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Demonstration of 1 MV vacuum insulation for the vacuum insulated beam source in the ITER NB system

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For the ITER neutral beam (NB) system, a measure to achieve the 1 MV vacuum insulation of the beam source have been developed. For this purpose, design basis for 1 MV vacuum insulation has been developed by integrating previous empirical scaling for plane and coaxial electrodes and new scaling for area with locally-concentrated electric field. Consequently, as the measure, the beam source is surrounded by more than three intermediate electrostatic shields instead of single gap to sustain 1 MV. Effectiveness of the shields designed by the design basis was experimentally verified by using a part of the beam source. The voltage holding capability has been significantly improved from 0.7 MV to 1 MV. This result ensures the 1 MV vacuum insulated beam source in the ITER NB system.

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