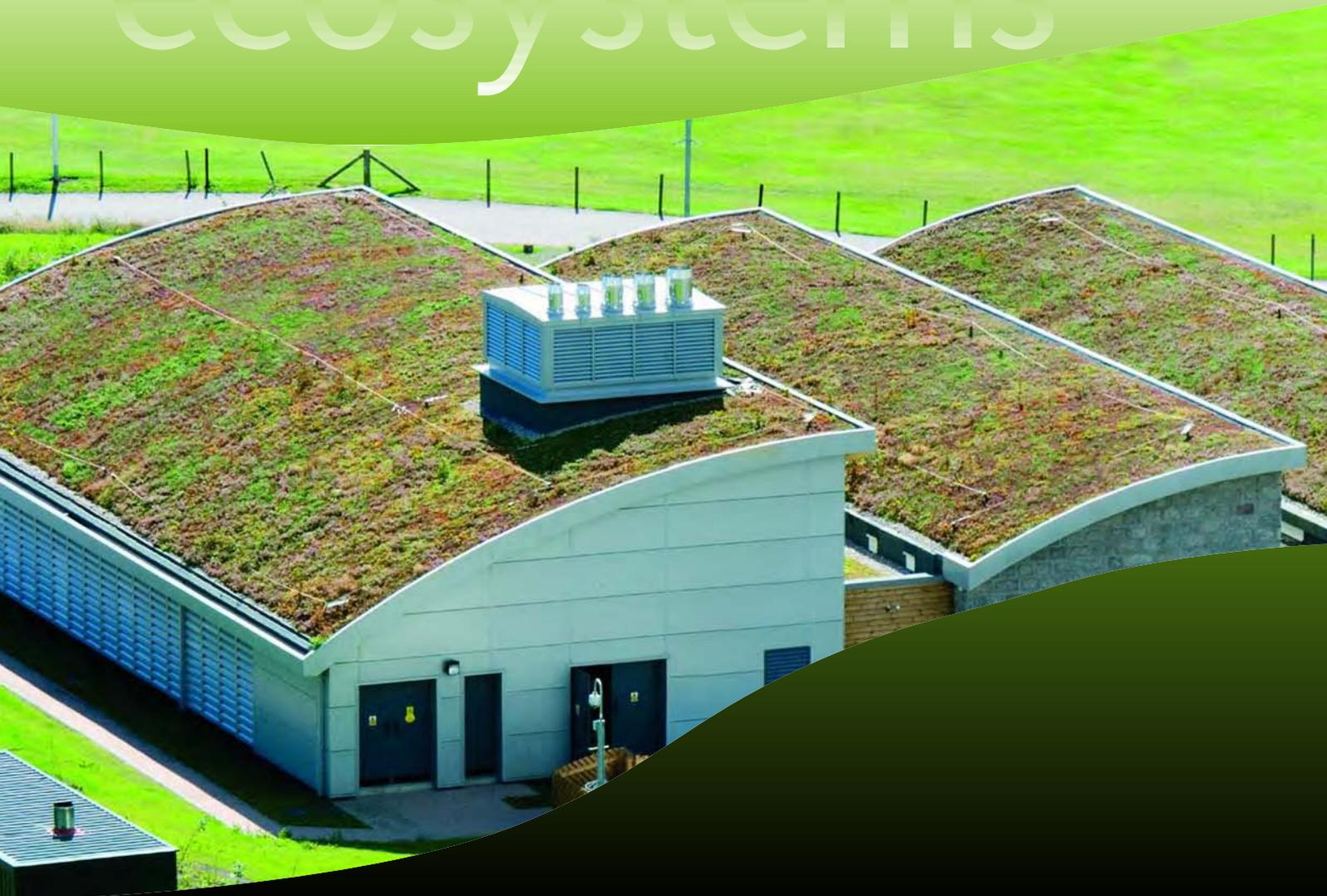


# Green ecosystems



# INTRODUCTION

## What is a green roof?

In its simplest form an Index green roof comprises a number of specialised polymer bitumen membranes from which the appropriate waterproofing system is constructed to protect the flat or sloping roof deck below. A water retention/drainage mat is then laid to sustain the vegetation layer which has been selected to top the installation.

Index green roof systems are suitable for all types of buildings (industrial, commercial, public or domestic) with either flat or sloping roofs up to a gradient of 50 degrees in refurbishment or new build applications.

## Benefits

Whether climate change is being brought about by increased carbon emissions or we are merely in a cycle of natural change, the British Isles are experiencing more extremes of heavy rainfall and high temperatures. The installation of green roofs can help to redress the balance of nature by drastically reducing the amount of immediate rainwater run-off to the local drainage system and limiting the chances of flooding in times of heavy rainfall. Much of this water is initially retained by the green roof's vegetation and substrate allowing it to slowly fall to the drains. The

various chemical substances carried in the rainwater are also absorbed by green plantings which eventually metabolises them. This natural control of intense rain is particularly important in cities and urban areas where hard roofing and pavings encourage instant run-off to the surface water drains often leading to an overloading of the system.

Conversely when high temperatures and drought become the problem green roofs provide pay back well beyond the aesthetic. The layer of vegetation increases relative humidity dampening and attracting airborne dust particles at the same time as filtering out a vast amount of solar radiation. This also reduces the urban heat island effect by creating a micro climate. The green mass not only keeps the building cooler in Summer heat but also dampens sounds which is particularly important in the echoing canyons of city landscapes. During Winter months pay back continues with the roof mass providing a higher level of thermal insulation than a traditional roof.

## Snapshot advantages of a green roof

### LIFE EXPECTANCY

A green roof increases the life expectancy of the waterproofing system by protecting it from climate extremes, exposure to UV and mechanical damage. This can more than double the life span of the system, reduces the level of pollutants associated with the manufacturing process and slows the depletion of raw materials.



### HEAT

A green roof reduces convection heat losses by up to 50% when compared with a traditional roof. This improvement in thermal insulation allows energy savings to be made in heating/air conditioning costs over a yearly cycle.



### STORM WATER MANAGEMENT

A green roof controls rainwater run-off by absorbing a high percentage of the immediate discharge to outlets, drains and sewers, reducing the possibility of flooding.



### SOUND

A green roof lowers noise levels by reducing reflective sound at the same time as improving sound insulation. The improvement level is dependent on the thickness of the landscaping.



### AIR QUALITY

The moisture retained in the green roof mass slowly evaporates attracting dust particles to the damp surfaces of vegetation and substrate at the same time as reducing thermal activity above the roof. The plants absorb gaseous pollutants and during the natural process of photosynthesis convert carbon dioxide to oxygen which improves air quality even more.



### SPACE

A green roof utilizes what might be otherwise expensive 'dead' space, improving the environment and providing a wild life habitat that aids biodiversity action plan targets.



# The choice of Green Roof Landscapes

Index green roof systems fall into four general categories:

## EXTENSIVE GREEN ROOFS

These are designed to be light in weight adding little structural load to the roof. The shallow rootzone of 40-80mm will support low maintenance hardy plants such as sedums, herbs and grasses which are low in height and drought, wind and frost resistant. Access to the installed roof is limited to maintenance traffic.



## INTENSIVE GREEN ROOF GARDENS

With a greater depth of growing medium the landscape variations of these accessible gardens can be designed for recreation, sport and leisure purposes. The only limitation to the plantings on this type of green roof i.e. flowers, shrubs, trees and hard landscaping, is the overall wet weight and live loadings likely to be imposed on the roof structure. These gardens in the sky need not differ from any landscaped gardens we can enjoy at ground level.



## BIODIVERSE BROWN ROOFS

Designed to create a habitat for indigenous flora and fauna and most commonly situated in city or urban landscapes Index brown roof systems can be engineered in their build-up to conform to the needs of a particular project and site conditions.

These roofs can be constructed with a topping of crushed recycled brick, or similar, or be combined with ponded areas where the loading on the building's structure permits.



## SEMI-INTENSIVE GREEN ROOFS

This cross between Extensive and Intensive allows a greater variety of plantings than Extensive build-ups. The deeper substrate of approximately 100-200mm can support shrubs and low woody plants such as heathers and lavenders but they will require irrigation and some maintenance. Paving and patios can be incorporated making it suitable for recreational use but this will impart a greater weight loading on the roof structure.

# Extensive Green Roof Systems

Because this type of system is lower in cost, is both light in weight and low maintenance, making it suitable for either refurbishment or new build applications, it is the most popular type of green roof system specified for flat and sloping roofs.

## PLANTINGS

### Insta system

This consists of rolls of pre-grown sedum which are delivered to site in one metre wide rolls of up to 20 metres long. It is suitable for use on both flat and sloping roofs with a maximum gradient of up to 50 degrees. The plants are cultivated in the form of vegetation mats comprising a support framework and a thin layer of soil on which up to ten varieties of sedum are usually grown to provide an aesthetically pleasing mix of colour. When the Insta system is delivered to site it has at least 85% vegetation cover giving instant colour effect as soon installation is complete.

### HS system

With this system individual sedum plugs are delivered to site in flat bottomed crates and hand planted at up to 25 plugs per square metre. This method is suitable for use on

both flat and sloping roofs with a maximum gradient of 15 degrees. The plants are loosely cultivated with their own root system and are available in fifteen different varieties. After one season these plants have usually achieved the minimum 75% coverage required.

Further alternatives are to cast a wild flower annual seed mix or grasses over the growing medium to allow a natural landscape to develop. Hydroseeding is also a quick and cost effective option where large and inaccessible areas are concerned, although with this method the grasses/flowers etc. may take up to 18 months to mature.

Whichever planting method is preferred a period of initial maintenance is necessary including regular watering dependent on the month in which the installation is undertaken and a simple feeding programme to encourage the sedum to become established. Grass only roofs can also be installed using the Insta planting method with pre-grown rolls of turf or by hand casting a special seed mix.

**Guarantee** - See page 15.



## Extensive Green Roof Systems-cont.

### MAINTENANCE

Although the maintenance requirements of an Extensive green roof are minimal it is recommended that a Maintenance contract be set up to ensure the future health of the plantings and efficiency of the roof system. Roof upstands and penetrations should be kept weed free and outlets must have inspection covers over them and they should be kept clear of debris.

Despite the fact that good detailing (correct choice of substrate to reduce unwanted wind blown seeds germinating, and the right level of moisture retention to

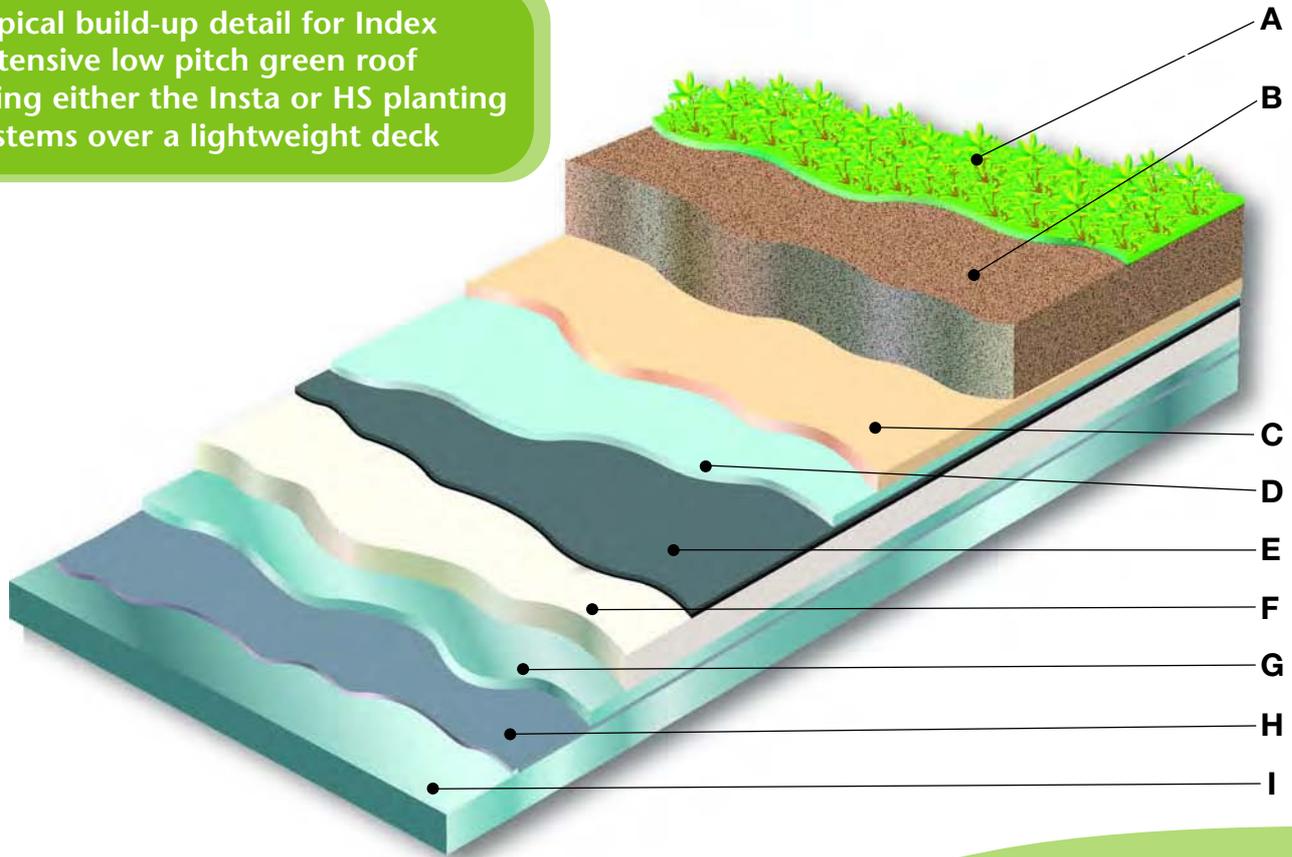
encourage survival of less dominant species) will ensure a long green roof life, wind blown seedlings must be removed by the roots, grass and herb type landscapes have to be cut when mature and the cuttings removed to limit moss growth.

Depending on the time of year that the installation takes place a temporary irrigation system may be required for the first six weeks to assist in the establishment of healthy root growth.



Good detailing at vegetation edges makes maintenance easier.

Typical build-up detail for Index Extensive low pitch green roof using either the Insta or HS planting systems over a lightweight deck



- A** Drought resistant regenerating varieties of sedum with a mature growth height of between 50-150mm.
- B** Substrate will be of a well balanced structure and be low in weight.
- C** Water retention/drainage mat. This non rotting fleece retains moisture and nutrients and provides mechanical protection to the root barrier/waterproofing membrane system below.
- D** Defend Anti-roots H membrane. The anti-root properties are achieved by adding phenoxy fatty acid ester to the polymer bitumen mix during manufacture. This does not migrate neither can it be washed out by water.

- E** Proteaduo composite APP/SBS 5mm thick membrane. The top APP layer of this composite has a high resistance to heat whilst the lower SBS layer offers exceptional elasticity at temperatures down to minus 25 degrees C nearest to the roof deck the point of most stress and movement.
- F** Indexzone insulation. Thickness to suit U-value required.
- G** Prominent Alu membrane. This aluminium foil reinforced vapour barrier prevents thermal breakdown of the insulation caused by condensation.
- H** Indever quick drying bituminous primer.
- I** Lightweight roof deck.

### Typical height and weight calculation table for an Index Extensive green roof system using the Insta planting system

Vapour control layer	3mm	4kg. per sq.m.
Indexzone Insulation or similar	120mm	5kg. per sq.m.
First waterproofing layer Proteaduo or similar	5mm	5kg. per.sq.m.
Second waterproofing layer Defend Anti-root H	4mm	4kg. per.sq.m.
Water retention/drainage mat (wet weight)	6mm	4kg. per.sq.m
Substrate (wet weight)	50mm	50kg. per.sq.m.
Index Insta planting system (wet weight)	20mm	20kg. per.sq.m.
<b>Total</b>	<b>208mm</b>	<b>92kg. per.sq.m.</b>

### Substrate depth table for the Index Insta planting system

Gradient	Substrate depth
Nil degrees	60mm
1-4 degrees	40mm
5-15 degrees	50mm
16-25 degrees	70mm
25-50 degrees	80mm

### Substrate depth for Index HS Planting System

Gradient from Nil to 15 degrees	80mm
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# Intensive Green Roof Systems

Intensive green roofs are accessible high level gardens which can be used for recreational or leisure purposes. The soft and hard landscaping variations are only limited by the total wet weight of the system and live loadings that the roof structure can be designed to bear.

In essence the waterproofing elements of the Intensive roof garden are the same as for the Extensive green roof build-up. However, the water retention/drainage mat is deeper to enable it to store more water and the depth of the growing medium (soil) is increased. The type of plantings and their sizes (large shrubs and semi-mature trees are possible) and will determine both the depth of soil mix and the type of irrigation system required.

Careful consideration also has to be given to the anchorage of mature trees to prevent wind damage. This can be achieved by installing eye-bolt fixings on adjacent paving slabs but fixings should never be made through the waterproofing layer into the roof deck. One method of reducing soil depth is to restrict plantings to borders of perennials such as alyssum, geranium, lavenders etc separated by low hedges and lawns, using large containers for planting of semi-mature trees and shrubs which demand greater soil depth for their root balls.

If this is done consideration has to be given to the higher point loadings of these containers which could for example be placed where a structural column is situated below.

## IRRIGATION SYSTEMS

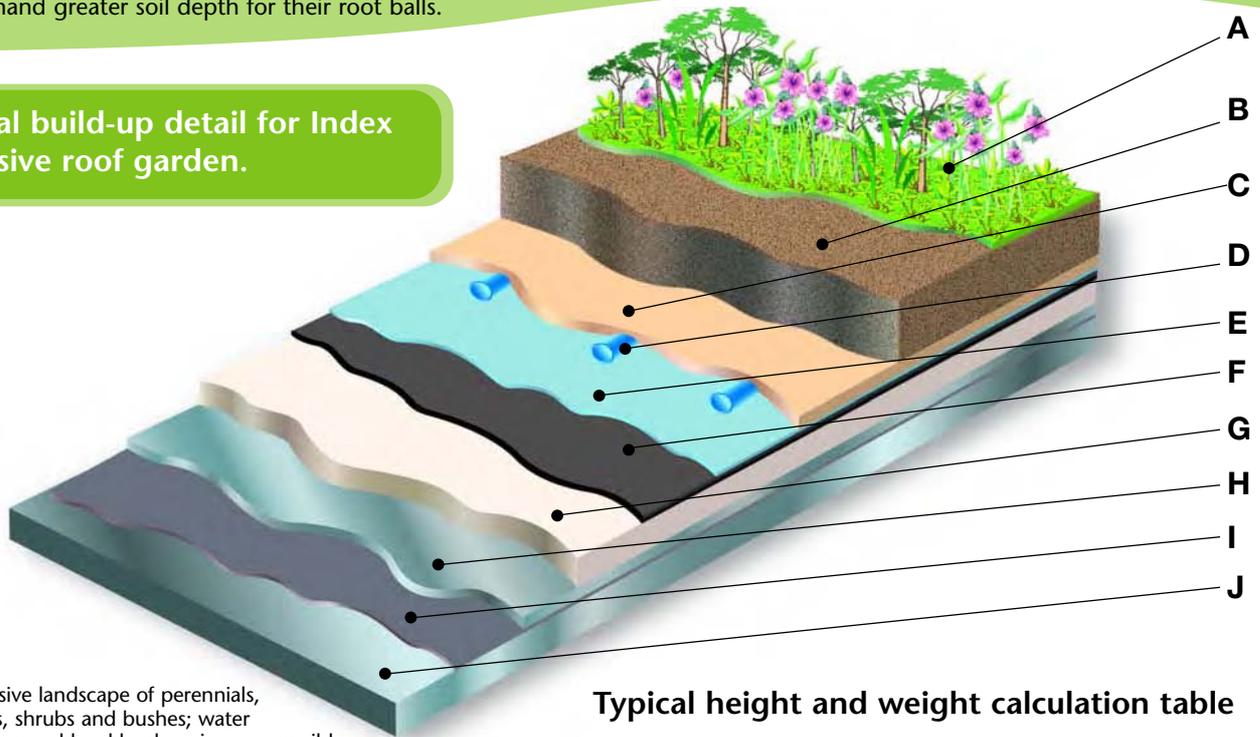
Index offer a range of watering systems ranging from simple micro fine pipes to a direct irrigation design which ensures water is taken directly to the water retention/drainage mat to reduce the amount of moisture lost by evaporation.

**Guarantee.** See page 15.

## MAINTENANCE

Due to the complexity of Intensive green roofs with their probable mix of soft and hard landscaping a post installation maintenance contract is essential. This should extend to regular servicing of the irrigation system. Apart from the obvious horticultural attention to pruning, replacing plants in season and fertilization of the soil, lawns and hedges have to be clipped and the cuttings removed. As with Extensive green roofs, upstands and roof penetrations need to be kept clear of weeds and drainage outlets should be kept free of debris.

Typical build-up detail for Index Intensive roof garden.



- A** Intensive landscape of perennials, lawns, shrubs and bushes; water features and hard landscaping are possible.
- B** Potential soil depths of 150mm to 300mm for perennials, lawns and small shrubs. From 300mm upwards where large shrubs and trees are added to the planting medium.
- C** Water retention/drainage mat
- D** Irrigation system
- E** Defend Anti-roots H membrane
- F** Proteaduo composite APP/SBS 5mm thick membrane. The top APP layer of this composite has a high resistance to heat whilst the lower SBS layer offers exceptional elasticity at temperatures down to minus 25 degrees C nearest to the roof deck the point of most stress and movement.
- G** Indexzone insulation. Thickness to suit U-value required.
- H** Prominent Alu membrane. This aluminium foil reinforced vapour barrier prevents thermal breakdown of the insulation caused by condensation.
- I** Indever quick drying bituminous primer.
- J** Roof deck.

## Typical height and weight calculation table

Vapour control layer	3mm	4kg. per sq.m.
Indexzone Insulation or similar	120mm	5kg. per sq.m.
First waterproofing layer Proteaduo or similar	5mm	5kg. per.sq.m.
Second waterproofing/ root resistant layer	4mm	4kg. per.sq.m.
Water retention/drainage mat (wet weight)	8mm	8kg. per.sq.m
Substrate (wet weight minimum depth)	150mm	150kg. per.sq.m.
Planting system (grass wet weight)	20mm	20kg. per.sq.m.
<b>Total</b>	<b>310mm</b>	<b>196kg. per.sq.m.</b>

# Green Walls

For centuries plants have been used as a thermal cushion to shield walls from intense solar heat or wind driven cold. Index, in alliance with BioTexture Ltd, can now offer the BioWall™ green living cladding solution for buildings and walls.

This modular system comprises rails which are fixed to the building's face, leaving a 50-200mm zone between it and the follow-on cladding panels. This ventilated cavity ensures that rain does not penetrate through to the structure. It also allows insulation boards to be integrated into the system to provide an external Part L solution. Any number of panel/baskets nominally 600mm wide x 300mm high, containing the growing medium and decorative plantings, are then mechanically fixed in a modular series. Bespoke panels can be fabricated to suit any finishing dimensions, openings or even curves.

## BioWall panels

The BioWall panels are approximately 78mm deep and engineered in basket form from either galvanised wire or regenerated plastic product to carry the growing medium and roots. A fascia panel with mesh, netting or a pattern of apertures allows the decorative plantings to grow through freely. The 78mm thick horticultural grade rockwool growing medium is integrated into each panel so it absorbs

and maintains 80% of liquid by volume whilst still leaving 15% air pockets. In this way the hydroponic system uses minimal quantities of irrigation water and nutrients with little run-off yet it still provides the plants with the perfect environment in which to thrive. The total wet weight of the BioWall system is approximately 50 kg per square metre. A controlled irrigation system is necessary for this hydroponic growing method to deliver just the right amount of nutrients and water to each section of the wall by regulated pressure compensated drippers and moisture meters. A small pump room completes the installation.

Because the panels are planted and pre-grown under nursery conditions they need only be transported to site once major building wet trades have completed their work.

## Applications

The plants will arrive on site in a semi-mature state. BioWall living walls are suitable for cladding in either refurbishment or new build projects, or on independent walls in shopping malls, atria etc. Designers can change the living wall palette with the seasons a highly important factor in tourist areas and public landscapes. They are also an effective way of overcoming problems of graffiti.



# Structural Waterproofing

The structural waterproofing services offered by Index, in partnership with its appointed contractors, extends from tanking massive underground water reservoir installations to waterproofing concrete decks on tower blocks and apartment balconies.

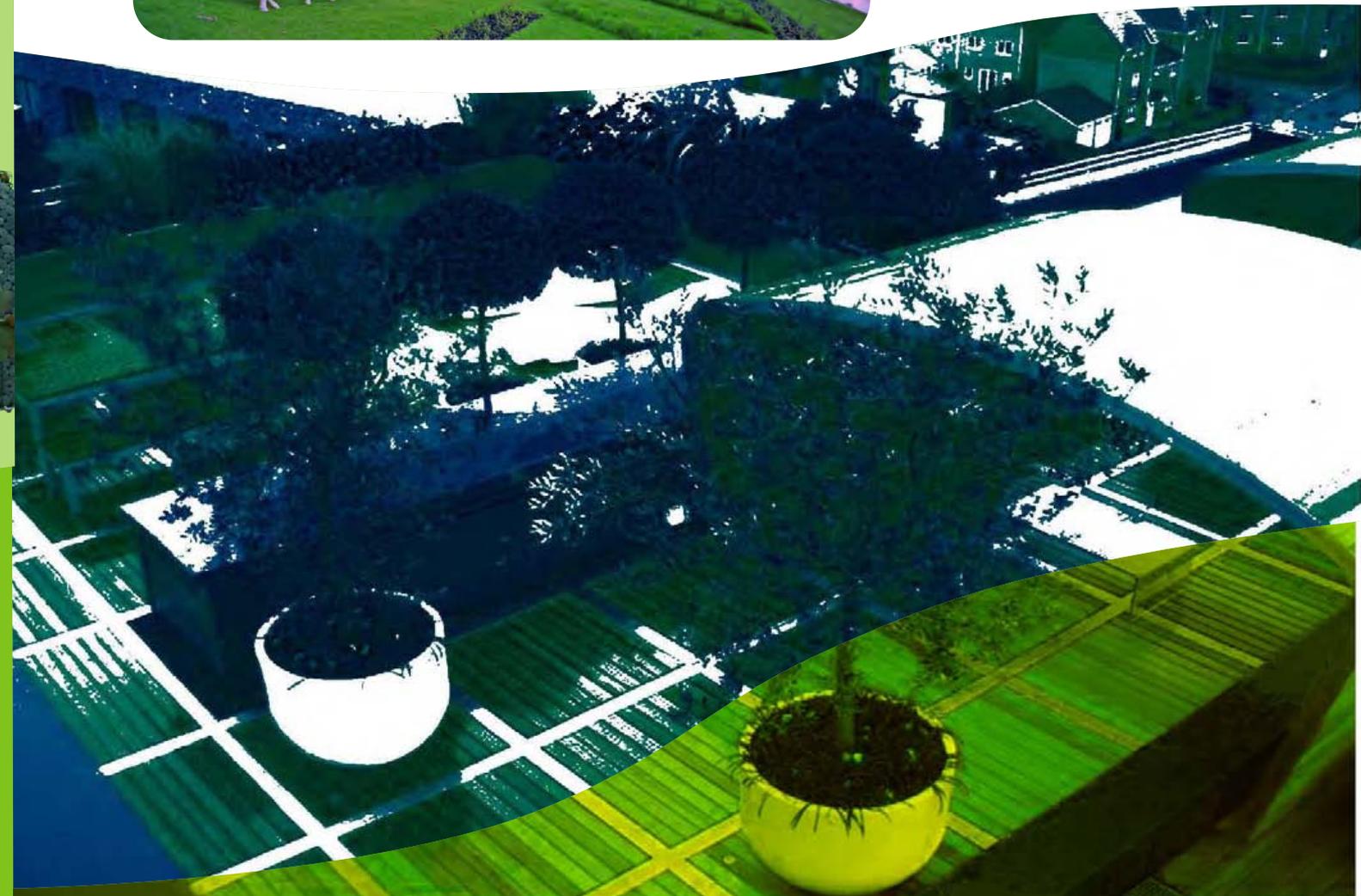
Among the high performance products used in such installations are the Defend Antiroots H membrane which

conforms to the FLL standard and Proteaduo a new generation bi-polymer membrane. The latter is particularly useful in car park construction in that it can accept base asphalt at over 200 degrees C without rucking, blistering or melting.



**Large slabbed underground car park serving 125 luxury apartments at the Budenberg HAUS Projekte, Altrincham Manchester**

*Pic. courtesy Urban Splash. RIBA Award Best New build Project 2007*



# Rooflights

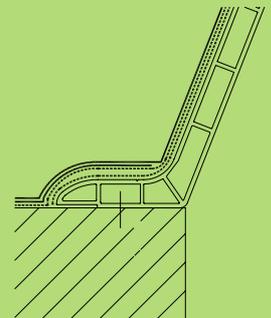
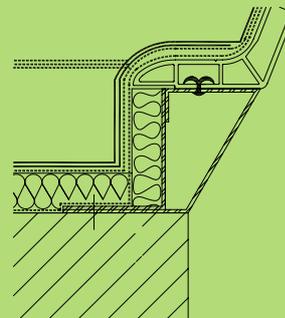
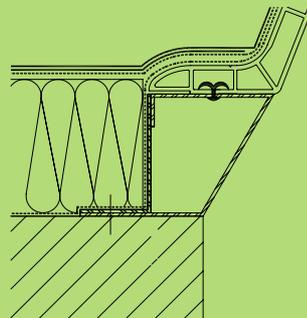
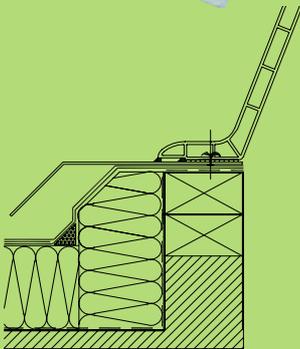
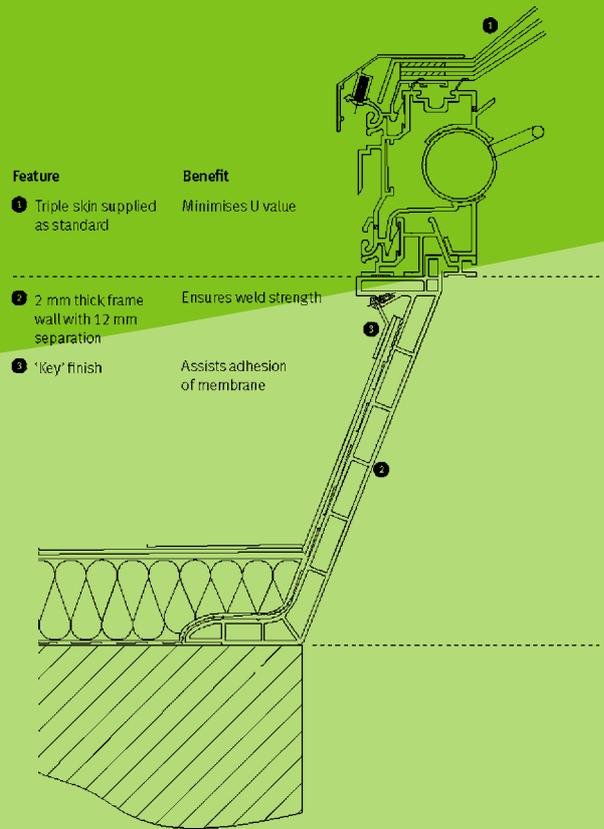
Since the introduction of high performance bituminous membranes many independent surveys have shown that built-up systems are the most cost effective and long term solution to waterproofing flat roofs whether the surface is traditional or green in nature. But there are always demands for the introduction of natural light, ventilation and access in such areas.

This is why Index launched its series of Novalite rooflights with upstands and adaptor kerbs specially designed to preserve the integrity of the waterproofing membranes in new build or refurbishment applications. The Novalite range, which has a U value of of 1.8Wm<sup>2</sup>K is available in nine square sizes (600 to 1800) and fifteen rectangular sizes (600 x 900 up to a maximum of 1200 x 2400).



They are available in clear, opal, bronze and triple skin uv protected polycarbonate, with vented airspaces. The integral water management system ensures that moisture drains to the outside of the building and air leakage meets part L criteria. There is a choice of pyramid or dome polycarbonate shapes with a further alternative of double glazed insulated glass units.

The 2mm thick welded PVC-u kerb has a flexible base adapter. The special 'key' finish aids bonding of the waterproofing membrane to create a positive seal. Other features include aluminium trim and extruded gasket sections; a steel security insert is housed within the PVC-u section. There is a choice of fixed, worm gear opening, hit and miss or access hatch systems.



## Adaptor Curb

Allows the rooflight to be fixed to new/existing builders kerbs and can incorporate various ventilation options.

## Flexible Metal Foot

This roof attachment can be manufactured to accommodate varying thicknesses of roof insulation, whilst allowing 'flexible' matching of rooflight to roof opening

## Insulated Metal Foot

Provides the same adaptability as the flexible metal foot whilst allowing for 'cut to falls' variable depth insulation systems.

## Direct to Roof Deck

Allows for the kerb to be attached direct to the supporting structure. It is possible that this may be above the insulation layer.

# Fallsafe devices

Green roofs, particularly those that are sedum planted, need little maintenance over their long life span. However when it becomes necessary for example to service rooflights or air conditioning units, it is important that an effective fall protection system is in place to safeguard operatives working at height.

Index have selected a system which offers a range of specific-purpose energy absorbing anchors that can be fixed to timber, metal or concrete decks. In the event of a fall the forces that are generated via the cable system are limited through the built-in energy absorber. This distributes the load into a parallel plane across the roof deck and ensures the safe arrest of the worker.

The design of the force management anchor base plate, with its recessed fixing bolts, allows the bituminous

membrane to be bonded direct to its upper surface ensuring a good waterproof seal. The anchors are complemented by a stainless steel cable arrest system which is unobtrusive on environmentally sensitive roof installations.



# A Selection of Green Roof Solutions

These installations from the Index portfolio illustrate a range of plantings on flat and sloping roofs.

**New Build; Underground coastal home, Pembrokeshire National Park, Wales.** Local turf was used for this Extensive green roof to allow the structure to blend into its natural surroundings.

**Architect:** Future Systems Ltd.



**New build; Sports changing facilities and community heating plant complex, Aberdeen.** Sedum clad roofs curve from 2 up to 32 degrees.

Sedum clad roofs curve from 2 up to 32 degrees.

**Architect:** T.C.D. Architects.



**New build; Residential home for the physically disabled, Newnham-on-Severn, Gloucester.** Pitched and gently curving Extensive grass roof with automated irrigation system.

**Architect:** Quattro Design.



**New build/Refurbishment; Eco Centre, Cockermouth School, Cumbria.** Sloping roof combining traditional build-up and sedum topped green roof system.

**Architect:** Adhoc Architects.



**New build; Library block, University of Lancaster campus, Cumbria.** The area has some of the highest rainfall in the UK and the plantings of sedum using the Insta method provide passive storage to reduce immediate pressure on the grey water collection system.

**Architect:** Archimedia Consulting Ltd.



**Refurbishment:** Brown biodiverse roof BVSC Building, Birmingham. Crushed brick over Index Extensive waterproofing system.

**Architect:** Birmingham City Council.

**New build: Mix of 10 and 26 degrees sloping sedum topped roofs at Nant-yr-Arian Visitor Centre, Near Aberystwyth**

**Architect:** Acanthus Holden.



# Index technical support, standards and guarantees

Index Building Products Ltd is a wholly owned British subsidiary of Index S.p.a. headquartered in Verona, northern Italy who have become a world leader in the production of modified bitumen roof membranes. The British arm is one of the Index family of companies who market Index high performance waterproofing products and systems across five Continents. The parent company was established in 1979 and has made major investments in its own extensive laboratory facilities which have not only enabled it to drive forward continuous development of Index products but also to provide the vital technical support for the Index network which operates in all world climate zones.

## TECHNICAL SUPPORT

The Index team of experienced regional technical managers undertake free roof surveys and prepare detailed reports and complete green roof specification packages. They also carry out site monitoring of the approved contractors work to ensure specification compliance before issuing appropriate insurance backed guarantees. Index offer a complete range of technical product data sheets and specification brochures covering applications and solutions to all types of waterproofing problems, including detail drawings based on good roofing practice which are available for downloading into CAD packages. The company has been awarded CPD status by RIBA for its technical seminars and Index is a subscriber to the NBS

plus Service which can provide instant access to standard specification clauses for Index membranes and systems.

## STANDARDS

Index products have been independently tested by over 25 leading test institutions world wide including the BBA, ICITE and Factory Mutual. The polymer bitumen membranes are manufactured in accordance with the international ISO 9000/2000 range of Quality Standards and ISO 14001 as far as environmental considerations are concerned. BS 8747 Reinforced Bituminous Membranes for Roofing gives a typical life in excess of 50 years.

The installation of Index membranes and systems are only undertaken by an approved network of contractors to ensure that the quality ethos extends from manufacture through to specification and installation.





**GUARANTEES**

Index polymer bitumen built-up waterproofing systems designed for green roofs carry an insurance backed guarantee of up to 20 years for roofs installed by one of the Company’s approved roofing contractors. The guarantee is issued by Index once its technical manager, who will have monitored the installation at all critical stages of the operation, has approved the work and obtained the acceptance of the client’s commissioning specifier or agent. This guarantee is offered with the backing of a company that has been manufacturing high performance membranes for over 30 years. Some 25 million square metres of these products have been installed on warm, cold, inverted and green roofs in the UK alone.

**HEALTH & SAFETY**

With a long history of installations in the UK Index recognize that any work on a roof is associated with some

degree of risk. However the company only uses an approved network of contractors whose management will have carried out risk assessment protocols in accordance with Health & Safety directives before any contract commences.

**ENVIRONMENTAL MANAGEMENT**

Index recognizes that respect for the environment is an essential condition of carrying out business in today’s world. A key element of Index’s environmental policy is to minimize the impact of its operations on the environment by conforming to current laws and regulations. Furthermore it has adopted environmental management systems in accordance with the International ISO 14001 Standard. It directs its research and development energies at products and technologies that are clean during the products entire life cycle and tries to ensure that none of the company’s activities can cause risk to the safety and health of its staff or to the general community at large.

# APPLICATION DETAILS

based on best practice

1. Parapet edge detail
2. Internal rainwater outlet
3. Internal box gutter detail
4. Eaves detail, sloping roofs (gradients over 25 degrees)
5. Detail for inverted roof build-up
6. Index **Intensive** green roof system

Note:

## Primer

Before any Index waterproofing system is installed it is *recommended* that all surfaces to be waterproofed are first primed with Indever quick drying primer.

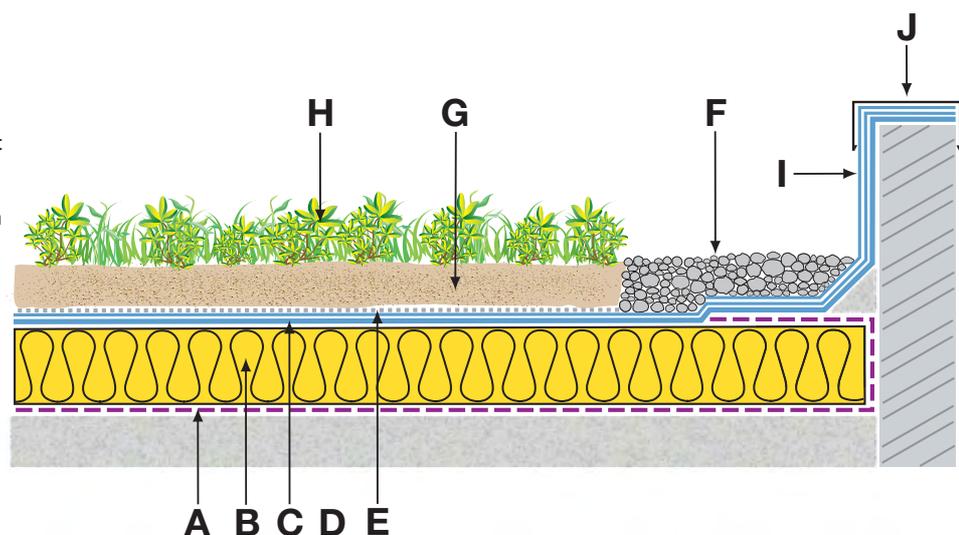
## Trims

A range of bespoke trims are available.

1

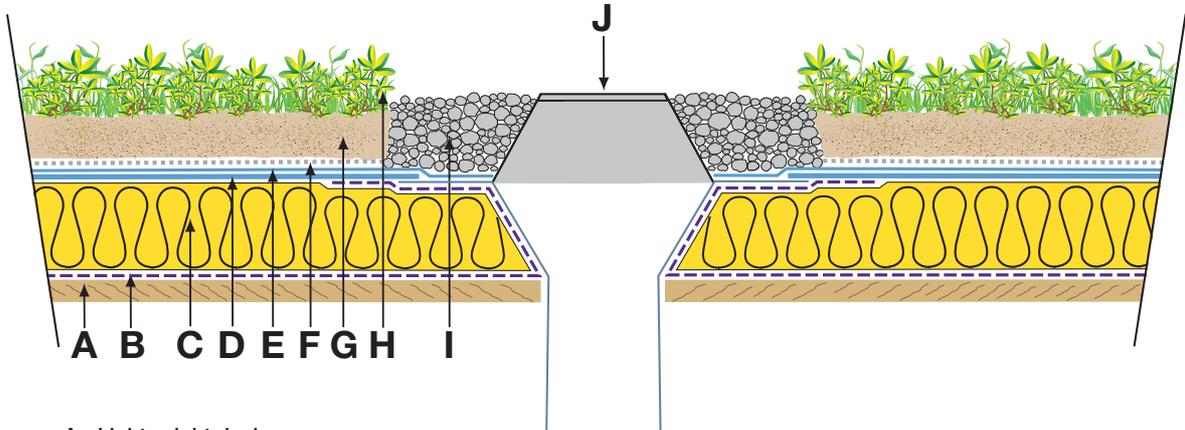
## Parapet edge detail for Index low pitch or sloping Extensive Green Roof System

- A - Prominent alu vapour barrier
- B - Indexzone insulation
- C - 5mm Proteaduo underlay
- D - 4mm Defend Anti-roots
- E - Water retention/drainage mat
- F - Vegetation barrier
- G - Substrate/Rootzone
- H - Insta Sedum planting system
- I - Mineral Antirroot Firestop
- J - Metal Coping



## 2

### Internal rainwater outlet detail for Index low pitch Extensive Green Roof System

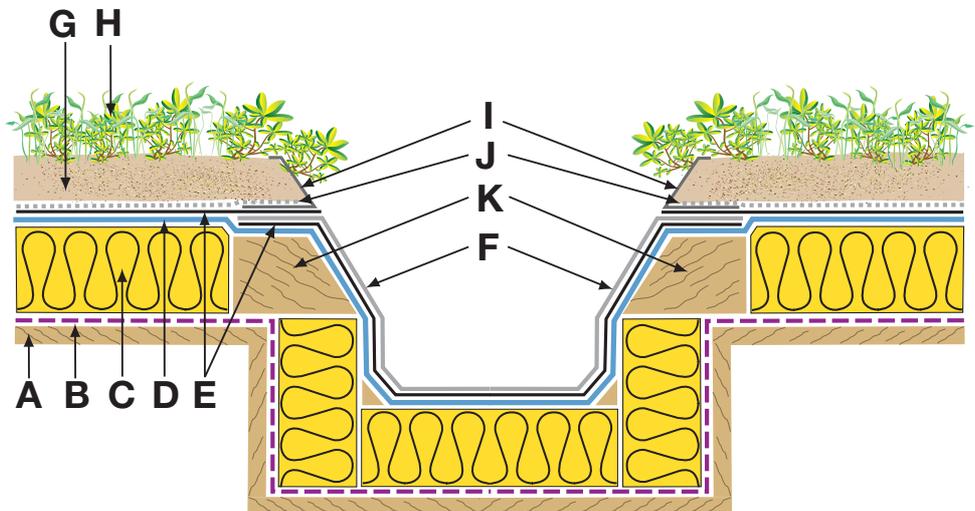


- A - Lightweight deck
- B - Prominent alu vapour barrier
- C - Indexzone insulation
- D - 5mm Proteaduo underlay
- E - 4mm Defend Anti-roots H
- F - Water retention/drainage mat
- G - Substrate/rootzone
- H - Insta planting system
- I - Vegetation barrier
- J - Rainwater outlet with removable cap

## 3

### Internal box gutter detail for Index low pitch Extensive Green Roof System

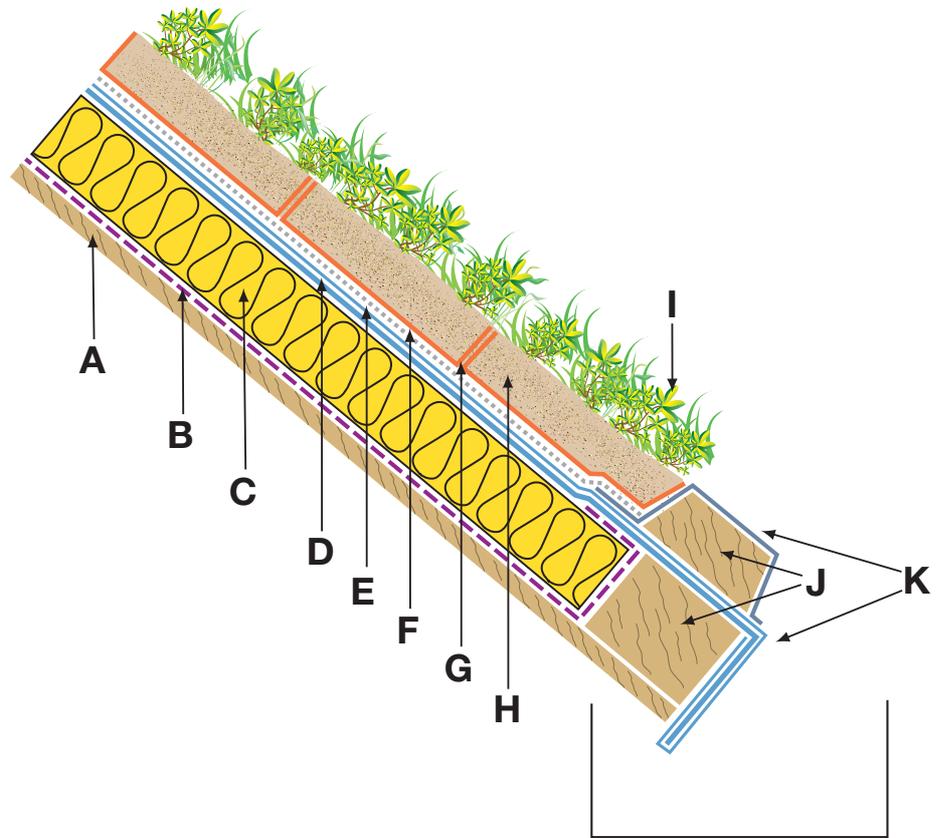
- A - Lightweight deck
- B - Prominent alu vapour barrier
- C - Indexzone insulation
- D - 5mm Proteaduo underlay
- E - 4mm Defend Anti-roots H
- F - Mineral Antiroot Firestop
- G - Substrate/rootzone
- H - Insta planting system
- I - Perforated trim
- J - Water retention/drainage mat
- K - Timber battens



# 4

## Eaves detail for Index Sloping Extensive Green Roof System (gradients between 25 and 50 degrees)

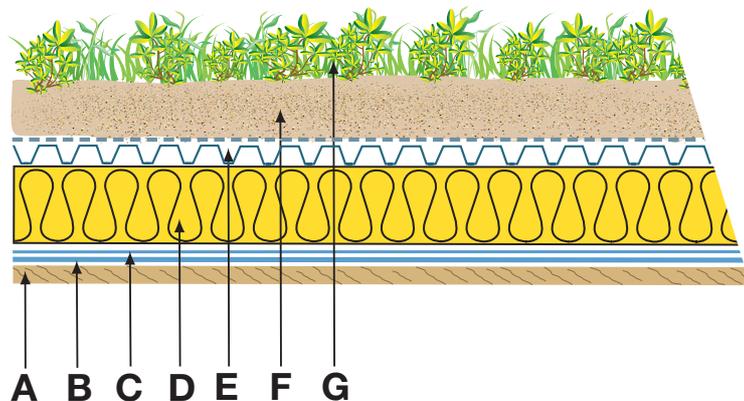
- A - Lightweight deck
- B - Prominent alu vapour barrier
- C - Indexzone insulation
- D - 5mm Proteaduo underlay
- E - 4mm Defend Anti-roots H
- F - Water retention/drainage mat
- G - Polypropylene substrate retention trays
- H - Substrate/rootzone
- I - Insta planting system
- J - Timber battens
- K - Mineral Antiroot Firestop



# 5

## Detail for inverted roof build-up in an Index low pitch Extensive Green Roof System

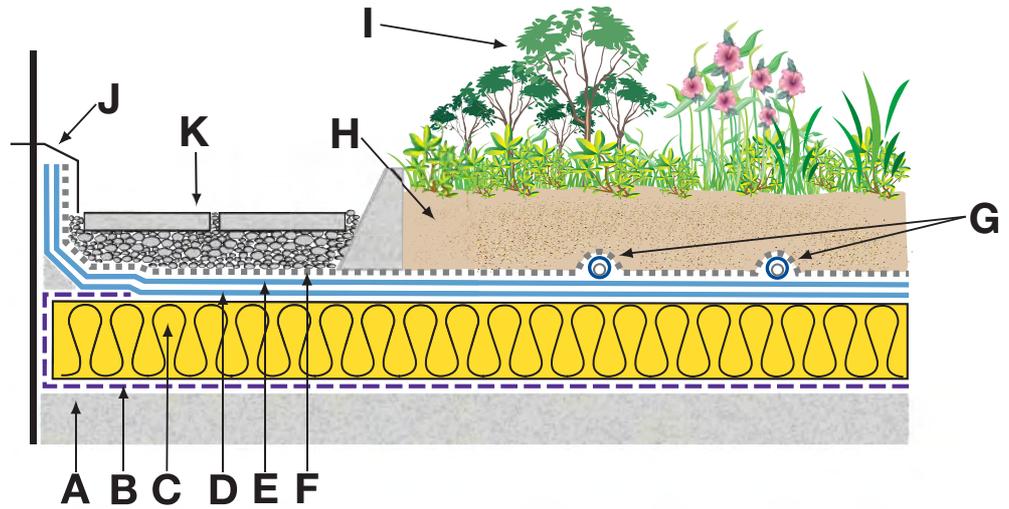
- A - Lightweight deck
- B - 5mm Proteaduo underlay
- C - 4mm Defend Anti-roots H
- D - Indexzone insulation
- E - Water retention/drainage mat
- F - Substrate/rootzone
- G - Insta planting system



# 6

## Hard to soft landscaping details for Index Intensive Green roof system

- A - Deck
- B - Prominent alu vapour barrier
- C - Indexzone insulation
- D - 5mm Proteaduo underlay
- E - 4mm Defend Anti-roots H
- F - Water retention/drainage mat
- G - Irrigation system
- H - Substrate
- I - Grass/decorative plantings
- J - Metal cover flashing
- K - Hard landscaping



Index offers a comprehensive range of product data and technical specification brochures covering applications and solutions to all types of waterproofing problems. Detail drawings of good roofing practice are also available on request.

This information is available on-line at the Index website [www.indexbp.co.uk](http://www.indexbp.co.uk)

Index has obtained CPD status from RIBA for its technical seminars featuring green roofs and advances in flat roof waterproofing technology. The Company is also a subscriber to the NBS Plus Service which can provide instant access to standard specification clauses for Index waterproofing systems.

