of components over control plug. Free from interference of trailing cable system with other components, particularly fuel handling machine during plug rotation is also ensured in the design.
To carry out functional testing and qualification of the important system, a prototype arrangement between SRP and roofslab was manufactured and erected at full scale Top Shield Layout Model. In line with the approved testing program, the rotatable plugs were rotated by designated angles and twist in cables was critically studied. From the detailed tests, it is observed that the configuration conceived for the supporting structure and the cable routing between SRP and roof slab satisfy the design intent and is capable of maintaining electrical continuity of the cables, meeting functional requirements. Subsequently, the system was qualified through systematic cyclic testing.

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