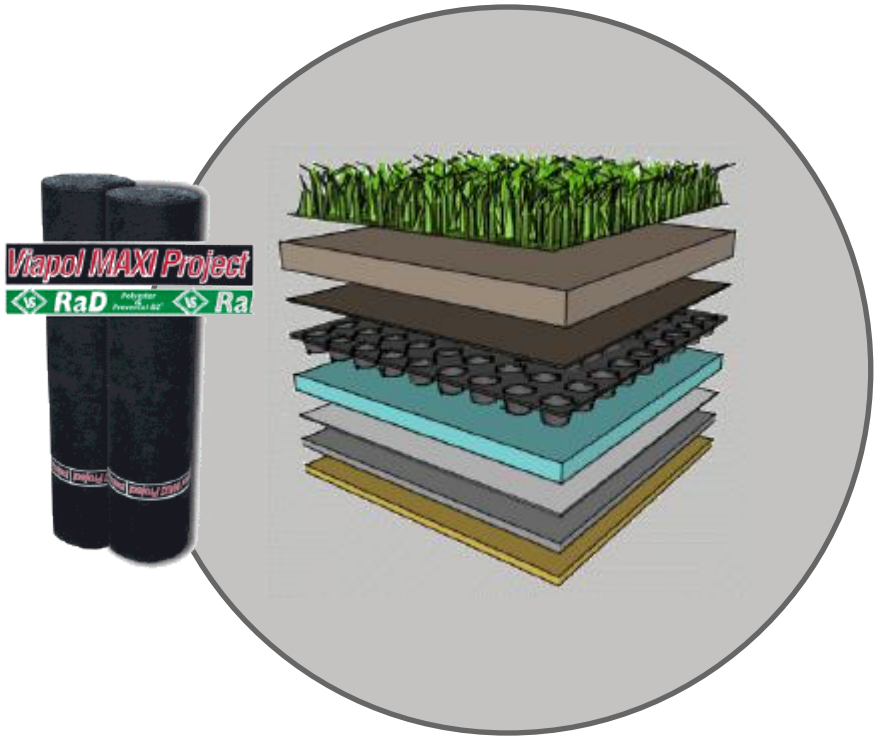
01

member of GBC Italy



green roof waterproofing

- a short guide -

Date : 15.11.2013 - Rel : 002 - Ref : GreenRoof--ShoGui--002

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INTRO

A recent study conducted by Green Roofs for Healthy Cities indicates the green roof industry is growing dramatically. The study sites a growth rate of more than 25 percent every year. The green roof industry, according to the study, is growing rapidly in response to the pressing need for cleaner air, improved energy efficiency, more usable green space in communities, and better storm water management. In fact, it concluded that the storm water–management benefits of green roofs make them ideal for ultra-urban areas : they don't consume additional land, and they reduce the need for costly drainage-filtering systems. Simply put, green roofs are proving to be ideal for growing urban communities. Not only do they help to reduce storm water runoff, but green roofs play a significant role in protecting human health as well

Roof gardens are multifaceted systems that take the roof system far beyond just a waterproofing system. The Roof Garden System offers many advantages with some of the more important benefits outlined below

ROOF GARDEN BENEFITS

Storm Water Management : green roofs help alleviate storm water runoff through retention and detention of the rainwater. This benefit can cut costs associated with required municipal on-site storm water retention
Air and Water Purification : roof gardens help to purify the air by converting CO2 into oxygen, helping to reduce greenhouse gases. The roof garden soil structure helps to purify the water through filtration and can be designed to provide a method for neutralizing acid rain
Provides Sound Insulation : the growth media, plants and layers of trapped air in a green roof system serve as excellent sound insulators. Tests have shown that green roofs can reduce indoor noise pollution caused by outdoor contributors
Extends Roof Life : roof gardens can protect roof membranes from ultraviolet radiation, extreme temperature fluctuations and puncture or other physical damage. Minimization of such exposure can improve the long term performance of the roofing system.
Adds Value Aesthetics : green roofs can provide the urban environment with visually pleasing vistas and rooftop gardens. In urban environments, Roof gardens also add value by converting space into areas usable for recreation by the occupants. In such locations, the scarcity of real estate makes the addition of a roof garden for such recreation a competitive alternative

ROOF GARDEN DEFINITIONS --- (01)

Ultra-Extensive (shallow) Roof Garden System : a shallow planting system (from 6 to 10 cm in depth) ideally suited for areas that will receive little maintenance. Recommended plants include sedums, herbs and grasses. The anticipated weight above the membrane assembly is generally between 5 and 8 pounds per square foot, per inch of system depth, in a saturated state

Extensive (medium depth) Roof Garden System : a medium depth planting system (from 10 to 20 cm in depth) where recommended plants include sedums, herbs, grasses and other vegetation which can grow in this depth of media. In temperate climates, un-irrigated systems can be provided without difficulty. However, drip, mist or spray irrigation systems may be required to support more diverse plant types or for installations in semi-arid climates. The anticipated weight above the membrane assembly is generally less than 50 pounds per square foot

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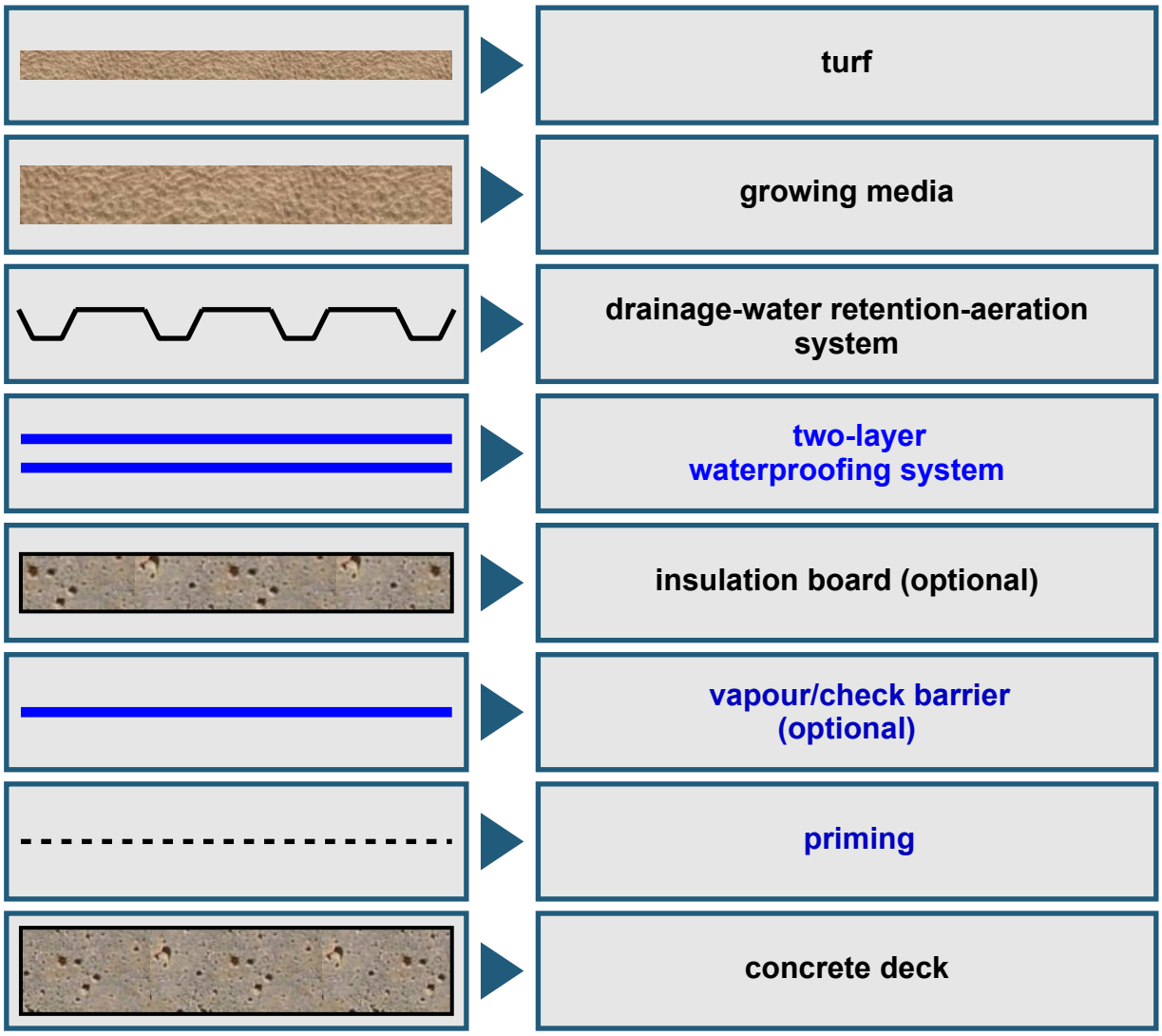
ROOF GARDEN DEFINITIONS --- (02)

Intensive (deep) Roof Garden System : a planting system of greater depth (soil depth greater than 20 cm) that requires regular maintenance, such as watering, fertilizing and mowing/weeding. A variety of plants are available including sod grass, annual or perennial flowers, shrubs and even small trees. This system typically requires a structural concrete roof deck to support the larger dead load. An irrigation system may be utilized in these assemblies, as required. The anticipated weight above the membrane assembly is generally greater than 50 pounds per square foot.

ROOF GARDEN DESIGN

TYPICAL LAYERS OF A ROOF GARDEN SYSTEM - GENERAL

n.b : the above layer's sequence and the technical items hinted are not exaustive



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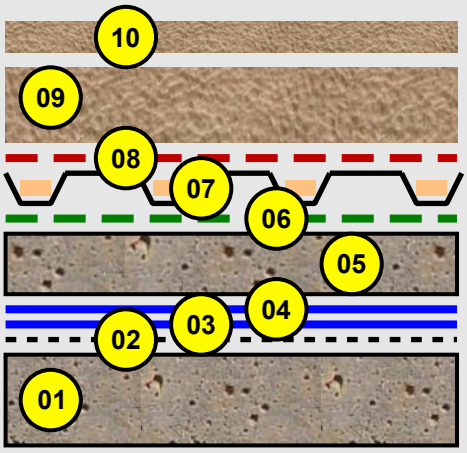
INTENSIVE ROOF GARDEN - INVERTED ROOF - INSULATED



(**01**)--roof deck
(**02**)--**ViaBit** primer
(**03**)--**Vetroasfalto underlay membrane**
(**04**)--**Vetroasfalto top-layer anti-root membrane**
(**05**)--xps insulation board (edge drainage channels)
(**06**)--nonwoven fabric as protection-drainage layer
(**07**)--drainage-storage layer (bedding of expanded clay)
(**08**)--nonwoven fabric as filter-drainage layer
(**09**)--selected growing medium
(**10**)--turf

MONO-LAYER WATERPROOFING SYSTEM

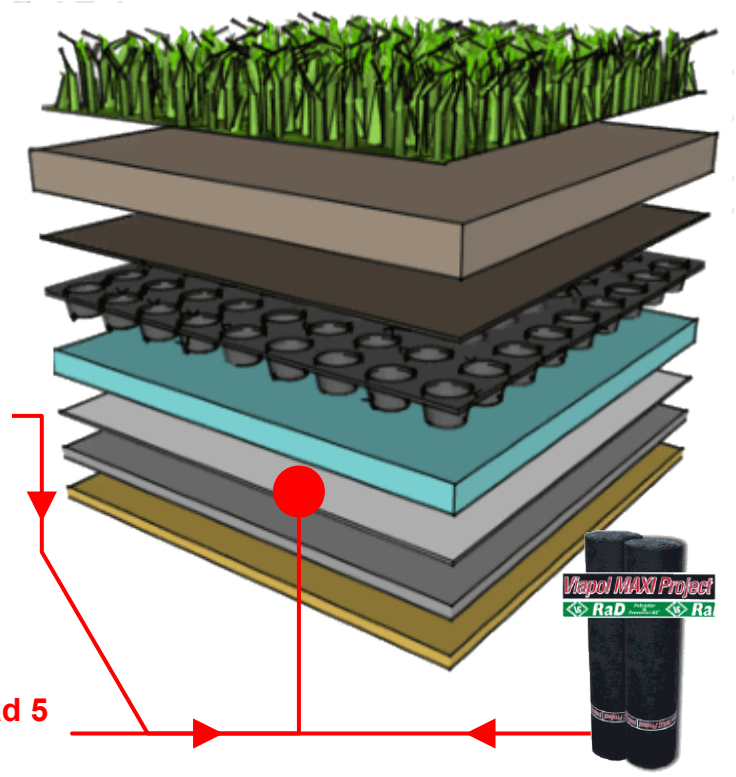
plants

growing media

filter fabric

drainage / storage layer

insulation
waterproof membrane
protection board
roof deck



Viapol Maxi Project Bmt Rad 5
(Anti-Root Membrane)

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05

ISO 9001:2008

CE

06

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Date	04/11/2013
Rev	04/11/2013
Cert Body	0546
Cert FPC	CPD-16876

Description : plastomeric polymer bitumen membrane BPP, compound in distilled bitumen modified with high molecular weight polymers, reinforced with non woven polyester strand + glass fibre mat. Field of Application : top layer, root resistant, in a multi-layer waterproofing system. Method of Application : torched-on. Directive : EN 13707 - Sistema 2+. Dangerous Substances : the p roduct does not contain asbestos or tar

TECHNICAL DATA SHEET — BPPVPV220

PRODUCT	VIAPOL MAXI PROJECT BMT RAD 5

Compound	BPP	(bitumen modified with plastomeric polymers)
Reinforcement	non woven polyester strand + glass fibre mat	

CHARACTERISTIC	EN DRC	UNIT	VALUE		TOL
Visible Defects	EN 1850-1	-----	pass		-----
Thickness	EN 1849-1	mm	5,00		-0,2
Width and Length	EN 1848-1	m	1,10	7,50	-1%
Straightness	EN 1848-1	mm	max 15		pass
Max Tensile Force (L / T)	EN 12311-1	N/5cm	700	600	-20%
Elongation (L / T)	EN 12311-1	%	50	50	-15 abs
Resistance to Tearing (L / T)	EN 12310-1	N	180	180	-----
Resistance to Static Loading	EN 12730	kg	15		-----
Resistance to Impact	EN 12691	mm	1.000		-----
Joint Strength (L / T)	EN 12317-1	N/5cm	npd	npd	-20%
Peel Resistance of Joint (L / T)	EN 12316-1	N/5cm			npd
Pliability (Cold Flex)	EN 1109	°C	-15		pass
Pliability (Cold Flex) - Aged	EN 1296	°C			npd
U.V Artificial Ageing (Visible Defects)	EN 1297	-----			-----
Watertightness	EN 1928	kPa	60		-----
Water Vapour Permeability	EN 1931	µ x 1000	20		npd
Water Vapour Permeability (Aged)	EN 1296	µ x 1000			npd
Form Stability (New / Aged)	EN 1110	°C	130		pass
Dimensional Stability (L / T)	EN 1107-1	%	-0,20	0,20	pass
Root Resistance	MBP Group	%add	>0,5% bitumen		pass
Externel Fire Performance	EN 13501-5	class	F(roof)		npd
Reaction to Fire	EN 13501-1	class	F		npd
Granule Adhesion (Mineral)	EN 12039	%			npd

Topside Finish	anti-adherent dotted talc	
Underside Finish	polyprophylene surface strand (Uptex)	
Rolls x Pallet / Packaging	20	shrinkable pe film, on pallets

OUR INTERNAL CODE - 1MPBA5--BPP-15PV185--SARS--VI APOL MAXI PROJECT BMT RAD 5

DECLARATION OF PERFORMANCE n° BPPVPV220 04.11.2013

1. Unique identification Code of the Product-Type = BPPVPV220 04.11.2013
2. Product Identification = BPPVPV220 04.11.2013
3. Intended Use :

HARMONIZED STANDARD CE		INTENDED USE
13707		Flexible Sheets for Waterproofing
13707		Single ply
		Top layer in a multi-layer system
		Base layer in a multi-layer system
		Top layer, under heavy protection, in a multi-layer system
	X	Top layer, root resistant, in a multy layer system
13969		Flexible Sheets for Waterproofing Bitumen damp proof sheets
13859-1		Flexible Sheets for Waterproofing Underlays for discontinuos roofing
13970		Flexible Sheets for Waterproofing Bitumen water vapour control layers
14695		Reinforced Bitumen Sheets for waterproofing of concrete bridge decks and other trafficated areas of concrete

4. Manufacturer : Vetroasfalto SpA - via Pascoli,3 - 20060 Basiano (MI) - tel +39.02.959831 fax +39.02.95983555 - email vetroasfalto@vetroasfalto.com
5. Authorized Representative : N.A
6. System or systems of assesment and verification of constancy of performance of the construction product

Harmonized Standard EN	System of assesment and verification of constancy of performance of the construction product (AVCP)
13707 - 13969 - 14695	AVCP 2+
13970 - 13859-1	AVCP 3

7. According to the above mentioned AVCP systems, n otified bodies have performed the initial inspection of the manufacturing plant and o f factory production control and issued the certificate of constancy of conformity of the factory production control

Harmonized Standard EN	Institute/Lab	Not Code	Conformity Certificate/Test Report
13707 - 13969 - 14695	Certiquality	0546	0546-CPD 16876
14695	AMT	1139	1139-CPD 8537/11
13859-1	---	---	---
13970	ITC	---	---

8. European Technical Assesment : N.A ----- [1MPBA5 - VIAPOL MAXI PROJECT BMT RAD 5]
9. Declared Performance (go to next page)

DECLARATION OF PERFORMANCE n° BPPVPV220 04.11.2013

ESSENTIAL CHARACTERISTIC	U.M	PERFORMANCE		H.T.S
External Fire Performance	class	F(roof)		13707
Reaction to Fire	class	F		13707 - 13969
Watertightness	kPa	60		13707 - 13969
Max Tensile Force (L / T) (RT)	N/5cm	700	600	13707 - 13969
Elongation (L / T) (AR)	%	50	50	13707 - 13969
Root Resistance	-----	npd		13707
Resistance to Static Load	kg	15		13707 - 13969
Resistance to Impact	mm	1.000		13707 - 13969
Resistance to Tearing (L / T) (RL)	N	180	180	13707 - 13969
Joint Peel Resistance	N/5cm	npd	npd	13707 - 13969
Joint Shear Resistance	N/5cm			13707 - 13969
Cold Flexibility	°C	-15		13707 - 13969
Water Vapour Permeability	µ x 1000	20		13707
Durability after Aging				
--- Cold Flexibility	°C	npd		13707
--- Scorrimento a Caldo	°C			13707
--- UV Ageing	-----			13707
--- Max Tensile Force (L / T)	N/5cm			13859-1
--- Elongation (L / T)	N/5cm			13859-1
--- Watertightness	KPa			13969 - 13859-1 - 13970
--- Water Vapour Permeability	µ			13707
--- Chemical Resistance	-----			13969 - 13970
Watertightness	KPa			14695
Bond Strenght	N/mm²			14695
Crack Bridging Ability	°C			14695
Compatibility by Heat Conditioning	%			14695
Thermal Impact Resistance	-----			14695
Res Compaction Asphalt Layer	-----			14695
Shear Strenght	N/mm²			14695
Dangerous Substances	The product does not contain Asbestos or Tar - 13707 - 13969 - 14695			

N.B : H.T.S = "Harmonized Technical Specification"
PERFORMANCE = tollerances according to the applicable standards and SITEB guidelines
TOLERANCES : (RT) = ± 20% --- (AR) = ± 15 --- (RL) = ± 30%

10. The performance of the product identified in po int 1. e 2. is in conformity whit the declared performance in point 9. This declaration of performance is issued under the sole responsa_ bility of the manufacturer identified in point 4.

13707	EN 13707:2009	effective from date	28.08.2009
13969	EN 13969:2007	effective from date	22.03.2007
13859-1	EN 13859-1:2010	effective from date	15.07.2010
13970	EN 13970:2007	effective from date	22.03.2007
14695	EN 14695:2010	effective from date	13.01.2010

1MPBA5	
Basiano (ddmmyyyy)	04.11.2013

signed for and on behalf of the manufacturer
the Tecnical Manager Jacopo Reali

Aggregate : non-organic fragments that make up part of growing medium
Allowances : an amount established in the contract documents for inclusion in the contract sum to cover the cost of prescribed items not specified in detail and providing for the variation between the predicted cost and the actual cost of construction
Ballast : a material used to hold loose laid roofing materials in place
Cation exchange : the quantity of positive ions (cation) that can be absorbed by growing medium
Carbon Footprint : measures the total amount of greenhouse gases (GHG) caused by an activity or a person's day-to-day life through the burning of fossil fuels for electricity,cooling, transportation etc., and is generally measured in units of tons (or kilograms) of carbon dioxide equivalent.
Climate change : change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods
Compaction : increase in growing medium density
Dead Loads : all permanently placed materials on and below the roof (e ,g. green roof materials, green roof plants, ceiling fans)
Direct Green Roof System : is a system where the vegetation is not planted in containers or modules, but onto specially designed layers that are placed on top of the existing roof. Often called seamless system, wall-to-wall system or monolithic system. Direct green roof systems are the most efficient solution for greening roofs with the best protection for the roof
Drainage Layer : system comprised of granular drainage material, drainage boards, drains, and/or pipes which remove enough water from the roof so as to not compromise the waterproofing system and building. Ideally this allows enough water to remain in the system to sustain plant life
Ecosytem services : the direct and indirect contributions of ecosystems to human well-being
Erosion Blankets : protective sheeting or woven fabric placed on top of growing medium to protect it from wind, water or mechanical erosion while plants are being established
Evapotranspiration : the sum of water loss through evaporation and plant transpiration
Extensive Green Roof : an extensive green roof system is typically one with a growing medium depth of 6" or less and no permanent irrigation system
Fertilization : the application of nutrients to plants. Can take to form of solids or liquids
Filter Cloth, Filter Fabric : a synthetic material laid over or included as a part of the drainage layer to prevent blockage of the drainage
Green Roof Assembly : an assembly consisting root barrier, drainage layer, filter cloth, growing medium, and plants installed on an impervious surface
Green Infrastructure : green infrastructure refers to the array of products, technologies, and practices, such as green roof habitats, that use naturals systems to enhance overall environmental quality and provide ecosystem services, such as filtering air pollution, carbon sequestration, and stormwater attenuation
Growing medium, Growing Media, Green Roof Soil : the particulate matter or substrate that anchors the plant roots to sustain plant growth
HVAC systems : heating, ventilation and air-conditioning systems
Hydrodynamic membrane : a membrane that relies on gravity to shed water
Intensive Green Roof, Garden Roof, Roof Garden : an intensive green roof system is one with growing medium typically of a depth of 6" or more and permanent irrigation
Irrigation System (temporary or permanent) : systems which deliver moisture to the growing medium making it available for plant use
Loose Laid Green Roof System, Built-Up Systems, Monolithic Systems, Wall-To-Wall Green Roofs : green roof which is constructed / assembled directly at the final destination. The most efficient solution in regards of costs, environmental and general green roof benefits
Membrane Protection Layer : a material used to protect the waterproofing membrane and/or an insulation layer against friction between roofing and green roof elements

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Modular Green Roof System, Tray System, Pre-vegetated Planters, Prefab Sectional System : a roof greening system which combines one or more layers in a pre-manufactured or pre-vegetated container (e.g. drainage, growing mediums, and plants). Pre-vegetated modular systems are a costly alternative for small projects and hobby gardeners
Monolithic System : green roof which is constructed / assembled directly at the final destination. The most efficient solution in regards of costs, environmental and general green roof benefits
Moisture Retention Layer : layer installed below the drainage layer which stores water for plants' use after a rain event, or to spread moisture more evenly over a large area. Moisture retention fabrics are installed below the drainage and often have an additional function as membrane protection layer
Overburden : a term used primarily by roofing professionals to refer to the entire green roof system above the waterproofing
Retrofit : when a green roof is built on to an existing roof
Roof Assembly : a roof assembly is the interaction of all roofing components, including the roof deck, membranes, insulation, covering, etc, for weather proofing and thermal insulation
Root Repellent Layer : a physical barrier which prevents roots from affecting the waterproofing system
R-value : the measure of thermal resistance (R = K·m²/W)
Semi-Intensive Green Roof : a semi-intensive green roof system is one with a growing medium depth of around 6" that is occasionally irrigated
Urban Heat Island Effect : this is a phenomenon whereby urban areas experience higher temperatures than the surrounding countryside. This is caused primarily by the change in land cover from green open spaces to buildings, roads and other infrastructure which absorb solar radiation during the day and releases it as latent heat during the night
Water Holding Capacity : the maximum volume of water that a medium can tolerate before super-saturation
Water capture : the quantity of water that is retained in any layer of a green roof system after new water additions have ceased and that cannot escape the roof except through evaporation or plant transpiration

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