Green Roof Irrigation







Access Irrigation Guide to Green Roof Irrigation

Guide to Green Roof Irrigation

A guide for architects and landscape designers

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Access Irrigation has been involved with designing and installing irrigation systems for over 40 years. Many projects involve irrigation systems for new buildings, houses, car parks and town centres. In this time we have worked with many architects, landscape architects and landscapers.

As irrigation is a specialist field many architects do not have time to obtain a vast knowledge of the subject. With this in mind we felt that it would be helpful to produce a booklet aimed specifically at the needs of architects and landscape architects.

This booklet covers typical green roof requirements and irrigation methods along with information on installation.

As a company Access Irrigation can provide specialist advice and detailed costs for each project along with full specifications for the client. For more complex projects, Access can work as consultants to the architect, producing an overall irrigation scheme, along with tender specifications.

Once a project has been approved, Access would normally work with the main contractor to install the system. On larger projects we can provide project management services to the main contractor. On completion the system would then be demonstrated and handed over to the client.

We do hope that you will find this guide helpful. We do two further guides in this series the 'Access Irrigation Guide to Landscape Irrigation' and the 'Access Irrigation guide to Rainwater Harvesting'. Either of these can be posted to you or downloaded as a PDF from our website.

If you have any comments on the guide or would like any advice on any proposed irrigation projects, please give me or any of our sales team a call.

Regards

Mike Briley Sales Director

Access Irrigation Ltd Crick NORTHAMPTON NN6 7XS

Tel: (01788) 823811 Fax: (01788) 824256 sales@access-irrigation.co.uk www.access-irrigation.co.uk



Introduction

Environmental considerations are making green roofs very popular. Unlike hard construction materials like tiles, green roofs significantly reduce rainwater run off, reducing flooding problems. Intensive roof systems can retain up to 90% of rainwater and, even on the thinnest extensive green roof system, 40% of the water is retained. In addition, the remaining 60% of the rainwater will run off much more slowly than with a conventional roof.

Green roofs also provide valuable insulation, both in the form of reduced heat transfers



and a reduction in noise. As well as increasing biodiversity, providing a habitat for plants and wildlife, a green roof will improve air quality by trapping airborne dust particles and pollutants.

Any green roof design is the compromise between giving the grass or plants enough soil to thrive unattended and keeping the roof weight down. Because soil has a high density the cost of the roof structure increases the more depth of soil is required. Therefore most designs will use the minimum amount of soil or even special mixes of compost to reduce weight. From a horticultural viewpoint a shallow depth and the exposed aspect causes the soil to dry out very quickly, leading to plant stress and failure.

Specialist companies such as Bauder Ltd have designed roofing systems to incorporate soil and plants. These have special drainage layers and water retaining reservoir boards, allowing shallow depths of soil to be used. They also ensure that the soil does not slip or move on sloping structures. The

latest and simplest designs consist of a sedum blanket pre-made into panels. This is simply laid onto the roof without the need for any soil.

Green roof types

There are two basic types of green roof design;

Intensive Roof Systems

This type is usually used where an accessible garden environment is required. Structures such as water features, benching, planters and even trees are incorporated in the design. The soil depth is usually deeper, therefore the roof structure has to be a lot stronger to take the additional weight. Greater maintenance is required with this design as a more varied plant type is used.

Extensive Roof Systems

This is used where the environmental benefits of a green roof are required. Sedums (low growing drought tolerant plants) pre-sown into a blanket are used predominantly because of their tolerance and lightweight construction. They also require less maintenance and are therefore more cost effective.

Irrigation Requirements

With any plants the best water comes from the sky. But the unique aspect of planting at high level requires specialist irrigation solutions. Access Irrigation Ltd have an extensive knowledge of green roof systems, and regularly work with specialist green roof companies.

On extensive systems, some die back during drought conditions is usually considered acceptable in order to match surrounding landscaped areas, however on sloped roofs with a pitch in excess of 5° , an irrigation system is recommended, and is essential on roof pitches over 20° .

Most intensive systems in-build a reservoir of water capacity to give a longer drying out period. As these areas are often in daily use, it is important to be able to add additional water during dry weather. The small compost area also makes the addition of liquid feed through the irrigation system necessary.

All green roofs, including extensive sedum roofs, will need feed to be added to the roof area. For intensive green roofs, fertiliser will need to be added at regular intervals, as the nutrient supplies in the soil will quickly become exhausted. The addition of nutrients on a Sedum roof will help the condition of the plants and assist their ability to withstand the extremes of

temperature on the roof. Without fertiliser only the strongest species will survive, reducing the diversity of planting and eventually leading to a monoculture.

The easiest way of adding nutrients to a green roof is via an irrigation system. A water-driven injector will inject liquid feed into the system at a predetermined rate.

In addition to an irrigation system designed to supplement rainfall and add nutrients, all green roof systems will need irrigation and occasional fertilisation during the establishment phase. As the plant root systems are not established, watering must be done with a sprinkler system. A temporary sprinkler watering kit is available for this purpose.

Irrigation Methods

These will vary according to application etc. but there are two main types.

Sprinklers

Used only on Intensive roof systems. If the roof depths are very shallow, supply pipework is laid in the gravel margin, or in raised beds around the edges of the lawn. Traditional lawn type sprinklers of the pop-up type are then positioned around the outer perimeter of the grass area, spraying into the lawn area.

These sprinklers have good coverage and can also be used to establish the grass when first laid.

For lawns with greater soil depth the pop-up sprinklers can be fitted directly into the lawn area, and will operate in the same way as sprinklers in a traditional lawn.

Driplines

Extensive green roofs are usually fitted with a dripline system which directly targets the root zone. This shouldn be installed during the green roof installation.

A specialist dripline is used, which is designed to go in the root zone – most ordinary drip pipes will clog if used in this way. The individual drippers also have a compensation device built-in to ensure that, regardless of the elevation on the roof, each dripper will provide the same amount of water.

Driplines are laid below the soil surface at root level. According to application, driplines are laid across the roof in lines spaced 300-400mm apart.

In the case of Sedum blankets two lines of dripline are usually all that is required wetting the capillary type matting not the sedums, one along the top of the slope and another halfway down.

On intensive roof gardens, where planters or shrub borders are included, these have to be dealt with using driplines placed on the surface (or under a mulch) of the bed. If there are pots or urns in the roof area, these can be watered using individual drippers for each pot.

Pressurisation and control units

Because of the irrigation location ie: high level, a pressurized water supply will be required to ensure even watering. Water regulations require a type 'A' air break on all irrigation systems. This can be taken from a suitable pressurized supply within the building or a purpose made pressurization unit. The latter is pre-assembled and has a built in water storage tank with air gap, pressure pump and controller. This unit is usually located in a pump room at lower level. Copper or MDPE pipework is taken from its location to the roof level. A mains water and 230v power supply is all that is additionally required.

The controller can be set to operate the irrigation automatically either daily, weekly or manually as required. An additional rain sensor can also be fitted if required - this will suspend watering if sufficient rainfall as occurred.

Installation

Roof level

Depending upon the roof size, the roof irrigation is usually divided into zones. Each zone will have a separate pressurized supply pipe running to it.

Depending on the roof make up sprinklers and associated pipework are laid either in the soil or in the gravel margin trough before gravel/soil is laid. Pop-up sprinklers are fitted at positions around the grass area. Pop-up sprinklers are not usually fitted in the grass due to the lack of clearance depth.

Dripline is usually laid on the soil surface but below the grass level. This is best done in the soiling stage in the time period before the final soil and grass level is added. On sloping sites dripline may be on top of the soil cell or even in it. The dripline is laid across the roof and spaced 300-400mm apart. The dripline is fixed to the soil surface using plastic anchorage pegs and are connected to a header pipe which runs down the roof area. This pipe connects to the individual zone supply pipes. On sloping roofs air valves are usually fitted on the top lines to prevent the driplines drawing soil in. For planters in intensive systems the dripline is laid on the soil surface.

Sedum blanket panels on sloping roofs are usually only fitted with two lines of dripline, one on the top and one in the middle of the slope. The dripline is placed directly on the roof felt and the blanket panel laid on top. Because the water usage is less several large areas can be linked together and watered in one zone.

Pressurisation and control units

The zone pipework is connected to a control valve manifold. This will usually be located in a pump room at lower level. An individual solenoid valve is required for each zone. In the case of a pressurization unit the solenoid valves will be built into the unit. If another water source is being used then this will be fixed to a suitable wall.

A supply pipe from the pressurization unit or pressurized supply connects to the control valve manifold. The solenoid valves are electrically operated via the controller.

Operating time for the system will vary according to application and will be specified in the design specification.

Temporary Sprinkler Systems

Irrespective of green roof type, overhead sprinklers must be used to first establish the grass or sedums. A temporary sprinkler system is used. This ensures that the roots grow into the soil medium.

Temporary systems are designed to stand on the roof area and water regularly. Operation of the system using a battery timer adds to the efficiency, as it allows watering to be undertaken at dawn, when wind and evaporation levels tend to be at their lowest.

Once the green roof has been established, the built-in irrigation system can take over and the temporary system moved to another site.

Rainwater Recycling

The irrigation on the green roof can be made to be self contained, catching extra run off water from the green roof and traditional roof areas in times of rain, holding it in a rainwater storage tank, then re-using this water when irrigation is required. By using rainwater to irrigate, there are no restrictions on the irrigation of the green roof system, even during hosepipe bans or drought orders.

The stored rainwater is normally held in an underground tank, where the water can be kept cool and away from light sources, best preserving its quality. Alternatively for very small schemes an above ground tank can be used. For existing buildings, where fitting underground tanks would be difficult, an above ground steel tank can be used.

Before the water enters the tank, it is important to filter the water of leaves of large debris. It is also important to try and keep the guttering and roof areas free of potential sources of contamination, such as diseased plants or dead birds etc. When the water is taken from the storage tank it will be passed through a further filtration system, before being put back onto the roof irrigation.

The rainwater storage tanks need to be sized to ensure that there is water for irrigation during dry weather. If necessary, the system can have a mains water top up system, which will add small amounts of mains water into the tank, when the weather is very dry.

When using recycled water, care needs to be taken to ensure any risks are minimized through comprehensive risk assessments.

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Extensive and Intensive Green Roof

Drawing Ref:	Description:	Guide Price
3101	Permadrip dripline system for extensive green roof with pitch of 5° or more. Guide price includes dripline, break tank and pump set and automatic controls.	£2900 for roof up to 300m ²
Drawing Ref:	Description:	Guide Price
3201	Dripline system for intensive flat wildflower roof. Permadrip-Pro dripline to give 0.3 x 1m emitter spacing. Guide price includes dripline, break tank and pump set and automatic controls.	£4900 for 705m ² roof shown. Includes pump, tank and automatic controls
Drawing Ref.	Description :	Guide Brice
3202	Typical roof garden irrigation with pop-up sprinklers for lawns, Permadrip dripline for planted beds and Permadrip-Pro for trees. System includes pump, tank and automatic controls. Guide price based on 600m ² lawns, 50m ² planted beds and 12 no. trees; irrigated in 3 no. zones.	£4450 Total
Drawing Ref:	Description:	Guide Price
3203	Dripline system for intensive grass roof. Permadrip-pro to give 0.3 x 0.3m emitter spacing. Guide price includes dripline, break tank and pump set and automatic controls.	£3950 for 180m ² roof shown. Includes pump, tank and automatic controls

G Design and pricing guides/Extensive and intensive green roof

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Drawing Ref:

3202 Notes: E300 lawns E300 lawns E550 beds E300 trees E300 trees E750 pipework E700 pump & tank E4250 Total

Crick, Northampton NNG 7XS 01788 823811 sales@access-irrigation.co.uk www.access-irrigation.co.uk

Extensive and Intensive Green Roof





Drawing Ref: 3203

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Crick, Northampton NNG 7XS sales@access-irrigation.co.uk www.access-inrigation.co.uk 01788 823811

Extensive and Intensive Green Roof





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Description

Some plants such as sedums survive in drought conditions, gaining all they need from minimal rainfall. This makes the usual routine of daily watering redundant, in fact harmful. However what do you do in long periods of drought? How do you monitor whether the plants are suffering too much stress and in need of water to sustain them?

The new Access Drought Control System is the answer. So simple, yet so effective at safeguarding drought tolerant species. Saves water and money, minimizes water waste, applies just the water your plants need, when they need it most. The system uses the latest generation of Heron digital controller linked with a sophisticated rainfall sensor. Simply set the longest permissible period before the plants suffer damage (1-30 days) and the rainfall threshold (mm). The controller monitors rainfall over the set period and if no rainfall occurs then watering takes place. However if the rainfall threshold is reached the clock is then reset and the delay period begins again.

Iroughtguard Watering



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Extensive greenroof





Drip irrigation is the most efficient method of watering an established sedum mat type roof.

Permadrip Pro has no protruding parts that can be damaged whilst installing and is simply laid upon the felt roof layer, or in the substrate, before the mat is installed making it completely invisible.

Permadrip Pro uses a unique pressure compensating, non drain, anti syphon dripper, spaced at close intervals along a 16mm diameter delivery pipe. The dripper has a unique labyrinth design that is both self-flushing and highly clog resistant.

- 16mm OD with integrated drippers
- Dripper spacing: 15cm or 30cm
- Pipe wall thickness: 1.2mm
- Emitter output: 1.6l/h

- Closing pressure 0.25 bar
- Max operating pressure 0.5 4.0 bar
- Recommended filtration: 0.13mm/130microns
- Liquid fertilizer capability