

## Characteristics of Helmet-shape Liquid He Dewar for Whole-head Magneto Encephalographic Measurements

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Magneto encephalography (MEG) is a technology measuring the magnetic fields from the human brain. By measuring MEG signals, we can get the information on the cellular current with a high spatial and temporal accuracy. In order to measure the magnetic fields in short time, we need a helmet-type sensor distribution covering the whole head. We fabricated and tested helmet dewars for MEG measurements. The dewar was fabricated of the fiberglass-reinforced plastic (FRP) which has low thermal conductivity and high mechanical strength. The vacuum space of the dewar is filled with multiple layers of super insulations and thermal shield layers. In order to eliminate thermal noise from these metallic layers, the super insulations have aluminum thin film in isolated island pattern, and the thermal shield is made of Cu-wires. The internal diameter of the dewar tail is 400 mm, and the cold-to-hot distance is 20 mm. The reservoir volume is 90 L. The boil-off rate of the liquid He is in the range of 10-12 L/d. The dewar can be fabricated to accommodate axial gradiometers of 128 or 160 channels, and magnetometers of 256 channels.

Keywords: dewar, thermal noise, magneto encephalogram