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NAA-SR-Memo-1843

Issue Date: 1/24/57

REACTOR COOLANT PUMPS:
SODIUM FREEZE SEAL COOLING LOADS

by

R. W. Atz

The purpose of this memo is to summarize the cooling load data of the freeze seals in the sodium coolant pumps for the SRE. It is believed that the information contained in this report will be of particular value to the operating personnel at the Reactor.

This cooling load data was taken during the course of the sodium pump development program, a period of 1-1/2 years from January 1955 to June 1956. This information is taken from IOL's and memos published during this program. References for the material presented appear in the appendix to this paper. In addition, some data is presented which, while not specifically requested, was taken incidental to the testing of other equipment.

The first part of this report will cover the shaft seals for the pumps.

The cooling loads⁽¹⁾ for the shaft seals for the main sodium pumps are presented in Figure 1. The main primary and main secondary units have the same cooling requirements. The pressure drops through the tetralin cooling jackets in the seals are shown in Figure 2⁽²⁾. The greater pressure drop in the seal for the main primary pump is attributed to the friction in the additional connecting tubing to the floor plate.

The cooling load data for the shaft seal for the auxiliary sodium pumps⁽³⁾ are shown in Figure 3. The pressure drops across the tetralin passages in these seals⁽²⁾ are shown in Figure 4. They are different for the reasons cited in the preceding paragraph.

The case freeze seal cooling load for the main pumps is shown in Figure 5⁽⁴⁾. The case seal tetralin passage pressure drop is shown in Figure 6⁽⁴⁾. This data is for the main secondary pump only. No tests were performed on the main primary pump.

The case freeze seal cooling requirements for the auxiliary secondary pump is shown in Figure 7⁽³⁾. The pressure drop through this seal cooling jacket is shown in Figure 8⁽⁵⁾. No tests were performed on the auxiliary primary pump.

Temperature distribution data for the various seals is included in the letters which are indicated in the references.

APPENDIX

- (1) IOL Atz to Cygan 23 January 1956
- (2) IOL Atz to Wodtke 30 July 1956
- (3) IOL Bley to Manners 16 April 1956
- (4) Unpublished data taken by R. Atz during flowmeter calibration program 3/14/56.
- (5) Unpublished data taken by H. P. Schroeder

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FIGURE 1

COOLING REQUIREMENTS-SHAFT FREEZE SEALS

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MAIN SODIUM PUMPS

MODEL NO.

Tetralin Flow = 32 lb/min
Average Inlet temp. = 87°F

1200 RPM
600 RPM

SODIUM TEMPERATURE - °F

COOLING LOAD - KW

513 005

FIGURE 2

Pressure Drop - Flow Rate for Shaft Freeze Seals in Main Sodium Pumps

T = 65°F.

TETRALIN FLOW - GPM

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Water Flow = 4.5 lb/min
Average Inlet Temp. = 70°F

COOLING LOAD - kW

FIGURE 4

PRESSURE DROP - FLOW RATE FOR SHAFT FREEZE SEALS IN AUXILIARY SODIUM PUMPS

NORTH AMERICAN AVIATION, INC. FIGURE 5 COOLING REQUIREMENTS CASE FREEZE SEAL		PAGE NO. 8 OF 12 NAA-SR-Memo-1843 REPORT NO.
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FIGURE 6
PRESSURE-FLOW CHARACTERISTICS OF COOLING JACKET - CASE FREEZE SEAL
MAIN SODIUM PUMPS

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FIGURE 8

PRESSURE-FLOW CHARACTERISTICS OF COOLING JACKET - CASE FREEZE SEAL
AUXILIARY SODIUM PUMPS

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