SECTION 7: Subsurface Design, Installation and Operation

BEST SUBSURFACE APPLICATIONS

- Curves and edges
- Narrow turf areas
- Large turf areas
- Subsurface shrub and ground cover areas
- Near buildings
- Adjacent to parking lots
- Small, confined areas
- Athletic Fields

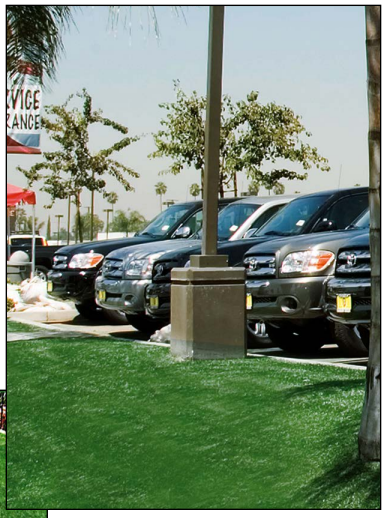
BENEFITS OF SUBSURFACE DRIP IRRIGATION

- Increased efficiency
- Lower water use
- Elimination of overspray
- Resistant to vandalism
- Healthy plant growth
- Increased watering uniformity
- No damage to fences or trees
- Less water run-off into sewers & drains
- Lower maintenance
- Increased time for field or turf usage
- No wind issues
- Less evaporative loss

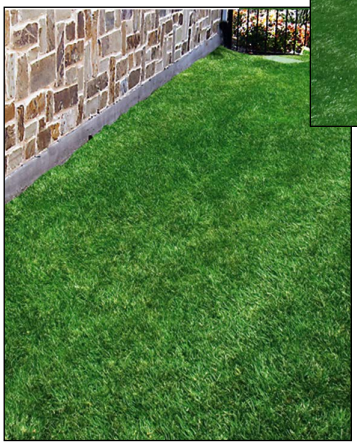
AREAS WHERE OVERSPRAY MUST BE AVOIDED

It is a challenge to avoid overspray in narrow turf areas. Examples include median strips, parking lot islands and turf around parked cars. Also consider adding adjacent to right-of-ways. Subsurface drip is an excellent option to avoid overspray in these challenging applications.

Narrow strips or next to roadways



Car dealerships or parking lots



Adjacent to buildings or hardscapes

■ ADJUST FOR TREES

Trees. Trees planted in turf areas should be on a separate zone. This is particularly true with subsurface drip because over time, tree roots could push the buried subsurface drip lines up to the surface. Also, trees are more costly to replace than grass, so if the zone for the grass area needs to be turned off to reduce water consumption, then a separate zone can still be operated to maintain tree health.

The best method for establishing, transplanting, and irrigating trees on a separate zone is by using the Rain Bird Root Watering System. More information can be found at ***http://www.rainbird.com/rws.***

Recommended
The tree is on a separate zone and there is full separation between the tree and the turf grass.

Acceptable
Although the tree and turf grass are on the same zone, the buried dripline should be placed far enough away from the trunk so that tree roots do not push the dripline to the surface.

Not recommended
There is no additional water for the tree. The dripline is close to the trunk and the tree roots will probably push the buried dripline up to the surface.

■ ADJUST FOR CURVED EDGES

Curved Edges. Rain Bird XFS/XFS-CV Dripline is flexible enough to follow curves that are 3 inch (7.6 cm) in radius and larger. When there are curved shapes in the landscape, avoid designing dripline rows that follow the curves. Instead, lay out as many straight lines as possible to simplify the installation, then fill in missed areas with additional straight lines if possible. When the landscape design layout is finished, make a grid pattern overlay to scale with the selected emitter and row spacing (for example, a grid that is 12 inches by 18 inches / 30.5 cm by 45.7 cm). Place the overlay on top of the design and check to be sure that at least one row and not more than two rows are found in each grid. This procedure ensures good uniformity in the design and avoids creating areas that may receive too much or too little water.

When installed on bare ground, specify Rain Bird stakes to hold tubing in place and secure the dripline with stakes every 5 feet (1.52 m) on straight runs; and every foot when following a curve of 4 foot (1.22 m) radius or less. Stakes are not required if the dripline is installed directly in the ground with mechanical equipment. (see page 53)

Recommended

Not Recommended

■ ADJUST FOR A CONFINED AREA

Small, confined areas represent a unique challenge when designing and installing a subsurface irrigation system. Below are step by step instructions to establish a grid layout and header design for a small, confined area similar to that shown in the photo.

■ LAY OUT THE FINAL GRID PATTERN, DESIGN THE SUPPLY HEADER, AND FLUSH HEADERS

Establish the overall grid concept. Generally, the least costly grid design is to place the header along the short dimension and design rows to run the length of the long dimension. This reduces the header material cost and will have fewer connections.

1. Identify the zone boundaries and show the direction of the dripline row.
2. Determine the maximum row length from Table 7 on page 29. The chart gives the maximum length for a given pressure at the lateral inlet (not the pressure available at the water source).
    a. To choose the maximum row length at this step, estimate the inlet pressure available at the row that is farthest away from the water source.
    b. Perform a pressure loss calculation from the water source to the farthest end of the header to confirm that all driplines will have adequate pressure. Be sure to account for changes in elevation.
3. Specify the distance from the edge of the zone to the first row in the grid.
    a. For turf that is planted against a hardscape edge or curb, the first row should be 2 inches (5 cm) away from the edge.
    b. For turf that is adjacent to a planted area, the first row should be 4 inches (10.2 cm) away from the edge.
4. Measure the widest part of the zone and specify the number of rows. (see page 15-16 for an example)
    a. Find the widest zone dimension (in inches or centimeters).
    b. Subtract the specified distance from both edges.
    c. Divide by the spacing between rows, and round up to the nearest whole number.
    d. Add 1 to this number to find the exact number of rows in the grid.
5. Design a header system that provides the pressure that was assumed in step B above to each of the rows.
    a. For small areas with less than 8 GPM (30.28 L/M) total flow, the header can be made of polyethylene tubing, either with or without emitters.
    b. For larger confined areas, divide the zone into subsections with no more than 8 GPM (30.28 L/M) flow and design a polyethylene header system for each of these subsections. Consider using QF Header.
6. Repeat the process at the opposite end of the zone to design flush headers and connect the flush headers to a manual or automatic valve so that the entire grid can be flushed regularly.

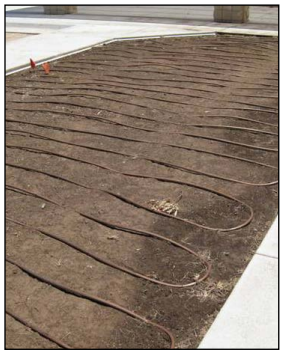
Establish the overall grid concept. For the most cost-effective design, the maximum row length determines the long dimension of the zone and the total available water flow determines the number of rows. Most large systems use a supply header in the middle of a zone and rows are installed in opposite directions from the center of the zone to reduce friction loss. (see Center Feed Layout diagram on page 15)

■ LAY OUT THE FINAL GRID PATTERN, DESIGN THE SUPPLY HEADER, AND FLUSH HEADERS

1. Determine the maximum row length from Table 7 on page 27. Estimate the inlet pressure at the row that is farthest away from the water source.
2. Calculate the flow rate of the longest row by multiplying the number of emitters by the flow rate of each emitter.
3. Divide the flow rate available at the water source by the flow rate of the longest row and round down to find the maximum number of rows that can be irrigated in one zone.
4. Design water supply and flush headers to supply the rows, using the spacing between rows as selected for the soil type. In large systems, large diameter PVC or poly pipe is often used to supply water to a riser that feeds rows in opposite directions.
    a. Header designs should be specified with minimal friction loss to be sure of adequate pressure at the inlet of each lateral.
    b. Headers should be designed to limit the water velocity to no more than 5 feet (1.5 m) per second to reduce friction loss, reduce long-term wear and hydraulic water hammer. (see Table 4 on page 21)
    c. Perform a pressure loss calculation from the water source to the farthest end of the header to confirm that all driplines will have adequate pressure. Be sure to account for changes in elevation.
5. Specify air relief valves as per standard design practice for the large diameter water supply piping.
6. Repeat the process at the opposite end of the zone to design flush headers and connect the flush headers to a manual or automatic valve so that the entire grid can be flushed regularly.

SUBSURFACE INSTALLATION OPTION A: PRE-GRADED METHOD

- Remove the soil to a depth of at least 4 inches (10.2cm) below final grade; place the dripline on the soil surface
- Place the dripline grid on a uniform grade that is free of sharp rocks or other objects that may damage the dripline
- Make all connections to the supply header, flush header, flush valve, air relief valve, and control zone kit, then check for leaks before backfill
- Use tie-down stakes to keep the dripline in place while replacing backfill
- Be sure to compact the backfilled soil with rubber-tired machinery or a heavy roller. Some amount of compaction is required for water to move through the pores in the soil due to capillary action.



SUBSURFACE INSTALLATION OPTION B: VIBRATORY PLOW METHOD

- A single-shank or multi-shank vibratory plow can be used in new installations on bare soil, or to retrofit under existing turf
- This type installation method is less destructive to existing turf grass
- Be sure to cover the ends of the driplines after each pass to keep soil and debris from entering the lines before they are connected to the headers.

SUBSURFACE INSTALLATION OPTION C: ROTARY TRENCHING METHOD

- A rotary trenching unit cuts a narrow trench approximately 1 inch (2.54 cm) wide by 4 to 6 inches (10.2 cm to 15.24 cm) deep
- Suitable for installations in narrow or small existing turf grass applications
- Also suitable for subsurface shrub and ground cover installations

SUBSURFACE INSTALLATION OPTION D: HAND TRENCHING METHOD

- Hand trenching may be utilized in areas too small for mechanical installation
- Ideal for subsurface applications in turf grass and shrub bed installations with loamy or sandy soil
- Establish finish grade
- Hand dig trenches 4 to 6 inches (10.2 cm to 15.24 cm) deep to install XFS or XFS-CV subsurface dripline
- Cover trenches and rake level
- If installing shrubs or groundcover, maintain flags to identify dripline location during planting

RECOMMENDED PRACTICES

1. Keep all driplines, headers (manifolds), and mainline piping free of dirt during installation because any contamination in these lines could plug the dripline emitters.

2. Check headers (manifolds) and dripline laterals for leaks before covering with soil.

3. Check pressure at the site and be sure to operate below the maximum rated pressure of 60 psi (4.14 bar). Check and record pressure at the supply header and flush header. Any changes in pressure can be used in future troubleshooting.

4. If core aeration is expected to be done in the turf where subsurface dripline is installed, be sure the tine depth is less than the depth of the buried dripline. Depth of dripline is recommended to be 6" (15.24 cm) while tine depth should not be set greater than 4" (10.2 cm).

5. When using machinery for the installation:
   a. Do not drive over the dripline; always keep a layer of soil between the dripline and machinery tires.
   b. To help keep driplines in place, drive in the same direction as the drip line, not across the lines.
   c. Avoid driving in the same places at the site or you will be creating heavily compacted areas.

6. Be sure there is uniform soil compaction all over the site after installation.

7. After installation, open the flush valves (one at a time) and collect some of the water to check to be sure that the installation is clean.

8. After installation and backfill, observe the first wetting pattern. Rapid puddling could indicate a leak or might mean that the driplines are not buried at the specified depth.

9. Allow for expansion and contraction of tubing.

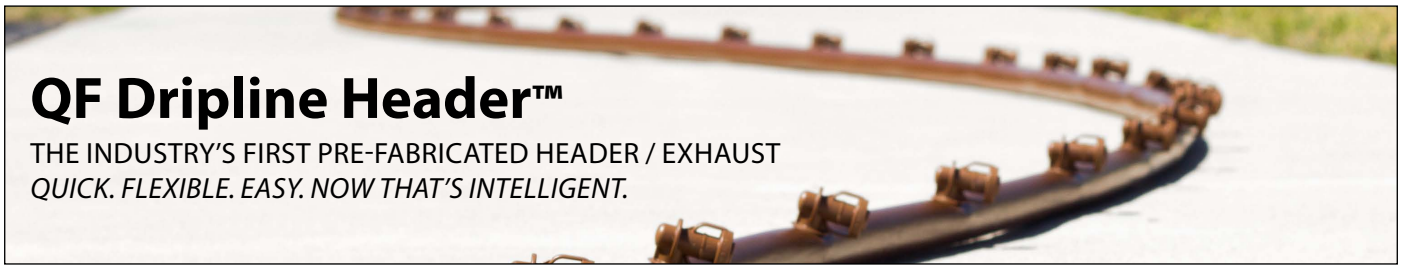
Conservative estimate of expansion and contraction:

Dripline will expand 0.1 inch per 100' for every 1° F of temperature change.

- **Example 1: 260' tubing length and 40° F temperature change**
  2.6 (100' lengths) x 0.1 (in/100') x 40 (degrees F) = 10.4" or 1.5 cm per 100 meters for every 1° C of temperature change.
- **Example 2. 120 M tubing length and 5° C of temperature change**
  1.2 (100 m lengths) x 1.5 (cm/100 m) x 5 (degree C) = 9 cm

Ensure that dripline depth is consistent throughout the installation

SECTION 8: Specifying Products in The Zone



QF Dripline Header™

THE INDUSTRY'S FIRST PRE-FABRICATED HEADER / EXHAUST
QUICK. FLEXIBLE. EASY. NOW THAT'S INTELLIGENT.

The QF Dripline Header is an innovative product developed by the Rain Bird Xerigation®/Landscape Drip Division to be a replacement for site-built headers in dripline installations. Its performance characteristics match PVC in terms of flow and pressure ratings. This Quick and Flexible product was specifically designed to eliminate the high labor costs and hassle associated with site-built headers. The flexibility and durability of the QF Dripline Header makes it ideal for curved or non-linear landscapes, making installation quick and easy.

Features

Performance
The QF Dripline Header has comparable design characteristics to a PVC header using the 5ft. per second rule. It has similar volume and pressure performance to ensure proper flow to the dripline grid or other drip irrigation systems.

Flexibility

Patent-pending QF Dripline Header is the ONLY coiled header on the market. Manufactured using a proprietary dual-layered polyethylene blend for optimal flexibility, this product is ideal for curved landscapes. Simply roll out, connect to a water source and attach the dripline; it's that simple.

360º Pre-Installed XF Series Rotating Elbows
No other product has pre-installed elbows that ensure guaranteed spacing. The 360º rotating elbows allow for trenching misalignment – no need to re-trench, simply rotate the elbows slightly to accommodate the dripline. QF Dripline Header utilizes the XF Series Fitting elbow design, which requires 50% less force to insert – resulting in less hand and wrist fatigue. A protective ring surrounds the elbow, protecting it from damage and ensuring a proper seal. The ring also provides leverage when holding the elbow and attaching the dripline.

Specifications

3/4" Models
- **OD:** 0.940"
- **ID:** 0.820"
- **Wall thickness:** 0.060"
- **Elbow spacing:** 12" or 18" (30.5 cm or 45.7 cm)
- **Coil length:** 100' (30.5 m)
- **Coil color:** brown

1" Models
- **OD:** 1.200"
- **ID:** 1.060"
- **Wall thickness:** 0.070"
- **Elbow spacing:** 12" or 18" (30.5 cm or 45.7 cm)
- **Coil length:** 100' (30.5 m)
- **Coil color:** brown or purple

Operating Range:

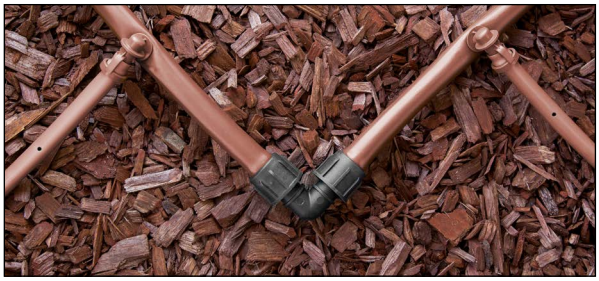
- **Pressure:** 0 to 50 psi (0,0 to 4,14 bar)
- **Temperature:**
  - **Water:** Up to 100° F (37,8° C)
  - **Ambient:** Up to 125° F (51,7° C)

Models

XQF7512100: XQF 3/4" Dripline Header (12" Spacing 100' Coil)
XQF7518100: XQF 3/4" Dripline Header (18" Spacing 100' Coil)
XQF1012100: XQF 1" Dripline Header (12" Spacing 100' Coil)
XQF1018100: XQF 1" Dripline Header (18" Spacing 100' Coil)
XQF101210P: XQF 1" Dripline Header (12" Spacing 100' Coil) Purple
XQF101810P: XQF 1" Dripline Header (18" Spacing 100' Coil) Purple

Fittings Guide

The QF Dripline Header is designed to work with Rain Bird's TLF Series - Twist Lock Fittings (¾" and 1" models) which provide an even tighter seal on tubing by using high quality barbs and twist locking nuts.



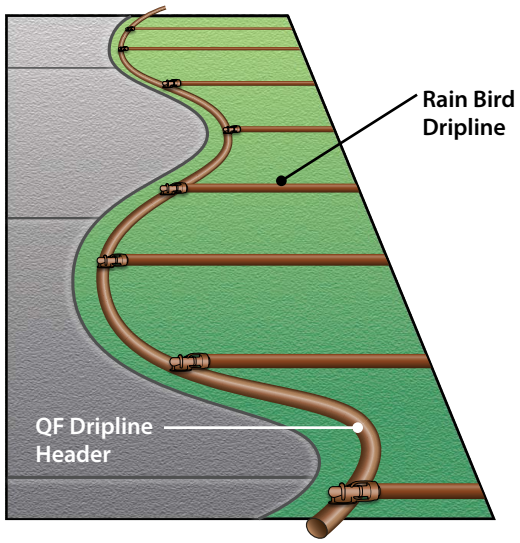
Twist Lock Fittings - 800 Series
(For use on ¾" QF Dripline Header)

Twist Lock Fittings - 1000 Series
(For use on 1" QF Dripline Header)

■ DESIGN GUIDELINES FOR QF DRIPLINE HEADER

Determine pressure loss for any QF Dripline Header grid

For situations where QF Dripline Header will be used in an irregular shaped layout, the pressure loss can be summed up by calculating the friction loss through each segment of QF Dripline Header. Since flow in the QF Dripline Header changes after each lateral, losses at each individual pipe segment must be calculated separately and then added together. Table 11 below gives the loss for the pipe flow in the QF Dripline Header for one segment (flow around one fitting and travel thru 12" or 18" of pipe length). Add these numbers to get the friction loss in the main pipe segment of QF Dripline Header. Then, look up the additional loss of travelling through the elbow using the small chart on the right. Add these two numbers together to get the pressure loss within the QF Dripline Header.*



■ TABLE 11: FRICTION LOSS THRU QF DRIPLINEHEADER

Friction Loss Through QF Dripline Header per Pipe Segment (psi)					
Product Size:		¾"		1"	
Elbow Spacing:		12"	18"	12"	18"
QF Dripline Header Pipe Flow (GPM)	1.0	0.01	0.01	0.00	0.00
	2.0	0.02	0.03	0.00	0.00
	3.0	0.05	0.05	0.01	0.01
	4.0	0.07	0.08	0.01	0.01
	5.0	0.11	0.12	0.01	0.02
	6.0	0.15	0.16	0.02	0.02
	7.0	0.19	0.21	0.03	0.03
	8.0	0.24	0.27	0.04	0.04
	9.0	0.30	0.33	0.04	0.05
	10.0	0.36	0.41	0.05	0.06
	11.0	0.43	0.49	0.06	0.07
	12.0	0.51	0.57	0.08	0.09
	13.0			0.09	0.10
	14.0			0.10	0.11
	15.0			0.12	0.13
	16.0			0.13	0.15
	17.0			0.15	0.16
	18.0			0.17	0.18
	19.0			0.19	0.20
	20.0			0.21	0.22

■ TABLE 12: FRICTION LOSS THRU INDIVIDUAL QF DRIPLINE HEADER ELBOW

Friction Loss Through Individual QF Dripline Header Elbow (psi)		
Dripline Lateral Flow (GPM)	1.0	0.3
	2.0	1.3
	3.0	2.9
	4.0	5.1
	5.0	8.0

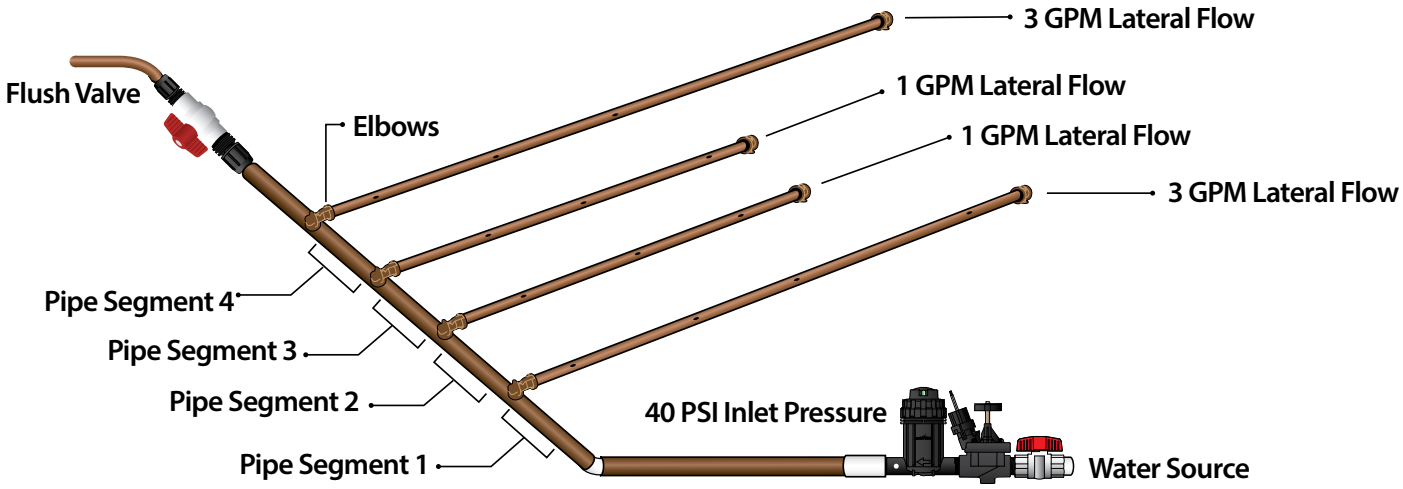
Note: Dark shaded area of chart indicates velocities over 5' per second. Use with caution.

*Pressure loss charts are for flow thru QF Dripline Header only. Loss based on elevation changes, piping from valve etc. to be added seperately.

EXAMPLE USING QF DRIPLINE HEADER PRESSURE LOSS TABLES

As an example, the system below uses a ¾" -12" QF Dripline Header and consists of four laterals. The first and last laterals flow at 3 GPM and the middle two laterals flow at 1 GPM. The example below shows how to calculate the Friction Loss in both the pipe and elbows.

Step 1: Prepare your design and calculate flow rates per lateral.
Step 2: List and determine the friction loss for each pipe segment.
Step 3: List and add the additional friction loss at each elbow.
Step 4: Calculate the total friction loss at the inlet to each lateral.



	Pipe Segment Friction Loss (psi)	Elbow Friction Loss (psi)	Total Friction Loss at Lateral Inlet (psi)	Available Water Pressure at Lateral Inlet (psi)
Lateral #1 (3 GPM Flow)	0.24 psi	2.9 psi	3.14 psi	36.86 psi
Lateral #2 (1 GPM Flow)	0.11 psi	0.30 psi	0.41 psi	36.45 psi
Lateral #3 (1 GPM Flow)	0.07 psi	0.30 psi	0.37 psi	36.08 psi
Lateral #4 (3 GPM Flow)	0.05 psi	2.9 psi	2.95 psi	33.13 psi

CONTROL ZONE KITS

Rain Bird Control Zone Kits provide all of the components necessary for on/off control, filtration and pressure regulation of a low-volume irrigation zone, making the kits simple to order and easy to install.

KIT FEATURES

LOW FLOW VALVES

Featured on the following models: XCZ-075-PRF and XCZ-LF-100

- The only valve on the market hat can handle flow rates as low as 0.2 GPM without without weeping (Low Flow DV Drip Valve)

ANTI-SIPHON VALVE

Featured on the XACZ-075-PRF and XACZ-100-PRF models

- Field-proven low flow anti-siphon valve that has an atmospheric vacuum breaker for backflow prevention and an IAPMO rating

COMPACT SIZE

- With only two components (valve plus pressure regulating filter) you can fit more Control Zone Kits in a valve box, saving time and money

PR FILTER KITS

Featured on the following models:
XCZLF-075-PRF, XCZ-075-PRF, XACZ-075-PRF, XCZPGA-100-PRF, XCZ-100-PRF, XACZ-100-PRF

- All of these kits provide on/off control, filtration, and built-in pressure regulation with fewer components so there is less chance of leakage at the connections, both at installation and over the life of the system

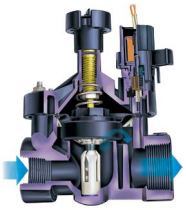
QUICK-CHECK FILTER WITH PRESSURE REGULATION AND FILTRATION ALL IN ONE

GREEN INDICATES A CLEAN FILTER

RED INDICATES A DIRTY FILTER

Featured on the following models: XCZ-100-PRB-COM

- Save labor and time with the simple-to-check indicator bubble and easy-to-clean stainless steel screen
- The product design allows the internal filter screen element to be accessed vertically while preventing debris from falling into the line
- Efficient design combines filtration and pressure regulation in one compact unit
- Fewer connection points mean less chance of leaking and less assembly time
- The body is made of durable, glass filled nylon
- Replacement stainless steel screens also avaiable separately in 100, and 200 mesh



SCRUBBER VALVE

Featured on the following models:

- XCZ-100-PRB-COM,
- XCZ-100-PRB-R
- XCZ-150-LCDR

- Plastic scrubber scrapes the stainless steel screen to clean and break down grit and organic materials
- Slow closing prevents water hammer and subsequent system damage
- Fabric-reinforced diaphragm adds strength and durability

CONTROL ZONE KIT SELECTION GUIDE

This easy-to-use selection tool is available at www.rainbird.com/CZK and will help identify the most appropriate Control Zone Kit for the application.

Commercial High Flow: 15 - 62 GPM

XCZ-150-LCS
FLOW: 15 - 62 GPM

XCZ-150-LCDR
FLOW: 15 - 62 GPM

Commercial Wide Flow: 0.3 - 20 GPM

XCZ-100-PRB-COM
FLOW: 0.3 - 20 GPM

XCZ-100-PRBR
FLOW: 0.3 - 20 GPM

XCZ-100-PRB-LC
FLOW: 0.3 - 20 GPM UPDATED

Residential Medium Flow: 3 - 15 GPM

XCZPGA-100-PRF
FLOW: 3 - 15 GPM

XCZ-100-PRF
FLOW: 3 - 15 GPM

XACZ-100-PRF
FLOW: 3 - 15 GPM

Residential Low Flow: Flow: 0.2 - 10 GPM

XCZLF-100-PRF
FLOW: 0.2 - 10 GPM

Residential Low Flow: Flow: 0.2 - 5 GPM

XCZ-075-PRF
FLOW: 0.2 - 5 GPM

XACZ-075-PRF
FLOW: 0.2 - 5 GPM

FITTINGS

Rain Bird offers a complete fittings solution set for the entire dripline system. All fittings are designed to deliver a secure connection with features which allow for easy installation.

■ XF DRIPLINE INSERT FITTINGS

Rain Bird's 17mm Insert Fittings have a barbed end that is raised and sharp providing a strong connection. This fitting is rated for operating pressures up to 50 psi (3.45 bar) without using clamps. If operating pressures exceed 50 psi (3.45 bar), a clamp is recommended. To install, the fittings are pressed into the tubing. It is important you do not heat the polyethylene tube before inserting to make installation easier, as it will weaken the connection and can damage the tubing. For the full line of insert fittings, refer to our product catalog or visit the website at: ***http://www.Rainbird.com/professionals/products/drip-distribution***

Features:

- Complete line of 17mm insert fittings to simplify installation of XF Series Dripline
- High quality barbs grab tubing for a secure fit
- Unique barb design to reduce insertion force and still retain a secure fit
- Non-obtrusive colored fittings to complement natural earth tones

Models

Model: XFF-COUP
Description: 17mm Barb x Barb Coupling

Model: XFF-ELBOW
Description: 17mm Barb x Barb Elbow

Model: XFF-MA-050
Description: 17mm Barb x 1/2" MPT Male Adapter

Model: XFF-FA-050
Description: 17mm x 1/2" FPT

Model: XFF-TEE
Description: 17mm Barb x Barb x Barb Tee

Model: XFF-TMA-050
Description: 17mm Barb x 1/2" MPT x 17mm Barb Tee Male Adapter

Model: XFF-MA-075
Description: 17mm Barb x 3/4" MPT Male Adapter

Model: XFF-TFA-050
Description: 17mm x 1/2" FPT x 17mm

Also Available

Model: XFD-CROSS
Description: Barb Cross 17mm x 17mm x 17mm x 17mm

Model: XFD-TFA-075: Barb Female Adapter
Description: 17mm x 3/4"FPT x 17mm

Model: XFD-FA-075: Barb Female Adapter
Description: 17mm x 3/4" FPT

■ XF SERIES | INSERTION TOOL

Rain Bird's XF Insertion Tool assists you with installing XF Series 17 mm Fittings in less time with less effort. The XF Insertion Tool securely locks fittings into place to make inserting into dripline much easier. The handles on either side of the tool can be used to flair out the ends of the dripline. The tool also has a sloped valley to allow room for the dripline when inserting onto the second side.

Compatibility:
Insertion tool can be used to install XF Coupling, Elbow, and Tee fittings.

Model:
FITINS-TOOL

■ XF SERIES | EASY FIT COMPRESSION FITTINGS (FOR ON-SURFACE USE ONLY)

Rain Bird patented Easy Fit compression fittings go together with half the force as insert fittings and can be used for on-surface dripline and tubing with diameters from 16 to 17mm OD. Snap-in adapters provide versatility to eliminate the inventory of over 160 combinations of connections. The Easy Fit compression fittings provide a stronger connection and can be used with operating pressures up to 60 psi (4.14 bar). For the full line of Easy Fit fittings, refer to our website at ***https://www.rainbird.com/products/easy-fit-compression-fitting-system*** or consult a Rain Bird product catalog.

Model: MDCF-50-MPT

Description:
1/2" MPT x Compression adapter for easy fit fitting

Model: MDCF-75-MPT

Description:
3/4" MPT x Compression adapter for easy fit fitting

Model: MDCF-EL

Description:
16mm Compression x Compression Elbow

Model: MDCF-50-FPT

Description:
1/2" FPT x Compression adapter for easy fit fitting

Model: MDCF-75-FPT

Description:
3/4" FPT x Compression adapter for easy fit fitting

Model: MDCF-TEE

Description:
16mm Compression x Compression Tee

Model: MDCF-75-FHT

Description:
3/4" FHT x Compression adapter for easy fit fitting

Model: MDCF-COUP

Description:
16mm Compression x Compression Couipling

Models: MDCF-CAP (Black)
MDCFP-CAP (Purple)

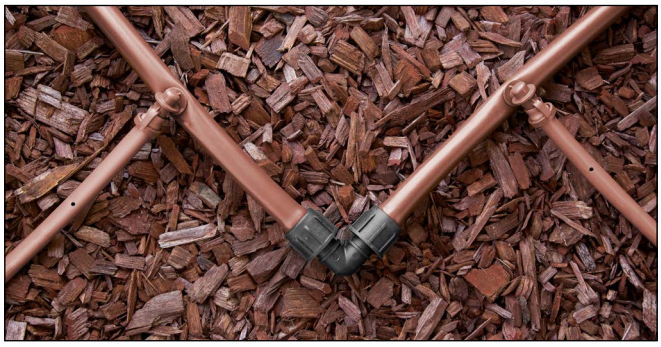
Description:
Use Caps to shut off MDCF-COUP, MDCF-EL or MDCF-TEE

TWIST LOCK FITTINGS (TLF)

Rain Bird's complete line of Twist Lock Fittings simplify the installation of all industry-standard ½", ¾" and 1" tubing. They provide an even tighter seal on tubing by using high quality barbs and twist-locking nuts. Their unique barb design reduces insertion force while maintaining a secure fit.

Operating Range

- Pressure: 0 to 60 psi (0 to 4.1 bar)



Models

600 SERIES:

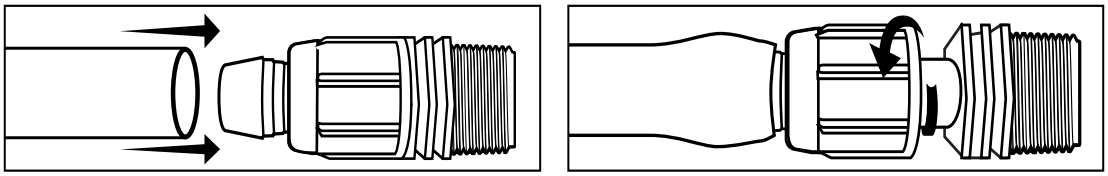
- TLF-CUPL-0600: Twist Lock Fitting ½" Coupler
- TLF-TEE-0600: Twist Lock Fitting ½" Tee
- TLF-ELBW-0600: Twist Lock Fitting ½" Elbow
- TLF-MPT6-0600: Twist Lock Fitting ½" NPT to ½" Adaptor
- TLF-MPT8-0600: Twist Lock Fitting ¾" NPT to ½" Adaptor

800 SERIES:

- TLF-CUPL-0800: Twist Lock Fitting ¾" Coupler
- TLF-TEE-0800: Twist Lock Fitting ¾" Tee
- TLF-ELBW-0800: Twist Lock Fitting ¾" Elbow
- TLF-MPT8-0800: Twist Lock Fitting ¾" NPT Adaptor
- TLF-CAP-0800: Twist Lock Fitting ¾" Cap

1000 SERIES:

- TLF-CUPL-1000: Twist Lock Fitting 1" Coupler
- TLF-TEE-1000: Twist Lock Fitting 1" Tee
- TLF-ELBW-1000: Twist Lock Fitting 1" Elbow
- TLF-MPT8-1000: Twist Lock Fitting 1" NPT Adaptor

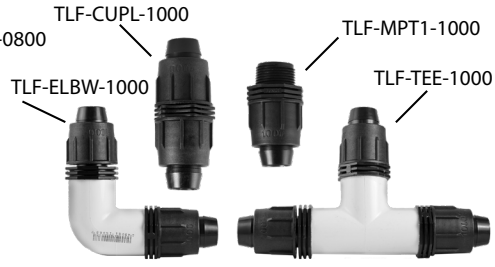


2 Step Installation

	600 Series		800 Series		1000 Series	
	Inches	mm	Inches	mm	Inches	mm
Acceptable Internal Diameter	0.590 to 0.630	15 to 16	0.790 to 0.845	20.0 to 21.5	1.025 to 1.085	26.0 to 27.6
Acceptable Wall Thickness	0.025 to 0.050	0.64 to 1.27	0.045 to 0.065	1.14 to 1.65	0.045 to 0.065	1.14 to 1.65
Compatible Tubing	XT700, ½" XBS		¾" XBS, ¾" QF Dripline Header		1" QF Dripline Header	

600 Series

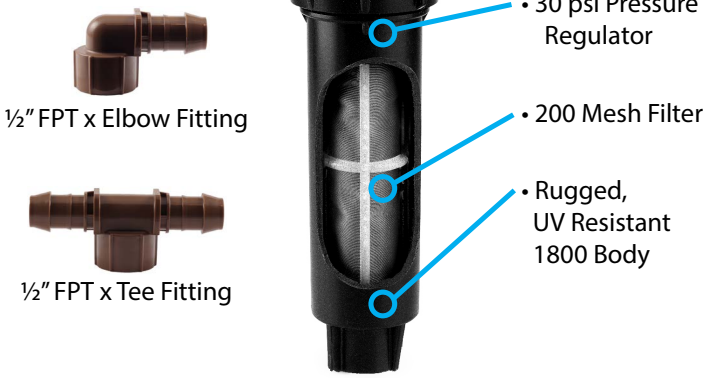
800 Series



1000 Series

■ SPRAY-TO-DRIP RETROFIT KIT

The easiest and fastest way to convert a conventional spray zone to a low-volume irrigation zone.



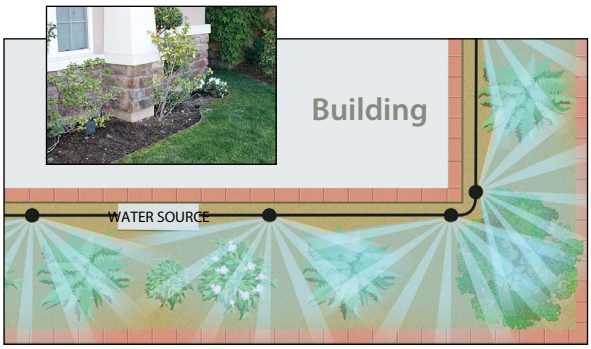
INSTALLATION

- Simply remove the top of any 1800 and remove the internal assembly (on the 1806 and 1812 leave the spring in the body)
- Remove the internal assembly of the retro kit and drop it into the exiting body
- Tighten the cap
- Cap off all other spray heads in the zone using Xeri-Caps™ (sold separately)
- ½" FPT x Elbow Fitting and (1) ½" FPT x Tee Fitting for easy connection to drip tubing

FEATURES

- Can be installed above or below grade.
- Provides 30 psi (2.1 bar) pressure regulation and 200 mesh (75 microns) screen
- **Flow rate:** 0.50 to 6.00 GPM



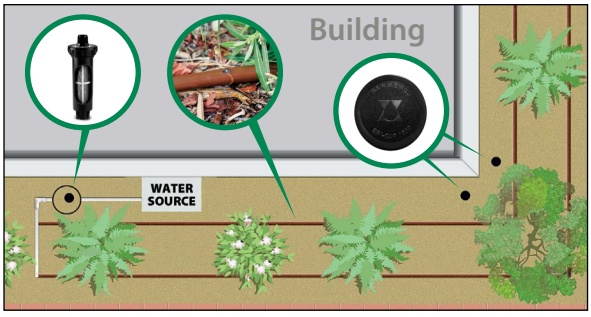
■ CURRENT APPLICATION

Products

- Overhead sprays

Issues

- Overspray damage to structure, fence, windows
- Water loss to wind
- Runoff liability in high traffic areas



■ DRIP SOLUTION

Products

- Retrofit Kit (1800-Retro)
- XF Series Dripline
- 17mm XF Insert Fittings

Advantages

- Reduce the effects of wind and evaporation by 30%-70%
- No runoff
- No overspray damage
- Easy to install

AIR/VACUUM RELIEF VALVES

Air/Vacuum Relief Valves are used for two reasons:

- To allow air into a zone at the end of a watering cycle. This ensures a vacuum doesn't draw debris into the dripline. (back siphoning)
- To ensure release of air from a zone at the start of watering, eliminating air pockets. This speeds fill time, thus increasing watering uniformity across the zone.

Install Air/Vacuum Relief Valves correctly by:

- Install at the highest point(s) of the dripline zone.
- Install the valve in an exhaust header or a line that runs perpendicular to the lateral rows to ensure all rows of the dripline can take advantage of the air/vacuum relief valve.

SEB 7XB emitter box (Sold Seperately)

½" Air Relief Valve

Model:
ARV050

TABLE 10: LATERAL RUN LENGTHS

Maximum length of dripline that can be used with the Air Relief Valve (ARV)

	½" ARV	
Emitter Spacing	0.6 GPH	0.9 GPH
12"	639 ft	424 ft
18"	958 ft	636 ft

Air Relief Valve capacity

	½" ARV
Total Flow (GPM)	6.5
Total Flow (GPH)	390

ARV should be installed at the high points in the drip zone for proper operation and to reduce the risk of back siphoning.

TIE-DOWN STAKES

XF Series tie-down stakes are made of long lasting corrosion resistant 9-gauge galvanized steel. Use stakes to hold dripline on-surface or under a mulch cover. For best results, stagger stakes every 3 feet (.91 m) in sand, 4 feet (1.22 m) in loam, and 5 feet (1.52 m) in clay. At fittings where there is a change of direction such as tees or elbows, use tie-down stakes close to the fitting on each leg of the change of direction.

Models:

TDS6050
TDS6500

MANUAL LINE FLUSH POINT

A manual flush point is necessary to flush the system after instillation and maintenance. The flush point is also necessary when emptying the system for winter.

- Install the manual flush at a low point in the exhaust header of a grid layout, or at the mid-point of a Loop Layout. (see pages 15,16)
- Install a flush port with a threaded plug or a manual flushing valve in a valve box with a gravel sump adequate to drain approximately one gallon of water
- Manual flush points are normally installed as far away from the water source as possible

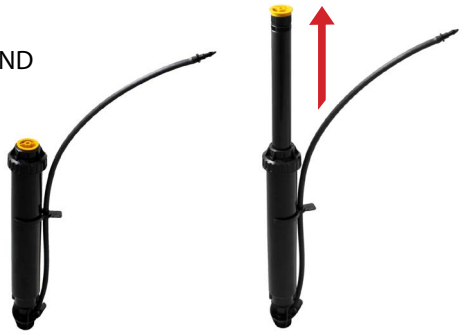
DRIP SYSTEM OPERATION INDICATOR

Features

- Stem rises 6" (15 cm) for clear visibility
- When stem is fully extended, drip system is charged to a minimum of 20 psi
- Includes 16" of ¼" distribution tubing with ¼" connection fitting pre-installed
- Operational Indicator Kit includes three different indication caps; potable, non-potable, or an adjustable 4-VAN nozzle
- VAN nozzle is tightened to no flow but can be opened to observe wetting pattern

Model

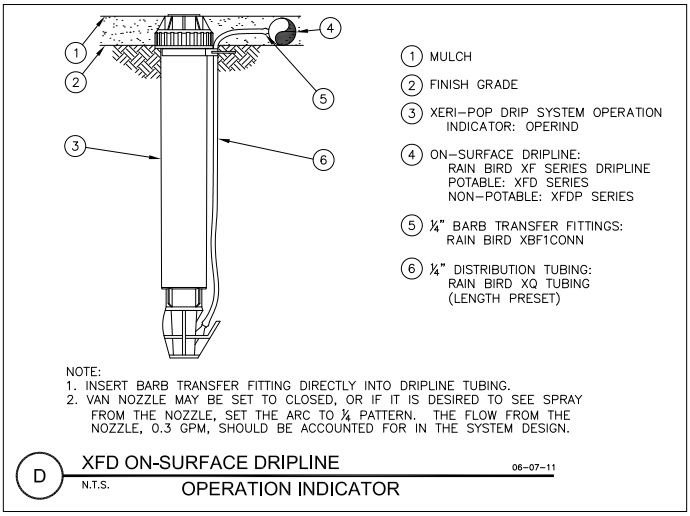
- OPERIND



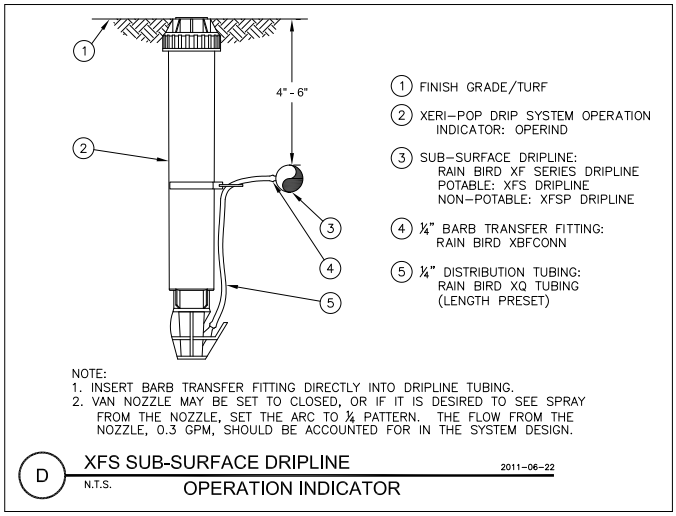
System is OFF *System is ON*

4-VAN Nozzle | Potable Cap | Non-potable Cap

Installation of Operation Indicator with XFD On-Surface Dripline



Installation of Operation Indicator with XFS Subsurface Dripline

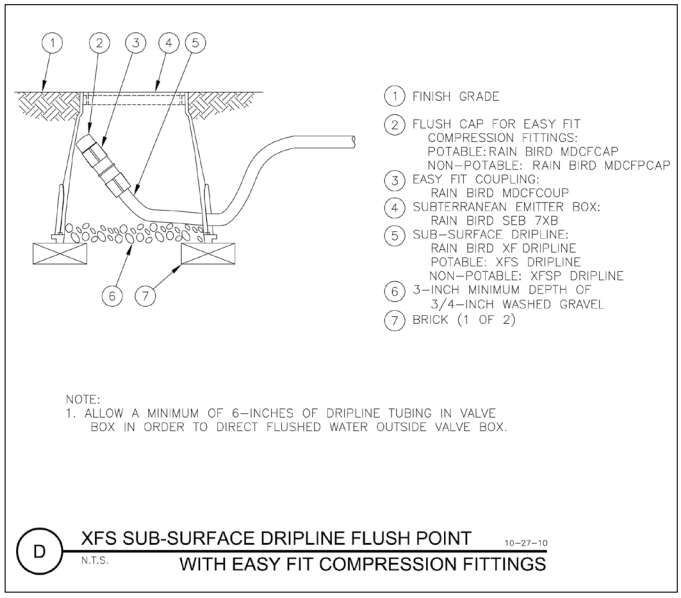


SECTION 9: FAQ's, Glossary and Resources

PREVENTATIVE MAINTENANCE

FLUSHING

- Flush the system every two weeks for the first 6 weeks and check the water that is flushed out for cleanliness
- Establish a regular flush schedule for the future after these initial checks
- Flush the system well after any repairs are made
- Check the pressure at the supply and flush headers on a regular basis and compare with the pressure readings taken right after installation



WINTERIZING

- Winterizing an irrigation system involves removing enough water to ensure that components are not damaged due to freezing weather
- Check the manufacturer's instructions for winterizing the valves, filters and backflow prevention devices

If compressed air is used to blowout the lines:

- Compressed air may only be used with the flush valve open and with the air pressure at 40 psi (2.76 bar) or less
- XF Dripline Insert Fittings are rated to 50 psi (3.45 bar), so the air pressure must be adjusted below this pressure
- It is air volume, not pressure, which is effective when blowing out the lines
- The pressure-regulating valve that is part of the control zone regulates water, not air pressure
- With all flush valves open, compressed air should be applied until no water is seen exiting the flush valves
- After turning off the air, close all flush valves

If compressed air is not used to blowout the lines:

- A drain port should be installed at all low points in the zone. These ports may be a tee or elbow with a threaded plug or a manual flush valve
- If the zone is in a grid or closed loop system, the headers may contain a significant amount of water because they are either QF Header, blank XF Series tubing, PVC, or poly pipe. It is important to provide drain ports for these components
- If the zone has laterals that dead-end and are not connected to an exhaust header, the lateral ends should be opened to drain at the lowest point(s)

SPECIFICATIONS

WRITTEN SPECIFICATIONS AND CAD DETAIL DRAWINGS

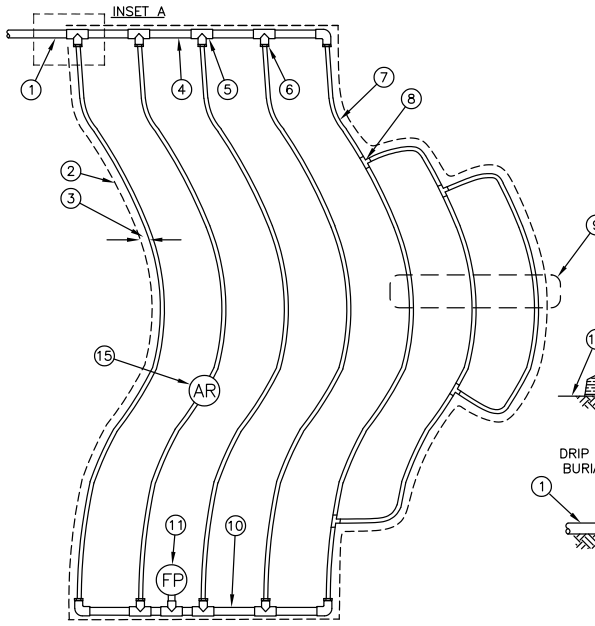
Rain Bird's technical specifications for commercial products are now avilable in Microsfot Word format. For your convenience, these technical specifications can be easily edited or cut and pasted into your documents and drawings, saving you time and money.

Visit written specifications page:
https://www.rainbird.com//professionals/specifier-design-resources-product-page

Rain Bird CAD Detail Drawings for Landscape Irrigation products are now available in four popular formats: DWG for AutoCAD users, DXF for importing into alternate CAD programs, JPG for most web browsers and Microsoft Office users and PDF for printing and emailing to clients.

Visit CAD drawings page:
https://www.rainbird.com//professionals/specifier-design-resources-product-page

Sample CAD Drawing



1. PVC SUPPLY PIPE FROM RAIN BIRD CONTROL ZONE KIT (SIZED TO MEET LATERAL FLOW DEMAND)
2. PERIMETER OF AREA
3. PERIMETER DRIPLINE PIPE TO BE INSTALLED 2"–4" FROM PERIMETER OF AREA
4. PVC SUPPLY MANIFOLD
5. PVC SCH 40 TEE OR EL (TYPICAL)
6. BARB X MALE FITTING: RAIN BIRD XFD–MA FITTING (TYPICAL)
7. SUB–SURFACE DRIPLINE: RAIN BIRD XF SERIES DRIPLINE (TYPICAL) POTABLE: XFS DRIPLINE NON–POTABLE: XFSP DRIPLINE
8. BARB X BARB INSERT TEE: RAIN BIRD XFD–TEE (TYPICAL)
9. TOTAL LENGTH OF SELECTED DRIPLINE SHOULD NOT EXCEED LENGTH SHOWN IN TABLE
10. PVC EXHAUST HEADER
11. FLUSH POINT: SEE RAIN BIRD DETAIL "XFS FLUSH POINT"
12. PVC SCH 40 RISER PIPE
13. TURF OR MULCH
14. FINISH GRADE
15. AIR RELIEF VALVE: RAIN BIRD AR VALVE KIT XXX SEE RAIN BIRD DETAIL "XFS AIR RELIEF VALVE KIT"

NOTES:
1. DISTANCE BETWEEN LATERAL ROWS AND EMITTER SPACING TO BE BASED ON SOIL TYPE, PLANT MATERIALS AND CHANGES IN ELEVATION. SEE INSTALLATION SPECIFICATIONS ON RAIN BIRD WEB SITE (WWW.RAINBIRD.COM) FOR SUGGESTED SPACING.
2. LENGTH OF LONGEST DRIPLINE LATERAL SHOULD NOT EXCEED THE MAXIMUM SPACING SHOWN IN THE ACCOMPANYING TABLE.

D XFS SUB-SURFACE DRIPLINE 3–17–11
N.T.S. TYPICAL ODD CURVES LAYOUT

XFS Dripline Odd Curves Layout.dwg

	XFS Dripline Maximum Lateral Lengths (Feet)					
	12" Spacing		18" Spacing		24" Spacing	
PSI	0.6 GPH	0.9 GPH	0.6 GPH	0.9 GPH	0.6 GPH	0.9 GPH
15	273	155	314	250	424	322
20	318	169	353	294	508	368
30	360	230	413	350	586	414
40	395	255	465	402	652	474
50	417	285	528	420	720	488
60	460	290	596	455	780	512

WHEN USING 17MM INSERT FITTINGS WITH DESIGN PRESSURE OVER 50PSI, IT IS RECOMMENDED THAT STAINLESS STEEL CLAMPS BE INSTALLED ON EACH FITTING.

FREQUENTLY ASKED QUESTIONS

Where can I use XF Series Dripline?
This design guide outlines all of the XF series driplines for use in any on-surface or subsurface landscape irrigation application.

How do I know if the drip system is actually working?
A Drip System Operation Indicator (OPERIND) can be installed on a XF Series Dripline zone. During operation the OPERIND will provide a visual indication that the drip zone is performing as designed. (see page 54)

What can I expect to achieve in regards to water savings?
It is generally accepted that drip irrigation is over 90% efficient. It delivers water directly to the plant root zone. Also, when compared to sprinklers, drip irrigation can save water by reducing the effects of wind and evaporation from 30% to 70%.

Can XF Series Dripline be used with reclaimed (non-potable) water?
Yes. XF Series dripline is available in full purple and purple stripe for non-potable water.

What is the life expectancy of the system?
XF Series dripline is made of a dual-layered tubing that provides unmatched resistance to chemicals, algae growth and UV damage. With good design, installation and maintenance an XF Series dripline system will provide many years of reliable service. Like any irrigation system, a drip zone should be inspected regularly to insure that filters are clean and that the system is working properly.

How does the Rain Bird Copper Shield™ work?
Rain Bird's Copper Shield™ protects the emitter from root intrusion without harming the plants or other roots. When a root tries to intrude into the emitter, it comes in close proximity to the Copper Shield™ and copper ions are released. These copper ions bind themselves to the attacking root tip and stop it from advancing, thus protecting the emitter.

Will I see striping in turf irrigated with Subsurface dripline?
A well designed, installed and maintained XFS subsurface dripline system will provide years of superior turfgrass quality while using significantly less water.

Will the XFS Copper Shield™ work if it oxidizes?
If the Copper Shield™ oxidizes, these oxides continue to have copper in them. The emitter continues to be protected because of the copper ions that are still present in the oxidized Copper Shield™.

How long will the copper last?
Testing shows that on average Copper Shield™ will exceed 16 years of life.

Rain Bird's Professional CustomerSatisfactionPolicy	**XF Series Dripline offers five (5) years on product workmanship and seven (7) years on environmental stress cracking**

FREQUENTLY ASKED QUESTIONS

What if I need to aerate?
Subsurface drip irrigation can greatly reduce or eliminate the need for aeration. If core aeration is expected to be done in the turf where subsurface is to be installed, be sure the tine depth is less than the depth of the buried dripline. If core aeration is used, consider installing the dripline at 6" deep and using an aeration tine depth no greater than 4".

How do I fertilize my turfgrass areas with an XFS Subsurface drip irrigation system?
There a variety of methods to fertilize turfgrass areas including the following:

- Initiate a manual start on the irrigation controller for the turfgrass zones to bring water to the surface and begin to move the fertilizer into the soil structure
- Apply hand watering to the turfgrass areas to water in the fertilizer
- Apply fertilizer prior to a rainfall event
- Consider the use of fertilizer injection system to provide nutrients to the on-surface shrub bed areas as well as the subsurface turf areas

Can I establish sod with Subsurface Drip Irrigation?
An XFS subsurface dripline system is no different than a spray head or rotary zone in this regard. Initial water time and frequency should be programmed appropriately to allow for the establishment of new sod. As with conventional sprinkler systems, some supplemental hand watering maybe needed to be provide coverage to isolated "hot" spots during the establishment period.

Where can I find out more about Rain Bird XF Series Dripline?
For additional information on the XF Series family of dripline products please visit www.rainbird.com.

GLOSSARY

Aerated (aeration) – The act of creating holes in the turfgrass to loosen the soil and get oxygen to the underground roots.

Application Rate – A measurement of the amount of water added to a zone over a certain amount of time, often reported in inches per hour.

Back Siphoning – The reverse flow of water from the soil into the emitter outlet hole. This can happen when there is no check valve or vacuum air relief valve, and water drains out of low-elevation emitters creating a back siphon that pulls water into the emitters at higher levels.

Capillary Action – The movement of water through the soil where the water sticks to the sides of very small passages or capillaries between soil particles.

Center Feed – This layout allows you to increase the size of the zone by providing lateral runs on both sides of the supply header which is located in the center.

Dripline – Polyethylene tubing with emitters pre-inserted at various intervals; usually 12" or 18".

Dynamic Pressure – The pressure as measured when water is flowing in the system.

Emitter – The device inside the dripline that controls the amount of water flow out of each outlet hole.

Emitter Check Valve – A built-in feature of a dripline emitter which allows water to flow in one direction only. Used to prevent drainage at the lowest point in the zone.

End Feed – A typical layout that uses supply headers and flush headers with rows of dripline connected between them.

Flow Rate – The amount of water that travels through the pipes or the emitters in a given amount of time. Flow rate is normally measured in gallons per minute (GPM) or gallons per hour (GPH).

Flush Header – Flexible or rigid pipe and fittings connecting a group of dripline rows and found at the opposite end of the Supply Header (also known as "manifold").

Flush Valve – A valve that can be opened automatically or manually to discharge the water that is in the system of dripline rows and headers to remove any accumulated dirt or debris.

Friction Loss – The reduction in pressure caused by water flowing in a pipe because of friction created when the flowing water slides against the inside walls of the pipe or tubing.

Hold Back – The ability of an emitter with built-in check valve to keep dripline charged with water up to a certain elevation change.

Pores – The small spaces between soil particles that water can move into (see Capillary Action).

Precipitation Rate – A measurement of the amount of water added to a zone over a certain amount of time, often reported in inches per hour (same as Application Rate).

Riser – A pipe or tube that carries water upward from a buried water supply pipe to a fitting or sprinkler.

Run Time – The amount of time that the valve is open and water is delivered to an irrigated area.

Static Pressure – The pressure as measured when there is no flow in the system.

Supply Header – The combination of flexible or rigid pipe plus fittings that supplies water to many rows of dripline (also known as "manifold").

Zone – A part of the landscape that gets irrigated at the same time.

NOTES

NOTES

The Intelligent Use of Water™

LEADERSHIP • EDUCATION • PARTNERSHIPS • PRODUCTS

At Rain Bird, we believe it is our responsibility to develop products and technologies that use water efficiently. Our commitment also extends to education, training and services for our industry and our communities.

The need to conserve water has never been greater. We want to do even more, and with your help, we can. Visit www.rainbird.com for more information about The Intelligent Use of Water.™

RAIN BIRD®

Rain Bird Corporation
970 West Sierra Madre Avenue,
Azusa, CA 91702, U.S.A.
Phone: (626) 812-3400
Fax: (626) 812-3411

Rain Bird Technical Services
(800) RAINBIRD (1-800-724-6247)
(U.S. and Canada)

Rain Bird Corporation
6991 East Southpoint Road,
Tucson, AZ , 85706, U.S.A.
Phone: (520) 741-6100 Fax: (520) 741-6522

Specific Hotline
(800) 458-3005 (U.S. and Canada)

Rain Bird International, Inc.
1000 West Sierra Madre Avenue,
Azusa, CA 91702, U.S.A.
Phone: (626) 963-9311
Fax: (626) 852-7343

www.rainbird.com

D40024C