

26th National Symposium on Cryogenics and Superconductivity

Contribution ID : 93

Development and experimental studies on flexible transfer lines for liquid helium application

Thursday 23 Feb 2017 at 13:00 (00h15')

Content :

Transfer of cryogenic fluids from one location to the other is a common laboratory and commercial occurrence. Vacuum insulated transfer lines (with or without superinsulation) are the most efficient to minimize the loss of the cryogenic fluid by evaporation and heat transfer. Flexible transfer lines are most convenient to transfer cryogenic fluids in view of the manoeuvrability of the lines especially under space constraints, although they lead to higher heat load and pressure drop when compared to the rigid lines. This paper discusses the design, development and experimental studies on vacuum and superinsulated flexible transfer lines made of stainless steel bellows for liquid helium applications. The transfer line is approximately 2.5 m long with the ID of the inner bellow and the OD of the outer bellow being 19.5 mm and 61 mm respectively. Temperature sensors and pressure transducers are attached to different locations of the transfer line to monitor its performance during cool down and steady state operation. The results of our experimental studies on pressure drop, cool-down and mass flow rates for liquid nitrogen at different inlet pressures are also presented in this paper.

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Session classification : Technical Session 5

Track classification : Cryogenics Storage and transfer lines / Space Research / Cryogenic Test & Test Facilities

Type : Contributory Talk