

Thermal Conductivity of Insulating Material at Cryogenic Temperature

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The thermal conductivity of insulating material is measured over a temperature range of 10 K to the approximately room temperature. A two-stage cryocooler is employed as a heat sink to cool the test specimen down to a desired temperature. In a vacuum vessel, the cold heads of the cryocooler are thermally connected to the specimen as well as the thermal shield. An electric heater is placed in the middle of the test specimen for generating uniform heat flux. For a supplied heat flux the temperature distribution in test specimen, multi-layer insulation (MLI), is measured in steady state, from which the effective thermal conductivity is calculated and presented with respect to the mean temperature. The correlation at temperature between liquid nitrogen and room temperature is derived from measured data. In addition, the effect of the contact pressure, operating temperature and type of material on the thermal conductivity are investigated.