

A simple coaxial ceramic based vacuum window for Vacuum transmission line of ICRF system.

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We present here a simple coaxial RF vacuum window designed for 200 kW power without any design complicacy and is simple to fabricate. It is achieved by sandwiching a UHV grade ceramic disk in between inner and outer straight conductors. The window has been designed and fabricated for use in the VTL section of ICRF system on ADITYA tokamak. The window has been modeled with CST Microwave Studio and transient analysis has been done for different scattering parameters. The window is found to be an excellent leak tight with leak rate better than 1.0×10^{-9} mbar l/s. Pressure test on window up to a 3 bar atmospheric pressure shows that it can also be used as a gas barrier in transmission lines. Low power VNA test shows a pleasing VSWR and insertion loss less than 1.05 and 0.05 dB respectively in the frequency range of 20-100MHz. Special care has been taken to minimize sharp edges to avoid pre-breakdown phenomena. Partial discharge tests at 50Hz shows an excellent result up to 24 kV peak and the observed discharge magnitude was less than 20 pC. The window shows the ultra high vacuum compatibility and it tested for high RF power at 29 MHz up to 100kW of power.

This paper presents the design detail, tests conducted and the results obtained for the vacuum window.

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