Armstrong® Drain Trap Selection

To obtain the full benefits from the traps described in the preceding section, it is necessary that the correct size and pressure of drain trap be selected for each job, and that it be properly installed and maintained.

Rely on Experience. Most drain traps are selected on the basis of experience. This may be:

- Your personal experience
- The experience of your Armstrong Representative or distributor
- The experience of thousands of others in draining identical equipment

Do-It-Yourself Sizing is required at times. Fortunately, drain trap sizing is simple when you know or can figure:

1. Liquid loads in lbs/hr.
2. Pressure differential.
3. Maximum allowable pressure.

1. Liquid Load. Each "How To" section of this handbook contains formulas and useful information on proper sizing procedures and safety factors.

2. Pressure Differential. Maximum differential is the difference between main pressure, or the downstream pressure of a PRV, and return line pressure. See Fig. LD-12. The drain trap must be able to open against this pressure differential.

Operating differential. When the plant is operating at capacity, the pressure at the trap inlet may be lower than main pressure. And the pressure in the return header may go above atmospheric.

If the operating differential is at least 80% of the maximum differential, it is safe to use maximum differential in selecting traps.

IMPORTANT: Be sure to read the discussion on page LD-16, which deals with less common, but important, reductions in pressure differential.

3. Maximum Allowable Pressure. The trap must be able to withstand the maximum allowable pressure of the system, or design pressure. It may not have to operate at this pressure, but it must be able to contain it. As an example, the maximum inlet pressure is 150 psig and the return line pressure is 15 psig. This results in a differential pressure of 135 psig; however, the trap must be able to withstand 150 psig maximum allowable pressure. See Fig. LD-12.

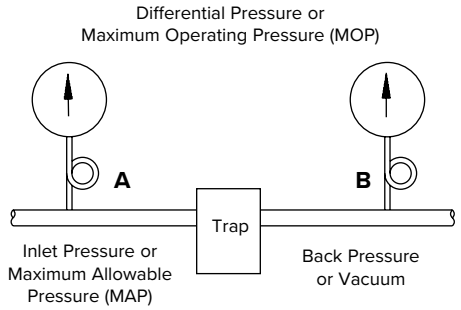

Figure LD-12. "A" minus "B" is Pressure Differential: If "B" is back pressure, subtract it from "A." If "B" is vacuum, add it to "A."

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit armstronginternational.com for up-to-date information.

Factors Affecting Pressure Differential

Pressure Differential in Detail

Inlet pressure can be:

1. Air main pressure.
2. Reduced pressure controlled by a pressure reducing valve station.

Discharge can be:

1. Atmospheric.
2. Below atmospheric—under vacuum. Add vacuum to inlet pressure to get pressure differential. 2" Hg vacuum = approximately 1 psig of pressure below atmospheric.
3. Above atmospheric due to:
   a. Pipe friction
   b. Elevating liquid

Every 2' lift reduces pressure differential by approximately 1 psig, when the discharge is only liquid.

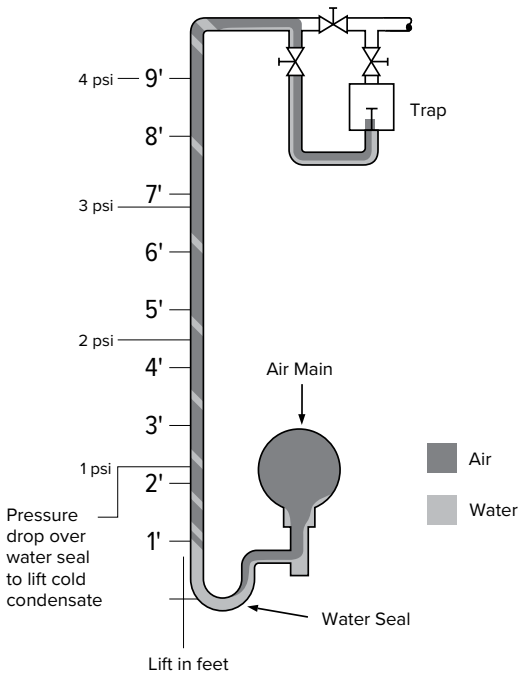

Figure LD-13. Liquid from gravity drain point is lifted to trap by a syphon. Every 2' of lift reduces pressure differential by approximately 1 psig. Note seal at low point and the trap's internal check valve to prevent back flow.

Special Considerations

Drain traps are available for services other than those found on standard compressed air systems.

High Pressure

Spring-loaded mechanisms allow float type drain traps to operate on pressures above 3 000 psig.

Fluids Other Than Water

Different fluids, such as oils and liquid, can be compensated for with specially weighted floats or lower operating pressure ratings. Fluids with specific gravities down to 0.4 will work with float type drain traps.

Materials of Construction

Service requirements for stainless steel or other corrosion-resistant materials can be met by float and inverted bucket type drain traps.

NACE Sour Gas Service

Special materials and construction are required for hydrogen sulfide service.

High Capacity for Large Flow Rates

Ultra-capacity type drain traps allow float type drain traps to be used on service requiring capacities up to 700 000 lbs/hr.

Dual Gravity

Float type drain traps can be modified to drain a heavier fluid from a lighter fluid.

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How to Select and Size Armstrong Drain Traps

For Draining Liquids From Gases Under Pressure

Armstrong liquid drain traps are offered in a wide variety of sizes and types to meet the most specific requirements. The most widely used models and sizes utilize bodies, caps and some operating parts that are mass produced for Armstrong steam traps. The proven capabilities of these components, along with volume production economies, enable us to offer you exceptionally high quality at attractive prices. You can choose the smallest and least costly model that will meet your requirements with confidence.

Selection Procedure for Draining Liquid From Gas

1. Multiply the actual peak liquid load (lbs/hr) by a safety factor of at least 1-1/2 or 2. See paragraph headed “Safety Factors.”

2. From Orifice Capacity Chart LD-12, find the orifice size that will deliver the required cold water capacity at the maximum operating pressure. If a light liquid is to be drained, convert light liquid capacity in lbs per hour to water capacity using factors in Table LD-5. Then find orifice size from Chart LD-12.

3. From the Orifice Size Operating Pressure tables on the product model pages, find the drain trap(s) capable of opening the required orifice size at a specific pressure (and specific gravity if other than cold water–specific gravity 1.0).

NOTE: If specific gravity falls between those shown in the tables, use next lower. Example: If specific gravity is 0.73, use 0.70 gravity data.

Safety Factors

Safety factor is the ratio between actual continuous discharge capacity of the drain trap and the amount of liquid to be discharged during any given period. Chart LD-12 shows the maximum continuous rate of cold water discharge of the drain trap. However, you must provide capacity for peak loads and, possibly, lower-than-normal pressures. A safety factor of 1-1/2 or 2 is generally adequate if applied to the peak load and the minimum pressure at which it occurs. If the load discharge to the trap is sporadic, a higher safety factor may be required. Contact your Armstrong Representative for details.

Selection Examples

EXAMPLE No. 1: Find a drain trap to drain 1 000 lbs of water per hour from air at 500 psig pressure differential.

Multiply 1 000 lbs/hr by 2 (if not already done) to provide a safety factor; thus, a 2 000 lbs/hr continuous discharge capacity is required. In Capacity Chart LD-12, the 2 000 lb capacity line intersects the 500 psig pressure line directly below the No. 38 drill orifice curve. This orifice is available in the No. 1-LD or No. 11-LD drain trap, but for much lower pressures. Moving to the 32-LD, a #38 orifice is good to 489 psig. This is the trap/orifice combination to use.

Table LD-14, page LD-37, shows the No. 32-LD drain trap with #38 orifice will operate at pressures up to 489 psig and, therefore, is suitable for the job. Further checking shows the No. 2313 HLS drain trap with a 7/64" orifice could also handle the job, but it is designed particularly for low gravity liquids and is more costly than the No. 32-LD, so the No. 32-LD is a better choice.

EXAMPLE No. 2: Find a drain trap to drain 6 400 lbs/hr (safety factor included) of .80 specific gravity liquid from gas at 400 psig pressure differential.

Since Capacity Chart LD-12 is based on water capacity, the known light liquid capacity requirement must be converted to its equivalent water capacity with the factor given in Table LD-5: 6 400 x 1.12 = 7 168 = water capacity required for using Chart LD-12.

Chart LD-12 shows that 7 168 lbs/hr and 400 psig calls for a 7/32" orifice. Entering the .80 specific gravity column of Table LD-14, page LD-37, shows that a No. 36-LD forged steel drain trap will open a 7/32" orifice at pressures up to 707 psig. As a matter of fact, this drain trap will open a 1/4" orifice at 501 psig and would be the one to use.

NOTE: While drain traps are sized on the basis of pressure differential, steel must be used whenever gauge pressure in the drain trap exceeds 250 psig.

Where Not to Use

Float type drain traps are not recommended where heavy oil, sludge or considerable dirt are encountered in lines. Dirt can prevent the valve from seating tightly, and cold oil can prevent float traps from opening. Where these conditions exist, Armstrong inverted bucket BVSW traps should be used.

How to Order Drain Traps

Specify:

- Drain trap size by number
- Orifice size
- Pipe connections—size and type
- Maximum operating pressure

If the correct drain trap cannot be determined, tell us capacity required, maximum pressure, and SPECIFIC GRAVITY of liquid.

Table LD-5. Conversion Factors to Find Cold Water Capacity Equivalents for Light Liquids

Specific Gravity	Multiply Light Liquid Capacity in Pounds Per Hour by:
.95	1.03
.90	1.06
.85	1.09
.80	1.12
.75	1.16
.70	1.20
.65	1.24
.60	1.29
.55	1.35
.50	1.42
.45	1.49
.40	1.58

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For Draining Water From a Light Liquid

Armstrong dual gravity drain traps for draining water from a light liquid are described on pages LD-47 and LD-48. All models shown are identical to corresponding models of traps used to drain liquid from a gas except that float weights are modified to make them suitable for draining water from a light liquid.

Dual gravity drain trap* selection requires that you know the peak heavy liquid load, maximum operating pressure, and specific gravity of the light liquid. With this information you can determine the orifice size required from Chart LD-12 and find the specific drain trap that will meet your conditions from the pressure tables on the dual gravity pages.

Selection Procedure for Draining Water from a Light Liquid

1. Assume a required safety factor of 2:1. Multiply the peak load in pounds per hour by 2. (See paragraph on "Safety Factors.")

2. From Capacity Chart LD-12, find the intersection of actual load times safety factor and the minimum operating pressure differential. Follow the pressure line immediately above this point to intersect the next higher orifice capacity curve. Then follow this curve downward and to the left to get the orifice size.

3. Inspect the tables on pages LD-47 and LD-48 to find the smallest trap that can open the predetermined orifice size at the maximum operating pressure differential. Do not oversize dual gravity drain traps. Oversizing will cause excessive fluctuation of the interface between the two liquids.

NOTE: While drain traps are sized on the basis of operating pressure differential, forged steel must be used when total pressure in the drain trap exceeds 250 psig.

How to Order Dual Gravity Drain Traps

Specify:

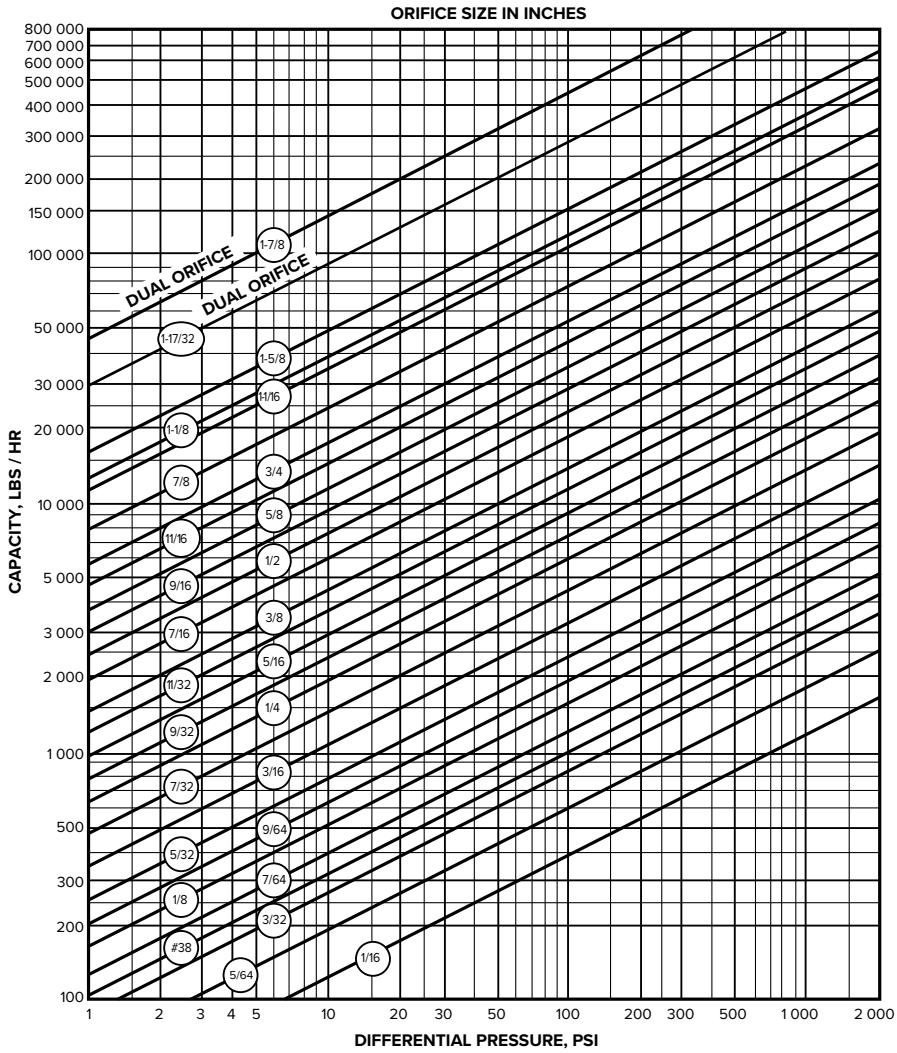
- Drain trap size by number
- Orifice size
- Pipe connections—size and type
- Specific gravity of light liquid
- Weight of water discharge per hour
- Maximum operating pressure

If you are not sure of the drain trap size to use, then specify:

- Specific gravity of light liquid
- Capacity in pounds of water per hour with safety factor included
- Working pressure—maximum and minimum

Chart LD-12.
Calculated Cold Water Capacity of Armstrong Drain Trap Orifices at Various Pressures

Actual capacity also depends on trap configuration, piping and flow to trap. It is important to allow for safety factors and fluid density variations due to temperature.



* Floats for dual gravity drain traps are weighted with quenching oil which, in the unlikely possibility of float failure, may be dispersed through the system. If this is a hazard, consult the Armstrong Application Engineering Department.

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