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HELIUM INVENTORY MANAGEMENT, QUALITY CONTROL AND HELIUM LOSSES DURING SST-1 CRYOPLANT OPERATIONS

Content :

Helium Cryogenic plant for Steady State Superconducting Tokamak (SST-1) at IPR is in operation since 2002. Superconducting magnets system (SCMS) of SST-1 with a cold mass of around 40 tons is cooled by means of cryogenic helium refrigerator cum liquefier (HRL) of 1.3 kW at 4.5 K cold power. We have an installed capacity of warm gas helium of about 11000 NM3 for helium cryogenic plant. This helium inventory includes four medium pressure vessels at maximum 14 bar (a) and two high pressure vessels at maximum 150 bar (g) working pressure. During SST-1 operation one of the medium pressure vessels is used as helium buffer in case of quench in SCMS. In the present work, we present the details of helium inventory management and quality control measures adopted. As a part of quality control, we routinely carry out helium leak tightness test at service pressure to ensure there are no major leaks in the helium distribution network and associated sub-systems. Helium inventory data are recorded real time to review the status. As required for any large cryogenic system, helium losses incurred during experiments are identified and reduced to improve operational availability.

Summary :

Here we present the details of helium inventory management, quality control measures adopted and helium gas losses incurred for SST-1 cryogenic helium refrigerator cum liquefier at IPR.

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