Building the most energy efficient, longest lasting steam trap for the market since 1950.
Velan Steam Traps
And Where They are Found in Power Plants

The purpose of this document is to provide the information as to where VELAN steam traps are found in a power plant. VELAN looks at the applications in a two-fold approach:

- The primary steam traps that are used to help the plant generate electricity.
- The secondary steam traps that are used to help heat the building.

PRIMARY STEAM TRAPS

These steam traps are installed throughout the plant from the boiler to the turbine, and everywhere in between. A failure at any of these trap applications can affect the output of the plant and thus are very critical to the plant’s operation. We have listed the following applications as primary steam traps:

- Main Steam Drains
- Gland Condenser Drains
- Turbine Extraction Drains
- Cold Reheat Drains
- Hot Reheat Drains
- Feedwater Heater Drains
- Air Preheaters
- Soot Blower Drains
- Desuperheater Drains

These steam trap applications are explained in greater detail further in this document.

SECONDARY STEAM TRAPS

These steam traps are installed on the heating system and the tracing system, if the customer needs to trace fuel oil. If the plant does not have a tracing component, it will not be found at the plant. A failure of a steam trap in these applications will not affect the output of the plant, thus giving it a secondary classification. We have listed the following applications as secondary steam traps:

- Heating System – Drip Leg Drains
- Heating System – Unit Heater / Heat Exchanger Drains
- Tracing Drains

These steam trap applications are explained in greater detail further in this document.
VELAN STEAM TRAP APPLICATIONS

MAIN DRAIN DRIP LEGS

Steam traps must be located at regular intervals along a steam main to keep the line clear of condensate. Failure to do this, not only causes water-logging and severe waterhammer, but reduces the efficiency of the heating process to which the steam is being supplied. For these reasons, it is vital that condensate be discharged close to saturation temperature to ensure effective condensate removal from the line. Velan steam traps for drip leg applications are available for all pressures. The water seal, maintained over the valve seat, eliminates steam loss and extends operating life. The rugged construction and Stellite® valve trim allow Velan drip leg traps to operate reliably, over long periods, at high pressures, with varying climatic conditions.

HEATING

Space heaters consist of small volume steam spaces having high heat transfer rates resulting from the use of finned surfaces and powerful fans. Therefore condensate at temperatures close to saturation temperature is rapidly formed. As constant air off temperatures are essential to create proper environmental control in the offices, warehouses or factories being heated, rapid discharge of condensate is essential. With changing climate, the condensate load from the heaters varies widely, as does the steam pressure to the heater through the temperature regulator. Effective steam traps must therefore have a wide capacity and pressure range with a rapid response characteristic. Good cold discharge capacity and air venting is also required to permit rapid efficient plant start up.

Steam heat exchangers heat water in a shell and tube, thus heating water for showers and other HVAC applications. It is essential that the condensate is removed as it is formed, to avoid flooding of useful heating surfaces.

Extremely high cold start up capacity, efficient air venting and optimized hot discharge capabilities of the Velan steam trap enhance its ability to handle any heating application service. The standard MFT will discharge condensate at steam temperature when the load is high, but will then act thermostatically when the load is low. It is the only float trap on the market that WILL NOT FREEZE OR FAIL IN THE CLOSED POSITION.

TRACING

Steam tracing is used to reduce the viscosity of process liquid flowing through a pipeline. This reduces the power required to pump heavy liquids and improves plant efficiency, particularly under cold environment conditions. Tracing lines are also used on control valves and instrument cases in cold conditions to prevent against freezing. Traps set to discharge condensate below saturation temperature, together with good lagging will keep product lines and instruments sufficiently hot. Certain Velan steam trap models are built specifically for tracing applications. These traps are designed to maximize use of the heat in both the steam and the condensate. The standard Velan tracer trap will discharge condensate below steam temperature, and use less steam for the job. When compared with traps which discharge condensate at saturation temperature, the Velan steam trap greatly reduces energy cost and lasts much longer. The Velan steam trap WILL NOT FREEZE OR FAIL IN THE CLOSED POSITION.
Fossil fueled power plants

Transport of steam between boiler and high pressure turbine.

Removal of condensate from steam mains and distribution lines to:
- Maintain steam quality between boiler and equipment.
- Protect equipment from damage by water hammer.

Condensate Load: During normal running condensate load will be zero, only during start-up and shut down sequence will traps normally be operative – loads even under those conditions will not be high.

Steam Pressure: Will normally range between 1500 psi and 4000 psi superheated.

Drain to Trap: Condensate flow is always designed to be by gravity.

Trap Discharge: Typically to a closed return system directly into the condenser.

Ambient Conditions: Not subject to temperature variance being inside the power plant.

Recommended Trap: N-1500 / N-2500 / N-2600 / N-4000 (Trap only or Piping King Option)

Characteristics: Robust, able to handle cyclic temperature change, good air handling, unaffected by superheat.

NOTE: For superheat service, A182-F22 material is normally used.
Fossil fueled power plants (coal, oil, waste, wood)

Removal of condensate from gland steam condenser

The gland steam condenser operates at very low pressure and temperatures. This application is best served by a compressed air drain trap that immediately removes the condensate as it forms.

Condensate Load: High at start up, but will reduce to a constant load during operation.

Steam Pressure: Usually between 14-32 inches of vacuum at 110°F

Drain to Trap: Condensate flow is normally by gravity.

Trap Discharge: Typically to a closed return system.

Ambient Conditions: Not subject to temperature variance being inside the power plant.

Recommended Trap: MFA or MFAS
3. Turbine Extraction Drains

A105 CS

Area: Fossil fueled power plants

Application: Transport of steam between turbine and extraction heater.

Objective: Turbine extraction drains are located between the exhaust side of the intermediate and low-pressure stages of the turbine, to various heaters.

Condensate Load: Normally heavy start-up loads will be experienced, but once equipment is warm, load will be lower and more constant.

Steam Pressure: Normally turbine extraction drains will be at intermediate or low pressure.

*This application can be subject to superheat conditions.*

Drain to Trap: Condensate flow is normally by gravity.

Trap Discharge: Typically to a closed return or drain system.

Ambient Conditions: Not subject to temperature variance being inside the power plant.

Recommended Trap: N-150 / N-300 (Trap only or Piping King Option)

Characteristics: Robust, able to handle cyclic temperature change, good air handling, unaffected by superheat.

NOTE: For superheat service A182-F22 material is normally used.
Fossil fueled power plants

Transport of steam between exhaust side of high-pressure turbine and top of the boiler.

Removal of condensate from steam mains and distribution lines to:
- Maintain steam quality between boiler and equipment.
- Protect equipment from damage by water hammer.

Condensate Load: The cold reheat line is a saturated application that can have a very large hot running load.

Steam Pressure: Will normally range between 500 psi and 700 psi saturated.

Drain to Trap: Condensate flow is always designed to be by gravity.

Trap Discharge: Typically to a closed return system directly into the condenser.

Ambient Conditions: Not subject to temperature variance being inside the power plant.

Recommended Trap: SPF6-600 (Trap only or Piping King Option)

Characteristics: Robust, quick opening, high volume discharge, good air handling, unaffected by superheat.

Estimated Running Load for High Capacity Saturated Drip Leg Application

SPF Series

Piping King
### 5. Hot Reheat Drains

<table>
<thead>
<tr>
<th>Area:</th>
<th>Fossil fueled power plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application:</td>
<td>Transport of steam between reheat super-heater to the inlet side of the intermediate-pressure turbine.</td>
</tr>
</tbody>
</table>
| Objective:  | Removal of condensate from steam mains and distribution lines to:  
  - Maintain steam quality between boiler and equipment.  
  - Protect equipment from damage by water hammer. |
| Condensate Load: | During normal running condensate load will be zero, only during start-up and shut down sequence will traps normally be operative – loads even under those conditions will not be high. |
| Steam Pressure: | Will normally range between 500 psi and 700 psi superheated. |
| Drain to Trap: | Condensate flow is always designed to be by gravity. |
| Trap Discharge: | Typically to a closed return system directly into the condenser. |
| Ambient Conditions: | Not subject to temperature variance being inside the power plant. |
| Recommended Trap: | N-675 / N-1500 (Trap only or Piping King Option) |
| Characteristics: | Robust, able to handle cyclic temperature change, good air handling, unaffected by superheat. |
| NOTE: | For superheat service A182-F22 material is normally used. |
Fossil fueled power plants

Heating of water through steam coil.

To heat boiler feed water continuously through a heat exchanger.

Normally heavy start-up loads will be experienced, but once equipment is warm, load will be lower and more constant.

Will normally range between 500 psi and 700 psi saturated.

Condensate flow is always designed to be by gravity.

Typically to a closed return system directly into the condenser.

Not subject to temperature variance being inside the power plant.

SPF6-600 (Trap only or Piping King Option)

Robust, quick opening, high volume discharge, good air handling, unaffected by superheat.
Fossil fueled power plants

Provision of hot forced air circulation.

Forced air circulation via fans or blowers through banks of air pre-heater coils to heat outside air before it enters the boiler combustion chamber.

Considering changing inlet air temperatures and control method condensate loads will vary considerably.

Will normally range between 100 psi and 300 psi saturated.

Condensate flow is always designed to be by gravity.

Typically to a closed return system directly into the condenser.

Major danger is from freezing especially when cold air is drawn from outside.

SPF5-350 (Trap only or Piping King Option)

Robust, quick opening, high volume discharge, good air handling, unaffected by superheat.
Fossil fueled power plants (coal, oil, waste, wood)

Removal of condensate from soot blower.

Soot builds up on boiler walls, boiler tubes and roof inside the boiler during the burning of coal to make steam in the boiler. This has a serious effect on boiler efficiency. High-pressure steam is used to loosen the soot on a timed cycle basis. Steam trapping the soot blower will ensure that condensate is not injected into the boiler.

During idle periods condensate load is small but will increase quickly with rapid release of live steam via the blower into the boiler.

Normally soot blowers operate between 400 psi and 800 psi with the majority of power plant applications at 600 psi.

Condensate flow is normally by gravity.

Typically to a closed return or drain system.

Not subject to temperature variance being inside the power plant.

N-675 / N-1500 (Trap only or Piping King Option)

Robust, able to handle cyclic temperature change, good air handling, unaffected by superheat.

For superheat service A182-F22 material is normally used.
9. Desuperheater Drains

Area: Fossil fueled power plants

Application: Transport of steam between de-superheater and point of use.

Objective: Removal of condensate from steam mains and distribution lines to:
- Maintain steam quality between boiler and equipment.
- Protect equipment from damage by water hammer.

Condensate Load: Normally heavy start-up loads will be experienced, but once equipment is warm, load will be lower and more constant.

Steam Pressure: Will normally range between 500 psi and 700 psi saturated.

Drain to Trap: Condensate flow is always designed to be by gravity.

Trap Discharge: Typically to a closed return system directly into the condenser.

Ambient Conditions: Not subject to temperature variance being inside the power plant.

Recommended Trap: SPF6-600 (Trap only or Piping King Option)

Characteristics: Robust, quick opening, high volume discharge, good air handling, unaffected by superheat.
### Area:
Fossil fueled power plants

### Application:
Transport of steam between boiler and point of use.

### Objective:
Removal of condensate from steam mains and distribution lines to:
- Maintain steam quality between boiler and equipment.
- Protect equipment from damage by water hammer.

### Condensate Load:
Normally condensate load is low and constant on this saturated application except during start up when loads can be quite high.

### Steam Pressure:
Normally the heating system drip leg applications will be at intermediate or low pressure.

### Drain to Trap:
Condensate flow is normally by gravity.

### Trap Discharge:
Typically to a closed return or drain system.

### Ambient Conditions:
Not subject to temperature variance being inside the power plant.

### Recommended Trap:
SF-50 / SF-150 / SF-300 (Trap only or Piping King Option)

### Characteristics:
Fail open, self draining vertical or horizontal robust, able to handle cyclic temperature change, good air handling, unaffected by superheat.
Fossil fueled power plants

Provision of hot forced air circulation.

Forced air circulation via fans on blowers through finned tube or banks of air blast coils for space heating.

Considering changing inlet air temperatures and control method condensate loads will vary considerably.

Normally the heating systems unit heater drains will be at intermediate or low pressure.

Gravity fed to avoid condensate back up.

Typically to a closed return or drain system.

Major danger is from freezing especially when cold air is drawn from outside.

MFT and MFTS (Trap only or Piping King Option)


Fit vacuum breakers to allow complete drainage of unit during shut down conditions.

Size extremely carefully – especially for start-up load.

CAST IRON

A216 GR-WCB

WWW.VELANSTEAMTRAPS.COM
<table>
<thead>
<tr>
<th>Area:</th>
<th>Fossil fueled power plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective:</td>
<td>Forced water circulation via pumps through shell and tube heat exchanger for space heating.</td>
</tr>
<tr>
<td>Condensate Load:</td>
<td>Considering changing inlet process temperatures and control method condensate loads will vary considerably.</td>
</tr>
<tr>
<td>Steam Pressure:</td>
<td>Normally the heat exchanger drain application will be at intermediate or low pressure.</td>
</tr>
<tr>
<td>Drain to Trap:</td>
<td>Gravity fed to avoid condensate back up.</td>
</tr>
<tr>
<td>Trap Discharge:</td>
<td>Typically to a closed return or drain system.</td>
</tr>
<tr>
<td>Ambient Conditions:</td>
<td>Not subject to temperature variance being inside the plant.</td>
</tr>
<tr>
<td>Recommended Trap:</td>
<td>MFT and MFTS (Trap only or Piping King Option)</td>
</tr>
<tr>
<td>NOTE:</td>
<td>Fit vacuum breakers to allow complete drainage of unit during shut down conditions.</td>
</tr>
<tr>
<td></td>
<td>Size extremely carefully – especially for start-up load.</td>
</tr>
</tbody>
</table>
Fossil fueled power plants

To provide a heating source around plant pipes and equipment.

Maintain the temperature of process products such as oil, sulfur, wax, asphalt or chemicals in pipes, pumps and valves to aid transportation of the product to prevent solidifying or congealing plus general use on water lines and associated such as safety showers.

Condensate Load: Low and constant varying in quantity during seasons. Winter produces greater condensate loads between 5 and 50 pounds per hour.

Steam Pressure: Most common range from 50 psi to 150 psi.

Condensate flow is normally by gravity.

To atmospheric drains or closed returns (note: most return systems are pressurized).

Ambient Conditions: From arctic to equatorial conditions. The greatest danger is from freezing. Always ensure short pipe between trap and ground if atmospheric drain.

Recommended Trap: TS-250 / Q-250 / UST-300

Characteristics: Fail open, self draining vertical or horizontal robust, able to handle cyclic temperature change, good air handling, unaffected by superheat.

Area:

Application:

Objective:

Condensate Load:

Steam Pressure:

Drain to Trap:

Trap Discharge:

Ambient Conditions:

Recommended Trap:

Characteristics: