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Design improvements in liquid helium transfer line for vertical test stand

Content :

A vertical test stand has been successfully commissioned at RRCAT. In this, cavities gets immersed in about 1,500 liters of liquid helium at 2K and characterized for its accelerating properties. To achieve this liquid level in the cryostat, for each characterization experiment, it requires double the amount of liquid helium to be filled at 4.2 K. To transfer such large quantities of liquid helium, it is preferred to transfer liquid directly from liquid helium plant main Dewar to the cryostat, instead of using portable Dewars. For this purpose, a 10 m long liquid helium transfer line was custom built and commissioned for filling the cryostat. Conventionally, flexible bellows are used to compensate shrinkage of inner tube of a liquid helium transfer line. Due to associated long term problems in using bellows, authors have successfully used rigidly anchored inner tube by welding. Demountable bayonet couplings were used wherever required. Also, from a design standpoint, thin tube butt weldments portion are major source of malfunction in cryogen transfer tubes. The focus of present study is to improve the inner tube design and welding procedures of thin walled tube with minimum post weld problems. Paper discusses the experimental results for pre and post manufacturing of cryogen transfer lines, in particular for the manufacturing of helium transfer lines. Various aspects of liquid helium transfer line their consequences are presented and discussed.

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