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# Cryogenic test stand for characterization of magnetocaloric materials

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**Abstract-**

**Alternative cryogenic refrigeration methods are needed to improve the low efficiency of traditional gas cycles cryocoolers. Magnetic refrigeration is an old known technique used to reach below Kelvin temperatures, though there is rising interest in using this method at liquid helium and liquid hydrogen temperatures due to its high Carnot efficiency. However, further experimentation is needed to fully understand the heat transfer dynamics of magnetocaloric materials at cryogenic temperatures. A test stand has been designed to evaluate the heat transfer coefficients of these materials using the single-blow transient test technique. The system consists of a hermetic helium gas circuit, which is cooled down to cryogenic temperatures and is forced to flow through a packed bed of magnetocaloric material. In order to test the heat transfer properties of the magnetocaloric materials at different magnetic fields the test stand has a superconducting solenoid capable of providing up to 4 T. The design and validation of the test stand for the characterization of magnetocaloric materials is described in the present paper.**

**Index Terms- Cryogenics, magnetic refrigeration, magnetocaloric effect, cryogenic system, experimental analysis.**



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