

34151 – sCO₂ Loop in Support of Gen 3 CSP Pathways

Development and Procurement of Major Components for Gen3 CSP Pilot Plant Cooling Loop

1. Impact

Relevant scale (1MW) supercritical carbon dioxide cooling system will be deployed to support the Gen3 CSP pathway selected to construct a pilot plant and evaluate heat transfer of supercritical carbon dioxide in a relevant solar powered environment

2. Project Goal

Design and Construct a 1-MWth supercritical carbon dioxide cooling loop to support the gas, liquid, or solid pathways of the Gen3 CSP program. System needs to be able to operate at pressures up to 25 MPa and 725 °C.

Identify manufacturers of equipment suitable for use in sCO₂. Complete procurement and fabrication of loop components. Build and test loop to prove operation for integration with the Gen3 CSP pilot plant awardee (G3P3)

3. Method(s)

Cooling loop system design was completed using requirements flowed down from Gen3 awardees prior to equipment requirement definitions. Manufacturers were contacted to start early procurement efforts. Minor components and

balance of plant items were procured. Items follow ASME pressure vessel and piping code.

4. Outcome(s)

System design completed. Component design completed. Balance of plant design completed. Piping design completed. Upcoming milestones: construction and testing on-ground and integration with G3P3 tower (Gen3 CSP pathway selected)

5. Conclusion/Risks

Team successfully continues activities to achieve construction of cooling loop.

Procurement interruptions (contractual, supply chain) have delayed completion of project.

Material availability of high temperature/high-pressure alloys remains challenging.

6. Team

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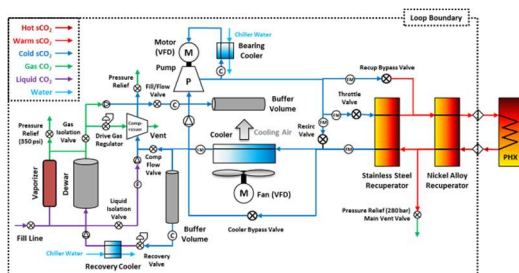


Figure 1. Process Flow Diagram of sCO₂ Loop

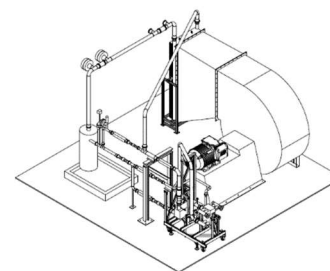


Figure 2. Main Loop Piping Configuration (On-Ground)