

# TIPS FOR INSTALLING DRIP IRRIGATION AT HOME

## Steps for Planning a Simple Drip Irrigation System

### 1) Draw a map of your garden.

Indicate length and width of garden beds and areas connecting them. Show the water meter, hose bib(s), and the type, size, and location of plants.

### 2) Measure the flow rate and pressure of your water source.

Make sure no water is being used inside your home when you perform the following tests to measure your flow and pressure outside.

To determine the *flow* in **gallons per minute (gpm) and per hour (gph)**:

Use a bucket of known capacity. Open the garden spigot to full flow. Time how many seconds it takes to fill the bucket. Then do the math:

$(60 \text{ seconds per minute} / \text{measured seconds}) \times \text{gallons of bucket} = \text{gpm}$

Example: It takes 45 seconds to fill a 5 gallon bucket.

$(60 / 45 = 1.33) \times 5 \text{ gallons of bucket} = 6.65 \text{ (approx.7) gpm}$

$7 \text{ gpm} \times 60 \text{ minutes in an hour} = 420 \text{ gph}$

The gph determines the maximum area that can be operated at one time, creating a watering *zone*.

Example: You have 420 gallons per hour of flow; emitters are spaced every 12 inches (1 ft) with a flow of 0.6 gallons per hour per emitter.

$420 \text{ gph} / (0.6 \text{ gph} / 1 \text{ ft}) = 700 \text{ feet (max. length of drip line you can run at one time)}$

To determine *water pressure* (the force pushing the flow of water) in pounds per square inch (**psi**), use a water pressure gauge (available at garden centers) attached to the garden spigot. Record the available pressure. Most homes have water pressure that is greater than drip irrigation systems require. A **pressure regulator** reduces the pressure so that drip parts are not damaged.

### 3) Choose emitters or micro-sprays appropriate for each planting area.

Use the chart on page 4 to determine which type of drip system will work best for your garden.

Check specifications on all products for gallons per hour (gph), pressure (psi), and maximum tubing length per zone. Add up the total gph output per zone to be sure your total flow can accommodate the number of emitters needed to water an area. If not, split the area into multiple zones. In residential gardens, it is best to use 0.6 gallon-per-hour emitters. While you can choose emitters that put out water faster, this slower rate will help get the water to the plants' roots

### 4) Determine how many zones you will have in your system.

Group plants by their water needs. Don't water plants requiring lots of water with plants that are drought tolerant. For healthy plants and efficient water use, each grouping should be set up to be watered as an individual zone with its own schedule.

**5) Sketch a layout showing where your drip tubing will be placed in each bed.**

Be sure to factor in how your irrigation will hook up to your water source. Identify the easiest places to tunnel under walks—or consider connecting to more than one faucet if needed to get water to an area across a driveway. Tunneling short distances can usually be done inexpensively with a rented water jet.

**6) Determine how you want to control your system.**

The choice depends on your budget and how much automation you want in the system. Here are some issues to consider when making your choice.

**Manual control**

The simplest system is one you turn on and off manually. A manual wind-up timer can help water for a set amount of time. One caveat is that under the Uniform Plumbing Code, garden hoses, soaker hoses, and various forms of drip irrigation cannot be connected to hose bibs for more than 12 hours. Using a **quick connect** device will allow you to easily disconnect your drip system after you use it.

**Automatic control**

If you want your irrigation system to turn on and off automatically, codes require that you connect it to a permanent, dedicated line with an approved backflow prevention device. If you take this step, you'll need a plumber or irrigation contractor.

**Back Flow Protection**

Whether you manually or automatically control your irrigation system, a backflow prevention assembly is required by law to prevent dirty water from contaminating your home drinking water and the city water supply. Backflow results from a drop in pressure in your water line that allows water to flow backward from your irrigation lines into your house. This could be caused by a break in the city water main, use of a nearby fire hydrant, or high water use in the house while the drip system is in operation.

If you are manually controlling a drip system attached to a hose bib, atmospheric vacuum breakers or double check valve assemblies are the most straightforward types of backflow protection devices. See the diagram on page 3 showing an atmospheric vacuum breaker that simply screws onto the faucet. Under City of Seattle code, the atmospheric vacuum breaker must be located six inches above the highest point in the irrigation system. Check with your local water district to understand their backflow requirements.

**7) Make a list of the number of parts and tubing needed to construct the system.**

Allow for a few extra connectors, couplers, plugs, emitters and end fittings for quick repair and maintenance. Include PVC (polyvinylchloride) piping in a diameter wider than the drip tubing to make a protective sleeve if you need to pass under walkways.

**Tools Needed for Installation**

- \* Hand pruners or tubing cutter
- \* Teflon tape
- \* Pliers
- \* Screwdriver
- \* Towel

**You may also need:**

- \* Irrigation tubing punch
- \* Saw (to cut PVC pipe)
- \* Shovel and mattocks
- \* One-step PVC solvent if using PVC pipe

## Head assembly parts from faucet



The following sequence of parts begins at the hose bib:

1. A **timer**, if used, must be placed *before* the backflow prevention.
2. A **backflow prevention assembly** is required by law to prevent dirty water from contaminating the drinking water. Types of backflow preventers include atmospheric vacuum breakers and double check valves.
3. A **filter** removes debris that can clog emitters.
4. A **pressure regulator** lowers water pressure so it won't damage drip parts.
5. A **fitting** such as this female hose end connects the mainline to the male end of the pressure regulator.
6. The **mainline** or **solid tubing** has no holes. This will deliver water from the faucet to the emitter tubing in the garden. Solid tubing avoids watering pathways, patios, etc.

## Determining Which Type of System to Install

<b>Equipment</b>	<b>Pros</b>	<b>Cons</b>	<b>Best Uses</b>
<b>Pressure-Compensating Emitters</b> (individual or in-line)	<ul style="list-style-type: none"> <li>• Apply water uniformly on slopes and large gardens</li> <li>• Resist clogging</li> </ul>	<ul style="list-style-type: none"> <li>• Cost slightly more than other types</li> </ul>	<ul style="list-style-type: none"> <li>• Sloped or large gardens</li> <li>• Shrubs, trees and perennials</li> </ul>
<b>Soaker Hoses</b>	<ul style="list-style-type: none"> <li>• Inexpensive</li> <li>• Readily available</li> <li>• Easy to lay out</li> </ul>	<ul style="list-style-type: none"> <li>• Watering rate varies through garden, especially on sloped sites</li> <li>• Wastes water in unplanted areas</li> <li>• May contain toxic residue</li> </ul>	<ul style="list-style-type: none"> <li>• Dense annual and perennial beds</li> <li>• Small gardens</li> <li>• Used only on planted areas, with solid tubing connection to faucet</li> </ul>
<b>Individual Drip Emitters</b>	<ul style="list-style-type: none"> <li>• Apply water only where needed</li> </ul>	<ul style="list-style-type: none"> <li>• Installing large numbers of emitters is time consuming</li> <li>• As plants grow, need to add more emitters</li> </ul>	<ul style="list-style-type: none"> <li>• Young shrubs and trees that only need water for the first few years</li> <li>• Containers</li> </ul>
<b>In-Line Emitters</b>	<ul style="list-style-type: none"> <li>• Easy to install in large areas</li> <li>• Damage-resistant</li> <li>• Pressure-compensating types apply water uniformly</li> <li>• Most efficient if installed properly</li> </ul>	<ul style="list-style-type: none"> <li>• May not be efficient for sparse plantings if installed improperly</li> </ul>	<ul style="list-style-type: none"> <li>• Dense perennial, tree and shrub plantings</li> <li>• Sparse plantings if installed properly</li> </ul>
<b>Drip Tape</b>	<ul style="list-style-type: none"> <li>• Inexpensive</li> <li>• Easy to install in large areas</li> <li>• Uniform watering</li> </ul>	<ul style="list-style-type: none"> <li>• Only runs in straight lines</li> <li>• Shorter-lived than other types</li> </ul>	<ul style="list-style-type: none"> <li>• Annual, perennial and vegetable gardens</li> <li>• Temporary systems to establish drought-tolerant plants</li> </ul>
<b>Microsprays</b>	<ul style="list-style-type: none"> <li>• Apply water only where needed</li> </ul>	<ul style="list-style-type: none"> <li>• Watering rate varies within spray pattern</li> <li>• Spray may blow away</li> <li>• Vulnerable to damage</li> <li>• Sprays foliage</li> </ul>	<ul style="list-style-type: none"> <li>• Groundcovers, seedlings and dense vegetable beds</li> <li>• Large trees that need water, such as some fruits</li> <li>• Small turf areas</li> </ul>

## Estimating How Long and How Often to Run Your System

A rule of thumb is to wet at least 50 percent of the root area of each plant. The number of emitters and spacing depends on the soil type and plants. Use more emitters on sandy soil, less on clay or loam.

The chart below shows some typical drip irrigation schedules for loamy soil. For clay soils or sloped areas, break the total run time into two or three applications to avoid runoff. The chart assumes you are using emitters that provide 0.6 gallons of water per hour; run times can be easily adjusted to emitters with higher or lower flow rates. The farther apart the emitters and rows, the longer you'll need to water.

### Run Times for 0.6 gallon per hour emitters

Planting Type	Spacing between Emitters and Rows of Drip Line	Weekly Water Need	Total Weekly Run Time
Vegetable garden or annuals	<u>Emitters:</u> 12–18 inches apart <u>Rows:</u> 12–18 inches apart	3/4–1 inch per week	60-140 minutes for 1 inch of water per week
Perennials	<u>Emitters:</u> 18–24 inches apart <u>Rows:</u> 18–24 inches apart	1/2 inch per week	70-120 minutes for 1/2 inch of water per week
Shrubs	<u>Emitters:</u> 18–24 inches apart <u>Rows:</u> 18–24 inches apart With a large shrub, put the tubing at the plant's drip line where the feeder roots can get the water.	1/4 inch per week	35-60 minutes for 1/4 inch of water per week
Trees (planted less than 5 yrs ago)	<u>Emitters:</u> 18–24 inches apart (18 inches for sandy soil; 24 inches for clay soil) <u>Rows:</u> 1 foot from both sides of trunk and a second line at tree's drip line.	1/2 inch–1 inch per week (start by trying 1/2 inch)	70-120 minutes for 1/2 inch of water per week; 2½ to 4 hours for 1 inch per week

## Avoiding Damage When Gardening

- Use high quality parts that resist damage such as factory-installed “in-line” emitters that don't protrude from the drip lines. Avoid use of small “spaghetti tubing” to individual plants, which is easily cut or moved by weeding and digging.
- Lay drip lines on the surface or under thick mulch so they can be easily located and moved before digging or planting. Do not bury them deep in the soil. Only use drip and soaker irrigation in areas that will be maintained by someone who is familiar with the system.
- Lay out drip and soaker tubing in straight-line grids or gently curving parallel runs that come near to each plant, and are easy to locate before digging in the garden or to inspect for damage.
- Make a map of complex systems to simplify inspection and maintenance when needed.

## Regular Maintenance

- ❑ Check and clean the filter as needed (as often as every few weeks for a screen filter). Reduced pressure may be a sign that the filter is clogged. Disc filters tend to clog less quickly and should be rinsed with clean water. For screen filters, scrub them with a toothbrush while immersed in a bowl of water and rinse well.
- ❑ Take the end caps off of each line and flush the line by running water through it at the beginning of each summer and at least one more time during the season. This is not necessary with self-scrubbing in-line emitter tubing.

## Protecting Your System from Frost Damage

- ❑ To prevent winter frost damage, install manual drain valves in low spots, such as where a line passes beneath a walk. Do not use automatic drain valves, because they waste water and are unreliable.
- ❑ Before heavy frost occurs, drain or blow out water from all fittings, valves and sections of lines that do not have emitters at low points. Shut off the main water supply, then manually open any automatic valves and open the “bleed” valve. Loosen or remove end caps at the bottom of lines to thoroughly drain the system. If fittings are situated so that water stays in them, lift sections of tubing so that they drain through an open end cap or emitters, or disconnect fittings to allow the water to drain.
- ❑ Take head assembly indoors when temperatures approach freezing.

## Drip Irrigation Suppliers

High-quality drip irrigation parts are available through local irrigation supply companies and many home improvement stores. Please keep in mind that irrigation companies, except Dripworks mainly sell to contractors and may have limited weekend hours. Check websites for more locations. *When going to home improvement stores, call ahead to make sure they have all of the head assembly parts first.*

<p><b>Berkey Supply</b> (in-store purchases only) 15500 Woodinville-Redmond Rd. Building C-100 Woodinville, WA 98072 <a href="http://www.berkeysupply.com">www.berkeysupply.com</a> 425- 487-1161</p>	<p><b>Ewing Irrigation</b> (recommend visiting store on Sat. mornings) 8710 Willows Rd NE, Suite C Redmond, WA 98052 <a href="http://www.ewing1.com">www.ewing1.com</a> 425-867-9530</p>	<p><b>John Deere Landscapes</b> 13930 NE 190th St Woodinville, WA 98072 <a href="http://www.johndeerelandscapes.com">www.johndeerelandscapes.com</a> 425-485-6167</p>
<p><b>HD Fowler</b> (in-store or phone purchases only) 13440 SE 30th Street Bellevue, WA 98005 425-746-8400 <a href="http://www.hdfowler.com">www.hdfowler.com</a></p>	<p><b>Horizon</b> (recommend visiting store on Sat. mornings) 11135 NE 33rd Pl Bellevue, WA 98004 <a href="http://www.horizononline.com">www.horizononline.com</a> 425) -828-4554</p>	<p><b>Dripworks</b> <a href="http://www.dripworksusa.com">www.dripworksusa.com</a> 800-522-3747</p>

**To learn more about water conservation in your garden:**

Call the **Garden Hotline** at **(206) 633-0224** or visit [www.savingwater.org](http://www.savingwater.org)



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