

# BASICS OF STEAM TRAPS

## WHY DO WE NEED STEAM TRAPS?

In order to operate economically and efficiently, all steam systems must be protected against 3 factors:

- \* CONDENSATE
- \* AIR
- \* NON-CONDENSIBLES

**Condensate** is formed in a system whenever steam gives up its useable heat. And, since condensate interferes with the efficiency of the operation of a steam system, it must be removed.

**Air**, one of nature's finest insulators, when mixed with steam, will lower its temperature and hinder the overall effectiveness of an entire system. For example: A film of air 1/1000th of an inch thick offers as much resistance to heat transfer as 13" of copper or 3" of steel. For that reason, air **MUST** be continuously bled from a system by steam traps to have it operate efficiently and to conserve energy.

**Non-condensibles**, such as carbon dioxide promote corrosion and other deterioration of equipment and inhibit their function.

## WHAT IS A STEAM TRAP?

A steam trap is basically an automatic valve which discharges condensate, undesirable air and non-condensibles from a system while trapping, or holding in, steam. They fall into 4 major categories: **Thermostatic**, **Mechanical**, **Thermodynamic** and **Drain Orifice**. Each type will be discussed in detail in this section.

In every steam system, there are four phases of operation in which traps play a vital role:

- 1) **Start-up** – During "start-up", when the system is initially activated, air and non-condensibles must be discharged.
- 2) **Heat-up** – During "heat-up", as the system works to achieve the desired temperature and pressure, condensate is discharged.
- 3) **At Temperature** – "At temperature", when the desired levels are reached, the valve must close to retain the steam.
- 4) **Using Heat** – At the "using heat" level, the valve's job is to stay closed unless and until condensate occurs; then the valve must open, discharge the condensate and close quickly and positively, without allowing valuable steam to escape.

## WHAT ARE THE QUALITIES OF A GOOD STEAM TRAP?

*A good steam trap should:*

- Discharge condensate, air and non-condensibles.
- Be equal to the load over a wide range of pressures and temperatures.
- Be freeze-proof where necessary.
- Be simple and rugged.
- Have few moving parts.
- Require low maintenance and spare parts inventory.
- Have a long life.

*A good steam trap should not:*

- Discharge live steam.
- Fail or malfunction if pressure changes.
- Respond slowly or hesitantly.
- Open too often, too briefly or for too long.
- Require constant adjustment or frequent repair.
- Require a wide variety of models, spare parts or orifice sizes for different pressures.