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DEMO Concept Development and Assessment of Relevant Technologies

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Recent development of a DEMO concept with a medium size (major radius of ˜8.2 m) and a lower fusion power (˜1.5 GW) is presented together with assessment of relevant technologies. The maximum toroidal field is evaluated at ˜13 T, which is nearly independent on strand materials (Nb3Sn or Nb3Al) unlike a compact DEMO, while the increase of the allowable design stress has a large impact on that. The divertor simulation study indicates that the tolerable level of divertor heat flux (˜5 MW/mˆ2) is foreseeable for the medium size DEMO, and the design study of short super-X divertor as an option is progressing to efficiently obtain the fully detached plasma. The assessment of various maintenance schemes indicates that the vertical port maintenance scheme provides advantages in the easy handling, the layout of poloidal coils, the size of toroidal coils, and separate maintenance of the in-vessel components. Finally, the study of the waste management suggests that the ratio of the radioactive waste to be disposed of in shallow land burial can be increased thanks to the lower fusion power.

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