PUMPING CHARACTERISTICS OF THE DIII–D CRYOPUMPS*

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Beginning in 1992, the first of the DIII–D divertor baffles and cryocondensation pumps were installed. This open divertor configuration, located on the outermost floor of the DIII–D vessel, includes a cryopump with a predicted pumping speed of 50,000 l/s excluding obstructions such as support hardware. Taking the pump structural and support characteristics into consideration, the corrected pumping speed for D_2 is 30,000 l/s.[1] In 1996, the second divertor baffle and cryopump were installed. This closed divertor structure, located on the outermost ceiling of the DIII–D vessel, has a cryopump with a predicted pumping speed of 32,000 l/s. In the fall of 1999, the third divertor baffle and cryopump will be installed. This divertor structure will be located on the 45° angled corner on the innermost ceiling of the DIII–D vessel, known as the private flux region of the plasma configuration. With hardware supports factored into the pumping speed calculation, the private flux cryopump is expected to have a pumping speed of 15,000 l/s.

There was question regarding the effectiveness of the private flux cryopump due to the close proximity of the private flux baffle. This led to a conductance calculation study of the impact of rotating the cryopump aperature by 180° to allow for greater particle and gas exhaust into the cryopump's helium panel. This study concluded that the cost and scheduling impact of changing the private flux cryopump orientation and design did not warrant the possible 20% (3,000 l/s) increase in pumping ability gained by rotating the cryopump aperature 180°.

The comparison of pumping speed of the first two cryodensation pumps with the measured results will be presented as well as the calculation of the pumping speed for private flux cryopump now being installed.

*Work supported by U.S. Department of Energy Contract DE-AC03-99ER54463.

[1]M.M. Menon, *et al.*, "Particle Exhaust Characteristics of an In-Vessel Cryopump Used in DIII–D Diverted Plasmas," Fusion Technology, Vol. 27, pgs. 355–363 (July 1995).

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Prefer:
✔ Oral
Poster

Session: Divertors and Plasma Facing Component Engineering