

Operational Experience on SST-1 NB Test Stand

P.Vatti Palle, L. K. Bansal, U.K. Baruah, P. Bharathi, A K Chakraborty, C. Chakrapani, B. Choksi, N. Contractor, L. N. Gupta, M.R. Jana, K. Ojha, B. Pandya, S. L. Parmar, P. J. Patel, V B Patel, K. Qureishi, C.B. Sumod, D. Thakkar, V. Tripathi, and V. Vadher,

Institute for Plasma Research, Bhat, Gandhinagar 382 428, India

Corresponding author: prahlad@ipr.res.in

The ‘SST-1 NB Test Stand’ is a stand alone neutral beam system designed for 5MW (55kV, 90A) rated power. A positive ion neutral injector (PINI) source is being operated on the test stand. [1] As a part of the development, a prototype ion source operable at lower voltage was used to test the integrated operation of the various subsystems of the test stand. Both the sources are filament based magnetic multi-cusp sources with SmCo5 (Samarium-Cobalt) permanent magnets arranged in a line cusp configuration and have triode type extraction systems. The PINI’s extraction area is (width) 23 cm \times (height) 48 cm, while the prototype source can produce beams of diameter \sim 20 cm. Subsystems included in the beam line consist of an inertial cooled beam interceptor, vacuum and gas feed systems, power supply system consisting of the regulated high voltage power supply (80kV, 75A), eight filament power supplies (8×7 kVA, 15V, 155A), twenty four discharge power supplies (24×160 V, 100A), the data acquisition, control and diagnostic systems. A VME based control system is integrated with the local controllers of power supplies and beam line systems. During the operation with prototype ion source, beams (ions + neutrals) with current of 6A were extracted up to 25kV. The beam is characterized by using thermal and optical diagnostics.

The NB-test stand operations are now being carried out by replacing the prototype with the PINI, which has performed well at extraction voltages up to 30kV. Experiments to achieve the SST-1 NBI designed parameters are under progress. The operational experience and comprehensive results obtained are presented in this paper.

[1] V. B. Patel et al., Jnl. Of. Phys. Conf. Series, 208, 2010,.012009.