

## **Specification for recycling coolers for hyper-pure germanium detectors**

### **Introduction**

Two dewars are required to hold liquid nitrogen ( $\text{LN}_2$ ) to cool existing hyper-pure germanium detectors. Each must be fitted with cryo-coolers to condense the boil-off nitrogen gas back into the dewar.

### **Detailed specification**

- $\text{LN}_2$  capacity must be at least 25 litres.
- Dewar must be compatible with existing hyper-pure germanium detectors fitted with a vertical dip-stick (model numbers Canberra GC4019 and GC4018 fitted with 7500SL cryostat). Dimensions are available on request.
- The complete cooler assemblies must fit under lead shield support frames which are 650 mm above the floor.
- The diameter of the dewars must not exceed 460 mm
- Detectors should ideally be field installable; any factory installation costs must be included in the total cost.
- A level gauge must be included
- The audible noise must be <60 dB(A) at a distance of one metre
- Time between  $\text{LN}_2$  fills must be in excess of 1 year
- There must be no measurable degradation of detector resolution at energies above 500 keV
- The maximum allowable degradation of detector resolution at energies between 100 and 500 keV is 10%
- The maximum allowable degradation of detector resolution at an energy of 60keV is 50%
- The maximum power requirements must not exceed 500W
- A 3 year warranty must be included