

Armstrong Steam Trap Testing Guide for Energy Conservation



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Knowledge Not Shared Is Energy Wasted

Steam Trap Testing Procedure

CAUTION: Valves in steam lines should be opened or closed by authorized personnel only, following the correct procedure for specific system conditions. Always isolate steam trap from pressurized supply and return lines before opening for inspection or repair. Isolate strainer from pressurized system before opening to clean. Failure to follow correct procedures can result in system damage and possible bodily injury.

Tips On Listening –

1. Some flow noises are best picked up with high frequency electronic listening devices, but these devices are not sensitive to mechanical sounds.
2. Low frequency meters, stethoscopes or even screw drivers can be used to detect mechanical sounds, for example: bucket dance, or the bubbling through the bucket vent.
3. Before purchasing a listening device, check it out on known conditions to see that it serves your purpose.
4. When checking traps on a manifold, be sure to check them all. A good trap can telegraph a bad trap's signal. Check to see at which trap the signal is the loudest. That's probably the faulty trap.

I. Inverted Bucket

A. Is trap cold?

1. Yes, then:

- a. Is steam shut off ? Yes, then turn on steam to check trap. If still cold shut off steam. (Allow sufficient time for purging of initial air.)
- b. Is there a plugged strainer up stream of trap? Yes, then clean strainer.
- c. If no plugged strainer, open trap.
- d. Is it over-pressured, orifice too large for applied differential? Yes, then replace mechanism with one for right pressure.

- e. Is bucket vent plugged? Yes, clean it.
 - f. Is inlet or outlet plugged or mechanism jammed with dirt? Yes, then clean it.
 - g. Is bucket unhooked? (worn mechanism) Yes, then replace mechanism.
2. No, then listen to it.
- a. Is it discharging intermittently? Yes, then it is OK.
 - b. Is it relatively quiet, so you can hear the steady “bubbling” through the bucket vent? Yes, then it is OK, light load.
 - c. Does bubbling sound increase and decrease in a kind of “rolling” sound? Yes, then it is handling air. Check trap in an hour. If it is still handling air, replace the standard bucket with a thermic bucket. If air problem persists, replace inverted bucket trap with a float and thermostatic trap.
 - d. Is it discharging steadily with no bucket sound? Yes, then it is too small. Replace trap with larger one.
 - e. Is it discharging steadily with bucket dancing up and down? Yes, then it has lost its prime. Close a valve upstream or downstream of trap for a few minutes and then re-open. If trap does not catch its prime, mechanism is worn (replace), or guide assembly is misaligned (align. See instructions.) Internal check valve on tube and coupling may be necessary to cure chronic prime loss.
3. If trap is capsule construction, non-repairable, remove it from the line in case of any malfunction, and apply compressed air or a water stream to its outlet and then its inlet. If this does not correct the problem replace the trap.

II. Float & Thermostatic Trap

A. Is trap cold?

1. Yes, then:

- a. Is steam shut off? Yes, then turn on steam to check trap. If still cold shut off steam. (Allow sufficient time for purging of initial air.)
- b. Is there a plugged strainer up stream of trap? Yes, then clean strainer.
- c. If no plugged strainer, open trap.
- d. Is it over-pressured, orifice too large for applied differential? Yes, then replace mechanism with one for right pressure.
- e. Has thermostatic element failed shut? (Open trap at room temperature, thermostatic valve should be open.) Yes, then replace.
- f. Is float collapsed? Yes, then replace.
- g. Is float mechanism free to move open and shut? No, then clean or ease binding parts of mechanism or replace mechanism.
- h. Is trap inlet or outlet plugged? Yes, then clean it.

2. No, then listen to it.

A float and thermostatic trap modulates to the load, so it discharges constantly. There is always flow if there is a condensate load. If the trap is passing live steam, this not only adds to flow noise, but it also raises the pitch of the sound because of the higher velocity.

If a valve upstream or downstream of the trap is closed for a few minutes there will be a back-up of condensate. When the valve is reopened, the float valve should move to wide open until the back-up condensate is clear. If the mechanism is OK, there should now be a reduction in noise. If the mechanism is faulty, live steam will be passed at this time, which can be detected by a higher pitch in the flow noise.

Is live steam discharge suspected? Yes, then shut off steam, allow trap to cool and open trap.

- a. Has thermostatic element failed open?
(Remove element from trap and place in boiling water. It should close. Mounting the discharge connection of the element on the end of a tube permits blowing into the tube to see if the valve is shut.)
- b. Is foreign material in trap preventing free operation of mechanism? Yes, then clean it.
- c. Is mechanism binding open or is valve not seating squarely on orifice? Yes, then ease binding parts, align mechanism, or replace mechanism.

III. Disc Trap

A. Is trap cold?

1. Yes, then:

- a. Is steam shut off? Yes, then turn on steam to check trap. (Allow sufficient time for purging of initial air.) If still cold, shut off steam.
- b. Is there a plugged strainer up stream of trap? Yes, then clean strainer.
- c. If no plugged strainer, open trap.
- d. Is disc free to be lifted from seats? No, then clean it so it is free.
- e. Is it plugged with dirt at inlet or outlet? Yes, then clean it.

2. No, then: Listen to it:

- a. Is it discharging intermittently, about six (6) time/min.? Yes, then it is OK.
- b. Is it discharging intermittently, about twelve (12) times/minute or discharging steadily? Yes, then it is worn and wasting excessive steam and should be replaced OR it is too small and should be replaced by larger trap. (New trap of

III. Disc Trap (Cont.)

proper size will intermit about six (6) times/minute.) Or there is excessive back pressure.

- B. If a disc trap is connected into a return line, don't check visually by discharging it to atmosphere through a test valve. This removes the back pressure, which can cause problems if it exceeds 50% of the inlet pressure. The temperature of the return line indicates its back pressure.

IV. Thermostatic Trap

A. Is trap cold?

1. Yes, then:

- a. Is steam shut off? Yes, then turn on steam to check trap. (Allow sufficient time for purging of initial air.) If still cold, shut off steam.
- b. Is there a plugged strainer up stream of trap? Yes, then clean the strainer.
- c. If no plugged strainer, open trap.
- d. Has thermostatic element failed shut? (Valve should be open at room temperature.) Yes, then replace it.
- e. Is it plugged at inlet or outlet? Yes, then clean it.

2. No, then listen to it.

- a. Is it discharging intermittently? Yes, then it is OK.
- b. Is it discharging constantly? Yes, then spray with water.
 1. If it discharges more heavily briefly and shuts off, it is OK.
 2. If there is no change in sound—
 - a. Close a valve upstream or downstream for a few minutes. A short time after reopening, is there a sudden rise in pitch of the flow noise?

1. Yes, then trap has failed open. Shut off steam and allow to cool. Open it and clean it if dirt is preventing proper functioning. If no dirt, remove element from trap and place in boiling water. It should close. Mounting the discharge connection of the element on the end of a tube permits blowing into the tube to see if the valve is shut.
2. No, then trap is too small. Replace with larger trap or add another of same size in parallel.
3. If trap is capsule construction, non-repairable, remove it from the line in case of malfunction, and apply compressed air or a water stream to its outlet and then its inlet. If this does not correct the problem replace the trap. (Element must not experience more than 40 psi pressure when cold.)

V. Sub-Cooling Trap

A. Is trap cold?

1. Yes, then:

- a. Is steam shut off? Yes, then turn on steam to check trap. (Allow sufficient time for purging of initial air.) If still cold, shut off steam.
- b. Is there a plugged strainer up stream of trap? Yes, then clean strainer.
- c. If no plugged strainer, open trap.
- d. Is valve on seat at room temperature? Yes, then replace element.
- e. Is it plugged with dirt at inlet or outlet? Yes, then clean it.

2. No then:

- a. Observe trap discharge to atmosphere. (This is the best way to check this trap.) Is there live steam? Yes, then replace trap.

Traps on Superheated Steam

Do not use thermostatic or float and thermostatic traps, which employ balanced pressure bellows, where superheated steam will contact the element.

Inverted bucket traps can be used successfully on superheated steam. When functioning properly they will be at the saturation temperature of the pressure involved. If one fails open it will be at the superheat temperature. An inverted bucket trap **on superheated steam** is one of the few combinations that can be checked successfully by temperature.

Testing Schedule

For maximum trap life and steam economy, a regular schedule should be set up for trap testing and preventative maintenance. Trap size, operating pressure and importance determine how frequently traps should be checked.

Suggested Yearly Trap Testing Frequency

Operating Pressure (psig)	Application			
	Drip	Tracer	Coil	Process
0 - 100	1	1	2	3
101 - 250	2	2	2	3
251 - 450	2	2	3	4
450 and above	3	3	4	12

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Armstrong Steam and Condensate Group

816 Maple Street, Three Rivers, Michigan 49093 - USA

Ph: (269) 273-1415 Fax: (269) 278-6555

www.armstronginternational.com