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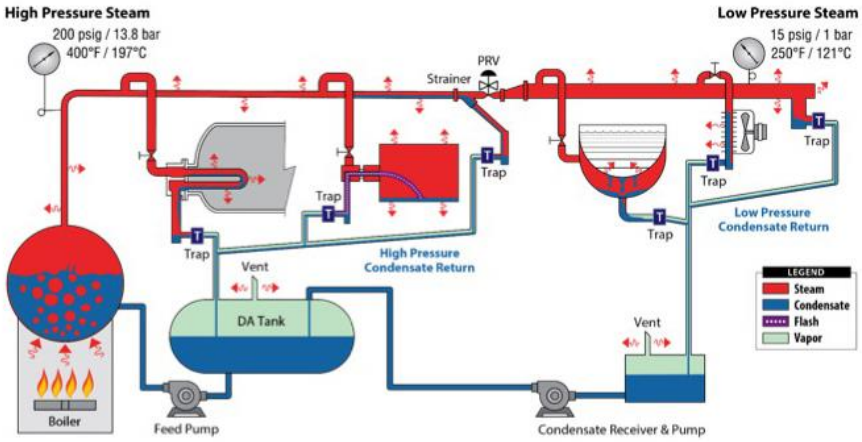
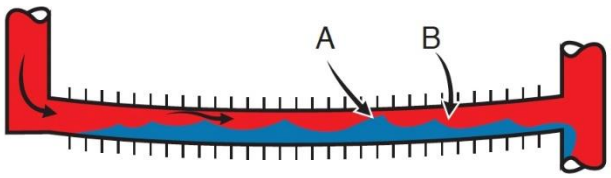
Why Steam Traps?

Condensate is the by-product of heat transfer in a healthy steam system. Condensate forms in heating systems and process equipment as a result of heat transfer from the steam to the product being heated. The duty of a steam trap is to discharge this condensate, as well as air or other gases in the steam system, while also preventing the escape of live steam. Therefore, the steam trap is an essential part of the entire steam system.



Why drain the condensate?

Condensate needs to be drained before it becomes a barrier to heat transfer. ***Waterlogging*** - condensate lying in the bottom of steam lines - can be the cause of one kind of water hammer. Steam traveling at up to 100 miles per hour makes "waves" as it passes over this condensate (A). If enough condensate forms, high-speed steam pushes it along, creating a dangerous slug that grows larger and larger as it picks up liquid in front of it (B). Anything that changes the direction—pipe fittings, regulating valves, tees, elbows, blind flanges—can be destroyed. In addition to damage from this "battering ram," high-velocity water may erode fittings by chipping away at metal surfaces.



Once condensate is drained it is still valuable hot water and should be returned to the boiler.

Considerations for steam trap selection

The conditions under which a steam trap operates will vary considerably. It may have to discharge condensate at steam temperature or something below this temperature. It may need to operate at atmospheric pressures or under a vacuum. Therefore, one type of steam trap cannot be the right choice in all applications. The steam trap must be matched to carry out its function under a given set of conditions.

1. **Air Venting**

   Upon start-up, the heater space is filled with air which must be displaced. If not, this trapped air will reduce heat transfer and ultimately reduce plant and steam efficiency. Ideally, one would purge the air as soon as

Greensboro Division
Phone: 336.393.0100 / 800.334.0231
Fax: 336.393.0140

Louisville Division
Phone: 502.459.7475 / 800.459.7475
Fax: 502.459.7633

Nashville Division
Phone: 615.822.3030 / 855.749.4820
Fax: 615.822.3031

www.mgnewell.com **sales@mgnewell.com** **www.newellautomation.com**

possible before it has a chance to mix with the steam. Air vents can be used, but in most cases, the air is vented through the steam trap. Thermostatic traps are preferred since they are fully open at start-up. Float traps with built-in thermostatic air vents are also applicable. Thermodynamic traps can handle a moderate amount of trapped air.

2. Condensate Removal

Once the air is vented, the trap must do what it's designed to do – pass the condensate but not the steam. If steam leaks through the trap, the system becomes inefficient and uneconomical. The condensate must be discharged immediately and at steam temperature. An incorrect steam trap selection will lead to waterlogging and reduce steam efficiency.

3. Plant performance

When conditions #1 and #2 have been taken care of, then one can focus on plant performance. This involves looking at the plant equipment and determining the right type of steam and steam trap for each point in the process. The needs of the process will usually decide the type of trap and the necessary size of the steam trap. System conditions and parameters to consider are:

- Maximum steam and condensate pressure
- Operating steam and condensate pressure
- Temperatures and flow rates
- Whether the process is temperature controlled

4. Reliability

A good steam trap system runs at optimum performance and requires little attention. Issues that affect reliability and performance are often associated with:

- Corrosion due to the condition of the condensate. Proper material selection and a good feed water conditioning system can eliminate corrosion.
- Waterhammer – typically caused by a lift after the steam trap that may have been overlooked during the design or installation.
- Dirt or other accumulations – it may result from debris in the pipe (corrosion) or other compounds carried over from the boiler.

5. Flash steam

Flash steam is caused when hot condensate from a high pressure system passes to a low pressure system. Flash steam is no different than 'normal' steam – the only difference is where it's formed. The formation of flash steam can happen naturally in a system and it can represent a substantial quantity of useful energy. Flash steam provides a simple opportunity to increase your system efficiency by capturing it and using it as part of your system.

Steam information courtesy of Spirax-Sarco