Intelligent Water Solutions

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SDI

Subsurface Drip Irrigation

Netafim™
Grow More with Less
What is SDI?
Subsurface Drip Irrigation (SDI) is a variation of traditional drip irrigation where the drip line is buried beneath the soil surface as opposed to laying on the surface. This allows for water to be supplied directly to the plant roots. Water will move through the soil downward by gravity as well as outward and upward by capillary action.

Why SDI?
SDI is the most efficient irrigation method available to turn fields into more productive and profitable land. For over four decades, producers have depended on drip irrigation advancements to help them improve yields while also reducing water, energy, labor, and nutrient costs. Central to the SDI advantage is its adaptability to any field shape, size, and topography. As water becomes scarcer, the 95% water efficiency rating is becoming a driving force in the adoption of SDI. These efficiencies arise from:
- Water is delivered directly to the root zone
- No loss due to run-off, wind, and evaporation
- Water is delivered consistently at the rate of plant uptake and ET

How SDI Works
SDI consists of flexible polyethylene (PE) tubing with emitters permanently welded to the inside wall of the tubing. These drip lines are buried within the soil in rows (typically 30” to 60” apart), at a depth (typically 8” to 16” deep) depending on the producers’ needs. Water is pumped under low pressure through a filtering system to the drip lines. The emitters slowly emit specific amounts of water directly to the root zone of the plant. The controlled, precise output of the emitter provides water at a rate that allows the plant to uptake most of the water pumped. The system can also be used to deliver nutrients more efficiently. The end result is improved crop yields with more efficient use of water.

SDI History
The 19th century brought about the beginning of modern drip technology when German researchers used clay pipe to create subsurface irrigation and drainage systems. Further development in the usage of plastic pipe to hold and distribute water occurred in Australia in the 1920’s. By far the most significant advancement came in the 1950’s with the development of the plastic emitter in Israel by Simcha Blass and his son Yeshayahu. This invention sparked the beginning of Netafim, now a global leader in drip technology.

Southern Irrigation works closely alongside Netafim. Netafim continues to lead the world in technologically advanced, user-friendly drip irrigation systems, offering a complete line of superior components. Component compatibility combined with proper system design, installation and maintenance ensures reliable easy to operate systems that provide the greatest efficiency and return on investment.

Interest in SDI in North America has grown rapidly within the last 20 years as a result of installation procedure refinements, lower costs, and enhanced product qualities. Many further innovations have brought SDI to the forefront of modern agriculture irrigation, especially in areas where water is scarce or where increased efficiencies are desired. SDI is now being used throughout the world on a wide range of grain, forage, and fiber crops including alfalfa, corn, cotton, soybeans, and sugarcane.

Frequently Asked Questions

- Doesn’t water only move downwards?
  Water movement varies depending on the soil type. Part of the design process will be to take a soil content probe at 0-6”, 6-12”, and 12-18”. Properly designed and installed, the water will move both downwards due to gravity, and upwards and outwards due to capillary action.

- Are there issues with lines plugging?
  With the advanced dripper construction and proper installation, operating, proper maintenance and flushing procedures, the risk of lines plugging is negligible. If this does occur, there are acids and chemicals that can be pumped through the lines to unplug the drippers.

- Are there issues with rodents?
  Damage to the drip lines caused by rodents is a recognized risk to any SDI system. With this said, there are many methods to reduce this risk as much as possible. Some of these include packing/rolling the soil immediately following trenching, running water through the lines immediately following installation, use of bait and traps, fumigation, predator introduction, and habitat modification.

- Does the system need to be winterized?
  Winterizing the system is a necessary maintenance procedure as water will freeze and expand, possibly damaging plastic and metal system components. Water from filters, valves, chemigation equipment, pressure regulators and subsurface pipes and drip lines should be emptied, especially at lower ends of the field where water typically accumulates. Polyethylene drip lines are not subject to damage from freezing since drippers provide drainage points and polyethylene is flexible.

Our Commitment
Southern Irrigation is committed to supporting the producer in every way possible. This includes Return On Investment calculations, on-farm visits, SDI system design, installation advice and any post installation help the producers may require. Our desire is for the producer to be 100% satisfied with the product and to experience the yield increases that are possible with this drip technology.
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**SDI ADVANTAGES:**
- Maintains optimum soil moisture
- Maintains optimum soil nutrient levels
- Increased soil aeration
- Less disease problems
- Ease of harvestability and machinery work due to no pivot being in the way
- Quick entry into field after irrigating
- Water application efficiency
- Fertilizer cost savings
- Controlled application
- Spoon feed directly to root zone
- Less loss to deep leaching
- Less loss to weed growth
- Decreased runoff
- Timely application based on plant physiology
- Energy cost savings
- Low pressure system
- Less herbicides
- Harvesting efficiencies
- 25-40% less water
- 25-40% less fertilizer
- Labour cost savings
- Easily automated
- Compatible with difficult terrain
- Undulating
- Sloping
- Irregular shapes
- Meandering rivers, streams and canals
- Compatible with varying soil types
- Environmental advantages
- No deep leaching of plant nutrients
- No run-off carrying pesticides and fertilizers
- Highest water use efficiency
- No overspray on non-target surfaces
- Ability to meet the ET demands of many different crops
- Improves crop quality and bottom-line results
- Increases crop yield

**DESIGN**
Proper irrigation design incorporates agronomic, financial, and ergonomic considerations into a balanced system. In order to create an SDI system that will be successful, there are many variables that must be considered. These include field shape, topography, soil profile, and water quality and availability.

**Field shape and topography**
Field slope will determine whether a designer selects a pressure compensating or non-pressure compensating dripper.

- **Flat terrain**
  - Non-compensating drip irrigation
  - Large fields with up to 1/2 mile runs

- **Rolling terrain**
  - Pressure compensating dripper line (applications demanding high uniformity)
  - Long runs

**Soil profile**
Soil type and absorption play an important role in determining dripper application rate, lateral spacing, depth and row spacing.

- **Heavy Textured Soil (Clay)**
  - Low flow drippers are recommended.

- **Medium Textured Soil (Silt)**
  - Requires closer dripper spacing (compared to clay soil). Lower flow drippers are recommended.

- **Light Textured Soil (sand)**
  - Closer dripper spacing is required in order to uniformly wet the soil profile.

**Water quality and availability**
Properly addressing water quality issues is the most important factor in the successful operation of the subsurface drip irrigation system.

- **Physical** – suspended particles and filtration
- **Chemical** – pH iron, bicarbonates, carbonates
- **Biological** – bacteria and filtration/chemical treatment
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**Filtration**
A properly designed system includes provisions for correct filtration. This is the main difference between having an easy to use system and one requiring constant monitoring. The filter station will be the single most important component in the list of materials. A well-designed filter system maximizes the performance and longevity of your SDI system. Filtration should be based on several factors: water quality throughout the growing season, dripper flow path area, nature of contamination and the likelihood for fluctuations.

**Apollo™ Disc-Kleen Automatic Filter**
Disc filters offer depth filtration by using a stack of compressed discs that force the debris to move through numerous trap points. The increase in filtration surface area decreases the frequency of cleaning and makes cleaning easier. As debris in the filter increases, the automatic backflush process is initiated, releasing and flushing out the trapped debris.

**Valves**
Due to tape burst pressure limitations, proper use of pressure regulating valves is essential.

**Air/Vacuum Release**
The use of air and vacuum relief vents can mean the difference between a successful system and one with vacuum-induced plugging problems. Vacuum placement is critical and is topography dependent. Depending on field layout, venting may have to be provided at the top of the valve sets and both ends of the field.

**Water Meter**
It is essential to monitor the flow in the operation of your system and crop’s water use. Your SDI system is designed to produce a specific flow rate at a given pressure. Changes in the flow rate may indicate leaks in the system, improperly set pressure regulating valves or even changes in the water source and pumping station.

**Manifolds**
Because of the low-pressure differentials allowed in drip system design, manifolds must be designed to produce minimal pressure drop due to friction. A subsurface drip system has a buried main line and sub main line on one side of the field and a flush line on the other side. Manifolds can be constructed of PVC, PE, or Layflat.

**Fertilizer Injection**
Good fertigation capabilities will help the system pay for itself faster than any other component. Growers often neglect to utilize this feature to its full potential due to perceived complexity, uncertainty over what to inject, etc. Injection systems should meet expected demands for all chemicals, be easy to operate and calibrate and have provisions to prevent unwanted precipitates.

**Netafim FertiKit 3G**
The FertiKit 3G is a fully configurable fertilizer/acid dosing unit. It can accommodate a variety of dosing channels, dosing boosters, NMC Controllers, peripherals and accessories to meet a vast range of applications and infrastructure demands. The FertiKit doses the various fertilizers and acids into a homogenous solution and injects it into the irrigation water mainline.

**Drill Line Laterals**
Dripper line product selection:
SDI dripper lines are available in many different configurations to meet your unique crop and soil conditions. The options you choose will determine the overall cost of the system:
- Wall thickness – consider planned length of use
- Tubing size and dripper spacing
- Dripper type – Pressure Compensating or non-Pressure Compensating
- Dripper performance – consider product history, physical characteristics of flow path and hydraulic parameters.

Drippers:
Netafim’s integral drippers are injection molded using state-of-the-art precision machinery. Each integral dripper includes a precision molded filter making Netafim drippers highly resistant to clogging:
- Pressure compensating (Netafim’s DripNet PC drippers deliver the same flow rate per dripper from 6 psi to 60 psi)
- Largest dripper inlet filter area on the market
- Anti-siphon mechanism

**Maintenance**
Routine maintenance will help extend the life of the system. Maintenance should follow a regular schedule and be recorded for later reference. When properly maintained, drip can last up to 25 plus years – producing greater yields, improved quality and increased profits.

**Installation**
Southern Irrigation offers plow machines that cut the soil and places the drip line into the ground. These machines plow multiple lines at a time and requires one tractor operator and two persons to change the spools and ensure the lines are being fed into the ground properly. The horse power requirement on the tractor depends on how many lines are being plowed, but generally each shank utilizes 50 horsepower.