

Stall: Definition, Causes, and Effects

Stall, a condition in which heat transfer equipment is unable to drain condensate and becomes flooded, affects many users of heat transfer equipment. Misunderstanding regarding the cause and effects of stall leads some users to inadequate or ineffective attempts to resolve the condition. For example, flooding might actually be caused by mechanical failure of the condensate drainage device, but this is not considered stall. A thorough understanding of stall, its causes, and problems that arise because of it will help users take proper corrective and preventive action.

◆ Cause

Stall occurs when the operating pressure of heat transfer equipment falls below the back pressure in the condensate return line, causing a negative pressure differential. A positive differential pressure across the trap is necessary for proper condensate drainage. When there is no pressure differential or a negative pressure differential across the trap, between the equipment and the condensate return line, condensate will begin to collect and flood the equipment. This occurs most often in systems in which the steam pressure is modulated to obtain a desired output (e.g., product temperature).

◆ Effects

Stalled condensate can cause a variety of problems, including the following:

- Inadequate condensate drainage
- Waterhammer
- Frozen coils
- Corrosion due to cool condensate and the formation of carbonic acid
- Poor temperature control
- Short equipment life
- Control valve hunting (system cycling)
- Reduction in heat transfer capacity

◆ Factors contributing to “stall”

There is one cause of stall: system pressure differential that is inadequate to drain condensate. The cause of the insufficient pressure differential, however, varies widely. Some possible reasons for insufficient pressure differential follow:

- Oversized equipment (excessive surface area)
- Overly conservative fouling factors
- Back pressure at equipment discharge due to elevation, obstruction or static pressure in the line

This Tech Sheet was developed by the members of the Fluid Controls Institute (FCI) Secondary Pressure Drainer Section. FCI is a trade association comprising the leading manufacturers of fluid control and conditioning equipment. FCI Tech Sheets are information tools and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific instructions regarding their equipment.

- Modulating control
- Equipment operating at lower pressures due to light load demands
- Vacuum

◆ **Possible solutions to stall**

Following is a chart showing typical applications. For further information about SPDs, see Tech Sheet SPD #201.

SPD Selection Guide Chart

Application	SPD Type
Condensate Recovery	Type 1
Equipment Drainage	
Stall ≤ 150 psig	Type 2
Stall > 150 psig	<i>Consult Manufacturer</i>
No Stall	Type 1

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