



Improving Operational Efficiency and Eliminating Maintenance With Fixed Orifice Steam Traps

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The job of a steam trap is to:

Keep steam in the system
and
Get rid of the condensate that forms
quickly and efficiently



Inefficiencies in the system are caused by:

- Steam traps failing
- Steam traps leaking
- Pressure drops from steam traps opening and closing
- Water in the system



Fuel savings with an orifice system

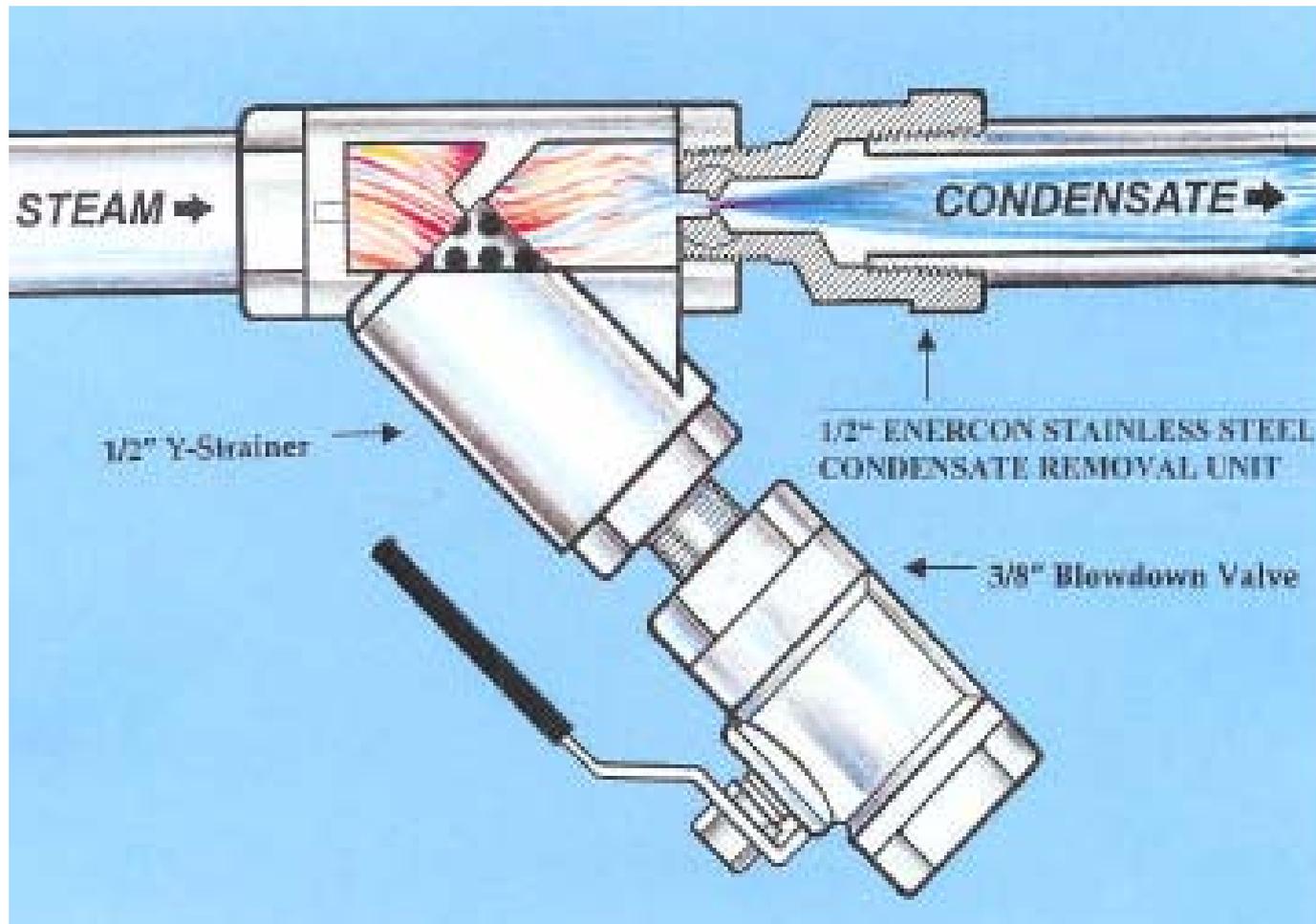
Plants that are completely converted to an orifice condensate removal system typically reduce trapped steam consumption 10-30% **year after year.**



Maintenance Benefits of Orifice Traps

- Repair and replacement are not needed, freeing up maintenance personnel for other priorities
- Reliable even in very cold climates such as Fort MacMurray
- Equipment failures due to bad traps are virtually eliminated

Orifice trap removes condensate continually



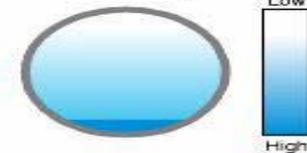
Orifice traps are based on turbulent flow

Types of Flow In Fluid Dynamics

Laminar Flow



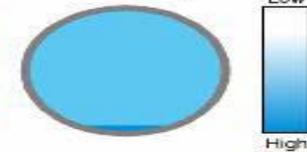
Density



Turbulent Flow



Density

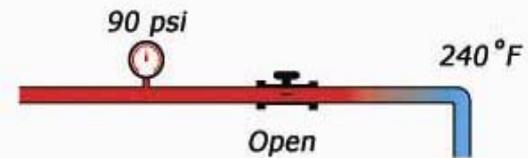
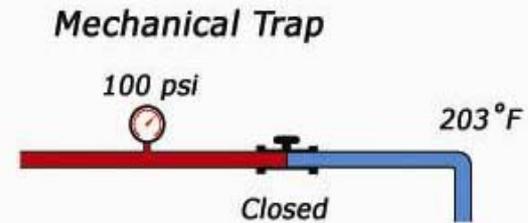


Pressure profile comparison

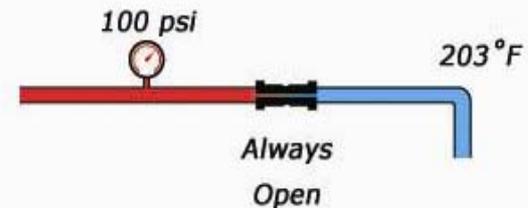
A small pressure drop occurs each time a mechanical trap opens.

There is no movement on the pressure gauge with orifice traps.

A properly operating mechanical trap opens and closes several times a minute



Permanent Orifice





Trap Efficiency

Orifice traps improve total system efficiency on both the:

- **Steam Side** of the trap by more efficiently relieving condensate;
- And the **Return Side** by reducing steam discharge losses.

Drier steam prevents water hammer, a safety hazard

Water can collect in the pipe and cause water hammer, resulting in pipe damage and potential injuries.

Orifice traps continually remove condensate in the pipes, providing drier steam and preventing water hammer.

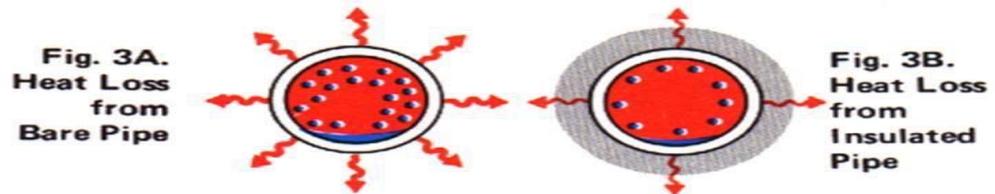
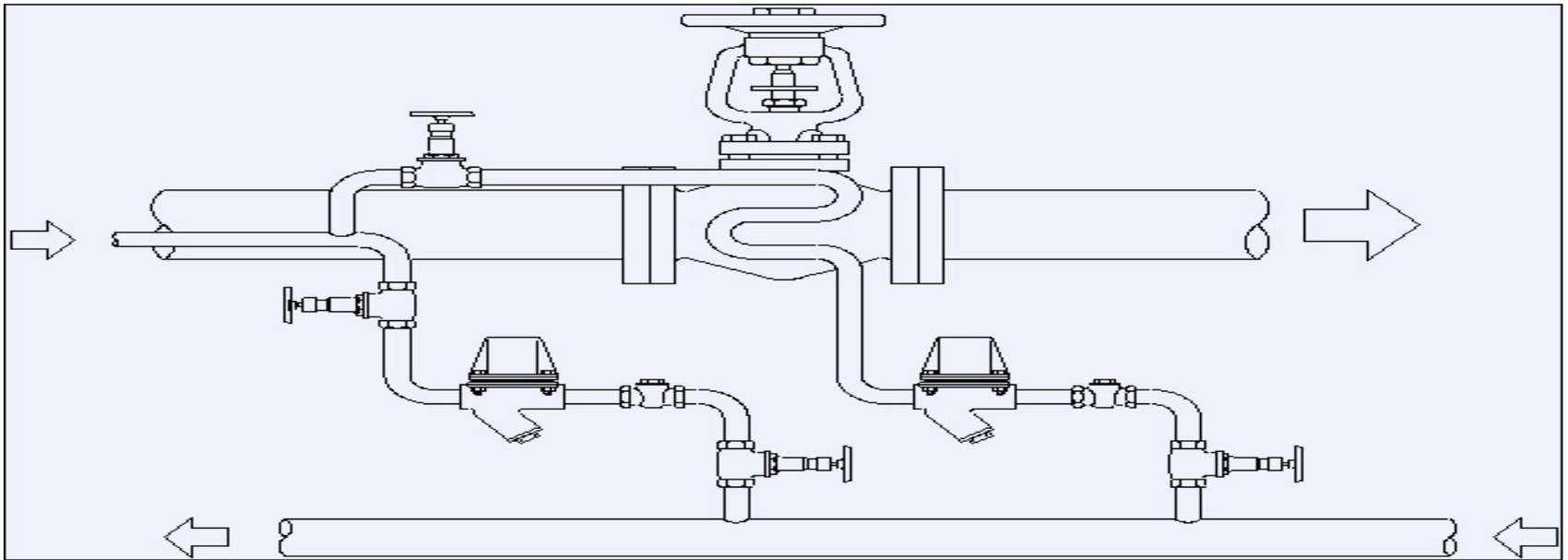


Fig. 4A. Condensate Slugging. Condensate which is allowed to collect in steam mains is blown into a wave configuration by flow velocity. When wave peaks, a solid slug is pushed downstream until it impacts, causing hammer.

Heat transfer on tracer lines improves



Tracer lines have better heat transfer with orifices spaced at 250' than with conventional traps at 150'

Varying loads: the typical turndown on tracers is 10:1



Typical fuel savings on tracer lines: 22%

A failed mechanical steam trap can pass 20 lbs of condensate and 90 lbs of steam.

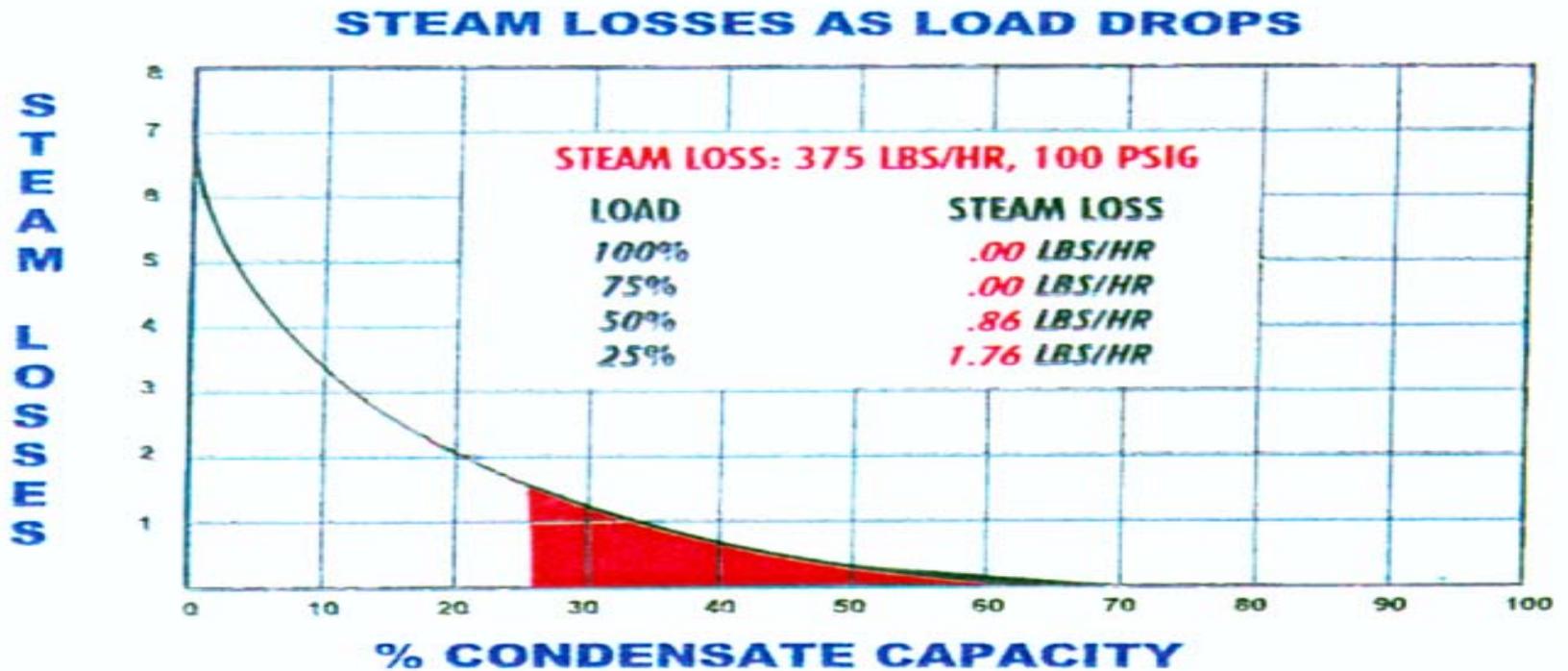
Applications with a modulating control valve

Applications with a modulating control valve or on/off control rarely fall outside orifice guidelines

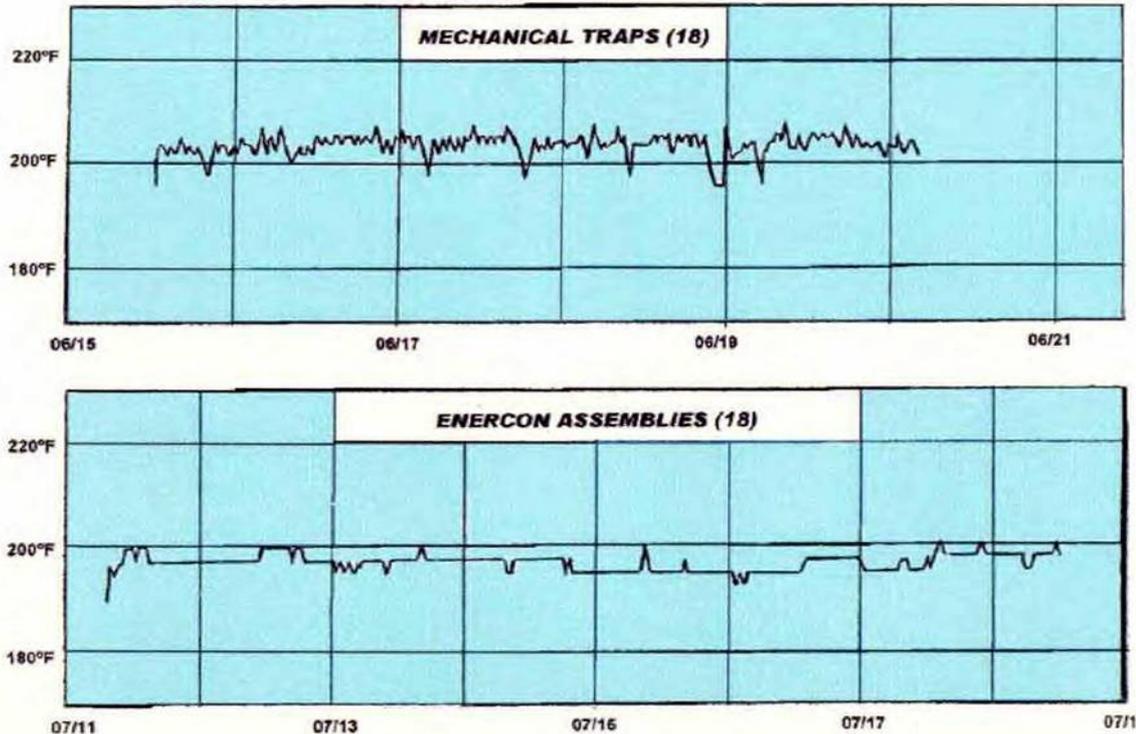
The same orifice will pass
405 lbs of water at 100 psi
as will pass
220 lbs of water at 10 psi

Orifice traps are sized to handle 100% of the condensate produced by an application.

Varying load at a given pressure



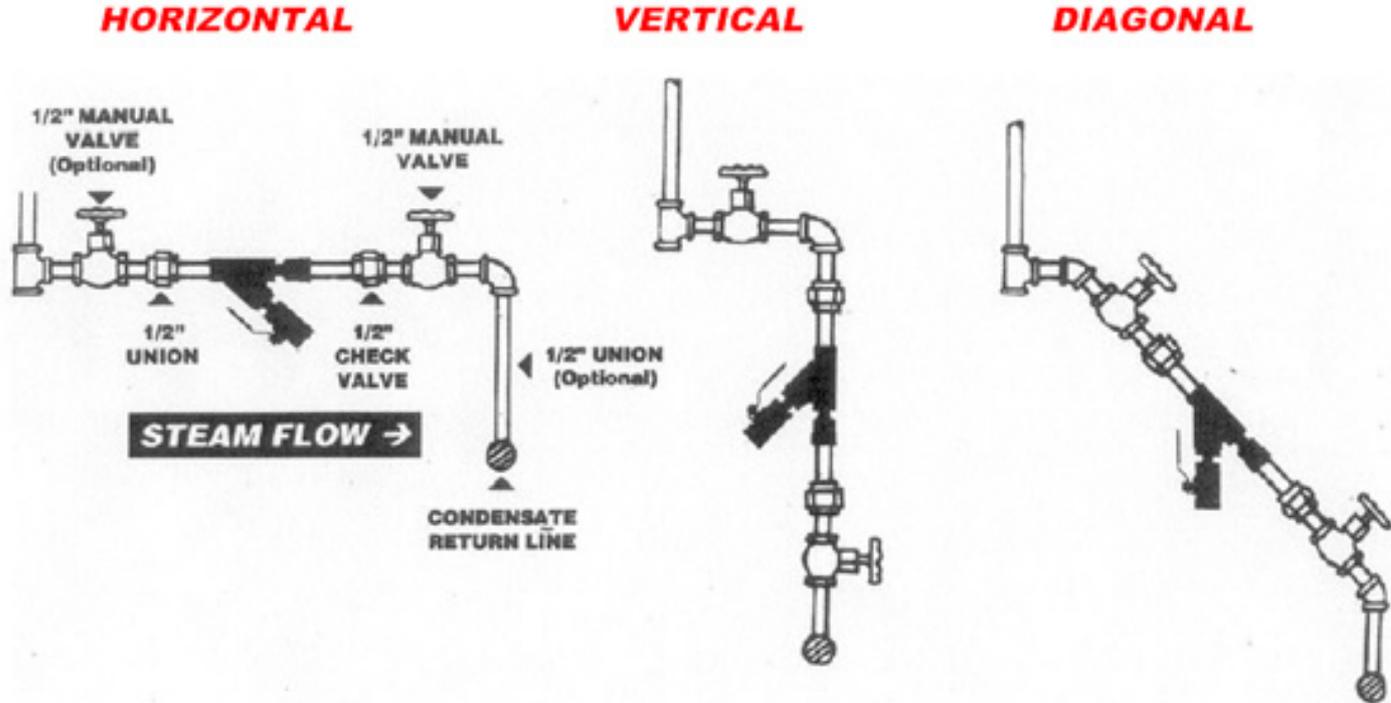
Improve consistency with orifice traps



TEMPERATURE PROFILE TEST COMPARING ENERCON WITH MECHANICAL TRAPS

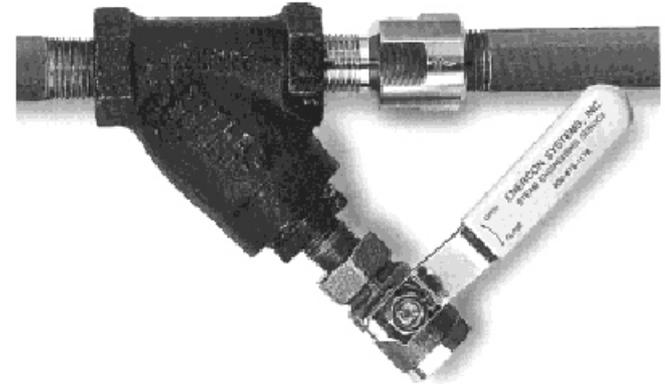
IntelCoat Technologies, South Hadley MA, international producer of quality paper products, compared temperature variations when 18 Enercon assemblies were installed on a photographic paper drying system vs. performance of mechanical traps they replaced. The Enercon assemblies were installed in September 2000.

Orifice installation example



Keys to a successful orifice installation

- **Experience with steam systems**
- **Proper sizing**
- **Quality hardware**
- **Warranty and Support**





Permanent GHG Reduction

New conventional steam traps reduce GHG's temporarily, but traps start to wear down once installed.

With orifice traps, because the fuel savings is permanent, the corresponding reduction in GHG's is also permanent.



Summary

Permanent orifice trapping system

- No repair or replacement needed
- Reduces fuel consumption for trapped steam 10-30%, year after year
- Improves heat transfer and resolves condensate problems
- Reliable in freezing weather
- Avoids catastrophic equipment failures from failed traps
- Replaces conventional traps cost-effectively 99% of the time