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Adoption of MgB_2 Large Superconducting Coils in Ignitor* G. GRASSO, R. PENCO, Columbus, B. COPPI, MIT — The superconducting material MgB_2 is found to be compatible with the cooling system of the current Ignitor design consisting of He-gas flow at about 30 K, although MgB_2 may use colder gas at 10-15 K. The two outer poloidal field coils have been considered as their main requirements can be met, in principle, by commercially available MgB_2 strands. Both the technical feasibility of these coils, as well as their stability and protection in the unlike case of its quench have been studied. Accordingly, the MgB_2 wire technology available from Columbus Superconductors is sufficient to achieve the target specifications for the considered coils (about 5 meters of outer diameter, and maximum field on the conductor of 4.7 T). Moreover, the relevant cable in conduit design, for the MgB_2 conductor including about 300 strands of 1 mm in diameter each, allows the system to maintain its temperature within 0.1 K of the He flow temperature. The stability of the MgB_2-based coils has been successfully verified as being practically insensitive to rare energy release events typically due to imperceptible cable movements, or microcracks in the epoxy impregnation. These are typical sources of severe instabilities in traditional superconducting magnets. Adopting materials such as MgB_2 is an important step toward achieving better duty cycles in experiments of the Ignitor type with a simplified cooling technology compared to that for traditional superconductors.*Sponsored in part by ENEA of Italy.

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