

§17. Test of High Pumping Speed Cryo-sorption Pump for LHD-NBI

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A large vacuum system with total pumping speed of $\sim 1360 \text{ m}^3/\text{s}$ for H_2 is required in each beam line with the neutral beam power of 7.5 MW for LHD-NBI. A high pumping speed cryo-sorption pump, in place of cryo-condensation pump has been constructed for longer pulses on the basis of the result of an engineering model¹⁾ as well as the cryosorption pump for NBI of JIPP T-IIU Tokamak. Radiation shields of the panel are cooled with liquid nitrogen (LN_2) so that the number of refrigerators is reduced to about half.

The cryosorption pump for ion source vacuum vessel (IS-CSP in Fig.1), which needs a pumping speed of $360 \text{ m}^3/\text{s}$ for H_2 , was fabricated and tested for a single pump in the vessel. The pump is composed of seven lengthwise modules in IS-CSP, and four modules ($250 \text{ m}^3/\text{s}$) in BeamDump-CSP.

Figure 2 shows the measured pumping speed of IS-CSP in the ion source vacuum vessel as a function of the pressure of H_2 . The pumping speed satisfies the design value with a margin of safety. Experimental results of cooling down characteristics, regeneration period, etc also agreed satisfactorily with the design values.

The cryosorption pumps of one IS-CSP and

four BD-CSPs are being assembled in the LHD-NBI system and their utilities are under construction. LHD-NBI experiment is scheduled in the middle of 1998.

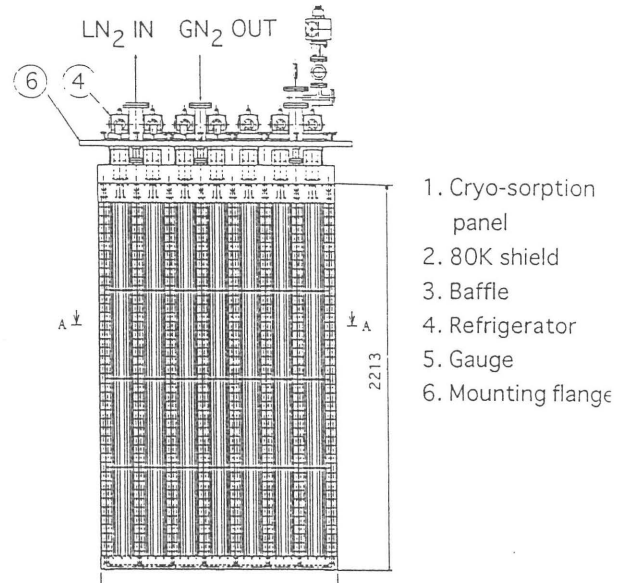


Fig.1. $360 \text{ m}^3/\text{s}$ cryo-sorption pump (IS-CSP) with LN_2 radiation shield for LHD-NBI.

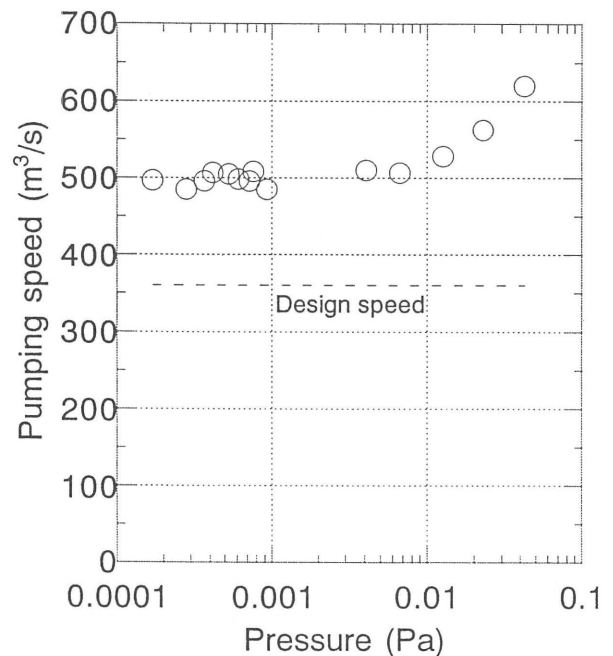


Fig.2. Measured pumping speed as a function of the gas pressure of H_2 in the vacuum vessel.

1) Oka, Y., et al., 5th EVC, Salamanca (1996).