

Putting it All Together: Making Sense of Drip Irrigation

UC Master Gardener Conference
August 24, 2017

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Sparse vs. Dense Planting





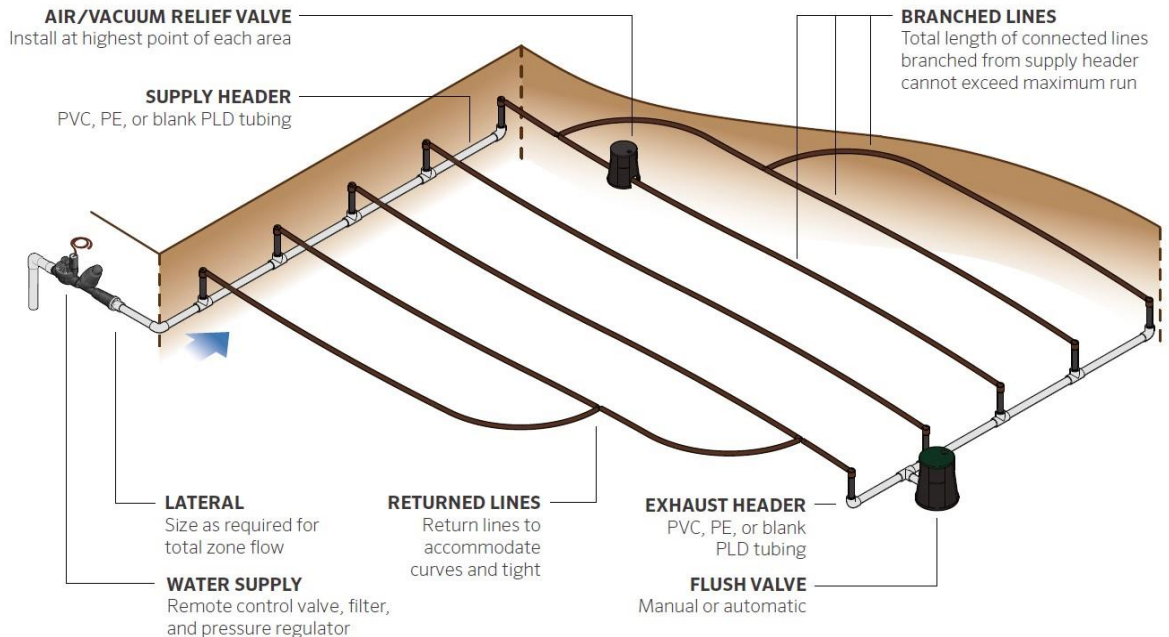
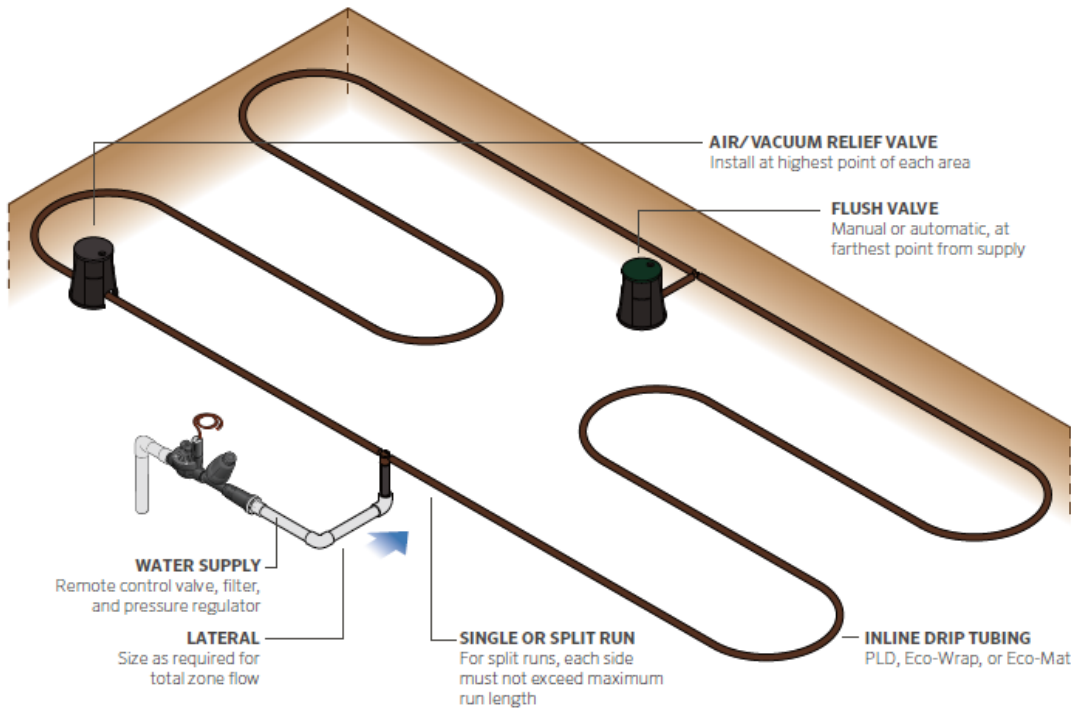
Sparse:
← Point Source
↓



Dense (will be):
← Line Source

2 Drip Layouts

(Source: Hunter)





Veg. Bed

Half Barrel



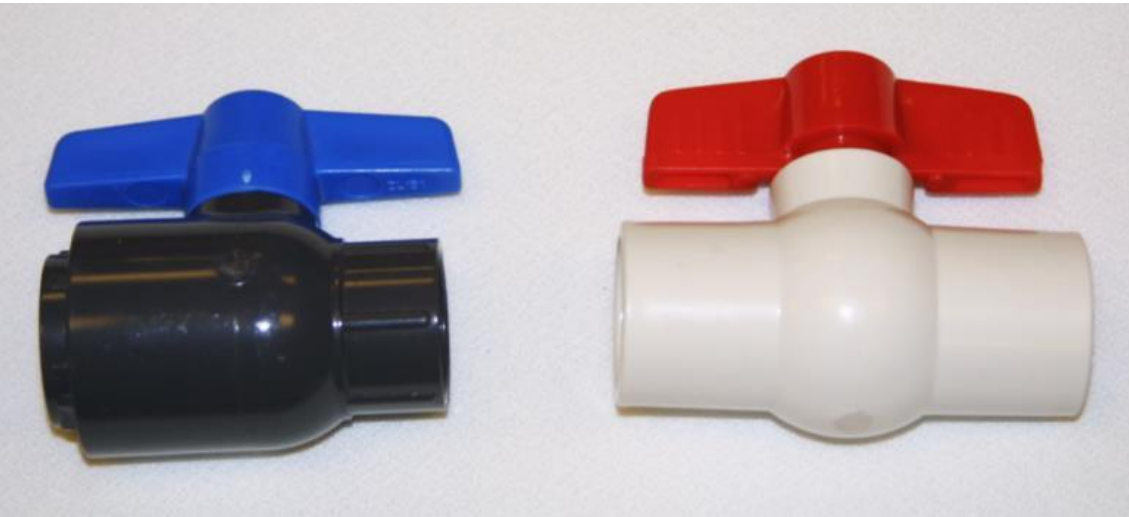
Pots



Drip Irrigation Parts

- Shutoff valve
- Irrig. controller
- Control valve
- Filter
- Pressure regulator
- Drip tubing
- Fittings
- Emitters (or microsprinklers)
- Wire stakes (U-pins)
- Flush valve / end cap(s)

Ball Valves



Closed

Open



Gate Valve



Ball valves easier to use, last longer

Irrigation Controller (Timer)

(Station = Zone = Valve)

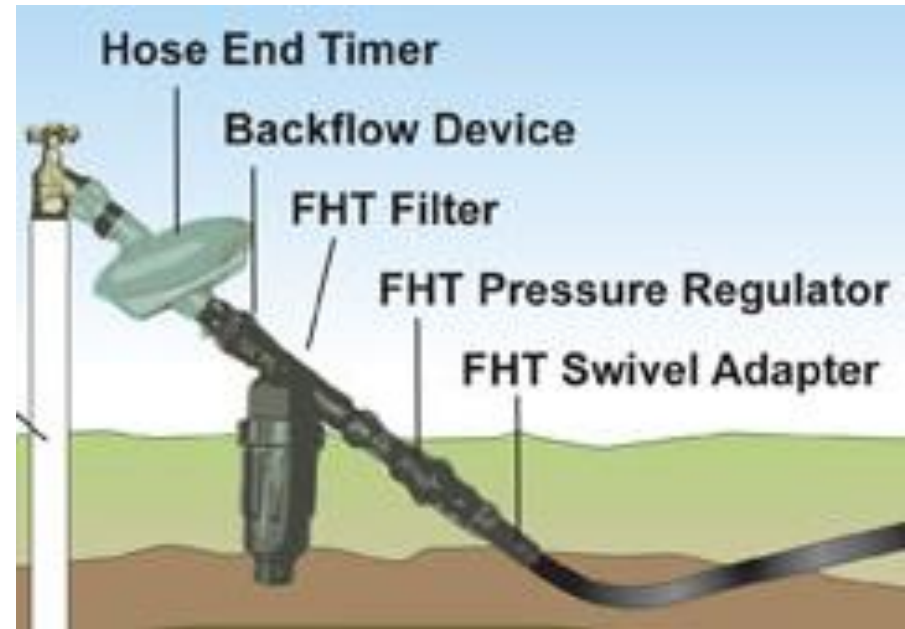
Permanent



On Hose Bib



Manifold Assembly vs. Hose Bib / Garden Valve

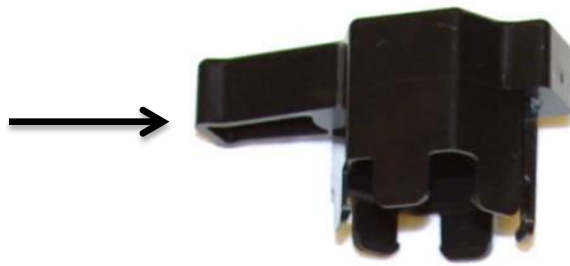


Control Valve Assembly

Multiple Valves = “Valve Manifold”

- Shutoff valve
 - Lets you shut off water to work on valves
- Control valves
 - Anti-siphon valves where no backflow preventer
 - Must be placed above highest emitter
 - Below-ground valves in valve box where main backflow preventer is in place
 - Install correctly, note arrow direction

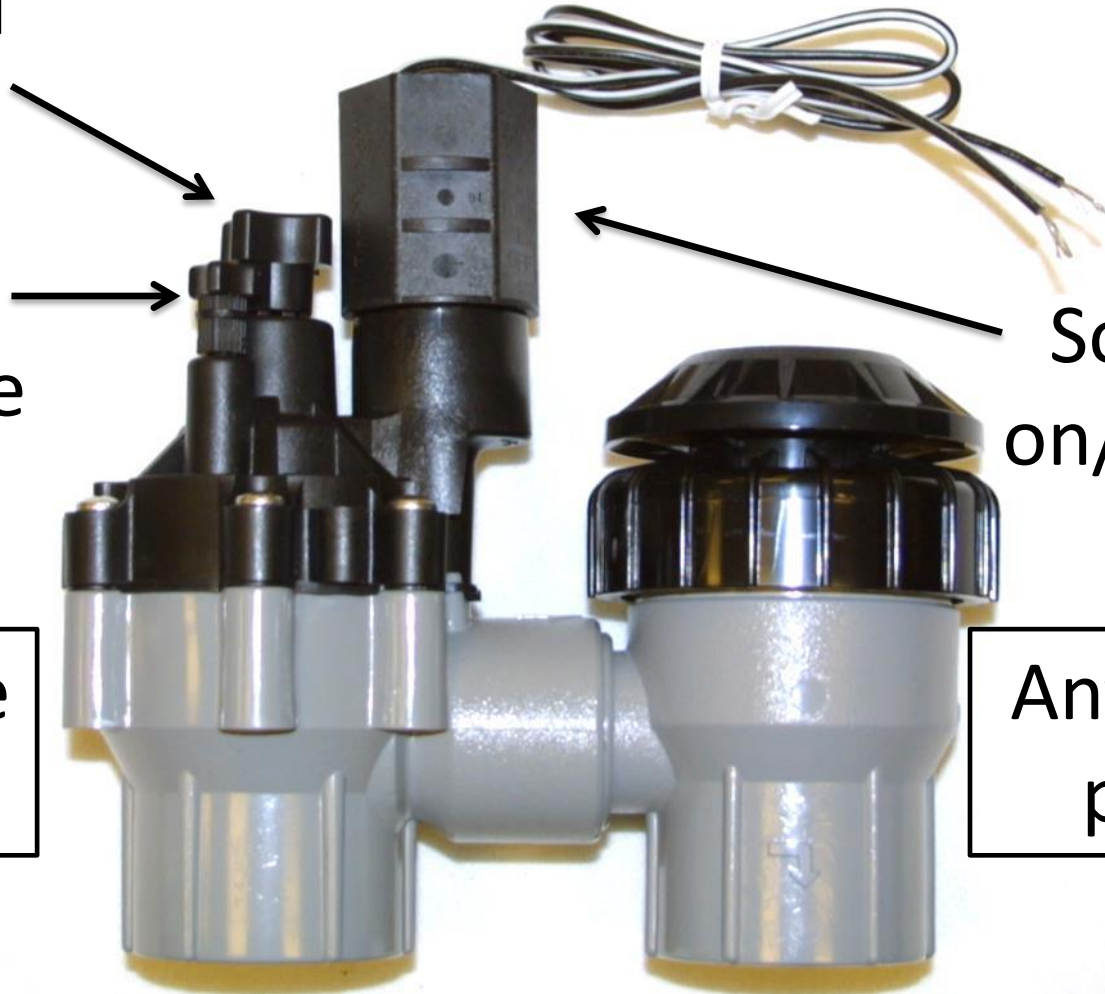
Solenoid
lever



Anti-Siphon Control Valve (Rainbird shown here)

Flow control
knob

Manual
bleeder valve



Solenoid,
on/off valve

Control valve
portion

Anti-siphon
portion



↓ Clean out



“Y” Filter
(Many kinds)

Flow
→



Pressure Regulators

- Reduce pressure to 20-50 psi
- Too high – Fittings come apart
- Too low – Lack of pressure for large systems
- MORE LATER!



Before Starting

Determine Water Pressure at Hose Bib

- Connect gauge to hose bib, turn on faucet
- This is “static pressure”
 - The highest pressure that will exist in drip system
- Use pressure regulator if above the limit for your system



Pressure Regulators - Example

Hunter (Varies by Company)

- 25 psi
 - Point source, punch-in emitters
 - Non-pressure-compensating emitters
 - Where 1/4" tubing is used
- 40 psi
 - 17 mm drip tubing with in-line emitters
 - Pressure-compensating systems
 - PC emitters compensate for 15-50 psi

Figure 8 end closure



End Closures

Compression hose
end plug with cap



Standard Drip Tubing “Sizes”

For 1/2”, use 17 mm tubing & fittings

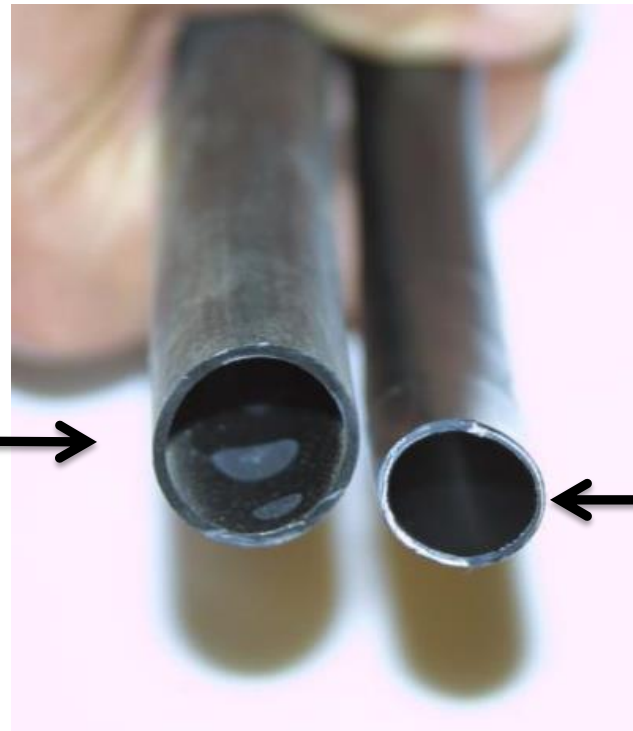
Tubing Sizes	Typical Color	Outer Dia. (in.)	Outer Dia. (mm)
1/4 in.	<u>Blank</u> : Black <u>In-line</u> : Black or brown	.250	6.35
1/2 in.	Brown	.620- <u>.670</u>	16- <u>17</u>
5/8 in.	Black	.700-.710	18
3/4 in.	Black	.940	24

Drip Tubing with In-Line Emitters

- No protruding emitters that may break off
- Different emitter spacing & flow rates
 - 6", 12", 18", 24" spacing, 0.4, 0.6, 0.9 (1.0) gph
- Can be buried and usually gets buried with mulch
 - Possible root intrusion or roots grow over
- Different manufacturers, different sizes (O.D.)
- Standard fittings are 17 mm
- Some companies' tubing and fittings are 16 mm
 - May not be compatible with 17 mm fittings, and vice versa!

5/8" (.710 mm) "Distribution" Tubing vs. 16 mm In-Line Drip Tubing

.710" O.D.
(18 mm)



.620" O.D.
(16 mm)

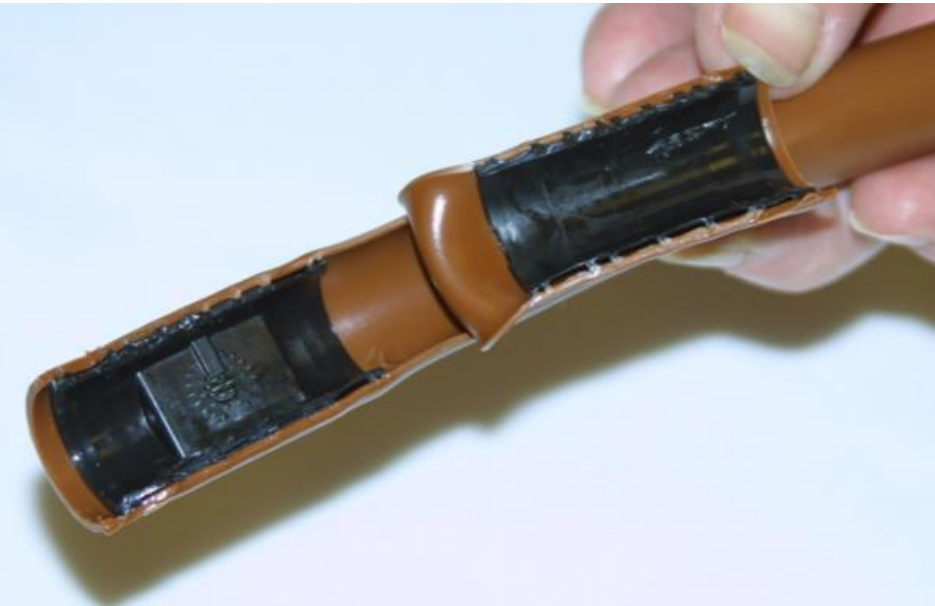


17 mm Tubing, In-Line Emitters

(e.g.,: Hunter, DIG, Netafim, Rain Bird)



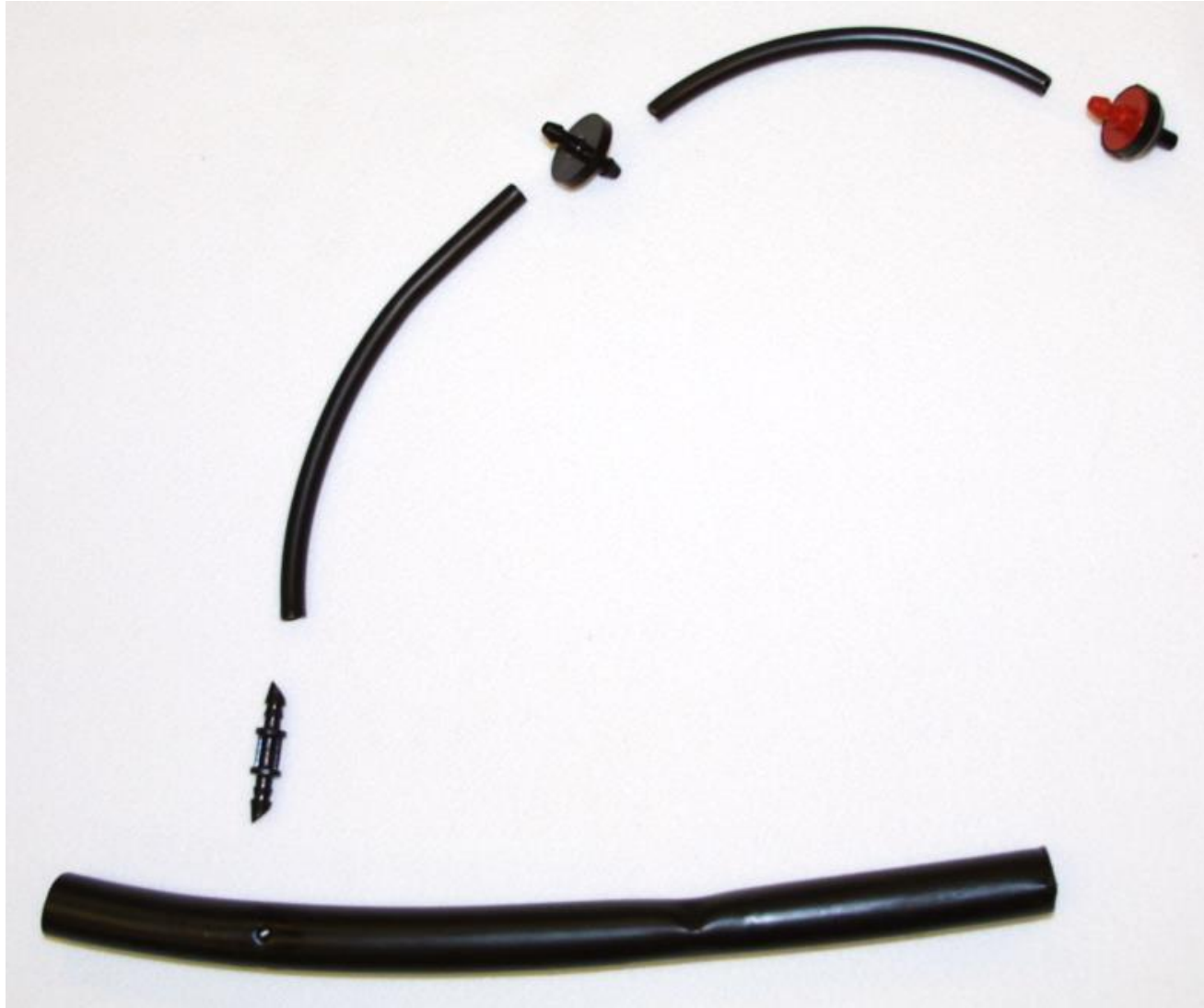
Standard



Rain Bird



1/4" In-Line Tubing



Pressure Compensating (PC) Emitters and Check Valves

- Most 1/2" in-line tubing is now PC
- Reduce effects of elevation change
 - Water pressure changes 1 psi for every 2.3 ft. of vertical elev. change (0.433 psi per 1 ft.)
 - PC emitters good to about 25 ft. elevation change
- Much in-line tubing now has built-in check valves
 - Hold up to 5 ft. of head, preventing low emitter drainage and water waste



Punch-In Emitters

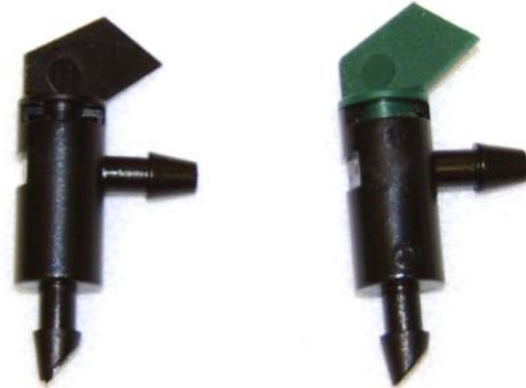


- Best for unevenly spaced plants, young trees, and raised drip lines (grapes, espalier)
- Available in various flow rates (0.5, 1, 2, 4 gph)
- Can be used on any size tubing
- Use pressure compensating (PC) emitters when possible



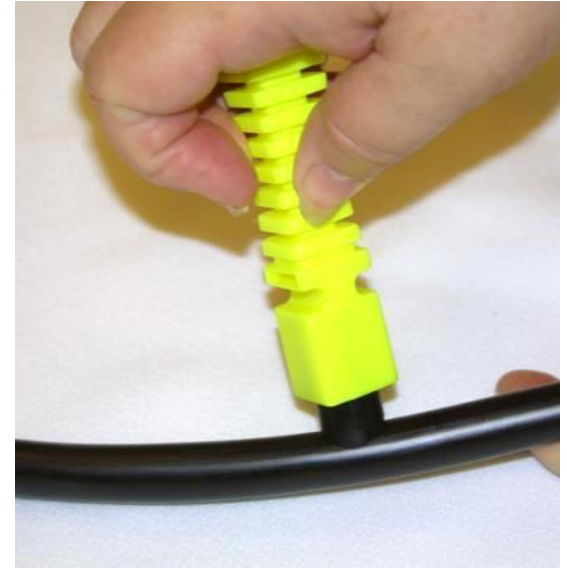
Punch-In Emitters

Flag Emitter



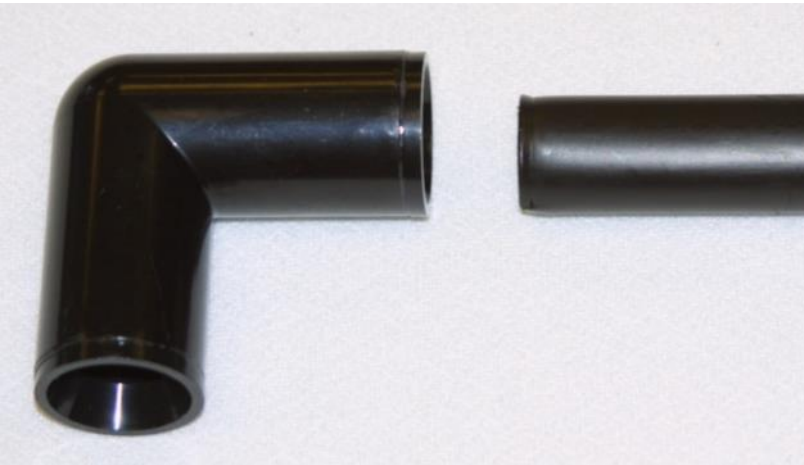
- Not pressure-compensating
- Remove flag to unclog

Many Punch Types

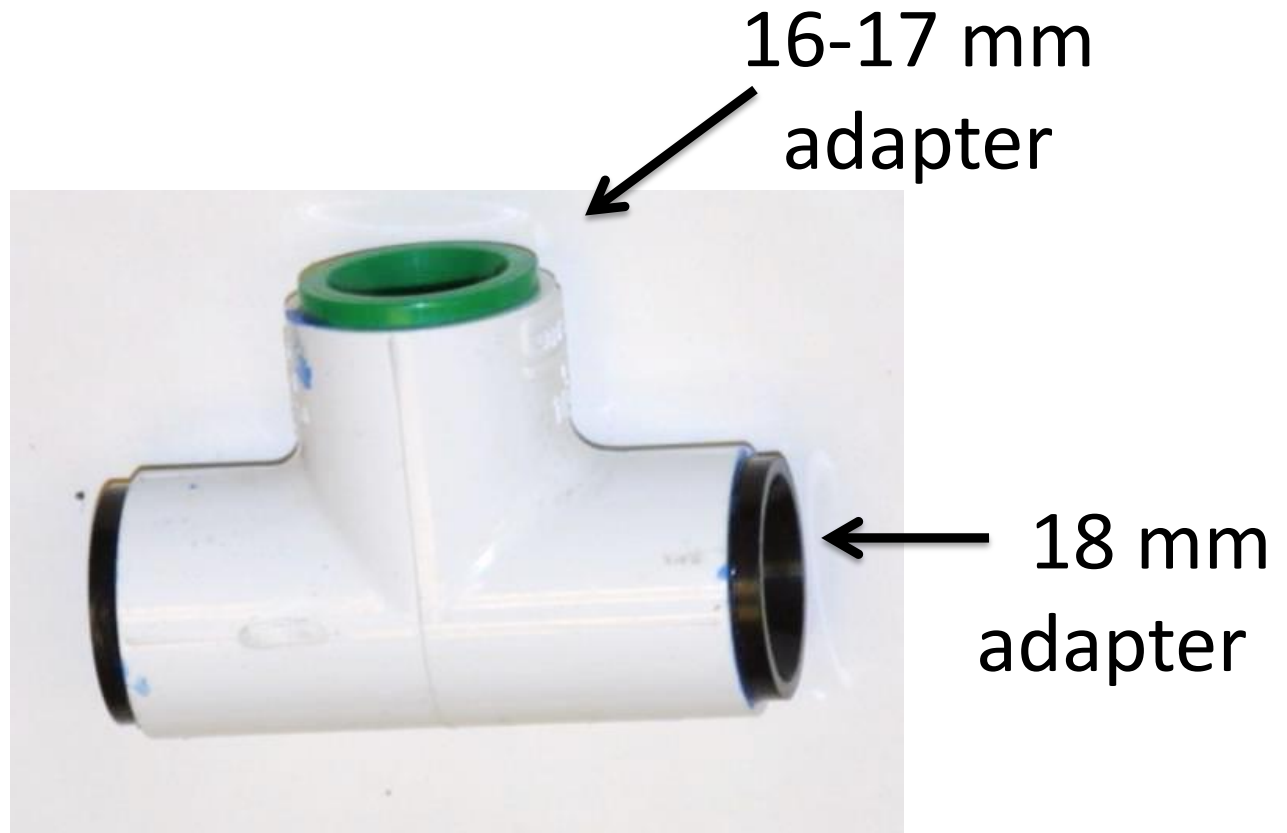


Compression Fittings

Be Mindful of Size Differences



Drip Adapter Fittings



16-17 mm
adapter

18 mm
adapter

1/2" PVC tee

17 mm Barbed Fittings



Standard fittings



Heat end of tubing
if necessary

Rain Bird
fitting



Rain Bird insertion tool

Universal Compression Fitting (Rain Bird)

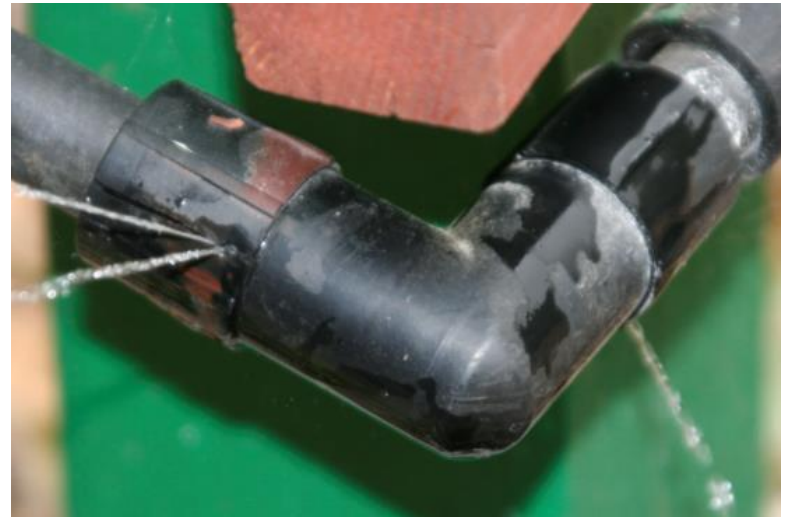


Fits .630" to .710"
(16-18 mm)

Some leakage &
disconnection issues



Ream out
smaller
tubing



Max. Length of a Single 17 mm Drip Line

18" Emitter Spacing, 1.0 GPH

Operating Pressure Range: 10-45 psi

PSI	15	25	30	35	40	45
Max. length (ft)	171	273	303	327	348	369
Flow (GPH)	114	182	202	218	232	246

Source: DIG (Other companies may have slightly different lengths & scenarios)

Maximum Length of 1/4" Drip Line @ 25 PSI (.6 GPH emitters)

Emitter Spacing	6"	9"	12"
Max. length	16'	22'	28'
# of emitters	32	29	28

Use header
if longer!




Source: DIG

Precipitation Rate and Flow Rate

Sprinklers Retrofitted to Drip (12"x15", 1 gph)

Fair Oaks Horticulture Center

- Previous sprinkler precip. rate: 0.9"
 - Retrofit drip precip. rate: 1.3"
 - Previous sprinkler flow rate: 11.5 gpm
 - Retrofit drip flow rate: 17.6 gpm
- High flow problem!
- 
- Previous flow rate through 1" pipe: 4.3 ft/sec
 - Retrofit flow rate through 1" pipe: 6.5 ft/sec
 - NEVER EXCEED 5 FT/SEC
 - Replaced 1" pipe with 1 1/4" pipe