108050000-TD0008-R00

Spallation Neutron Source

Klystron Glycol Water System Functional System Design (FSD)

June, 2002

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SNS Project Engineer

Klystron Building Glycol Cooling Controls Description
TD80008 Rev 0

Operating Philosophy

Purpose:

The purpose of RF Glycol cooling operation is to:

a) Maintain the glycol at an appropriate temperature setpoint.

Assumptions: Running both pumps simultaneously is not acceptable.

Operator Controls and Operating Modes

1) OFF: Pumps are de-energized. Tower water return line control valve at 50% open.
2) PUMP A IS PRIMARY: Pump A is energized and pump B is de-energized.
3) PUMP B is PRIMARY: Pump B is energized and pump A is de-energized

OPERATOR INTERFACE DEFINITIONS

Local Hardware/Manual Operator Controls

1) Post heat exchanger glycol water pressure *(PI 4307A)*
2) Pre heat exchanger glycol water pressure *(PI 4307B)*
4) Post heat exchanger glycol water temperature *(TI 4307A)*
5) Pre heat exchanger glycol water temperature *(TI 4307B)*
6) Tower water supply temperature *(TI 4307C)*
7) Tower water return temperature *(TI 4307D)*
8) HOA switch for Pump A *(HS 4307A)*
9) HOA switch for Pump B *(HS 4307B)*
10) Glycol water pressure gauge isolation valves *(HV 4307A,B)*
11) Glycol water pump isolation valves (*HV 4307W,X,Y,Z)*
12) FAULT indicator light on MCC
13) READY indicator light on MCC
14) RUN indicator light on MCC

Software HMI/EPICS Digital Operator Controls

1) Primary Pump Mode
    a. OFF
    b. Pump A is primary
    c. Pump B is primary

Software HMI/EPICS Digital Displays

1) Primary Pump Mode switch status
    a. OFF
    b. Pump A is primary
    c. Pump B is primary
2) Pump that is running and the pump that is de-energized. *(PDIS 4307A,PDIS 4307B)*
3) Failed Primary Pump: Differential pressure across primary pump is low. Logic de-energizes primary pump and energizes backup pump.

Software HMI/EPICS Analog Operator Controls

1) Glycol supply temperature

Software HMI/EPICS Analog Displays

1) Glycol water supply temperature *(TT 4307A)*
2) Tower water return line controller output *(IP 4307A/TCV 4307A)*

Alarms

1) Glycol supply temperature high and low
2) Low Flow due to Pump failure or massive leak (pump energized and differential pressure is low)
3) Flow path blocked (Pump energized and high differential pressure)
4) Primary pump failed, backup pump running (differential pressure is normal)
5) No flow (low differential pressure on both pumps)

Control Logic Description

In the OFF mode, the primary and backup pump will be de-energized .

In the PUMP A IS PRIMARY mode, the Pump A will be energized and the Pump B will be de-energized. After a delay period, the Pump A will be periodically checked for low flow. If low flow is detected, Pump A will be de-energized and Pump B will be energized. An alarm will be generated to the operator. After a delay period, the Pump B will be periodically checked for low flow. If low flow is detected, Pump B will be de-energized and a "No Flow" alarm will be generated to the operator.

In the PUMP B IS PRIMARY mode, the Pump B will be energized and the Pump A will be de-energized. After a delay period, the Pump B will be periodically checked for low flow. If low flow is detected, Pump B will be de-energized and Pump A will be energized. An alarm will be generated to the operator. After a delay period, the Pump A will be periodically checked for low flow. If low flow is detected, Pump A will be de-energized and a "No Flow" alarm will be generated to the operator.

For both the PUMP A IS PRIMARY and PUMP B IS PRIMARY modes, the Tower Water Return Line Control Valve is modulated by a PID algorithm to maintain the Glycol Supply Temperature Setpoint.

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