

Glow discharge cleaning

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1. Objective

The glow discharge is one of the wall conditioning methods in LHD. The glow discharge cleanings with the various working gases, such as hydrogen, helium and neon, have an effect on decreasing impurities in plasma vacuum vessel. Boronization using diborane (B_2H_6) diluted by helium gases is also supported by glow discharges. Two anodes are located at 4.5 and 10.5 ports on the upper side. Output voltages are about 200-300V and output currents are about 10-15A. Anodes made by graphite of $150 \times 150 \times 500$ mm, which was supported by movable pipes with bellows structure. Hence, these anodes are set around mid-plane in the vacuum vessel during glow discharge only. In general, operations of glow discharge cleanings are planned at mid-nights or the weekends. Removed gasses by glow discharge operations are measured by a quadrupole mass spectrometry.

2. Experimental setup

2.1 Locations

- GDC anode : 4.5U and 10.5U ports

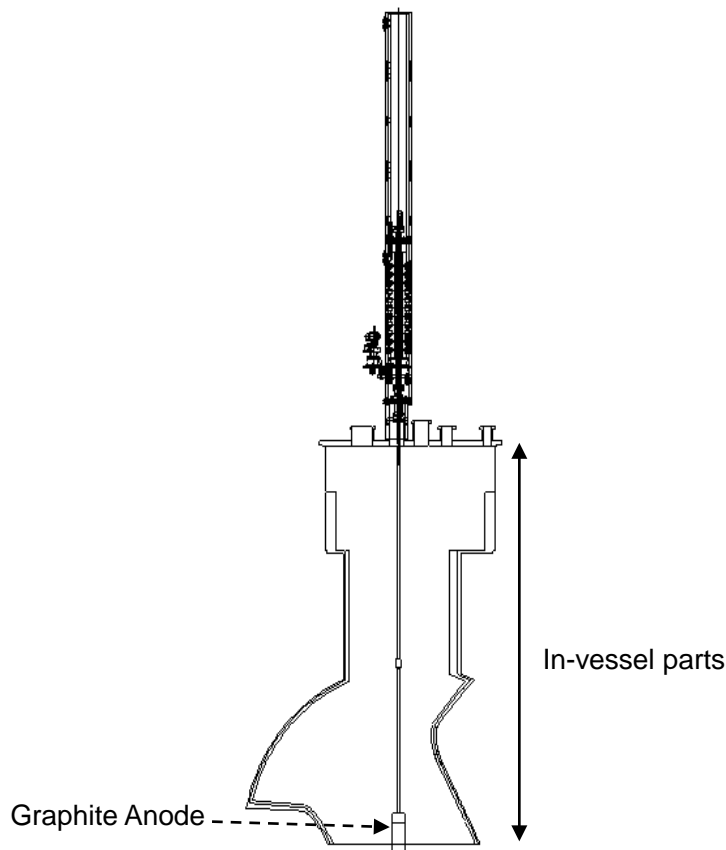


Fig.1 A schematic drawing of the glow discharge system at the vertical cross-section

2.2 Systems

Anodes are installed after main plasma operations using a remote operation system of movable pipes. Vertical positions of anodes are monitored by cameras. The upper/lower limits of movable pipes were set with contact type limit switches.

3. Operational parameters

- Operational pressure : 1 Pa
- Working gasses : H₂, D₂, He, Ne
- Current: 10-15 A
- Voltage : 200-300 V

4. Remarks

- Prevention of electric shocks during glow discharge cleanings is required around vacuum port areas.
- Protections of vacuum windows for diagnostics are required during glow discharge cleanings.

References

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