# Installation and Testing of Inverted Bucket Steam Traps

**Before Installing**
Run pipe to trap. Before installing the trap, clean the line by blowing down with steam or compressed air. (Clean any strainer screens after this blowdown.)

**Trap Location ABC's**
Accessible for inspection and repair.
Below drip point whenever possible.
Close to drip point.

**Trap Hookups.** For low and medium pressure service, See Figures 1-1 through 1-7. Follow the Power Piping Code for Drips and Drains when installing high pressure traps.

**Shutoff Valves** ahead of traps are needed when system cannot be shut down for trap maintenance. They are not needed for small steam heated machines—a laundry press, for example. Shutoff valve in steam supply to machine is usually sufficient.

Shutoff valve in trap discharge line is needed when trap has a by-pass. It is also a good idea when there is high pressure in discharge header. See also Check Valves.

**By-passes** (Figures 1-5 and 1-6) are discouraged, for if left open, they will defeat the function of the trap. If continuous service is absolutely required, use two traps in parallel, one as a primary, one as a standby.

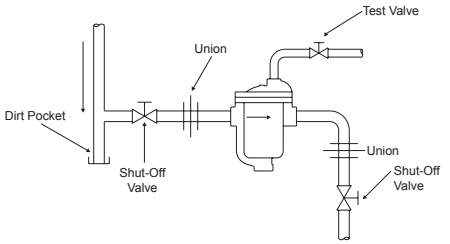



**Fig. 1-1.** Standard hookup No. 800-816, 880-883 traps, with shutoff valves to isolate trap during testing, inspection or repair. Unions should be at right angles—not inline—to facilitate trap removal.

**Fig. 1-2.**
Hookup No. 211-216 and 411 Traps.

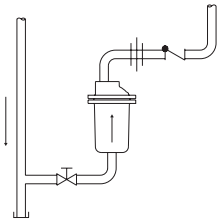
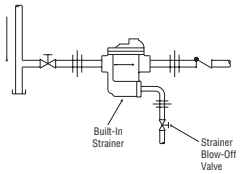


**Fig. 1-3.**
No. 880-883 with strainer blowdown valve.




**Unions.** If only one is used, it should be on discharge side of trap. With two unions, avoid horizontal or vertical in-line installations. The best practice is to install at right angles as in Figures 1-1 and 1-5 or parallel as in Figure 1-6.

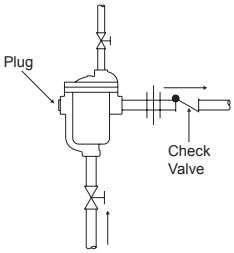
**Standard Connections.** Servicing is simplified by keeping lengths of inlet and outlet nipples identical for traps of a given size and type. A spare trap with identical fittings and half unions can be kept in the storeroom. In the event a trap needs repair it is a simple matter to break the two unions, remove the trap, put in the spare and tighten the unions. Repairs can then be made in the shop and the repaired trap, with fittings and half unions, put back in stock.

**Test Valves** (Figure 1-1) provide an excellent means of checking trap operation.

**Strainers.** Install strainers ahead of small traps if specified or when dirt conditions warrant their use. They are seldom needed with larger size traps.

Some traps have built-in strainers. (Figure 1-3) When strainer blowdown valve is used, shut off steam supply valve before opening strainer blowdown valve. Condensate in trap body will flash back through strainer screen for thorough cleaning. Reopen steam valve slowly.

**Fig. 1-4.**
Alternate hookup for No. 800-816 with inlet at bottom and side connection plugged.



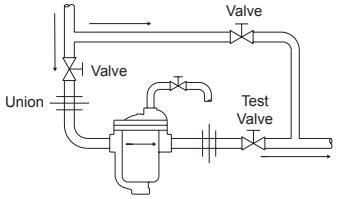
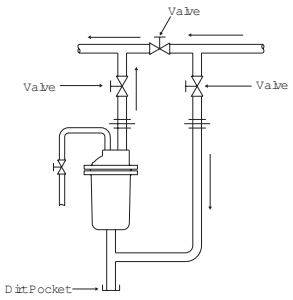




**Fig. 1-5.** Bypass hookups for No. 800-816 and 880-883 traps.

**Fig. 1-6.**
Bypass hook-up for No. 211-216 & 411 traps.




**Dirt Pockets** (Figures 1-1 and 1-6) are excellent for stopping scale and core sand, and eliminating erosion that can occur in elbows when dirt pockets are not provided. Clean periodically.

**Syphon Installations** require a water seal and, with the exception of the DC, a check valve in or before the trap. Syphon pipe should be one size smaller than nominal size of trap used but not less than ½" pipe size.

**Elevating Condensate.** Do not oversize the vertical riser. In fact, one pipe size smaller than normal for the job will give excellent results.

**Check Valves** are frequently needed. They are a must if no discharge line shutoff valve is used. Figure 1-8 shows three possible locations for external check valves—inverted bucket traps are available with internal check valves. Recommended locations are given below.

**Discharge Line Check Valves** (Figure 1-8) prevent backflow and isolate trap when test valve is opened. Normally installed at location **B**. When return line is elevated and trap is exposed to freezing conditions, install check valve at location **A**.

**Inlet Line Check Valves** (Figure 1-8) prevent loss of seal if pressure should drop suddenly or if trap is above drip point. Armstrong Stainless Steel Check Valve in trap body, location **D**, is recommended. If swing check is used, install at location **C**.

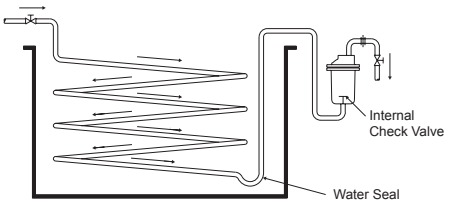



**Fig. 1-7.** Trap draining syphon.

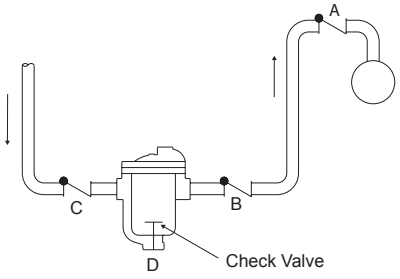



**Fig. 1-8.** Possible check valve locations.

**Protection Against Freezing.** A properly selected and installed trap will not freeze as long as steam is coming to the trap. If the steam supply should be shut off, the steam condenses, forming a vacuum in the heat exchanger or tracer line. This prevents free drainage of the condensate from the system before freezing can occur. Therefore, install a vacuum breaker between the equipment being drained and the trap. If there is not gravity drainage through the trap to the return line, the trap and discharge line should be drained manually or automatically by means of a thermo drain or pop drain. Also, when multiple traps are installed in a trap station, insulating the traps can provide freeze protection.

**Thermo Drains** are installed in a Tee ahead of 200 Series traps or replace the drain plug directly in the body of specially machined 800 Series traps. **Inlet tubes are removed.** When steam supply is shut off and temperature drops to 165°F (74°C), the thermal element opens the drain valve and empties the trap body. Not recommended for service above 15 psig (1 bar).

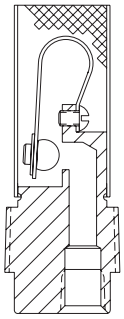


**Fig. 2-1.** Thermo Drain for 0-15 psi (1 bar) service.

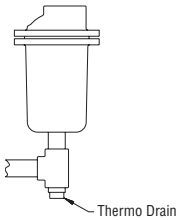



**Fig. 2-2.** 200 Series trap with Thermo Drain in tee ahead of trap. **Trap inlet tube must be removed.**

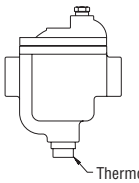



**Fig. 2-3.** Specially machined 800 Series trap with Thermo Drain. **Trap inlet tube cannot be used.**

**Pop Drains** open at approximately 4 psig (.27 bar) when decreasing line pressure allows the stainless steel spring to push the ball valve off its seat. They close when 7-8 psig (.48-.55 bar) line pressure overcomes the resistance of the spring, and seats the ball valve.

The A-8847 is a stainless steel pop drain with an "O" ring seat. The pressure range is 15-600 psig (1-41 bar) with a maximum operating temperature of 350°F (176°C).

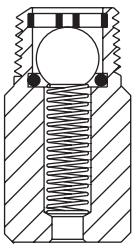


**Fig. 2-4.** Pop Drain

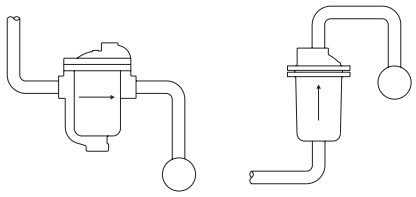


**Fig. 2-5.** Traps installed with short, well pitched discharge lines to prevent freezeups.

**Anti-Freeze Precautions**

1. Do not oversize trap.
2. Keep discharge line very short.
3. Pitch discharge line down for fast gravity drainage.
4. Insulate trap discharge lines and condensate return lines.
5. Where condensate return lines are exposed to ambient weather conditions, tracer lines should be considered.
6. If the return line is overhead, run vertical discharge line adjacent to drain line to top of return header and insulate drain line and trap discharge line together. See Fig. 2-6.

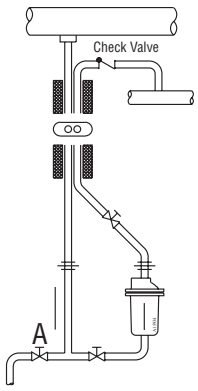



**Figure 2-6.**

NOTE: A long horizontal discharge line invites trouble. Ice can form at far end eventually sealing off the pipe. This prevents the trap from operating. No more steam can enter the trap, and the water in the trap body freezes.

# Testing Armstrong IB Traps

**Testing Schedule**

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

| Suggested Yearly Trap Testing Frequency | | | | |
|---|---|---|---|---|
| Operating Pressure PSIG (bar) | Application | | | |
| | Drip | Tracer | Coil | Process |
| 0 - 100 (0 - 7) | 1 | 1 | 2 | 3 |
| 01 - 250 (7 - 17) | 2 | 2 | 2 | 3 |
| 251 - 450 (17 - 30) | 2 | 2 | 3 | 4 |
| 451 & above (30) & above | 3 | 3 | 4 | 12 |

**How To Test**

Test Valve Method is best. Figure 1-1 shows correct hookup, with test valve in return line downstream of the trap. Here is what to look for when test valve is opened:

1. **Condensate Discharge—**Traps should have intermittent condensate discharge. When an IB trap has an extremely small load it will have a continuous condensate discharge which causes a modulating effect. This mode of operation is normal under this condition.

2. **Flash Steam—**Do not mistake this for a steam leak through the trap valve. Condensate under pressure holds more heat units—Btu—per pound than condensate at atmospheric pressure. When condensate is discharged, these extra heat units re-evaporate some of the condensate.

   **How to Identify Flash:** Trap users sometimes confuse flash steam with leaking steam. Here's how to tell the difference: If steam blows out continuously, in a "blue" stream, it's leaking steam. If steam "floats" out intermittently (each time the trap discharges) in a whitish cloud, it's flash steam.

3. **Continuous Steam Blow—**Trouble. Refer to Armstrong Bulletin 310 - Testing Guide.

4. **No Flow—**Possible trouble. Refer to Armstrong Bulletin 310 - Testing Guide.

**Listening Method of Testing.** Use a listening device or hold one end of a steel rod against trap cap and the other end against ear. You should be able to hear the difference between the intermittent discharge of some traps and the continuous discharge of others. This correct operating condition can be distinguished from the higher velocity sound of a trap blowing through. Considerable experience is required for this method of testing as other noises are telegraphed along the pipe lines.

**Pyrometer Method of Testing.** This method may not give accurate results depending on the return line design and the diameter of the trap orifice. Also, when discharging into a common return, another trap may be blowing through causing a high temperature at the outlet of the trap being tested. Better results can be obtained with a listening device. Request Armstrong Bulletin 310 – Testing Guide.

**Inverted Bucket Air Trap Operation.** There is an intermittent air loss through an inverted bucket trap draining water from compressed air. This is the air that passes through the small vent in the top of the bucket and amounts to approximately 10 cu. ft. (.28 cu m) of free air per hour. When the trap has a lot of water to handle, the air loss is materially reduced. All inverted bucket air traps must be primed before starting.

Armstrong®

Bulletin No. 307-F 6/08