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 ABCs
Accessible for inspection and repair.
Below drip point whenever possible.
Close to drip point.

Trap Hookups. For typical hookups, see Figs. CG-60 (below) through CG-71, pages CG-45 through CG-48.

Shutoff Valves ahead of traps are needed when traps drain steam mains, large water heaters, etc., where 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 Valves in trap discharge line are needed when trap has a by-pass. It is a good idea when there is high pressure in discharge header. See also Check Valves.

By-passes (Figs. CG-64 and CG-65) 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.

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 Figs. CG-60 and CG-64, or parallel as in Fig. CG-65.

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 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 (Fig. CG-60) provide an excellent means of checking trap operation. Use a small plug valve. Provide a check valve or shutoff valve in the discharge line to isolate trap while testing.
Installation and Testing of Armstrong Steam Traps

**Strainers.** Install strainers ahead of traps if specified or when dirt conditions warrant their use. Some types of traps are more susceptible to dirt problems than others—see Recommendation Chart on page CG-2.

Some traps have built-in strainers. When a strainer blow-down 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. Open steam valve slowly.

**Dirt Pockets** 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 1/2" 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. Fig. CG-63 shows three possible locations for external check valves—Armstrong inverted bucket traps are available with internal check valves, while disc traps act as their own check valve. Recommended locations are given in Fig. CG-63.

**Discharge Line Check Valves** prevent backflow and isolate trap when test valve is opened. Normally installed at location B, Fig. CG-63. When return line is elevated and trap is exposed to freezing conditions, install check valve at location A.

**Inlet Line Check Valves** prevent loss of seal if pressure should drop suddenly or if trap is above drip point in IB traps. Armstrong Stainless Steel Check Valve in trap body, location D, Fig. CG-63, is recommended. If swing check is used, install at location C.

Figure CG-62.
Typical IB Bottom Inlet—Side Outlet Hookup

Figure CG-64.
Typical IB By-pass Hookup

Figure CG-65.
Typical IB By-pass Hookup, Bottom Inlet—Top Outlet
A Safety Drain Trap should be used whenever there is a likelihood that the inlet pressure will fall below the outlet pressure of a primary steam trap, especially in the presence of freezing air. One such application would be on a modulated pressure heating coil that must be drained with an elevated return line. In the event of insufficient drainage from the primary trap, condensate rises into the safety drain and is discharged before it can enter the heat exchanger. An F&T trap makes a good safety drain because of its ability to handle large amounts of air and its simplicity of operation. Safety drain trap should be same size (capacity) as primary trap.

The proper application of a safety drain is shown in Fig. CG-66. The inlet to the safety drain must be located on the heat exchanger drip leg, above the inlet to the primary trap. It must discharge to an open sewer. The drain plug of the safety drain is piped to the inlet of the primary trap. This prevents the discharge of condensate formed in the safety drain by body radiation when the primary trap is active. The safety drain has an integral vacuum breaker to maintain operation when pressure in the heat exchanger falls below atmospheric. The inlet of the vacuum breaker should be fitted with a gooseneck to prevent dirt from being sucked in when it operates. The vacuum breaker inlet should be provided with a riser equal in elevation to the bottom of the heat exchanger to prevent water leakage when the vacuum breaker is operating, but the drip leg and trap body are flooded.

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 freeze protection drain. Also, when multiple traps are installed in a trap station, insulating the traps can provide freeze protection.

Anti-Freeze Precautions.
1. Do not oversize trap.
2. Keep trap discharge lines very short.
3. Pitch trap discharge lines down for fast gravity discharge.
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. CG-67.

NOTE: A long horizontal discharge line invites trouble. Ice can form at the 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 Steam 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.

Table CG-28. Suggested Yearly Trap Testing Frequency

<table>
<thead>
<tr>
<th>Operating Pressure (psig)</th>
<th>Drip</th>
<th>Tracer</th>
<th>Coil</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-100</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>101-250</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>251-450</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>451 and above</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

How to Test

The test valve method is best. Fig. CG-60 (page CG-45) shows correct hookup, with shutoff valve in return line to isolate trap from return header. Here is what to look for when test valve is opened:

1. Condensate Discharge—Inverted bucket and disc traps should have an intermittent condensate discharge. F&T traps should have a continuous condensate discharge, while thermostatic traps can be either continuous or intermittent, depending on the load. When an IB trap has an extremely small load it will have a continuous condensate discharge which causes a dribbling 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. See description of flash steam on page CG-4.

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 page CG-49.
4. No Flow—Possible trouble. Refer to page CG-49.

Listening Device Test. Use a listening device or hold one end of a steel rod against the trap cap and the other end against your 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.

Figure CG-70.
Typical Disc Trap Hookup

Figure CG-69.
Typical DC Hookup

Figure CG-71.
Typical Thermostatic Hookup