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Development of Oil Removal Module for helium liquefier @50lph without LN2 precooling

Content :

An Oil Removal Module (ORM) has been fabricated, assembled and tested at VECC for the project of development of helium liquefier @ 50 lph. The paper will describe the design basis, selection of purifying items, stages of fabrication of each components, assembly, pressure and leak testing of the module.

ORM is an integral part of a helium liquefier. The lubricated screw compressors compresses Grade 4.5 helium to 14 bar(absolute) and passing it to cold box via ORM. Oil coming to ORM is present in two forms: aerosols and vapour, which are being trapped by coalescer filter and charcoal adsorber consecutively.

The module comprises of the principal components viz. two coalescer filter columns, charcoal filter column, final micron filter for screening carbon, three electropneumatic pressure control valves (PCV), piping, charcoal heating system, etc. The gas flow rate is 85 g/s and output gas has less than 10ppb (by volume) aerosol level. The PCVs controls the pressure of the delivery and suction of the compressor, thereby, balancing the helium mass flow between the supply and return from cold box. Coconut shell activated charcoal with mesh size 4x8 and BET surface area 1150 m2/g is selected here. Linde Multicomponent detector (Hydrocarbon vapour, oil aerosol and water measurement ranges are 0-50ppm, 0 – 250 ppb, 0-220 ppm respectively), calibrated for gycol based synthetic oil Breox B35, is used here for performance measurement.

The integration of ORM with existing helium liquefiers is underway for performance testing.

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