



RELIANT ENGINEERING, PA
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System Description
 Condensate System
 Revision 2

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Training Objectives

At the end of this section, course participants shall be able to ...

1. List the parameters that contribute to the monetary cost of condensate.
2. State the purpose of the condensate system.
3. List the points of origin for the condensate system.
4. List the condensate return lines by name that tie into the condensate system.
5. List the trap stations that tie into the HP drip return station.
6. Briefly describe the flow path of condensate from the condensate storage tanks to the deserializer.
7. State the purpose and capacities of the condensate storage tanks.
8. List the lines that connect into the condensate storage tanks and their associated device handles.
9. List the local instrumentation associated with the condensate storage tanks and briefly describe the reset control.
10. Briefly describe the condensate transfer pumps and list the design data.
11. Describe in detail the condensate transfer pump auto fallover 12 sequences.
12. Explain the normal procedure for setting up a fallover sequence.
13. Explain the status "Auto Fallover Select – Not Possible."
14. List the causes of "Auto Fallover Select – Not Possible."
15. Explain what happens if a pump is started by placing the HDA switch in the HAND position.
16. Explain how to shut off the Auto Fallover.
17. Explain the purpose of the condensate pumps 1 and 2.
18. Explain the theory of deseration and why.
19. Explain the construction and principle of operation of a deserializer.
20. Describe the deserializer to include location, local controls, and low-level interlocks.
21. List the design data for the deserializer.

Component Descriptions

Condensate Storage Tanks

Description
 Condensate storage tanks 1 and 2 are the heart of the condensate system. Both tanks are located adjacent to the south side chimney and are shown in Figure 3.




Figure 3
 Condensate Storage Tanks

The condensate storage tanks provide suction to the condensate transfer pumps. Each tank has a six-inch supply line from the condensate return points, a six-inch outlet line to the condensate transfer pumps, and a four-inch line from city water make-up valve LCV-CW25.

Table 4 lists the connections into and out of each condensate storage tank.

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System Purpose

The condensate system collects condensate return and steam trap return water for delivery into the boiler feedwater system. The condensate system also provides a source of make-up water into the steam and water cycle from the city water system.

Flow Path

There are three points of origin for the condensate system:

- Condensate return lines from various campus points-of-use.
- The high-pressure (HP) drip tank and receiver station.
- Make up water via the city water system.

Water from all three of these sources flows to the deserializer and deserializer storage tank for delivery into the boiler feedwater system. The condensate flow path is shown in the DCS control screen of Figure 1.

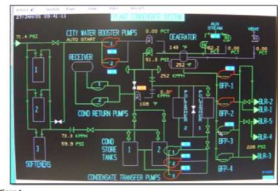


Figure 1
 Condensate System Control Screen

Background – The Monetary Value of Condensate¹

Treated and deaerated water is delivered into a boiler where it is (1) converted to steam, (2) travels through the steam distribution system to its various points of use, (3) changes phases from vapor back to liquid, and (4) forms condensate. If the condensate system is not functioning properly or if the condensate becomes contaminated, wasting condensate is equivalent to pouring money down the drain.

The monetary value of condensate can be broken down into the following categories:

- water cost
- sewer cost
- fuel cost
- chemical cost
- pretreatment cost
- blowdown cost
- calculation

For this section, monetary value of \$16 for the following examples.²

Condensate Recovery

Based on the above value, if a condenser estimated that 1,000,000 gallons per year drain, the value of this wasted condensate trap station repair.

Fuel Cost

Unrecovered condensate cannot be re-make-up water. Fuel cost is based on make-up water up to the temperature approximately 1 Btu to raise one pound many Btu's are required to heat one pound temperature. Subtract the make-up water temperature. Use this value as an input between Btu's and temperature. To multiply the temperature difference by

¹ Adapted from McDonnell PE James "Condensate"
² 2004 dollars

SYSTEM DESCRIPTIONS

System Descriptions can be used for many purposes, including training.

Our system descriptions include (but are not limited to):

- Title Page
- Table of Contents
- Lists of Figures and Tables
- Executive Summary (Optional)
- Document Objectives
- System Purpose
- System Flow Path(s)
- Component Descriptions and Safety Concerns
- Summary of Control Narratives
- Valve Alignment Lists
- Tables Instruments and Alarms

Our system descriptions also include photographs and process flow diagrams.

WE ALSO AUTHOR OPERATING PROCEDURES AND TRAINING MATERIALS