Tech Sheet #131
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VACUUM BREAKER VALVE

General:

The purpose of a Vacuum Breaker Valve is to quickly allow air into the vacuum space of the condenser and low pressure turbine exhaust hood. The vacuum breaker valve is usually located on the steam turbine or the condenser shell/transition.

Reasons:

Potential benefits for the use of a vacuum breaker valve are:

1. Reduce the vacuum
2. Reduce turbine speed as quickly as possible.
3. Reduce the possibility of turbine rotor vibration in over-speed condition.*
4. Reduce the loss of turbine lubricating oil pressure.*
5. Reduce the loss of turbine hydrogen seal oil pressure.*

* For more information please reference the appropriate section in Standards for Steam Surface Condensers

Operation:

A vacuum breaker valve is typically operable by a controller responsive to losses of load on the steam turbine. Once opened, the vacuum breaker valve will allow air into the steam space to quickly reduce the existing vacuum and hence reduce the acceleration of the steam turbine upon loss of load by the generator.

Sizing:

There are several criteria necessary for the sizing of vacuum breakers. These are total volume of steam space within the LP turbine casing and the steam surface condenser, and the time required to reduce the vacuum.

Specific sizing methodology supplied by steam turbine original equipment manufacturer should always be followed.

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Valve Types:

Vacuum breaker valves shall be as specified by the customer and/or steam turbine original equipment manufacturer.

In the absence of specified information, globe and butterfly valves are typically utilized. The sealing of the vacuum breaker valve is very important in reducing any potential air in-leakage into the condenser. Valves should always be rated for vacuum service with a tight shut off. Additionally, valves can be installed with a water seal system to prevent air in-leakage into the vacuum space.

Installation:

If vacuum breaker valves are to be installed on the condenser , they should be positioned as close to the condenser as is reasonably practical. Personnel protection & expected noise levels should be considered when designing the vacuum breaker valve intake piping. Mesh screens can be fitted to the intake pipe to prevent debris from being induced into the condenser shell.

Selection:

When selecting motor operated valves, the opening time must be considered, per the requirements of steam turbine original equipment manufacturer. During an 'over speed' condition, reduction in steam turbine speed is directly affected by both the opening time and valve size.

Specifying:

When specifying vacuum breaker valves, the following must be considered:

Valve Size:	Nominal Diameter
Valve Type:	Globe / Butterfly / Other
Water-seal:	Yes / No
Connection Type:	Flange / Butt Weld
Actuator Type:	Electric / Pneumatic / Digital / Analog
Opening Time:	Typically less than 30 seconds.
Valve operation:	Open/Close or Modulating

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