

**PERFORMANCE MEASUREMENTS OF A HERMETIC
CARBON DIOXIDE COMPRESSOR**

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ABSTRACT

This paper describes the performance measurements of a prototype carbon dioxide compressor using a compressor load stand. The compressor load stand was specifically constructed for this purpose and is based on a hot-gas bypass design. The compressor is a hermetic, two-stage, rotary compressor with an estimated cooling capacity of 0.8 tons of refrigeration.

Compressor tests were conducted for varying suction temperatures and pressures, and discharge pressures. For each test, the compressors mass flow rate, power consumption, and temperatures and pressures at each state point were recorded. In addition, the volumetric and overall isentropic efficiencies were reported. The results show volumetric efficiencies between 0.9 and 0.78 and overall isentropic efficiencies of up to 0.7 for pressure ratios between 1.5 and 5. Oil mass-flow rates of up to 12% with respect to the refrigerant mass flow rates were measured. The efficiencies are only slightly affected by different superheats.