

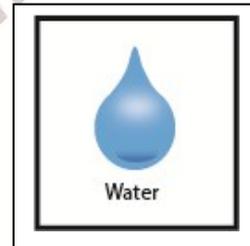


Drip irrigation is used on farms both large and small, in vineyards, home gardens, nurseries, urban balconies and rooftops all over the world. When DripWorks began selling drip irrigation products back in 1992, people were spraying their valuable water into the wind, or flood irrigating with uneven results. DripWorks has been an innovative leader as demand for and popularity of drip irrigation has boomed.

Introduction

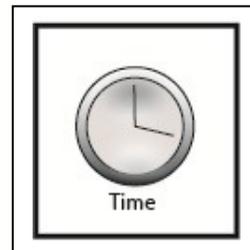
Water Efficiency: Drip irrigation is the most efficient method of watering today.

- Places a precise amount of water where you need it
- Prevents overwatering
- Results in less weeding
- Conserves water
- Saves money



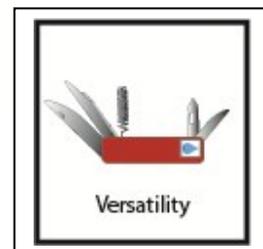
Time: Installing a drip system will not only save you water, but time.

- Eliminates hours of hand watering
- Can be fully automated with a timer
- Reduces weeding time



Versatility: Drip irrigation systems can be used just about anywhere.

- Gardens, vineyards, greenhouses, row crops
- Existing landscapes
- Hillsides or flat terrain
- Long lasting and adaptable

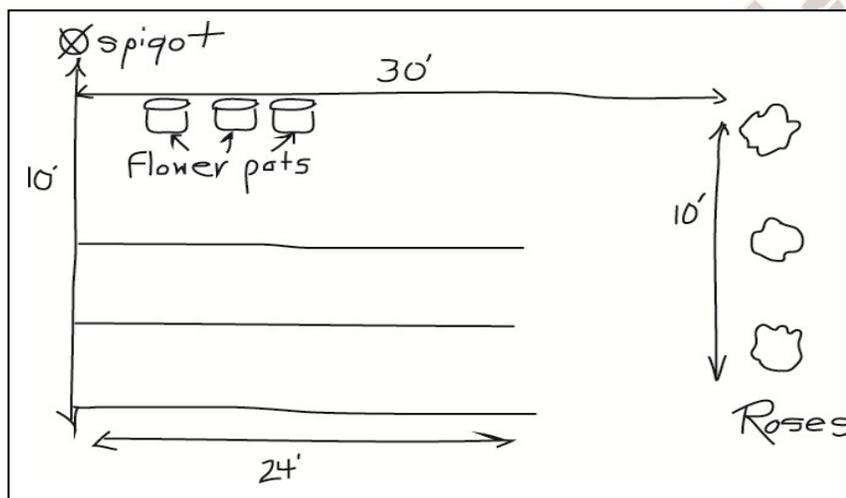


Getting Started

Step 1: Gather Information

- A drip system has a water source; what is yours? City, well, pond, irrigation ditch, stream?
- What is your point of connections (POC)? Hose, spigot, hydrant, ball valve, or gate valve?
- What will you water with drip irrigation? This will determine the type of emitters you need.
- Sketch your garden. Include probable water connections and distances from POC's to the corners of your garden. This will help determine the amount of mainline needed.

Sample Sketch (Note distances)



- Determine your flow rate. This information is critical to sizing your system.

Estimated Flow

Seconds to fill a *1 Gallon Container	5	6	7	8	9	10	11	12	13	14
GPH	720	600	514	450	400	360	327	300	277	257
*If filling a 5 gallon container multiply the GPH X 5										

To determine the flow in gallons per minute (GPM) and per hour (GPH):

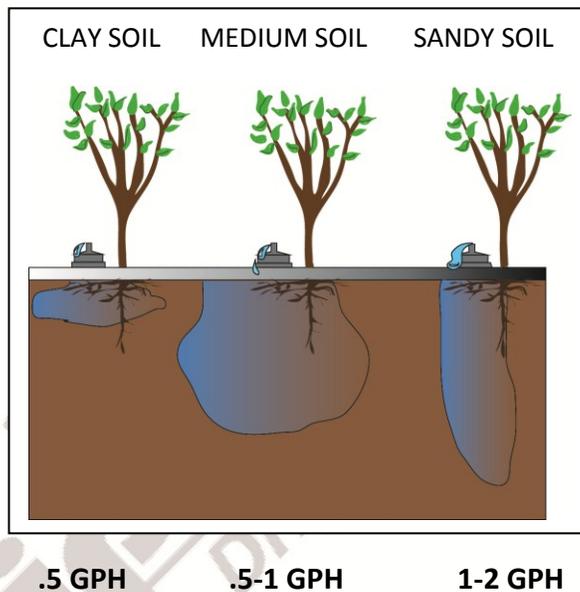
Place a 1 or 5-gallon container beneath the water source outlet and open the valve completely; timing the number of seconds it takes to fill the container. $(60 \text{ seconds per minute} / \text{number of seconds to fill}) \times (\text{number of gallons}) = \text{GPM}$

<http://www.dripworks.com/category/calculators>

Step 2: Select Your Products

Use the following information to determine the type of drip system that is most appropriate for your garden. When selecting products for your system there are a few things to take into consideration, such as soil types and plant watering needs. For questions on a particular plant's needs, consult a local nursery or contact a horticulturalist.

Recommended Emission Rates for Differing Soil Types



Once you determine the kind of emitters or spray you need, you can purchase those products separately or choose one of DripWorks' complete kits that matches your needs. One resource that may help you make your choice is DripWorks' Gallery of Plans, which can be found on our website at:

http://www.dripworks.com/category/cat_gop.

Basic Drip Emitters are lower cost and their flow will vary slightly depending on pressure. At low pressures basic emitters will flow more consistently than Pressure Compensating emitters. These emitters are used to water individual plants.



Pressure Compensating (PC) Emitters deliver a precise amount of water. They flow consistently from one emitter to the next regardless of changes in pressure or elevation. These emitters are self-flushing which makes them less likely to clog. Use these emitters to water individual plants.



¼" Soaker Dripline is a non-pressure compensating product that consists of ¼" poly tubing with built-in emitters spaced every 6, 9, or 12 inches. Its recommended use is in shorter garden beds and containers. Use for square foot gardening or in densely planted areas. This product is highly effective in lower pressure systems.



½" Inline Emitter Tubing consists of ½" poly tubing with built-in PC emitters. It is offered in a variety of spacing options and can be used in long rows, on uneven ground, and on hillsides. Use in densely planted areas or circle around root zones to water trees.



Drip Tape is best for long, straight row crops. It is the most economical way to water your plants and is easy to install and maintain.



Sprayers, sprinklers, and misters are used to distribute water over larger areas and work best for groundcovers and densely planted beds.

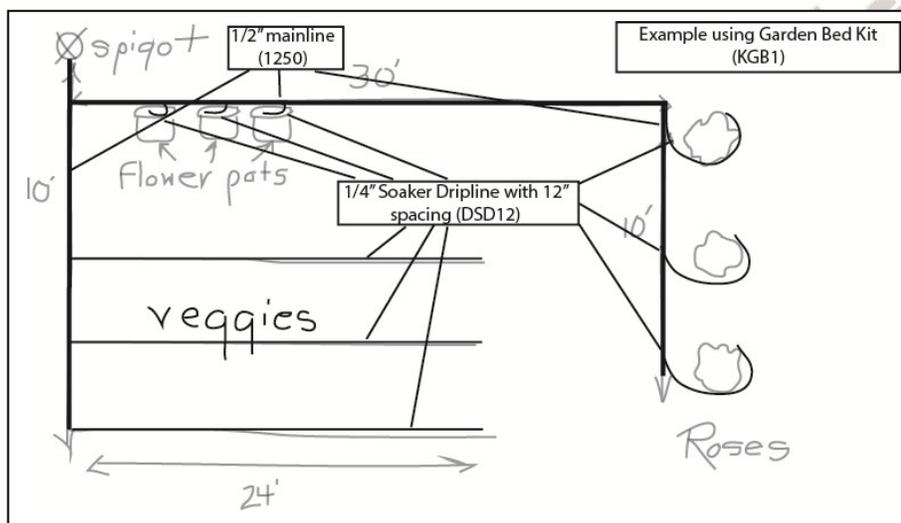


Step 3: Design a Drip System

Now that you have made a sketch of your garden and have chosen the products that fit your needs, another key factor in designing your drip system is your available flow. Flow will determine the number of plants or areas which can be watered at any given time.

Example: Let's assume an available flow rate of 240 gallons per hour (GPH). This means you can use up to 240 emitters with a 1 GPH output or 480 emitters that output .5 GPH.

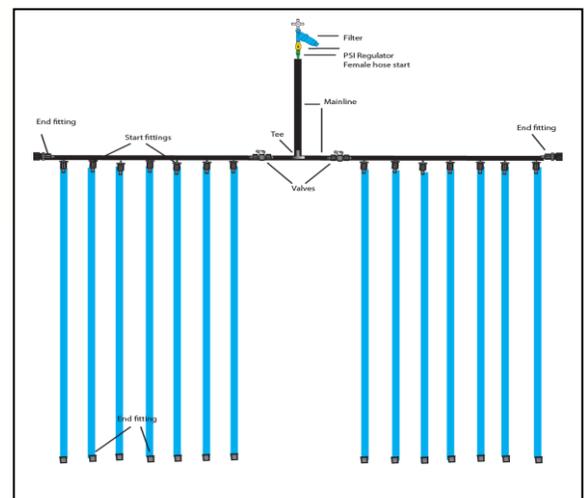
In addition to flow, it is helpful to know your water pressure—the force behind the flow. If your water pressure exceeds what your drip system needs or can handle, a pressure regulator will be required. A pressure regulator reduces incoming water pressure. *See page 2 to measure flow.*



Determining the number of zones

The number of zones required will often be determined by available flow. For instance, if your 1/2" mainline tubing, which carries 240 GPH, is feeding emitters with a total flow of 325 GPH, the system should be divided into 2 zones. It is prudent to group plants by their watering needs; each group should be watered as a separate zone on its own watering schedule.

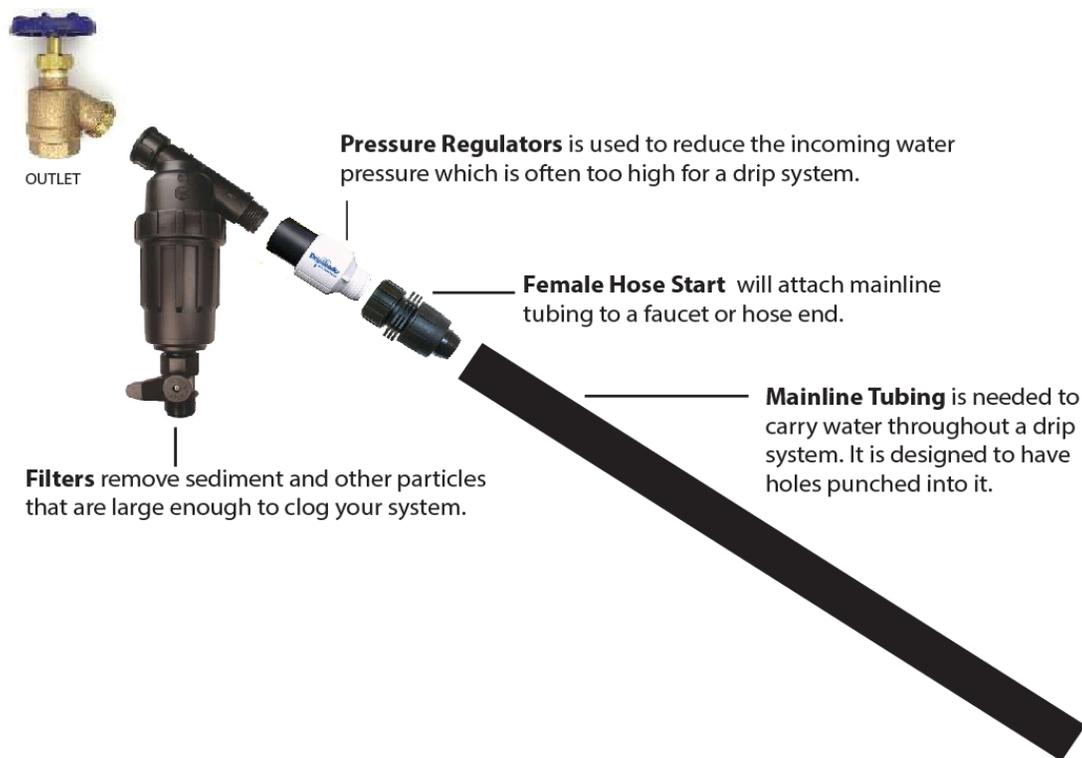
Example: Use manual valves to zone out system and split your system into two.



Tools and Products You May Need for Installation:

- Poly Tubing Cutter/Hand Pruner
- Poly Tubing Hole Punch
- Teflon Tape (for pipe thread only)
- PVC glue (for PVC installations only)

Starting from the Spigot



Installation Tips

- When installing your drip lines, consider mulching over them. This will increase the tubing's lifespan and help protect it from environmental hazards.
- Once the mainline and supply lines are installed, it is recommended that you flush your lines with clean water for a minute or two before installing emitters or bringing the system up to pressure. This will remove any debris.
- Add a backflow prevention device. Local codes usually require a backflow prevention device to protect your personal and municipal water supply from contamination.
- Automate your system with a battery (DC) or electric (AC) timer.

Winterizing Your System

In some parts of the country there is concern for freeze damage to a drip irrigation system. Two areas to deal with are the system start (timer, pressure regulator, and filter) and low spots in the system where water may have settled. Timers, filters, regulators, and all valves should be drained and moved indoors where practical. It is also recommended that you remove batteries from both battery timers and electric timers with a backup battery.

- When a hose thread filter assembly is removed for storage, use a hose plug (HPLUG) to seal the start of the mainline tubing. Use the appropriate pipe thread plug where required.
- After the main water supply is shut off, remove all end fittings, drain any water and replace the fittings. Fittings may crack if water is left in them.
- As long as the poly tubing is not full of water freezing will not damage it. Elevate the tubing slightly to drain the water or install flush valves at the low points. For greater water removal, blow air through the lines with a compressor.

Glossary of Terms

Flow is 1) The amount of water available for the drip system expressed in gallons per hour (GPH). Flow is a determining factor in how many plants (or how large an area) can be watered at one timer. 2) The total amount of water moving through the system as it exits emission devices.

Pressure (measured in pounds per square inch or PSI) is the force pushing the flow of water. Your pressure can be determined by using a pressure gauge (PGH100).

Water Source is where the water originates. This can be a municipal system, a well, a pond, spring, or stream.

Filter is used to remove particles from the water that might otherwise clog your emitters. Many water sources, especially municipal systems, are relatively free of debris. However, DripWorks still recommends filtration to ensure consistent, trouble-free operation of your system.

Zoning is the division of a drip irrigation system into areas that require similar watering rates or that would exceed the available flow of the system if watered together. Zoning can be based on planting needs, local watering restrictions, or limited water resources.

Mainline consists of polyethylene tubing used to carry water from your POC to and throughout your drip system.

Branch Line is polyethylene tubing that attaches to the mainline to bring water to an individual plant or to a zone. Branch tubing is generally ¼” or ½” tubing.

Pressure Compensating (PC) emitters distribute water equally throughout the whole system regardless of row length (within limits) and elevation changes. PC products come as drippers, sprayers, or sprinklers.

For expanded definitions and many more drip irrigation terms, visit our online glossary at:
http://www.dripworks.com/product/faq_glossary

If you have any questions about our products, or installing them, contact us at 707-459-6323, visit our website at www.dripworks.com or email us at support@dripworks.com

