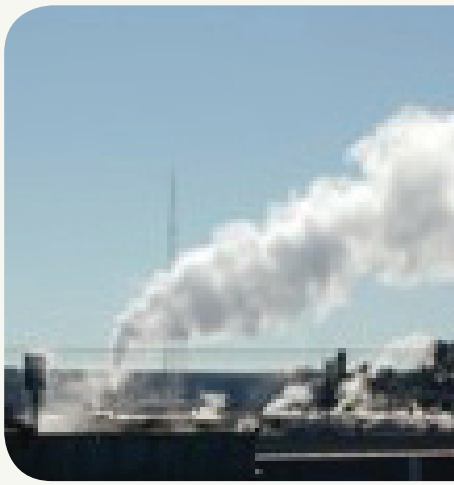
What is a successful Steam Trap Management Program?

With today's energy costs, it is extremely important to have a proactive steam trap-testing program included with the overall Steam System Management Program.

Poor steam trap maintenance is a major cause of energy dollar losses in today's steam systems. A successful steam trap management program can identify defective steam traps, and with this knowledge, the amount of dollars lost for each steam trap can be calculated.



A steam trap program will accomplish the following:

1. Reduce steam energy losses
2. Increase system reliability
3. Decrease combustion emissions
4. Decrease production downtime
5. Improve steam quality

The return on investment of a complete and integrated steam trap program is typically less than twelve months.

Why get involved?

With the continuous volatility of fuel prices, operational costs continue to rise and cause negative effect on the operating profit of a plant. Allowing steam losses to continue is no longer an option. A successful program must include the participation of people at all levels of the organization.

Twelve Steps to a Successful Steam Trap Management Program

1. Select a steam team and leader
   a. The team participants may include personnel from production, safety, engineering, maintenance and management.
   b. The team leader will coordinate all aspects of the program.

2. Steam system training
   Develop a roadmap to train the plant personnel on the different aspects

of the steam trap system and operation. Some examples of training topics include:

a. Steam traps
b. Root cause analysis
c. Testing
d. Problem solving
e. Correct sizing
f. Piping
g. Installations
h. Condensate recovery methods

3. Select manufacturers for the evaluation process.

The plant needs to evaluate the steam traps that will be used in the plant. The best practice is to implement a methodical selection process for steam trap evaluation and selection of vendors. Even if the plant is using a specific manufacturer, there is a need to reevaluate. New steam traps will leak steam; the plant must select one or two manufacturers with the least amount of leakage.

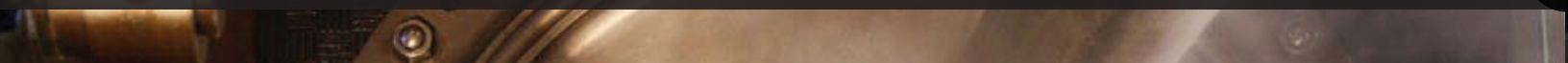
a. Select one to four manufacturers.
b. After the evaluation process, select no more than two manufacturers for steam trap suppliers.

4. Evaluation area

Find or locate six to ten steam traps that will be used for the steam trap evaluation. Select a location where it is easy to monitor the steam trap performance.

Suggestions to follow during the steam trap evaluation process:

a. Ensure the use of the universal mount design steam traps (ease of change out – five minutes or less).
b. A test valve arrangement shall be used to inspect the steam trap discharge (steam, condensate, flash, etc) during evaluation process.
c. A video record of steam trap operation should be taken for evaluation, benchmarking, and training purposes of proper steam trap operation.



5. Select the operational design of the steam traps.
Set a standard for the operational design of the steam trap that will be used in the different applications found in your plant.
Example: Mechanical, thermodynamic, and thermostatic. If you need assistance, please contact one of our engineers. Most plants need to have more than one operational steam trap design, but not more than two.

a. Steam line drip leg, unit heater, tracer or other small condensate load will use _____ design steam trap.
b. Process applications (heat exchanger, reboiler, reactor, etc.) will use _____ design steam trap.

6. Do you know where your steam traps are?
All steam traps need to be identified with a unique identification code. Additionally, important information should be recorded on each steam trap. The steam trap population should be recorded in a database. There are free software databases available that will meet these requirements.

Examples of information to be recorded during a steam trap survey:

a. Application
b. Manufacturer
c. Location
d. Size
e. Orifice size
f. Connection
g. Condition

7. Testing the steam traps.
A steam trap survey can be performed either by company personnel, or outsourced to an experienced audit firm. The survey should consist of all data that we have listed above. All documentation must be gathered on each steam trap. The steam trap software database should include repair or replacement costs as well as other important information.

If the plant is to be audited, the auditing personnel should be certified to Level I or Level II Steam Trap Examiner qualifications

Typical tools used for testing steam traps include the following:

Visual Inspection - Observe actual steam trap discharge by means of a block and test valve. The flash steam amount can be confusing and therefore experience is required to understand what is seen. But a steam trap that is leaking during the off cycle or a steam trap that is severely leaking and completely failed will easily be detected. Understand though that this method changes the operating conditions of the steam trap due to the elimination of back pressure. This does affect a few types of steam trap operations.

Temperature Measurement – Sense upstream and downstream temperatures with contact pyrometers or infrared detectors. This method will determine if there is blockage (steam trap is cold) as well as providing an estimate operating pressure.

Ultrasonic Detection – Ultrasound devices that detect a high frequency sound are a simple method of testing traps and are extremely accurate. Steam traps make distinctive ultrasound during proper operation and can be distinctively heard with an ultrasonic device.

All the above tools require training of the person assign to do the task.

8. Establish standards for steam trap installation.

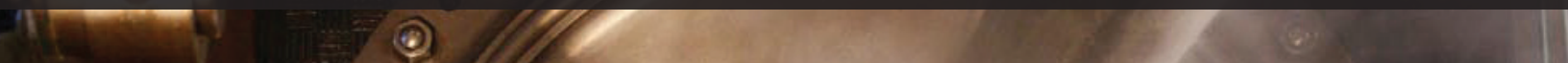
Standardization of steam trap installation at the plant will reduce the failure rate of steam traps in the plant. A high percentage of steam trap failures are due to an incorrect steam trap installation.

Where do we get standards?

Swagelok Energy Adivsors, Inc.. web site has standard installation prints, which can be provided in CAD format upon request. Standards allow the plant personnel to better understand the operation of each steam trap and proper installation techniques. This will eliminate repair or replacement costs due to incorrect installation.

9. Establish standards for sizing steam traps and design selection.

Proper trap sizing is the most important factor in obtaining efficient steam trap operation. Even though the correct operating design of a steam trap was selected, and the installation was correct, improper steam trap sizing



will cause either condensate to back up in the system or excessive steam loss into the return system. Be sure to review the necessary considerations in sizing steam control valves, steam piping, expansion, and heat transfer. It is important to take your time, consider all the parameters, and evaluate the dynamics of the system while making the correct sizing and selection of the steam trap.

Steam Trap sizing is not just a selection based upon pipe size. Rather it is sizing of the internal diameter of the steam trap discharge orifice. For low pressure heating systems, commercial steam trap manufacturers have made steam traps available in which pipe size relates directly to the steam trap capacity (orifice size). However, in industrial steam traps, this is not typically the case.

A two inch steam trap can have the same capacity as a steam trap with ½ inch connections. Only following the determination of the condensate capacity, maximum orifice pressure rating, operating steam pressure, pressure differential, and steam trap model have been determined, the pipe size or connections can be selected.

10. Benchmark the steam system before replacing or repairing the steam traps.
The steam system should be benchmarked before repairing or replacing the steam traps. This will determine the success of the program.

11. Replace or repair the steam traps.
Each plant needs to determine whether they are going to repair or replace the steam trap. Today, plant operation mandates a steam trap to be reliable for at least six years or longer. If the current steam trap does not have that capability, then the steam trap must be changed to a high performance steam trap design.

12. Take all benchmark data (after the corrections) and continue the steam trap program on a PM schedule.
Do not let the program stop; the program must continue indefinitely.

Recommended time schedule for testing steam traps

1. Process steam traps	Every 3 months
2. High pressure steam traps	Every 6 months
3. Low to medium pressure steam traps	Every 6 months
4. Building heating steam traps	Twice a heating season

Conclusion: With today's fuel cost to produce steam, today would be good time to get started with a proactive steam trap program. Do not let the steam system manage you; instead be the manager of the steam system.