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# The Benchmark for Efficient Watering Drip Irrigation

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**Drip or micro irrigation** is an extremely efficient method of delivering water to a plant. The concept is quite simple — deliver the water slowly, drip by drip, at a precise rate directly to the root zone. This keeps the root zone evenly moist and encourages deeper root growth.

Compared to conventional sprinkler systems (or even hand watering), water consumption is reduced by as much as seventy percent. Runoff, evaporation and wind loss are all minimized. Water is not wasted on non-growth areas where watering tends to encourage weed growth. By directing the water to the root zone, you can water less and not as often. When automated with a timer, a drip irrigation system will not only save water but also time. Since the water is applied directly to the root zone, plant foliage remains dry. Drip irrigation also reduces water-borne pests and fungal disease problems.

- Drip irrigation...
- Can be used in the home landscape virtually anywhere watering is required. This includes shrubs, rose gardens, annual and perennial beds and vegetable gardens.
  - Is ideal for container plants and hanging baskets that require frequent watering. It can even be used to fill a birdbath.
  - Is easy to install and requires no special tools.

Unlike sprinkler systems that require high water pressure and use PVC pipe, drip irrigation uses flexible polyethylene landscape tubing and requires low water pressure. Its components are not glued together. System components are available at most hardware stores, garden centers and “big box” stores. For the beginner, a complete kit is often the best way to get started when installing a drip irrigation system. These kits are also easy to expand. Most drip irrigation manufacturers offer free planning guides that are quite helpful.

## Basic System Components

### Faucet Connection

#### ► Timer

Although a drip irrigation system can be operated manually, the easiest and most efficient approach is to incorporate some type of automatic timer. These can range from battery-powered timers to sophisticated electronic timers that control several zones. Since drip irrigation systems operate largely unnoticed, it is quite easy to manually start the system and then forget it. Invest in a timer. It avoids leaving your system running for a couple of days by mistake.

► **Anti-siphon valve**

These valves prevent contamination of the water supply by preventing any potential backflow that might otherwise occur when valves are closed quickly. These devices are required by most city and county health codes.

► **Filter**

Because drippers have very tiny flow passages, the use of a filter is essential. A few flakes of rust, dirt or other debris can clog a dripper. *Don't underestimate the importance of the filter for long-term maintenance free operation.*

► **Pressure regulating device**

Most downstream components are rated for only 60 pounds per square inch (psi) of water pressure. Much of the Kansas City metro area has water supply pressures that exceed this figure. Installation of a pressure regulating device limits the downstream water pressure and keeps the system from blowing apart. These devices are typically rated at either 15 or 25 psi.

► **Dual shutoff Y-connector**

It is advisable to include this connector, especially if there is only one outdoor faucet. You can also use the Y-connector to assemble a second circuit for the irrigation system.

**Main Header  
Tubing**



*Polyethylene Tubing*

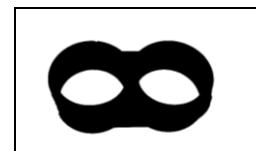
Think of the **main header tubing** as the tree trunk of the irrigation system. It connects the irrigation system to the water supply. Typically, ½-inch flexible polyethylene tubing is used. It is purchased in a coiled roll.

A variety of ½-inch compression fittings — couplings, elbows and tees — can be used to route the tubing. (No glue is required to connect any of these tubing components.)



*Compression Fittings*

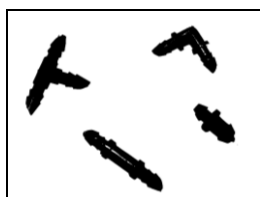
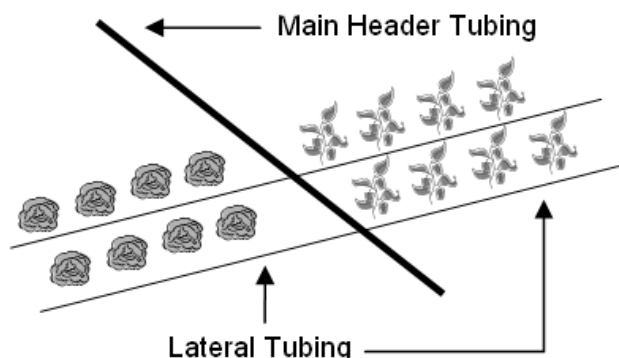
End closures are required at the end of the main header tubing. These can be either a hose end plug with a screw-on cap, or a “figure 8” type closure where the hose is crimped backwards against itself.



*Figure 8 Closure*

## Lateral tubing

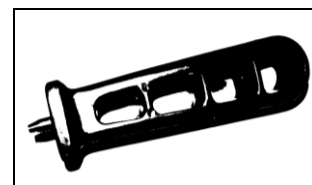
**Lateral tubing** forms the “branches” of the irrigation system tree. It is the ¼-inch tubing that runs from the main header tubing to the plants you want to water.



*Barbed Connections*

Use ¼-inch barbed connections to connect the laterals to the main header.

Hole punches are available that make precisely sized holes in the main header tubing for the barbed connectors. Goof plugs are available in case you change your mind and need to plug a hole in the main header tubing.



*One Type of Hole Punch*

## Drippers

**Drippers** are the small devices that allow the water to drip slowly from the laterals to the soil.

For our heavy clay soils, typically use ½ gallon per hour (gph) drippers. For light-textured soils, such as potting soil in containers, 1-gph drippers can be used. Higher capacity drippers are available but are intended for sandy soils.

Two types of drippers are available: pressure compensating and non-pressure compensating. Pressure compensating drippers cost a little more but deliver the stated capacity over a wide range of operating pressures. For systems that have a long run of tubing or have elevation ranges of 10 feet or more (from the highest to lowest dripper elevation), pressure compensating drippers are the best choice.

One type of non-pressure compensating dripper called an inline dripper (it is both a water outlet and a pass through to the next dripper) can be installed in lateral tubing. It is often useful for plants in close proximity. For containers, use up to three drippers (depends on container size).



*Inline Dripper*

## System Design

Because different types of plants require different amounts of water, your drip irrigation system may need separate circuits or zones, each served by a different main header. For example, trees and shrubs may need to be separate from container plants. Determining the optimal watering frequency and duration for each zone involves some trial and error. You will need to make adjustments as the seasons change.

A general rule of thumb is to limit the main header tubing to 200 feet or less. The total gph (gallons per hour) of the drippers on each circuit should be no more than 150 gph. Lateral tubing should be no more than 75 feet in length. Limit the total gph of the drippers on each lateral line to 35 gph.

When using drippers for containers on a deck, pull the lateral tubing through the gap between the planks or drill a small hole through the deck. When routing lateral tubing to hanging baskets, special clamps are available for nailing to a wooden support. These hold the tubing in place. Paint the black tubing, if desired, to make it virtually unnoticeable.

## Installation and Initial Startup

First, unroll all of the tubing along your planned route to avoid kinking. Allow the tubing to lie in the sun for about 30 minutes. It will soften slightly and make positioning easier.

Before any drippers are installed, connect the main header tubing and lateral tubing. Then, open the water supply valve and flush all the tubing. This removes any small debris and soil that can easily plug the drippers.

Any time the system is started, a gurgling sound is typical as the systems fills with water and air is expelled through the drippers.

## Maintenance

Once installed, drip irrigation systems are largely maintenance free and will last many years. The system needs to be emptied each year prior to winter. Do this by opening the end closures on the main header tubing and blowing low-pressure air through the system.

Alternately, you can install low point drains. They can be a dripper or a tee with a figure 8 closure.

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