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***Temperature Control System for Supercritical Flow of Brine and CO<sub>2</sub>***

The Magnetic Resonance (MR) Lab in the College of Engineering would like to study the transport properties of supercritical CO<sub>2</sub> using MR techniques. In order to achieve this it was necessary to design a system to ensure supercritical temperature and pressure of the CO<sub>2</sub> throughout a flow loop that was compatible with the MR spectrometer magnet. A water jacket system was designed that housed high pressure PEEK tubing (diameter = 0.125") inside larger diameter tubing (diameter = 0.75"). The CO<sub>2</sub> flows through the smaller diameter tubing and hot water flows through the larger diameter tubing to create a water jacket. This design allowed the CO<sub>2</sub> to be held above 31.1°C and ensures the CO<sub>2</sub> is maintained in a supercritical state for the entire flow system. MR measurements have been made of CO<sub>2</sub> and brine flowing. Below the supercritical temperature, two phase flow is evident. Above the supercritical temperature the CO<sub>2</sub> is completely dissolved in the brine and a single phase flow is observed.