



Quick Reference Card

Typical Optimizations for Steam Users

Symptom	Resulting Problem	Potential Cause	Optimizations
Heat Exchanger	Incorrect Process Control	Improper Piping	Follow proper piping practices
		Trapped non-condensable gases	Properly located thermostatic air vent
		Flooding	Proper drainage of condensate (Optimization for improper drainage of condensate)
		High Pressure Drop	Proper blowdown/Regular maintenance of strainer Install condensate pumps, air vents, and replacement bundles
	Damaged Equipment	Water Hammer	Follow proper piping practices
		Corrosion Caused by Cooled Condensate	Check for proper condensate drainage/Avoid stalling conditions
	Improper Drainage of Condensate	Undersized Steam Traps Unable to Handle Condensate Load	Proper steam trap selection
		Stalling/High Back Pressure	Usage of auxiliary equipment (i.e. pump traps)
		Presence of a Vacuum	Proper use/Installation of vacuum breaker
		Large Condensate Loads with Flash Steam	Install automatic differential condensate controllers
		Misapplied Steam Traps	Proper steam trap sizing
		Absence of a Properly Located Check Valve	Proper check valve location
	Improper Steam Quality	Erosion of Nozzles	Install a separator upstream of the evaporator
		Increase of Steam Use	
	Tube Bundle Failure	Corrosion Water hammer	Install condensate pumps, air vents, and fin tube replacement bundles
Water hammer			
Jacketed Kettles (Gravity Drained)	Temperature Instability	Presence of Non-Condensable Gases	Locate the thermostatic air vent
		Flooding	Practice proper condensate drainage
	Burnt Product	Trapped Air in Non-condensable Gases	Have a properly located thermostatic air vent
	Damaged Equipment	Water Hammer	Follow proper piping practices
		Corrosion Caused by Cooled Condensate	Check for proper condensate drainage/Avoid stalling conditions
	Water Hammer	Steam is Injected in a Flooded Jacket With Cold Condensate	Properly drain the jacket
	Stalling/Improper Drainage of Condensate	Undersized Steam Traps	Proper steam trap selection
		Stalling/High Back Pressure	Usage of auxiliary equipment (i.e. pump traps)
		Presence of Vacuum	Proper use/Installation of vacuum breaker
		Misapplied Steam Traps	Proper steam trap sizing
Absence of a Properly Located Check Valve		Properly installed check valves/Control valves	
Jacketed Kettles (Syphon Drainage)	Improper Drainage of Condensate	Flooded Kettle due to Flash Condensate	Install a differential condensate controller

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Symptom	Resulting Problem	Potential Cause	Optimizations
Closed & Stationary Steam Chamber	Poor Steam Quality	Incorrect Drainage of the Steam Main	Proper sizing/Location of drip leg Proper usage of steam separator
	Energy Wasted	Heat is Lost Through External Cooling Towers	Implement heat recovery between cooling and heating phases <i>*This can also be applied to Jacket Kettles Gravity Drained</i>
		Contaminated Condensate Drained to the Sewer	Reuse contaminated condensate as a heating media
HVAC Equipment (Air Handling Unit)	Flooding	Stalling Condition	Install a pump trap
	Water Hammer	Improper Selection of Steam Traps	Properly size and select the proper steam trap
	Improper Temperature Control		
HVAC Equipment (Unit Heaters)	Temperature Control	Heater is Started/Stopped Manually	Install a thermostat
	Improper Heating	Wrong Selection of Steam Traps	Proper selection of steam traps
		Flooding	Use auxiliary equipment (i.e. pump traps) Proper usage/Installation of vacuum breakers
Process Air Heaters	Stalling	Not Enough System Pressure to Return Condensate	Proper piping practices Correctly sized valves Proper installation and maintenance of a strainer
Submersed Coils	Condensate Contamination	Leak in Coils	Proper condensate drainage (through proper trap selection, avoidance of stall, etc.)
	Water Hammer	Flooding	
Steam Tracers	Freezing of tracer line	Improper steam trap selection	Select and size steam trap properly Use AIM trap monitoring equipment
	Cold Circuit	Use of a single steam trap on multiple tracer lines	Use a single trap for each tracer line
Absorption Machines	Incorrect Steam Trap Sizing	Wrong Size Steam Trap Installed	Determine the condensate load Install a steam trap below the steam coil
Deaerators	PRV Failure	Bad Steam Quality	Install a steam separator upstream of the PRV
		Debris	Install a strainer upstream of the PRV
	Low Feedwater Temperature	Faulty Thermometer	Check the vessel pressure reading/ Refer to the PRV failure section
		PRV Malfunction	
		Poor Mixing Between Water & Steam in DA	Check the tray alignment or if the trays have fallen
Oversized DA	Install and correctly size the deaerator		



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