



Landscape Dripline

*The Next Generation
of Inline Tubing*

**Design and
Installation
Guide**

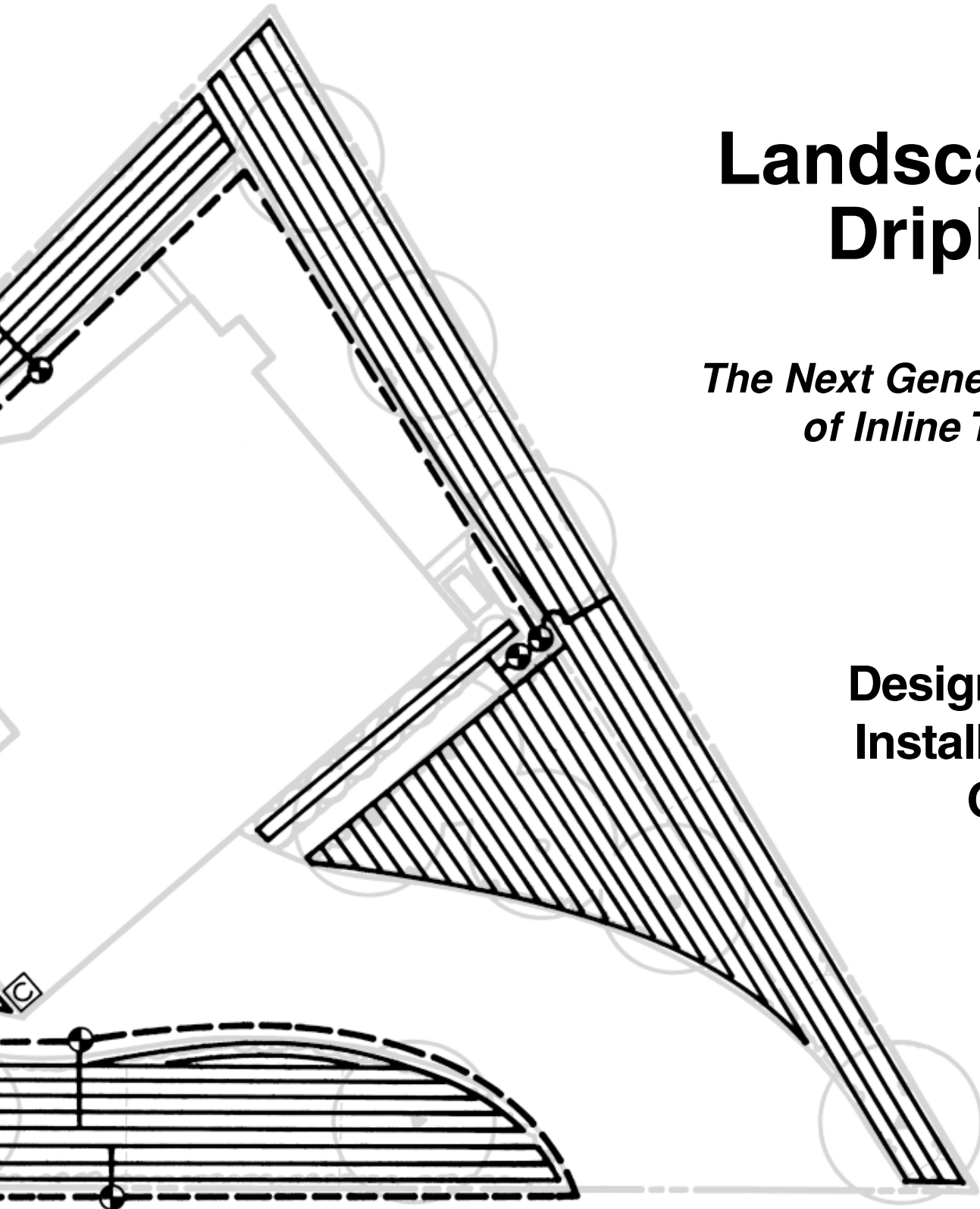


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Introduction to Landscape Dripline

Benefits of Low-Volume Irrigation

A low-volume irrigation system typically applies water slowly, at low pressure, at or near the root zones of plant material. Whether referred to as drip, trickle, micro-irrigation or low-volume, these systems feature emission devices that apply water in gallons per hour (GPH) as opposed to the gallons per minute (GPM) of a conventional overhead irrigation system. Typically, low-volume systems also require filtration and pressure regulation.

Low-volume irrigation can greatly reduce or eliminate water waste while promoting healthier plant growth because you can:

- Match the water application to the specific needs of each plant.
- More closely match the application rate to the soil's infiltration rate.
- Apply water directly to the root zone to reduce overspray and evaporation.

Low-volume systems also reduce or eliminate runoff on walks and paved areas, and overthrow onto windows and walls. Rain Bird's Xerigation® line of drip products offers a full range of water-saving choices for many non-turfgrass landscape applications, including control zone components, distribution components, emission devices and tools.

For complete performance and technical specifications, please see Rain Bird's *Landscape Irrigation Products Catalog* or visit Rain Bird's website at **www.rainbird.com**. The website also includes written specifications and detail drawings in downloadable files.

Landscape Dripline: A Better Inline Tubing

Inline emitter tubing is polyethylene distribution tubing with emitters pre-installed at the factory at preset intervals. Rain Bird's Landscape Dripline goes further than competitive inline tubing products because it provides unmatched clog resistance, lowers installation costs and is backed by Rain Bird support.

- **Rain Bird's patented ADI inline emitter** pressure compensates by lengthening the flow path instead of reducing its size.
- **Built-in pressure compensation** ensures consistent flow from each inline emitter throughout the entire length of the tubing and throughout its 8 - 60 PSI (0,5 - 4,0 Bars) operating range.
- **The critical flow path size**, of Landscape Dripline is significantly larger than the competitors.

Introduction (continued)

A Closer Look at Landscape Dripline

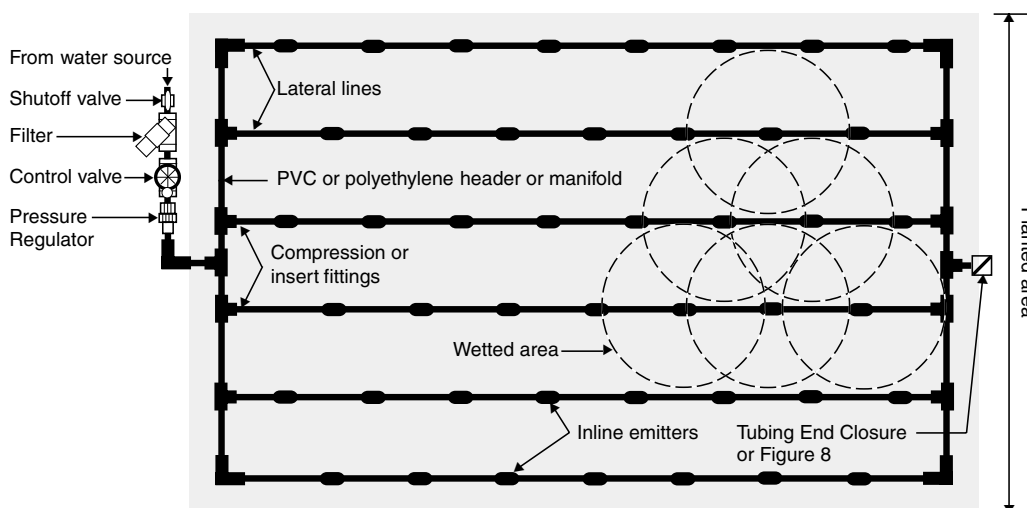
The Landscape Dripline system is a closed-loop system or grid of inline emitter tubing that, when properly spaced, delivers full coverage to planted areas. There are several factors that will influence which flow rate, emitter and lateral spacing, length of lateral and configuration you choose, including:

- Soil type—clay, loam or sand.
- Planting scheme—dense, sparse or mixed plantings.
- Topography—sloped or flat.

Landscape Dripline's unique design makes it easy to install and maintain because:

- Emitters are pre-installed and the tubing is easily rolled out to fit any shape or contour. You can add single-outlet emitters to water individual plants.
- You can use compression, insert or loc fittings to install.

Figure 1: The Landscape Dripline System



The following guide explains and illustrates how to design, install, operate and maintain Landscape Dripline for utmost reliability. To begin, gather information about the site to be irrigated with Landscape Dripline as discussed in the following sections.

Site Analysis

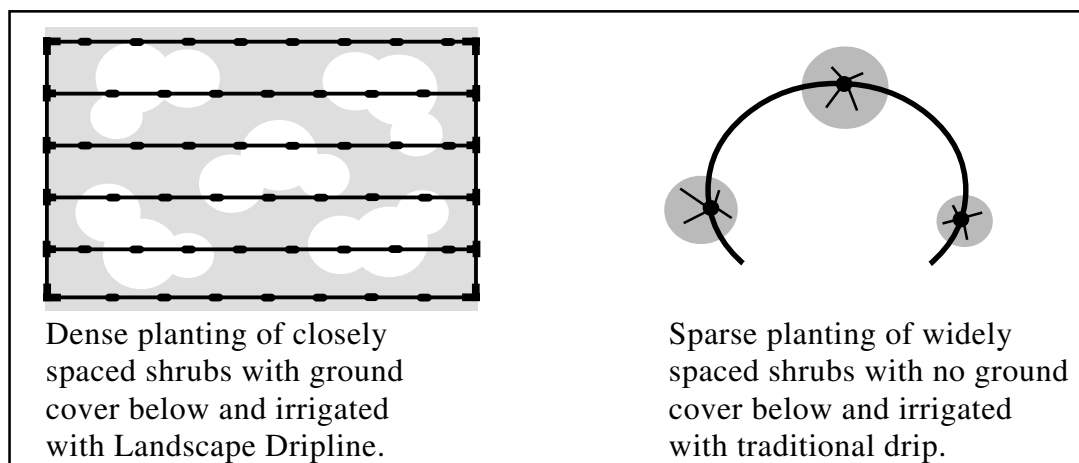
Dense Versus Sparse Planting Scheme

The first step in the design process is to define the planting scheme. Dense plantings are those where the space between the plants' mature canopies is less than two feet (0.6m). Sparse plantings are spaced 3' - 4' (.9-1.2m) apart. Sparse plantings are typically best irrigated by a flexible system of individual emission devices such as single- and multi-outlet emitters and/or micro bubblers that deliver a precise amount of water directly to the plant's root zone. For detailed information, refer to Rain Bird's complete *Low-Volume Landscape Irrigation Design Manual*.

In a dense planting, it is not cost-effective to irrigate each individual plant. Dense plantings are more effectively irrigated by emission devices that supply a precise amount of water across the entire planted area. Landscape Dripline can be installed in a grid configuration (see figure 1), to wet the entire planted area, it can be thought of as "broadcast drip". The technique is similar to spray sprinkler systems in that the intent is to provide 100 percent coverage. The precipitation rate of a Landscape Dripline system is generally lower than spray systems so watering times are longer but application efficiency is higher and there is no overspray or runoff.

The Landscape Dripline watering grid can be easily retrofitted to accommodate individual plants requiring more water. Simply connect supplemental inline tubing rings to the Landscape Dripline grid or insert emitters into Landscape Dripline (see figure 15) to provide the needed extra water. Trees should be irrigated on a separate valve (circuit) because of their higher water requirements. The difference in water requirements increases even more over time as the plants mature.

Figure 2: Dense Versus Sparse Planting and Watering Schemes



Site Analysis (continued)

Water Source

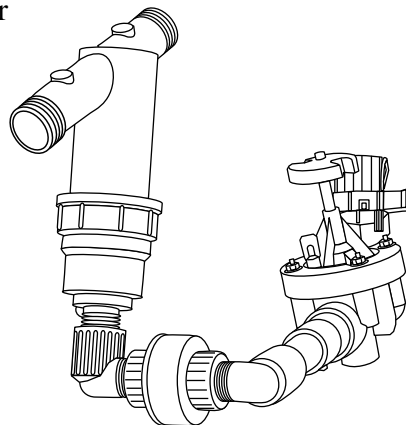
Note the type of water source, the water meter size and location, the service line size and length, and the static water pressure. Static water pressure should be measured at the point of connection. Your water purveyor may also be able to provide information about your water source.

Caution About Water Quality

Dirty water (reclaimed, reused, well, effluent, high mineral content, etc.) can be a problem for any irrigation system. Even though Landscape Dripline has unsurpassed clog resistance, a filter at the point of connection is required to screen out larger contaminants before they become a problem.

Filtration Requirement

Landscape Dripline requires 120-mesh (125-micron) filtration compared to 140-mesh or 150-mesh filtration required by today's conventional inline tubing products. When using water from sources containing primarily particulate contaminants and low amounts of organic contaminants it is cost effective to install an Automatic Filter Kit (see figure 3) near the point of connection, upstream of the remote-control valve(s) (see figure 7). This 150 PSI rated kit is available in 1", 1/2" and 2" sizes and consists of a Rain Bird Y-Filter, PEB valve and all necessary fittings. When connected to a multi-program controller, the valve acts as an automatic flush valve, ensuring regular, scheduled flushing of the Y-Filter. The union facilitates access to the stainless steel screen inside the Y-Filter body if manual cleaning is required. A choice of a 30, 50, 100, 150 or 200 mesh stainless steel screen is available. When the water supply is such that it contains organic contaminants, a sand media filter should be used for your system.



**Figure 3: AF-100 Automatic Filter Kit
(automatic flushing)**

Site Analysis (continued)

When a significant distance exists between the system's primary filter and the Landscape Dripline grid, a control zone kit acts as a secondary filter to protect the grid against contamination that could be caused by a break in the sub-main. In these cases, we recommend using one of Rain Bird's Control Zone Kits. These kits consist of ball valves, Y-filters, remote control or anti-siphon valves, pressure regulators and nipples. (see figures 5, 6 and 7).

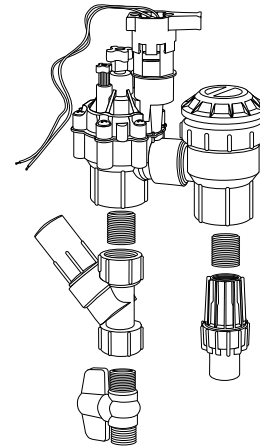


Figure 5:
XACZ-075,
Control
Zone Kit

Figure 6: X CZ-075,
Control Zone Kit

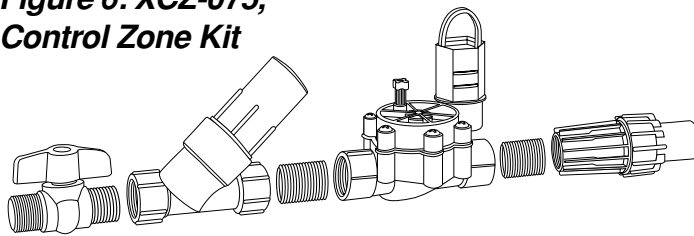
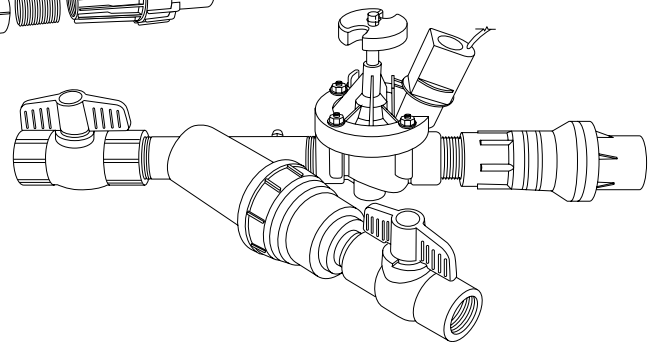


Figure 7: X CZ-100 COM,
Control Zone Kit



Pressure Regulation

Landscape Dripline should have an operating pressure of no more than 60 PSI (4 Bar). If static pressure is higher than 60 PSI (4 Bar) at the start of the Landscape Dripline run, a pressure regulator is required.

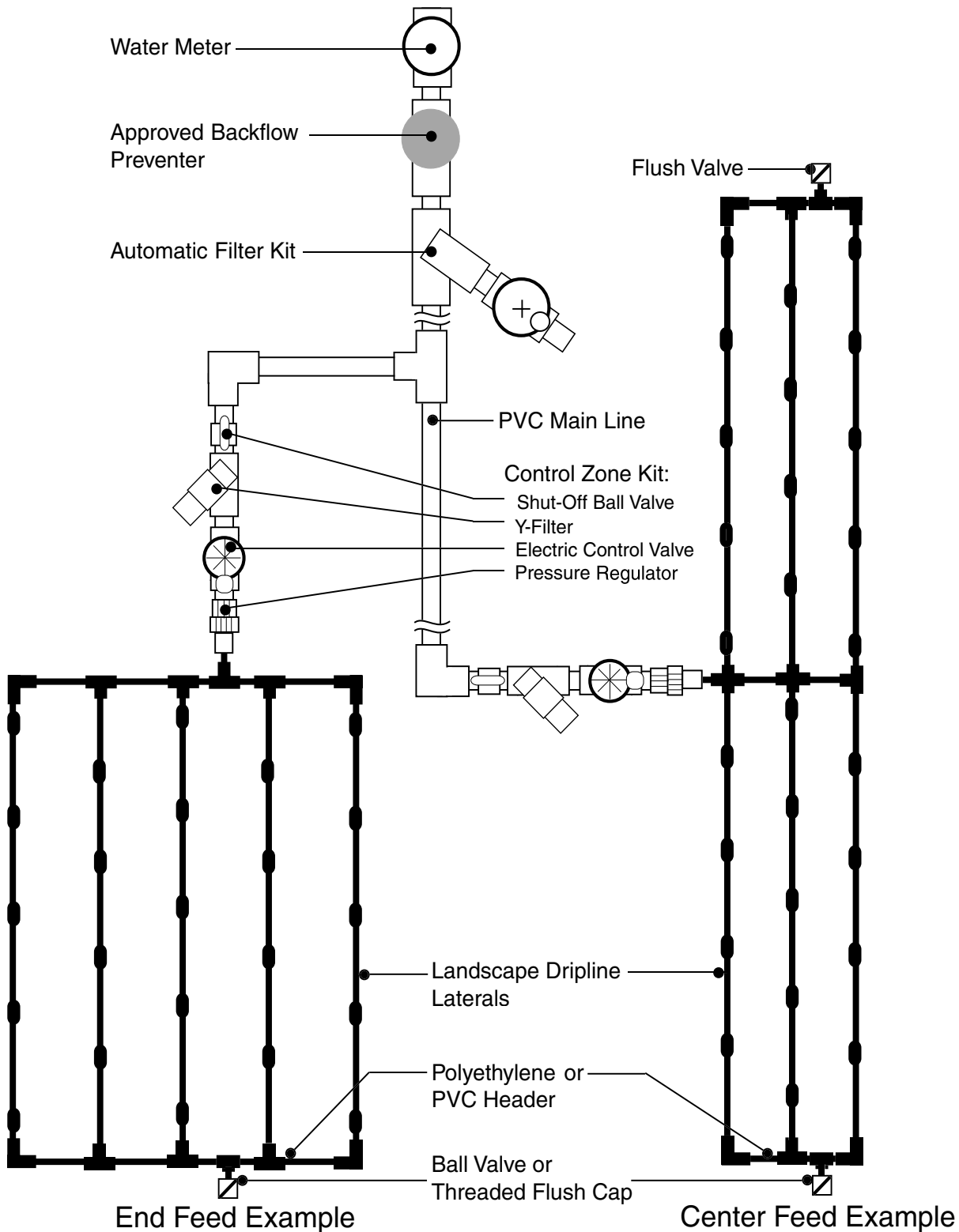
It is recommended that pressure regulators be installed as close to the planting area as possible to assure that the desired pressure is available for a Landscape Dripline watering zone (see figure 8).

Use Insert or Compression Fittings

Choose either Rain Bird LD16 Series insert fittings, LOC fittings, Universal fittings or Rain Bird 600CF Series compression fittings when installing and connecting Rain Bird's Landscape Dripline. While insert fittings are designed to be used up to 45 PSI (3 Bars) without clamps, compression fittings can be used up to 60 PSI (4 Bars) without the need for any clamps and are recommended for hot weather climates to provide maximum retention strength.

Site Analysis (continued)

Figure 8: System Configuration



Site Analysis (continued)

Soil Type

Soil type will greatly affect the spacing of Landscape Dripline emitters and laterals, and the irrigation schedule.

Clay/Fine Mostly clay. When dry, it forms hard lumps or clods. When damp, it is flexible and can be molded into shapes.

Loam/Medium A moderate amount of sand and very little clay. When dry, it breaks easily. When wet, it forms a lump.

Sand/Coarse Soil particles are loose, sandy grains. Squeeze it in your hand. If it's dry, it will fall apart as soon as you open your hand. If it's damp, it will form a lump and then crumble easily when you touch it.

The following table can be used as a general guide to spacing. Actual spacing is determined by the width of the planted area, evenly divided. See the next section, "Designing Your Grid."

Figure 9: Determining Emitter and Lateral Spacings

Soil Type	Emitter Spacing	Lateral Spacing
Clay/Fine	24"	24"
Loam/Medium	18"	18"
Sand/Coarse	12"	12"

Landscape Dripline comes in a variety of flow rates, spacings and coil lengths to meet the needs of a variety of soil types and conditions.

Figure 10: Landscape Dripline Choices

<u>LD-09-12-100</u>			
Model:	Flow Rate:	Emitter Spacing:	Length of Tubing:
Landscape	06 = 0.6 GPH (2,3 lph)	12 = 12" (30,5 cm)	100 = 100' (30,5 m)
Dripline	09 = 0.9 GPH (3,4 lph)	18 = 18" (45,7 cm)	250 = 250' (76,3 m)
		24 = 24" (61,0 cm)	500 = 500' (152,4 m)
			1,000 = 1,000' (305,0 m)

Soil Preparation (very important)

An inline tubing system relies on the soil to evenly spread water throughout the planting area. The more homogeneous the soil in the planting area, the more uniform the water distribution. Therefore, compacted soil must be tilled to an 8" to 12" (20 - 30 cm) depth and should be irrigated to field capacity prior to planting.

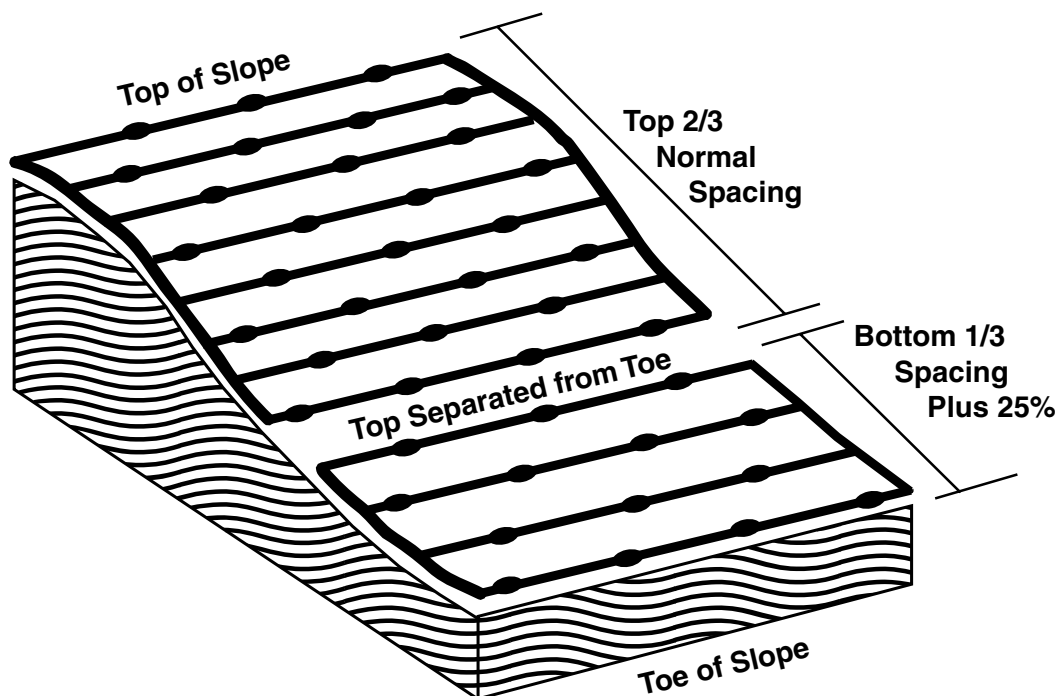
Site Analysis (continued)

Elevation Changes

The topography of a site will affect the application and flow of water. The design of the system must take into account any banks, slopes, berms or depressions on the site since runoff may occur with slopes of 3% or greater. Use the following criteria to install a Landscape Dripline system on a slope:

- Dripline laterals should follow the contours of the slope whenever possible.
- An air/vacuum relief valve should be installed perpendicular to the Landscape Dripline grid and at the highest point.
- Install Landscape Dripline at normal spacing within the top two-thirds of the slope.
- Install Landscape Dripline at 25% greater spacing within the bottom one-third of the slope.
- When elevation change is 10' (3 m) or more, zone the bottom one-third of the slope separately from the rest of the slope to provide greater low line drainage control.

Figure 11: Installation of Landscape Dripline on a Slope



Designing Your Grid

Select Landscape Dripline Model

As discussed in the site analysis section, the model of Landscape Dripline you choose is based mainly on soil conditions.

Figure 12: Selecting Landscape Dripline Based on Soil Type

Soil Type	Emitter & Lateral Spacing	Flow Rate
Clay/Fine	24"	0.6 GPH
Loam/Medium	18"	0.9 GPH
Sand/Course	12"	0.9 GPH

Determine Maximum Lateral Lengths

The maximum length of a Landscape Dripline lateral is determined by the maximum allowable pressure loss. The minimum inlet pressure should be 15 PSI. As long as you meet this requirement, there is no need to calculate friction loss in the Landscape Dripline lateral lines, just use the chart below (see figure 13).

Figure 13: Maximum Lateral Length Chart

Nominal Flow (GPH)	Maximum Lateral Length (Feet)					
	0.6	0.9	0.6	0.9	0.6	0.9
PSI	12" Spacing		18" Spacing		24" Spacing	
10	125	96	175	135	218	171
20	249	191	350	171	442	340
30	307	236	434	333	550	422
40	350	268	495	380	627	481
50	385	294	544	417	689	529
60	414	317	586	449	743	570

Note: Data assumes a minimum 8.5 PSI at end of lateral and no slope.

Nominal Flow (l/h)	Maximum Lateral Length (Meters)					
	2,3	3,4	2,3	3,4	2,3	3,4
Bars	30,5 cm		45,7 cm		61 cm	
0,7	38,1	29,3	53,3	41,1	66,4	52,1
1,0	55,1	42,3	77,4	46,1	97,2	75,3
1,5	79,0	60,6	111,2	60,8	140,5	108,0
2,0	91,8	70,6	129,8	96,6	164,4	126,2
2,5	101,8	78,0	143,9	110,5	182,3	139,9
3,0	110,4	84,5	156,1	119,8	197,8	151,8
3,5	118,0	90,2	166,8	127,9	211,3	162,2
4,0	124,4	95,2	176,1	134,9	223,2	171,3
4,1	126,2	96,6	178,6	136,9	226,5	173,7

Note: Data assumes a minimum 0,6 Bars at end of lateral and no slope.

Example: If the pressure at the start of your Landscape Dripline lateral is 40 PSI and the flow rate is 0.9 GPH with emitters spaced at 12", the maximum distance the tubing can be run (without the installation of supplemental emitters) is 268'/78,0m in any one direction.

Note: Figure 13 assumes zero slope. Contact Rain Bird Technical Support at (1-800-BIRD SVC) for lateral length charts that take into account slope conditions.

Designing Your Grid (continued)

Determine Lateral Line Spacing

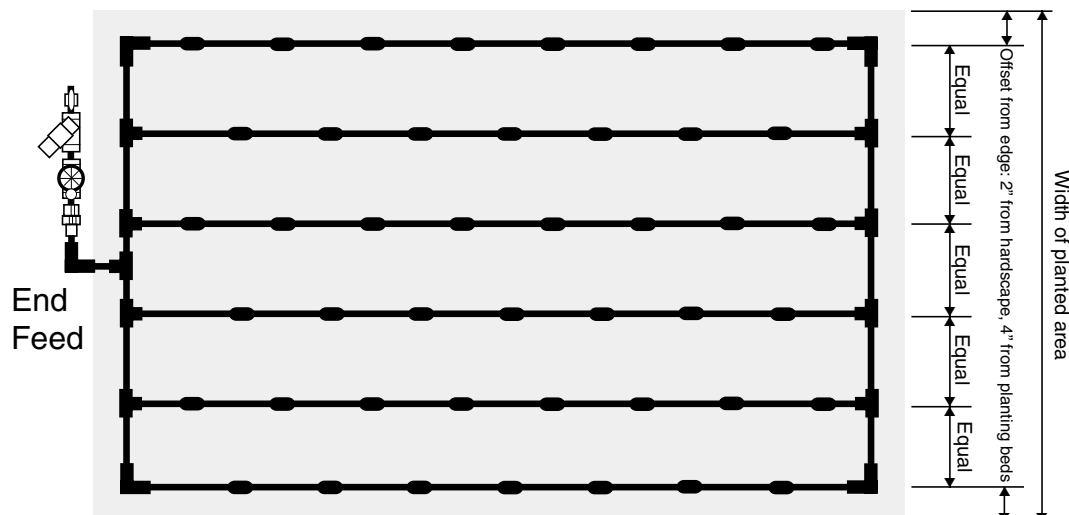
Use the following steps to calculate Landscape Dripline lateral spacing.

Figure 14: Lateral Line Spacing Calculations

Follow the example below to determine the space between lateral lines:			
To Get This:	Do This:	Calculations	Totals
1. Width of the planted area	Measure the width in feet		5 feet
2. Width of planted area in inches:	Multiply feet by 12 to get inches	$5' \times 12" = 60$ inches	
3. Actual width of the grid:	Subtract edge offset (multiply $2 \times 2 = 4$)*	$60" - 4" = 56$ inches	
4. No. of spaces between laterals:	Divide grid width by emitter spacing (12", 18", 24")	$56" \div 12" = 4.6$ spaces	
5. Actual no. of spaces:	Round up to the next whole number	$4.6 = 5$ spaces	
6. Actual space between lateral lines:	Divide grid width by number of spaces in grid	$56" \div 5 \text{ spaces} = 11.2"$	
7. No. of lateral line rows in the grid:	Add one to no. of spaces	$5 + 1 = 6$ rows	
Use the worksheet below to determine the space between lateral lines for your system:			
To Get This:	Do This:	Calculations	Totals
1. Width of the planted area	Measure the width in feet		
2. Width of planted area in inches:	Multiply feet by 12 to get inches		
3. Actual width of the grid:	Subtract edge offset (multiply $2 \times 2 = 4$)*		
4. No. of spaces between laterals:	Divide grid width by emitter spacing (12", 18", 24")		
5. Actual no. of spaces:	Round up to the next whole number		
6. Actual space between lateral lines:	Divide grid width by number of spaces in grid		
7. No. of lateral line rows in the grid:	Add one to no. of spaces		

* The edge offset is 2" from hardscape and 4" from non-hardscape.

Figure 15: Equal Lateral Line Spacing



Designing Your Grid (continued)

Supplemental Watering

Note: If your grid design does not need to consider supplemental watering, go directly to page 12, "Calculating Flow." Use this section if you are using Landscape Dripline in a mixed planting scheme.

Occasionally, plants within the Landscape Dripline watering grid will require supplemental irrigation. When Xeri-Bug emitters are inserted into the grid, the additional flow must be taken into consideration. For example, if 5 GPH of the flow is added to the grid through the addition of Xeri-Bug emitters, the length of the laterals must be reduced by 5 GPH plus a safety factor of 20 percent (1 GPH in this example) which brings the total flow adjustment to 6 GPH. See the following example:

1. Divide the adjusted flow by the flow rate of the Landscape Dripline emitter to determine how many inline emitters it takes to equal this adjusted flow:

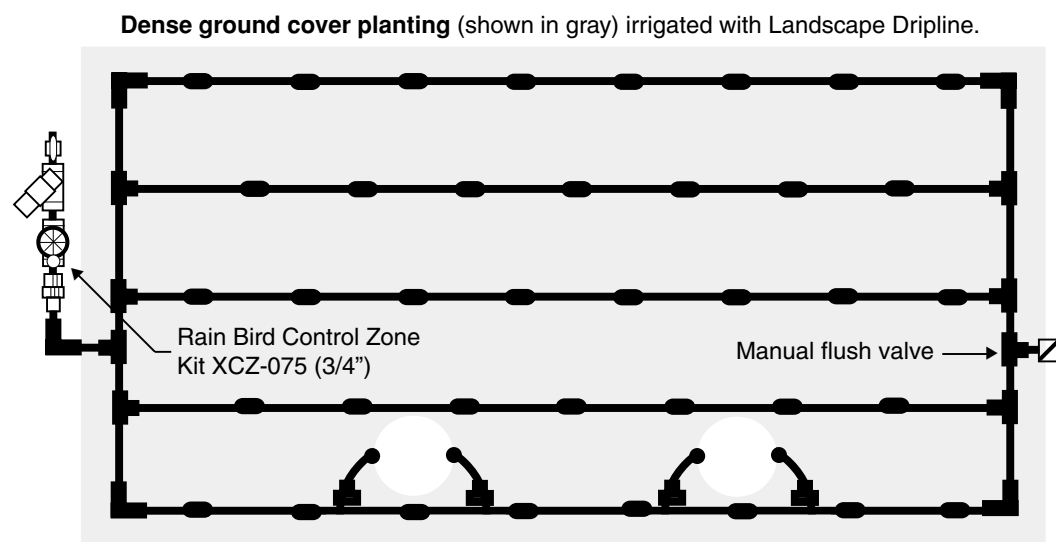
$$6 \text{ GPH (adjusted flow)} \div 0.9 \text{ GPH (emitter flow rate)} = 6.7 \text{ or } 7 \text{ emitters}$$
2. Multiply the number of emitters by the spacing of the Landscape Dripline being used:

$$7 \text{ emitters} \times 12" \text{ emitter spacing} = 84" \text{ length of tubing}$$
3. To convert inches into feet:

$$84" \div 12" = 7'$$
4. Adjust the possible maximum lateral length by 7'. From figure 12, at 45 PSI, the maximum lateral length for 0.9 GPH and 12" emitter spacing is 236'. To get the adjusted maximum length of tubing:

$$236' - 7' = 229'$$

Figure 16: Supplemental Watering Layout (see note at top of page)



Sparse shrub planting (shown in white) irrigated with supplemental single-outlet emitters connected to Rain Bird Landscape Dripline tubing. Emitters use Rain Bird 1/4" distribution tubing, TS-025 stakes and DBC-025 bug caps.

Designing Your Grid (continued)

Calculating Flow

Use the following chart, or the steps below to calculate the flow rate of this Landscape Dripline zone. For this example we will assume coarse soil and Landscape Dripline model: LD-09-12-500.

Figure 17: Landscape Dripline Lateral Flow Per 100' (GPM)

GPM/100'			
Emitter Flow	12" Spacing	18" Spacing	24" Spacing
.6 GPH	1.0 GPM	.67 GPM	.50 GPM
.9 GPH	1.5 GPM	1.0 GPM	.75 GPM

Figure 18: Flow Rate Calculations

Follow the example below to determine the flow rate:			
To Get This:	Do This:	Calculations	Totals
1. Length of tubing in feet:	Determine the total length in feet from grid		2,000 feet
2. Length of tubing in inches:	Multiply feet by 12 to get inches	$2,000' \times 12" =$	24,000 inches
3. No. of emitters in the zone:	Divide length by emitter spacing (12", 18", 24")	$24,000" \div 12" =$	2,000 emitters
4. Total no. of emitters:	Round up to next whole number	$2,000 =$	2,000 emitters
5. Flow rate in GPH:	Multiply no. of emitters by flow rate (0.6 or 0.9 GPH)	$2,000 \times 0.9 =$	1,800 GPH
6. Flow rate in GPM:	Divide GPH by 60 to get gallons per minute	$1,800 \div 60 =$	30 GPM
Use the worksheet below to determine the flow rate for your system:			
To Get This:	Do This:	Calculations	Totals
1. Length of tubing in feet:	Determine the total length in feet from grid		
2. Length of tubing in inches:	Multiply feet by 12 to get inches		
3. No. of emitters in the zone:	Divide length by emitter spacing (12", 18", 24")		
4. Total no. of emitters:	Round up to next whole number		
5. Flow rate in GPH:	Multiply no. of emitters by flow rate (0.6 or 0.9 GPH)		
6. Flow rate in GPM:	Divide GPH by 60 to get gallons per minute		

Guidelines For Zoning a Landscape Dripline Grid

Once you know the total flow of your grid (30 GPM in this example), determine the number of zones and their respective sizes using the information in the chart below.

Figure 19: Determining Maximum Flow Per Zone

Sch. 40 PVC Header Size	Max. Flow* GPM	PSI Loss**	Poly pipe Header Size	Max. Flow* GPM	PSI Loss**
1/2"	4.7 GPM	7.7 PSI	1/2"	4.7 GPM	8.8 PSI
3/4"	8.3 GPM	5.6 PSI	3/4"	8.3 GPM	6.3 PSI
1"	13.5 GPM	4.2 PSI	1"	13.5 GPM	4.8 PSI
1-1/2"	33.9 GPM	2.9 PSI	1-1/2"	31.8 GPM	2.9 PSI
2"	52.4 GPM	1.9 PSI	2"	52.4 GPM	2.2 PSI

* Based on maximum velocity of 5' per second.

** Per 100' of tubing.

Designing Your Grid (continued)

Figure 20: Daily ET Rates

Inches Per Day	
Atlanta, GA	.24
Boston, MA	.20
Buffalo, NY	.20
Bismark, ND	.20
Denver, CO	.18
Detroit, MI	.20
Honolulu, HI	.20
Houston, TX	.27
Kansas City, MO	.21
Las Vegas, NV	.30
Los Angeles, CA	.20
Louisville, KY	.20
Palm Springs, CA	.37
Pensacola, FL	.26
Portland, OR	.18
Phoenix, AZ	.30
Seattle, WA	.15

Calculating Precipitation Rates

Use the following steps to calculate the precipitation rate and station run time. Precipitation rate is the rate at which Landscape Dripline applies water to the soil. ET is water loss from the soil and plants.

1. Determine ET (evapotranspiration)

To determine ET, call your local agricultural extension or farm advisor or use the Daily ET Rates chart (see figure 20) to determine ET in your area. For our example, we will use **0.2" per day**, which is the ET for Los Angeles.

2. Calculate PR (Precipitation Rate)

$$\frac{231.1 \text{ (a fixed number in formula)} \times 0.9 \text{ GPH (emitter flow rate)}}{12" \text{ (emitter spacing)} \times 11.2" \text{ (row spacing from figure 13, page 10)}} = \mathbf{1.5" \text{ per hr. (rounded)}}$$

3. Calculate Station Run Time

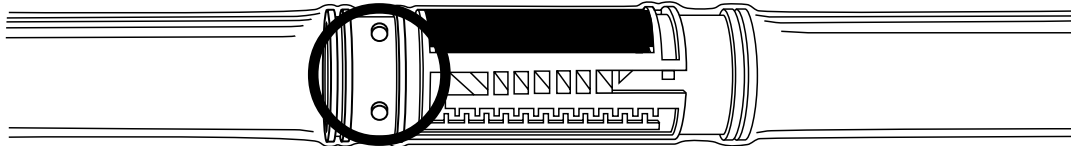
Daily ET: **0.2" per day** _____ = 0.13 hours x 60 minutes = 7.8 or 9 minutes
 Precipitation rate: **1.5" per hour**

Figure 21: Landscape Dripline Grid Precipitation Rates (in/hr)

Emitter Spacing	Lateral Spacing	Emitter Flow Rate	
		0.6	0.9
12	12	0.96	1.44
18	18	0.69	1.03
24	24	0.28	0.41

Designing Your Grid (continued)

Figure 22: Two outlet ports function as back up air relief valves.



Pressure Compensation

Because of Rain Bird's ADI technology, Landscape Dripline pressure compensates without reducing the size of the emitter flow path. This feature is the primary reason Landscape Dripline delivers unsurpassed clog resistance. Since it is pressure compensating, the first emitter on the line will apply the same amount of water as the last emitter on the line. Another advantage to Landscape Dripline is that it flushes without the use of a low-pressure flow spike that unduly complicates the design process.

Stakes and Staples

Landscape Dripline requires the use of stakes or staples to install it securely to the ground. Use the following table as a guide for staking:

Figure 24: Spacing of Stakes or Staples

Soil Type	Stake Spacing	Additional Stakes
Clay/Fine	4'-6' (1.2-1.8 m)	Before & after every turn
Loam/Medium	3'-5' (0.9-1.5 m)	Before & after every turn
Sand/Course	2'-3' (0.6-0.9 m)	Before & after every turn

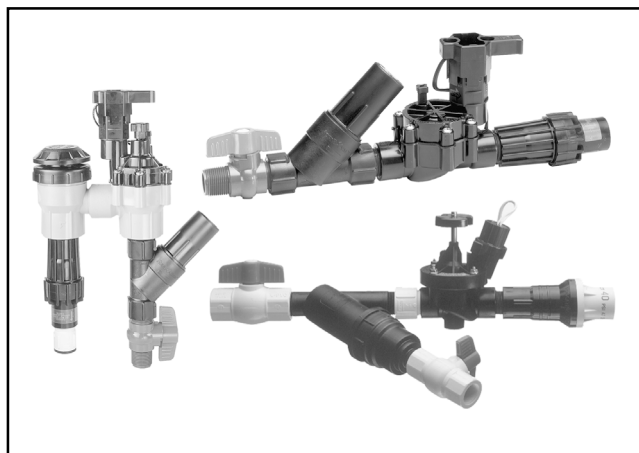
Landscape Dripline System Components



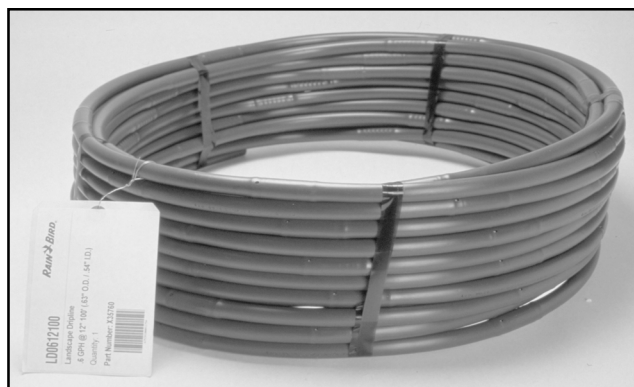
Rain Bird AF Series Automatic Filter Kits (1", 1-1/2" and 2" models shown).



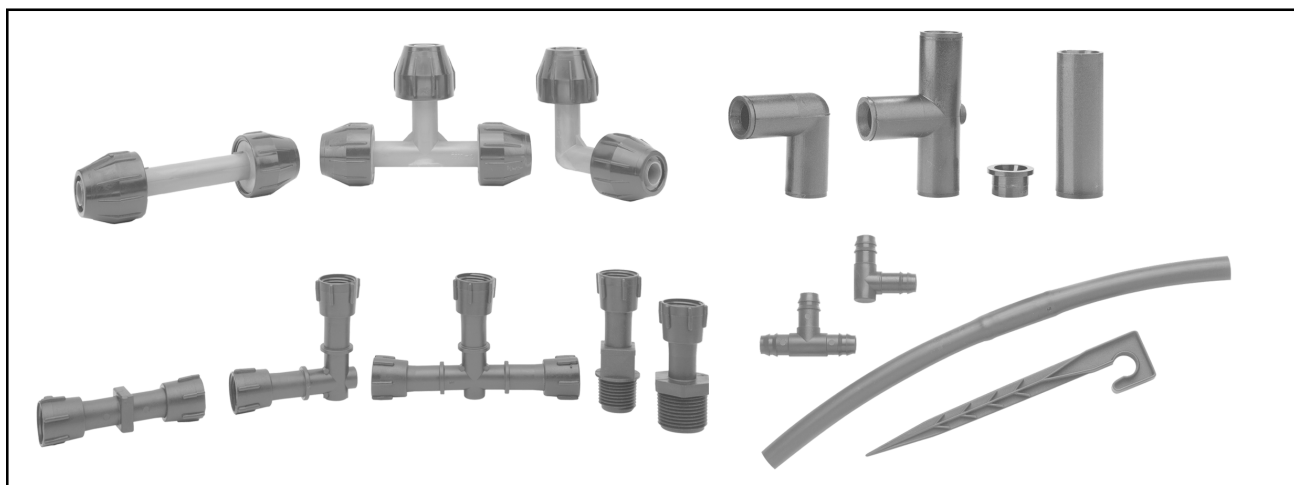
Rain Bird 1800-RETRO provides 200-mesh filtration and 30-psi pressure regulation as a point-of-connection for LD tubing.



Rain Bird Control Zone Kits.



Rain Bird LD-Series Landscape Dripline.



Rain Bird Compression Fittings, Universal Fittings, LOC Fittings and Barb Fittings.



For Technical Assistance,
Call Toll Free
1-800-247-3782



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