

Close Loop Gas Recirculation and Purification System for INO RPC System

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The total gas of the INO RPC system is about 216 cubic meters. Gas mixture consists of Freon R134a, Isobutane, Sulphur Hexafluoride in ratio of 95:4.5:0.5. To maintain the detector parameters within limits , gas mixture is required to circulate at a rate of minimum 1 volume change every week. This will result in a loss of about 31 cubic meters of gas per day, if open ended flow is employed. The lost gas is expensive and contributes significantly to global warming. In addition there will be logistic problems of taking this huge quantity of gas in and out of tunnel.

Close loop gas recirculation system (CLS) is designed to overcome above problems. The present system is a pilot unit catering to about 12 RPC detectors of $2\text{m} \times 2\text{m}$ size. The gas mixture is prepared in required concentration, in-situ, and circulated through the loop at controlled flow rates. The pressure band is adjusted to be within 20 mm of water column. A Programmable Logic Controller (PLC) keeps track of pressure and flow rates, process sequence and safety conditions. The loss of gas is continuously monitored to assess effectiveness of CLS. The concentration of gas components in the mixtures is monitored by sampling through Residual Gas Analyzer (RGA).

The RPC performance parameters, such as leakage current , noise rate, efficiency and cross-talk are monitored vis-a-vis CLS parameters . It has been found that RPC parameters respond in co-ordination with CLS functioning. Room pressure and temperature also seem to have influence on both of them.

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