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Design and fabrication of the waveguide Iris couplers for the Spallation Neutron Source drift tube linac

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The Spallation Neutron Source (SNS) employs six cavities in the Drift Tube Linac (DTL) section to accelerate the H⁻ ion beam to 87MeV. Each cavity is energized by a 2.5MW peak power klystron at 402.5MHz using rapid tapered waveguide iris couplers. All six original iris couplers have been in operation without replacement for over two decades. The increased RF power demands of the Proton Power Upgrade (PPU) project and operational problems, including arcing, temperature excursions, and vacuum bursts, have prompted the development of new iris coupler spares. The original iris couplers were made of GlidCop material, which is known to be mechanically strong and thermally stable, but is porous, expensive, and difficult to use in fabrication. To overcome these problems, the new spare couplers use Oxygen-Free Copper (OFC) and stainless steel (SS). This paper will discuss the mechanical, thermal and RF design, as well as challenges in the final coupler fabrication.

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Footnotes

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