

Conceptual Design Study of the RCP Test Loop

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1. Introduction

The Reactor Coolant Pump (RCP) is under development for application to APR 1400 Nuclear Power Plant in Korea. KAERI has been developing a RCP test loop facility to verify the performance of RCP and motor on base of design requirements of the APR 1400 RCP.

The basic design of the RCP test loop facility was launched on Jul, 2008, and the detail design would be finished by Sep, 2009. KAERI make a plan to be finished the construction of the RCP test loop facility by the mid of 2011. Figure 1 is shown a conceptual design view of the RCP test loop facility

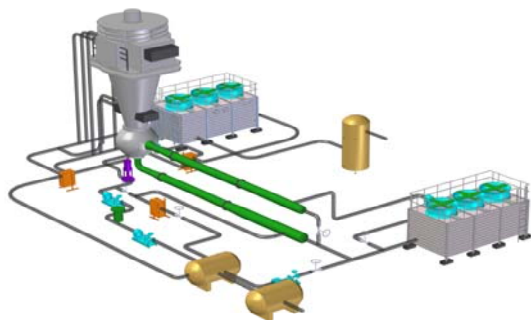


Fig.1. Conceptual design view of RCP test loop facility.

KAERI carried out the conceptual design study previous to the basic design of the RCP test loop facility. In this study, a design basis of loop flow condition was established, and a constitution concept of RCP test loop system was proposed.

2. Design Basis on Test Loop Flow Condition

The design basis of flow condition in the RCP test loop was established on the base of RCP design requirements and the seal design condition of RCP as follows;

- The maximum flow rate: 12.7 m³/sec
- The maximum temperature: 350 °C
- The maximum pressure: 17.6 MPa

3. Constitution of Test Loop System

The RCP test loop system is composed of several components and loops as the following; 1) RCP with motor, 2) Main loop including cooling loop and pressure control loop, 3) Auxiliary system comprised a RCP seal injection water and loop pressurizing water system, and cooling water system, lubrication oil system, nitrogen gas and compressed air supply system etc., 4) Electric power supply system (154 kV), 5) Instruments and control system, DAS etc..

The conceptual flow diagram of the RCP test loop is as shown in Figure 2.

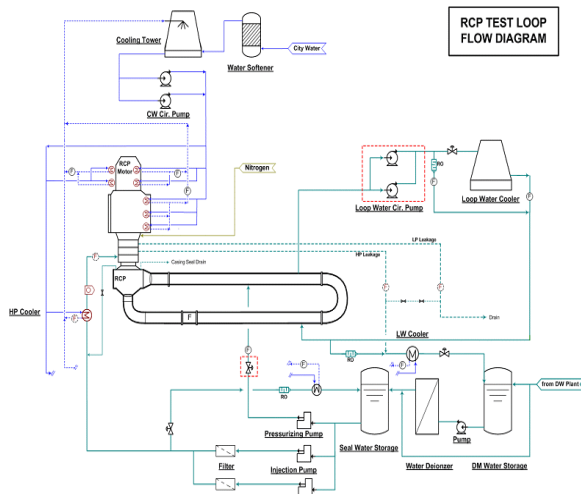


Fig.2. Flow diagram of RCP test loop.

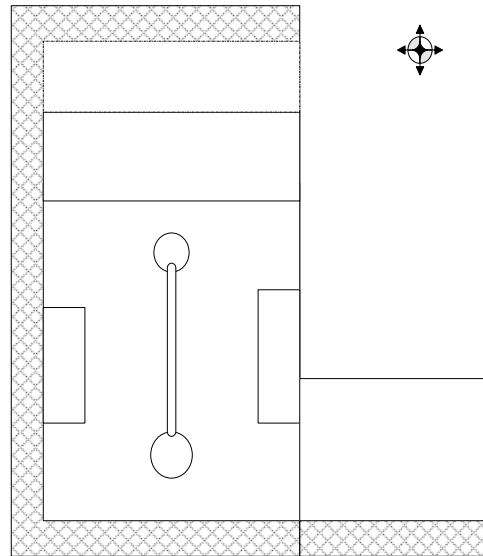


Fig.3. Conceptual overall layout of the RCP test loop facility.

4. Conceptual Overall Layout of the RCP Test Loop Facility

The building structure for RCP test loop facility will be compartmented to 3 parts of a main building and an auxiliary building, a yard structure. In the main building, RCP and the test loop, utility system will be installed. The full space for effective operation and maintenance will be considered in the main building

The auxiliary building will be used to area for RCP components stock and office room.

In the yard structure, cooling tower and loop coolers will be installed.