

AIR EFFECTS ON CONDENSER PERFORMANCE

By Scott MacFarlane

Air accumulation in the turbine's surface condenser or high air to steam ratio in the gland condenser is just one of four major causes for performance issues with condensers; the other three being cooling water fouling, system wear and insufficient cooling water flow. However, they all have identical effects on the condenser's performance. Each issue causes the exiting pressure of the turbine or gland seal to increase, which in turn affects the turbine's or gland seal's efficiency and the condenser's heat transfer efficiency.

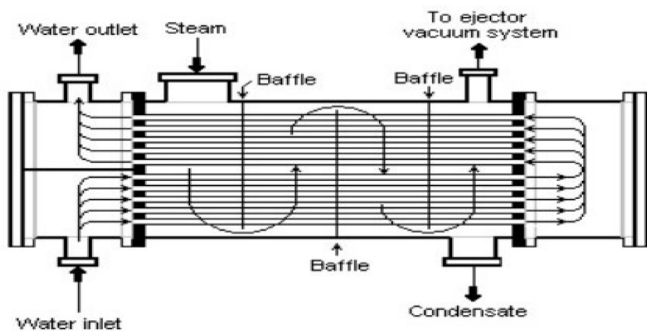


Figure 1

Air and/or other non-condensable gases that leak into the condenser create a “blanket” around the steam. This blanket hinders the condensing process due to the non-condensable gases' higher resistance to heat transfer. In these cases, the steam must diffuse through the blanket and sub-cooling occurs, which negatively

affects condenser performance. To remove these non-condensable gases, most condensers are equipped with a vacuum pump or ejector. Although, when the ingress rate becomes too high, the unwanted gas vapors will exceed the ability of the pump or ejector to exhaust the non-condensable gases. However, these vacuum pumps or ejectors are not used to create the vacuum needed for the condenser.

When it comes to testing your system for leaks, there are several options that can be performed while the system is both online or offline. Some older, but still practiced, online testing methods involve using feathers, shaving cream (or other light substance that could be sucked in), candles, or smoke to detect leaks. Newer online testing methods include ultrasonic testing and helium or halogen testing using a tracer gas detector. As expected, while online, the newer methods are more common with the tracer gas method being the most successful in detecting the hard to find leaks. While offline, water fill tests or bubble tests are the most suitable methods for detecting leaks

For more detailed information on leak testing please review the following technical bulletins.

- Agilent Technologies, “Leak Testing Steam Turbine Condensers”
- Heat Exchange Institute HEI, “Vacuum Systems: Understanding A Key Component of Modern Power Plant, Tech Sheet #110”.

For more information:

Email: RMS@rotatingmachinery.com

Tel: 484-821-0702

Headquarters

2760 Baglyos Cir.
Bethlehem, PA 18020

Houston Office

16676 Northchase Dr., Ste 400
Houston, TX 77060



rotatingmachinery.com

Tel: 484-821-0702

Parts: rms@rotatingmachinery.com

Rotating Machinery Services, Inc. | 2760 Baglyos Circle, Bethlehem, PA 18020 | Tel: 484-821-0702