



Application Brief

Green Irrigation Technologies for Green Roofs

Planted rooftops, also known as green roofs, are the popular, new approach to reducing storm water runoff and regulating temperatures inside the building. In the winter, green roofs insulate against heat loss and, in the summer, they absorb conducted heat. They also purify the air and water and reduce noise pollution. Some green roofs provide a park-like setting that serves as an outdoor extension of a corporate campus or a garden escape in an urban area.

But full sun and scorching temperatures combined with exposure to wind, rain, and snow present irrigation challenges for even the toughest plants.

Because of structural considerations, green roof irrigation systems have certain technical constraints. To start, hardware must be small enough to fit in shallow soil depths. Because lightweight, manufactured soil is used to meet weight-bearing requirements, it often can't hold much water, and exposure to sun and wind further accelerates evaporation.

Other irrigation considerations include drainage, slope, and water pressure. In most cases, irrigation design will be heavily influenced by the nature of the water supply, such as whether it is using recycled or potable water, and the water budget should guide both irrigation and plant selection.

Table 1. Green Roof Irrigation Water Supply Recommendation ¹

WATERED AREA	SUPPLY PIPE DIAMETER (inches)	MINIMUM FLOW RATE (gpm)	MINIMUM PRESSURE (psi)
Less than 1,000 sq. ft	1	6.6	36.3
1,000 to 4,000 sq. ft	1 1/4	11	36.3
4,000 to 10,000 sq. ft	1 1/2	20	43.5
Greater than 10,000 sq. ft	1 1/2 or 2	20	50.8 - 58

Sustainable Irrigation Solutions

Green roofs are often installed for sustainable water management, so it can seem counterintuitive to water them. But irrigating a green roof judiciously improves plant survival and extends its longevity so it can achieve other sustainability objectives. Because of the very small amount of water that can be stored in the soil, automated irrigation systems are recommended to improve plant survival. This is especially true when the roof is highly exposed to sun and wind. Smart irrigation technologies that provide real-time feedback on soil moisture content and evapotranspiration weather data are particularly effective to help meet sustainability objectives. Some irrigation systems also prioritize recycled water usage before tapping into potable water. These technologies maximize reuse of natural rainfall and minimize potable water consumption.

Irrigation Tips for Green Roofs

- Program controller for multiple cycles per day to ensure plants always have available water.
- Set fairly short run times by visually monitoring the site for the first couple weeks. Run times need to be long enough to increase moisture to field capacity, but short enough to prevent runoff.
- Use a lower threshold and set the turn-on point much closer to field capacity than would be necessary with on-grade plantings.
- Choose an irrigation system that includes flow monitoring and leak detection capability. These systems check for flow variances, send alerts, and can also shut off water in the event of a leak or pipe burst.
- When using a soil moisture sensor, be sure it is properly calibrated.
- Inspect the system at least 2-4 times a year. Winterize and drain the system in the fall and inspect and restart it in the spring.

Real-Life Examples

Click on the following links to get specific examples of irrigation systems installed in green roofs:

- [Facebook Corporate Campus, Menlo Park California](#)
- [Levi's Stadium, Santa Clara California](#)
- [National Oceanic and Atmospheric Administration \(NOAA\) Headquarters, La Jolla California](#)

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