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# THE HIGH VOLTAGE DECK 1 AND BUSHING FOR THE ITER NEUTRAL BEAM INJECTOR: INTEGRATED DESIGN AND INSTALLATION IN MITICA EXPERIMENT

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MITICA is the full scale prototype of ITER Heating Neutral Beam (HNB), designed to deliver 16.5MW of heating power to ITER plasma, currently under construction at the Neutral Beam Test Facility in Padova (Italy). In ITER HNB, negative ions (H-/D-) are produced in the Ion Source (IS) polarized to ground at -1012kV, then extracted by 12kV extraction voltage, accelerated to ground at 1MeV energy and finally neutralized. The complex power supply system feeding the IS includes two non-standard equipment, beyond the actual industrial standard for insulation voltage level (-1MVdc) and dimensions: 1) the HVD1 (High Voltage Deck1), a large air insulated Faraday cage (12.5m (L) x 8.4m (W) x 9.6m (H)) hosting the IS power supplies and diagnostics; 2) the HVBA (High Voltage Bushing Assembly), a -1MVdc air to SF6 Bushing which interfaces the HVD1 with the SF6 insulated Transmission Line (TL) connecting the Acceleration Grid Power Supply system (AGPS) with the IS, carrying inside its High Voltage electrode all IS power and diagnostics conductors. The HVD1 and HVBA are installed inside a large HV hall, with controlled ambient conditions. The main design choices leading to the final hall layout, integrating the HV experimental equipment and the conventional building plants by assuring the necessary clearance required by such very high electric insulation level, are presented. Moreover, the paper presents the manufacturing design developed by the supplier to meet the design constraints and requirements of the technical specification for such unconventional devices. The factory type tests to validate the design and release the manufacturing of the HVD1 are described together with the electrical, mechanical and thermal tests carried out on the HVBA. Finally, the paper reports on the on-site installation and commissioning and testing activities carried out in 2017 and on the final acceptance at full voltage foreseen in 2018.

**Co-authors:** Dr BOLDRIN, Marco (Consorzio RFX (CNR, ENEA, INFN, Università di Padova, Acciaierie Venete S.p.A.)); Dr SIMON, Muriel (Fusion For Energy); Dr ESCUDERO, Gerard Gomez (Fusion For Energy); Dr KROHN, Michael (Siemens AG); Dr DECAMPS, Hans (ITER Organization); Dr SACHS, Edgar (Siemens AG); Dr BONICELLI, Tullio (Fusion For Energy); Dr TOIGO, Vanni (Consorzio RFX (CNR, ENEA, INFN, Università di Padova, Acciaierie Venete S.p.A.))

**Presenter:** Dr BOLDRIN, Marco (Consorzio RFX (CNR, ENEA, INFN, Università di Padova, Acciaierie Venete S.p.A.))

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