ecorain USA
SUBSURFACE IRRIGATION TECHNOLOGY

INSTALLATION GUIDE

A SMART WATERING SOLUTION,
WATER SAVINGS UP TO 70%

Irrigation Mat

iMat®
IRRIGATION MAT

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INTRODUCTION

This guide outlines the installation and design of the iMat. It is written for installers, irrigation managers and designers who have a solid understanding of irrigation .Included are technical data, installation schemes, parts and tools needed for installation and operation of the subsurface irrigation system.

ECO Rain USA is proud to introduce its Root Zone Irrigation Mat System, the latest German innovation in low pressure subsurface irrigation technology.

The most significant advantages are:

Water savings of up to 70% compared to conventional irrigation systems.

Lateral water dispersion, which ensures water saturation and storage throughout the entire area.

Plant/grass growth even on sandy grounds and on roof tops in arid climate zones.

Neither conventional irrigation nor subsurface tubing irrigation systems can achieve plant growth in those environments!!!!!!

This subsurface irrigation system nurtures the roots throughout the entire area not just with water but as desired with air/oxygen, minerals and fertilizers. This complete system guarantees optimal root growth and plant health with minimal water consumption.

What is LEED?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a point based rating system to evaluate the environmental performance of a building over its life cycle.
LEED promotes a building approach to sustainability in five key areas: sustainable sites, water savings, energy efficiency, materials selection and indoor environmental quality.
Detailed information on obtaining credits and the certification process is available from The United States Green Building Council (USGBC) on their website: www.usgbc.org

WATER EFFICIENCY
Credit 1.1
Water efficiency landscaping :Reduce water usage by 50% insert :2 points
Intent :
Limit or eliminate the use of potable water for landscape irrigation by 50%
By the use of irrigation efficiency, captured rainwater, plant species, use of recycled wastewater.

When installing a green roof additional LEED points can be granted (up to 19 depending on the project)
ENERGY EFFICIENCY and SUSTAINABLE SITES.
EA Credit 1 : Optimize energy performance
Energy efficiency Credit: Vegetated roofs can aid to the reduction of the energy consumption of the building.
Sustainable Sites Credit :
SS Credit 5.1 Protect or Restore Habitat
Promote biodiversity , provide habitat, use native or adapted plants
SS Credit 5.2 Maximize Open Space : In urban areas
SS Credit 6.1 Storm water control : Quantity control
SS Credit 7.2 Reduce Heat Island Effect

Note by EcoRain USA when using the iMat :

The designer on the LEED project needs to provide an irrigation plan and legend as well as calculations
And a cut sheet of the irrigation system demonstrating how water consumption is reduced by 50%.
For roof tops energy efficiency : demonstrate percentage improvements in the proposed building performance rating compared with the baseline building performance

PLANNING AND DESIGN

Prior to planning the system the following information is required:

- A scaled plan of the site to be irrigated
- Point – of – connection information, including static pressure and water flow rate
- Water type such as potable, gray, well, treated, etc. and characteristics
- Soil type
- Planting sizes and maturity including relative water needs
- Conditions such as elevation differences and climate data

Soil Type

Caution is needed during the installation process to make sure that the soil and fill soil are free of any large and/or sharp edged stones or debris.
It needs to be ensured that the filter stability of the soil is guaranteed.

Water Quality

As long as the water characteristics remain within moderate to low range of the scale no clogging potential for the driplines is to be expected.

CHEMICAL WATER QUALITY FOR THE CLOGGING POTENTIAL OF DRIP IRRIGATION

Description	Clogging danger with the following concentration		
	Low	Moderate	High
pH	< 7.0	7.0 - 7.5	> 7.5
Particulate matter*	< 30	30 - 100	> 100
Total dissolved solids*	< 500	500 - 2,000	> 2,000
Ferrous*	< 0.1	0.1 - 1.5	> 1.5
Manganese*	< 0.1	0.1 - 1.5	> 1.5
Calcium*	< 40	40 - 80	> 80
Carbonate density*	< 150	150 - 300	> 300
Hydrogen Sulfide*	< 0.2	0.2 - 2.0	> 2.0
Bacteria (quantity/ml)	< 10,000	10,000 - 50,000	> 50,000

* Concentration in mg per liter (mg/L) or parts per million (PPM)

Please stay within the medium range of the scale in order to avoid clogging the system.

TECHNICAL SPECIFICATIONS

The iMat consists of two tightly connected hydrophilic fleece layers with integrated driplines with implemented emitter root intrusion protection.

The iMat has excellent water dispersion characteristics and a water storage capacity of 0.098gal/sft (4 l/m2)

iMat Specifications:	**Metric**	**US**
1 roll small		
Width x Length	0.8 m x 50 m = 40 m2	2.62 ft x 164 ft = 429.7 sqft
Driplines	2	2
Spacing between dripline	35 cm	13.8 inch
1 roll large		
Width x Length	1.2 m x 50 m = 60 m2	3.93 ft x 164 ft = 644.5 sqft
Driplines	3	3
Spacing between dripline	35 cm	13.8 inch
Water consumption	20 l/h/m2	0.49 gal/h/sqft
Water Storage capacity	4 l/m2	0.096 gal/sqft
Grey water compatible!		

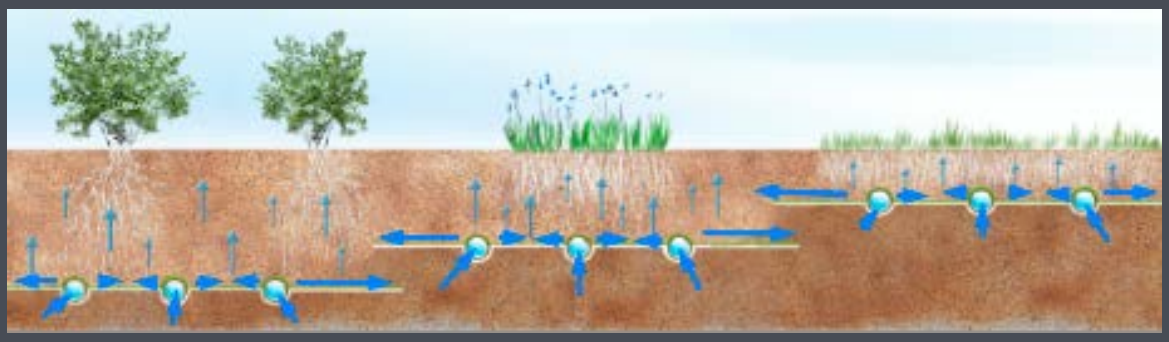
Dripline Specification:		
Outer Diameter	16.1 mm	0.634 inch
Inner Diameter	13.6 mm	0.536 inch
Dripper Spacing	30.5 cm	12 inch
Flowrate	2.3 l/h	0.6 gal/h
Pressure	0.6 – 4.1 bar	8.5-60 psi
Grey water compatible!		

iMAT SPECIFICS

- When laying down the mat the overlap just needs to ensure that there are no gaps between the adjacent mats.
- The water consumption per sqmeter and hour of the iMat is 20 l/h/squaremeter = 0.49 gal/h/sqft based upon which the number and size of the solenoid valves are calculated at given pipe dimensions.
- The maximum length of the matting strips depends on the water pressure and on any site elevation changes. Generally speaking, a maximum length of 328 Ft (100m) should not be exceeded.
- On hills the matting strips are laid perpendicular to the slope of the terrain and depending on the terrain securely fixed with stages.

INSTALLATION DEPTH

Installations with pre-cultivated mats have been successfully tested at an installation depth of 2”



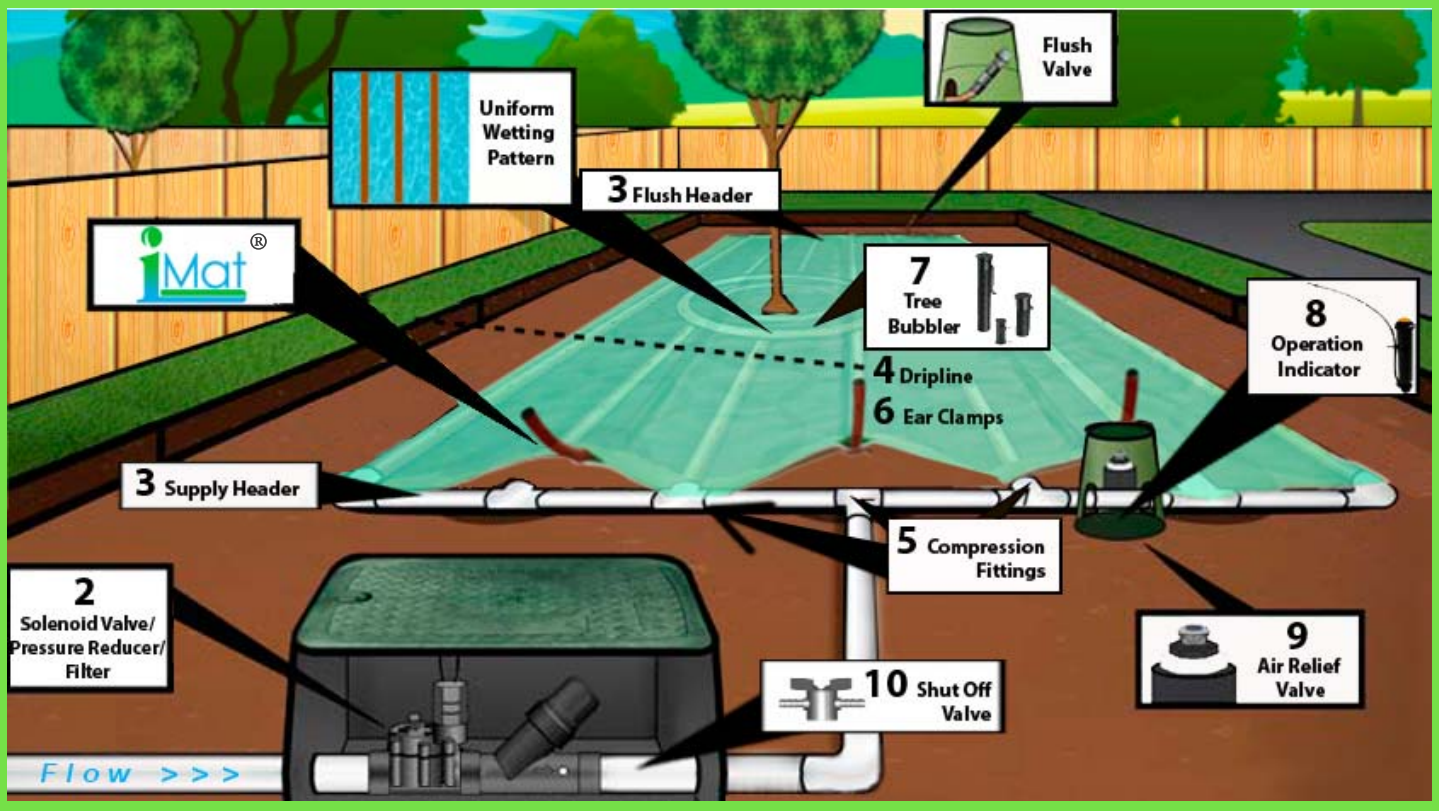
Shrubs and bushes 12” Perennials and Bushes 6-12” Grass sod or seeds 2-6”

The installation depth depends on each construction project's individual needs. It will be determined by the following factors and has to be coordinated with the landscape architect and/or landscape company:

- Location
- Type of soil / fill soil
- Kind of planting
- Specification of equipment and machinery for maintaining vegetation (such as lawn tractors or lawn mowers and aerators)

The use of the above listed equipment may require different installation depths to prevent damage during maintenance work, especially when it is decided to aerate from the top and not via the subsurface tubing system!!! In areas with especially saline ground water, the installation of a capillary barrier or a similar drainage system below the iMat is necessary to disable contact with the saline ground water.

SCHEMATIC LAYOUT



A typical zone layout consists of a supply header and exhaust/flush header where the driplines of the iMat are connected to. Large trees require a separate ring system of driplines to ensure sufficient water supply.

COMPONENTS

1.

STANDARD CONTROLLER AND RAINSENSOR.

A controller is called “the brain” of every irrigation system. Depending on the size of the project Controllers vary from 6 to 12 and more irrigation zones. The iMat is compatible with any parts and controllers available on the market. Program starting and runtimes according to watering schedule (see page 13)
Rain sensors are available in various versions. No necessity to irrigate when it rains

2.

LOW PRESSURE VALVE WITH INTEGRATED FILTER

Each irrigation zone is controlled by a separate solenoid valve which includes a pressure reducer and a filter. Irrigation systems with the iMat operate in the low pressure range. Therefore, a pressure reducer is required to regulate the water pressure down to the required water pressure of 9-60 psi (1-4 bars). This prevents clogging or damaging drippers in the dripline The filter ensures that no dirt particles can reach the integrated drippers in the dripline. If required install an integrated lowflow siphon valve which has an atmospheric vaccumbreaker for backflow prevention. (IAPMO rating)

3.

SUPPLY HEADER

Supply Header with integrated drip line connectors

OR:

Standard PVC Piping for Supply and Flush Header

4.

OPTION 1

OPTION 2

SUBSURFACE DRIP LINE WITH COPPER SHIELD ROOT PROTECTION

5.

BARBED FITTINGS

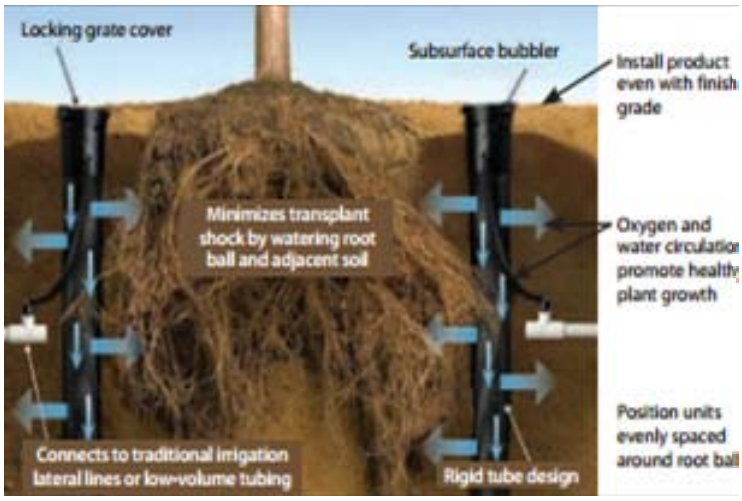
Insert or compression fittings connect the supply/flush header with the driplines of the irrigation mat.
Barbed fittigs or compressed fittings like elbows and tees connect the driplines within the mat with each other

COMPONENTS

6. EAR CLAMPS

1Ear stainless steel clamps SS 198 mm Nr48546162 @ MSC industrial supply

7. TREE BUBBLERS



8. OPERATING INDICATOR

Operation indicator pops up when under pressure min 20 psi

9. AIR RELIEF VALVE

Install Air/Vacuum Relief Valves correctly by:

- Locatin 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.

10. SHUT OFF VALVE

INSTALLATION Basics

Make sure you have at the construction site :

- the design documents / plans for the irrigation system
- a complete set of tools for each installer
- all materials and components

The irrigation system is installed according to the blueprints done by the landscape architect or planner

Make sure you keep any dirt out of your system at any time during the installation.
Caution is needed during the installation process to make sure that the soil and fill soil are free of any large and/or sharp edged stones or debris

- Keep fittings and pipes as clean as possible. Close line ends with end plugs or tape.
- Flush each line - if possible - before it is closed. Make sure to flush the system when Installation is finished
- Use stakes to fix the iMat to the ground if required

The following tools are required:

- Cordless drill or ratchet/sockets
- Pliers for clamps
- PE pipe cutters for PVC/PE main pipes and flush/supply headers
- Tape measure and pipe marker/ pencil
- Professional utility knife

Preparation of the irrigation area
- Excavate area according to design plan
- Remove sharp edged stones and other debris
- Establish a flat surface
- Determine location for the controller, valve box, rain sensor

Installation of main water line
- Digging trenches for the main water inlet line
- Installation of the main water line

INSTALLATION OF THE iMAT

Roll out the iMat green color face up !

Make sure the iMat is laid out straight and has no wrinkles

The matting strips need to separate adjacent curbs, walls, metal mounts, stones from the soil (see picture below) since they absorb the water due to temperature rise when exposed to sun or due to their natural water absorbing characteristics. Laying out a small mat strip along those adjacent materials can be used as a protection barrier as well.

Make sure drip emitters are connected close to the supply header T when you connect the pipes

Large trees and palms... cannot be irrigated using the iMat and require a separate irrigation zone designed by the architect.
Therefore their surface area is omitted and bypassed using a bridgewhen installing the matting strips.

The same applies to obstacles within the matting strips. Usually such bridging is done by connecting the driplines in the mat with supply headers

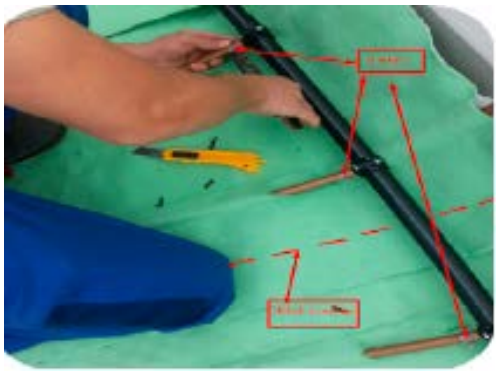
If this is technically not possible a ring bypass can be installed.

Installations on steep slopes or hilly terrain require either ground stakes, ground nails or geo grids, depending on the type of project.

Avoid walking on the mat.

On a curved surface, the mat needs to be cut on its sides so that the mat's shape can be adapted to the curve of the ground.

Connecting the iMat driplines to the tubing system or dripline supply/flush header:



The main water line needs to be connected to the supply header and the supply and flush header need to be connected to the driplines.
Depending on the architect or installer the compression fittings are either glued or clamp saddles are used which require drilling to connect the supply header with the iMat dripline.
All fittings should be secured using pipe clamps.
Supply header and flush header need to be installed "within" the matting strips or covered with iMat fleece material to ensure sufficient water for the entire area.
Use a pipe cutter to ensure clean cuts.

BACKFILLING

Do not walk on already installed matting strips especially not on driplines which are susceptible to damage.

The backfilling can be done in different ways:

Using Big Bags

Excavator

Silo

BACKFILLING

When backfilling, make sure the laid mats do not slide out of place. On steep slopes or areas with extensive wind exposure, the matting strips should be fixed to the ground with either ground staples or nails.

- When using substrate make sure it is compacted evenly to develop the necessary capillarity and disperse water evenly. Loose substrate contains air pockets !!

- If it is necessary to walk or drive over the already laid and backfilled matting strips use of wooden planks/ boards or similar.

LEAK TESTING

The system needs to be tested for leaks prior to backfilling to. Every zone should be operated for 20-30 minutes.
Wetting patterns should be evenly spaced and regularly sized.
In case there are any leaks observed they need to be repaired. The mat should be filled evenly.
In case this test is not possible before backfilling, it should be conducted prior to planting.
Each valve needs to run until the wetted areas appear at the surface. Follow the same procedure as described above.

Operation indicators:
The installed popup indicator shows that the system is under pressure.
You might want to attach a pressure gauge to control the system.
A valve box may be installed to visually inspect the moisture penetration of the iMat.

INITIAL OPERATIONS

• Before the initial operation all lines should be flushed with open shut-off /flush valves to remove any debris in the driplines. Repeat this procedure for the first three to six weeks once per week.

• During the first three to six weeks overhead irrigation is required until the roots are established. When germinating seed overhead irrigation is essential in addition to the subsurface irrigation. When the roots develop the overhead irrigation can be stopped.

• When establishing sod the subsurface system needs to run log enough to reach the soil's maximum carrying capacity. Ensure proper contact between the wetted soil and the sod. During the first few weeks after installation and initial operation the system should be inspected regularly to ensure that the irrigation system is working properly, and to adjust irrigation times and water amounts.

WATERING SHEDULE

• The timing and especially the actual run times are dependent on various factors such as the type of planting, climate zone, season, soil conditions...

• The following watering times are guidelines and are based solely on the water demand of the individual plants, without taking into account any further factors like the local climatic conditions, soil characteristics….

• Shaded areas have a significant impact on the amount of water required and need to be taken into account when setting the right irrigation times.

Vegetation type	Climate	1.– 2. Month after initial operation	3 Month after initial operation
Rolled lawn	humid	20-30 min/day	20-25 min/day
	arid	25-45 min/day	25-35 min/day
Seeded lawn	humid	20-45 min/day	20-25 min/day
	arid	25-50 min/day	25-45 min/day
Perennials	humid	25-45 min/day	20-30 min/day
	arid	25-45 min/day	20-30 min/day
Small shrubs	humid	20-40 min/day	20-30 min/day
	arid	25-45 min/day	20-30 min/day

• The above times relate to irrigation from April to October, however these times may vary as mentioned above depending on the selection of plants, soil, climate, weather conditions, etc.

• If there are no individual specifications for programming the control unit provided by the landscape architect, gardener or planner, those run times are advised for the initial programming of the controller.

• Multiple shorter run times per day are recommended versus one long run time. This ensures the soil to stay moist.

• Shorter run times ensure the soil not being oversaturated. The mat itself has a water storage capacity of 0.096 gal/sqft. Water cannot be stored beyond this capacity. Any additional water will just run off.

• Once the plants have developed and grown their root system down to the matting, the watering times can be reduced step by step.

GLOSSARY

Supply Header
The combination of rigid and/or flexible pipe plus fittings that supplies water to the iMat (Also known as manifold)

Flush Header
Flexible or rigid pipe and fittings connecting the iMat at the opposite end of the Supply Header. (Also known as manifold)

Static Pressure
The pressure measured when no water flow is in the system

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

Flow Rate
The amount of water that travels through the system in a given amount of time. The flow rate is measured in gallons per minute (gpm) or gallons per hour (gph).

Flush Valve
A valve that can be opened manually or automatically to discharge the water in the system to remove accumulated dirt or debris

Friction Loss
The reduction in pressure caused by the friction of the water while flowing through a drip line or pipe and hitting against the inside walls.

Back Siphoning
The reverse flow of water back into the emitter outlet hole. This can happen when there is no 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

Emitter
The device inside the drip tubing in the iMat that controls the amount of water flow out of each outlet hole.

Run Time
The amount of time the valve is open and delivers water to the iMat.

Application Rate/Precipitation Rate
A measurement of the amount of water added to the zone over a certain amount of time often reported as inches per hour

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