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## **C1Po2B-02 [16]: Freeze-Out Purifier for Helium Refrigeration System Applications**

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Purification systems are necessary to support commissioning and operation of helium refrigeration and associated experimental systems. These systems are typically designed for a low level of impurity (i.e., in parts per million), since a 4.5 K or 2 K helium system will freeze out every other substance. The trace impurities can block and/or change flow distribution in heat exchangers and potentially damage turbines or cryogenic compressors operating at high speed. Experimental systems, such as magnets, require such purification due to inherent characteristics in their construction. These are also used for the commissioning of sub-systems, like the compressors, or cold boxes. From experience, molecular sieve does not remove low-level moisture impurity sufficiently, and typical commercial freeze-out purifiers have very short times between regeneration, as compared to their design specifications. Based upon proven experience from a freeze-out purifier done for Brookhaven National Lab in 1980's, a freeze-out purifier with heat exchangers, liquid nitrogen cooler activated carbon bed has been designed. This design is expected to minimize the utilities and extend the capacity and the operating pressure range, thereby the time interval between regeneration. The goal of the design is to provide a simple to operate and efficient purifier system.

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