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Liquid Plastics

Green Roof

...bringing roofs to life





...bringing roofs to life

Introduction to Liquid Plastics

Since its formation, Liquid Plastics has developed high performance protective systems, which combine all the inherent advantages of liquid roofing with the additional benefits of the latest polymer-based technology.

With over 40 years experience of in-house research and development we can provide Green Roof Systems, which are highly engineered, quality solutions. They are not only quick and simple to install but also come with built-in quality assurance.

Following the success of our Cold Fusion Bonded Built-up Roofing Systems and Inverted Roofing Systems, we are able to offer Green Roof Systems, which will outlast and outperform traditional counterparts. The Green Roof Systems have all the advantages of our other roofing systems and include the totally seamless, cold liquid applied, Decothane Root Resistant Grade Waterproofing System to provide complete waterproof protection.











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Why Green Roofs?

Green Roofs present a solution in the quest for sustainability, particularly in urban developments where the emphasis is on increasing biodiversity and quality of life. They can aid planning consent and provide many environmental and economic benefits including:

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- Prolonging the life of the roof waterproofing system
- Enhancing the aesthetics of the building
- Utilising the roof space
- Improving thermal performance
- Aiding noise reduction
- Providing habitats for plants and animals
- Reducing storm water run off
- Absorbing C02

Types of Green Roofs

ntensive

Intensive Green Roof System designs are versatile, allowing the roof area to be utilised as highly aesthetic areas for recreation, public access or simply to be admired from surrounding buildings. They have a deeper growing medium than Extensive Green or Brown Roofs because trees, shrubs, turf and hard landscaping can be incorporated into the design. The roof structure will require extra loading capability to withstand the weight of the system and support an irrigation system for maintenance, if required.

Types of Green Roofs



Green Roof Systems

Extensive Green Roof Systems are an ideal solution to provide an aesthetic, low maintenance ecological feature, which can be admired from surrounding buildings. Due to a relatively shallow growing medium they are much lighter in weight, both dry and wet, than Intensive Green Roof Systems. This makes them ideal for use over most lightweight structures and pitched roofs. Due to this they are generally designed to provide limited access other than for general maintenance.

Brown Roof Systems

Unlike an Extensive Green Roof System, sedum or other selected plants are substituted with local brownfield site materials, such as crushed brick and site rubble. Brown Roofs can create aesthetic designs as well as aiding biodiversity by creating habitats for local plant and animal species. These systems are generally designed to provide limited access other than for general maintenance.



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Green Roof System Choice

When specifying Green Roof Systems from Liquid Plastics there is an easy two step process.



Roof Design

Whether the project is new build or refurbishment it is important to consider which roof design is most suitable to withstand the loads associated with the chosen Green Roof System.



Green Roof System

Select an Intensive or Extensive Green Roof System that is compatible with the chosen roof design. Typical Green Roof System build-ups can be seen on pages 10 and 11. These can be tailor made to your specification.

Roof Design



Cold

Cold roofs are suited to all types of Green Roof Systems.* In this type of roof design the insulation is placed below deck level or in some instances, such as above well ventilated underground car parks, insulation is not required at all. It is very important in this type of structure to allow for good ventilation to remove water vapour.



* The structure must be designed to withstand the loads associated with the chosen Green Roof System.

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Roof Design



Warm

Warm roofs are ideally suited to Extensive Green, Brown and most Intensive Green Roof Systems. The Liquid Plastics' Cold Fusion Bonded Built-up Roofing System uses Decotherm® insulation, which is a high performance CFC/HCFC free polyisocyanurate insulation core with autohesively bonded coated glass fibre facing on both sides. For some Intensive Green Roof Systems, an alternative insulation may be required with an increased compressive strength. Tapered Insulation schemes are also available on request.



Decothane Root Resistant Top Coat Decothane Root Resistant Base Coat with Reemat Premium Carrier Membrane

Decotherm[®] Insulation Vapour Control Layer

Roof deck



Inverted

Inverted roofs can be used with all types of Green Roof Systems as they can withstand extremely high loading, therefore, making them ideal for use as recreational areas.* The Inverted Roof Board Insulation is a high density rigid extruded polystyrene with high compressive strength and provides excellent protection to the Decothane Root Resistant Grade Waterproofing System.



* The structure must be designed to withstand the loads associated with the chosen Green Roof System.

Decothane Root Resistant (RR) Waterproofing System



Decothane Root Resistant waterproofing membranes are highly advanced root resistant polyurethane coatings, which use atmospheric moisture to trigger the curing process. They have been successfully tested to meet the requirements of DIN 4062 5.7 Root Resistance Test, proving that roots cannot penetrate through the Decothane membrane. All grades have an excellent International track record being used by distributors in over 40 countries worldwide.

Key Benefits



- Completely seamless waterproofing system eliminating the risk of leaks due to failure of joints and also ensures insulation boards are stabilised
- Decothane Root Resistant Waterproofing membranes have been tested to meet the requirements of DIN 4062 5.7 Root Resistance Test.
- Cold applied cold fusion bonded, zero heat, zero flame application
- No fire watch required during application installed system achieves highest fire ratings
 BS 476 : Part 3, DD ENV 1187 : 2002 Test Method 1, 2 and 3
- Easy to install with simple application to detail areas
- Increased working window no restriction to holiday and shutdown periods

Decothane has been independently approved by BBA, LPCB and FM



- Guaranteed for 25 years
- High tensile strength resists tear from building movement
- High elasticity allows for greater thermal movement
- Highly resistant to erosion, cracking or other defects



• Insulation used within the Built-up and Inverted Roofing Systems are free from Halogens,

CFCs & HCFCs, giving Zero ODP (Ozone Depletion Potential)

- Available in wide range of colours for exposed areas
- A wide range of accessories are available to complement your chosen Green Roof System

Types of Insulation

Decotherm®

Decotherm® Insulation is used in Liquid Plastics' high performance Cold Fusion Bonded Built-up Roofing System. It is a CFC/HCFC free polyisocyanurate insulation core with autohesively bonded coated glass fibre facing on both sides.



NOMINAL DIMENSIONS	AVAILABILITY	
Length (mm)	1200 (2400)	
Width (mm)	600 (1200)	
Decotherm Thickness* (mm)	25, 40, 50, 60, 75, 80,	
	90, 100, 110	

* Other thicknesses are available subject to quantity

Thermal Conductivity

The boards achieve a thermal conductivity of 0.027 W/m.K (thicknesses < 80mm), 0.026 W/m.K (thicknesses from 80mm to < 120mm) and 0.025 W/m.K (thicknesses \geq 120mm).

Inverted Roof Board

Liquid Plastics Inverted Roof Board is a high performance rigid extruded polystyrene insulation for use in Inverted Roof designs.

NOMINAL DIMENSIONS	AVAILABILITY	
Length (mm)	1250	
Width (mm)	600	
Thickness (mm)	30, 50, 60, 80, 100, 120	
	140, 160	

Thermal Conductivity

The boards achieve a thermal conductivity of 0.029 W/m.K. \leq 120mm and 0.031 W/m.K. \geq 130mm.

For hard landscaped areas, such as patios and walkways, Liquid Plastics offer a cementitious faced

insulation board as an alternative to Inverted Roof Board with pavers.

Green Roofs Systems - Typical Build-ups

Intensive Green Roof System - Flat Step2

- 7. Soft / hard landscaping (dependent on design)
- 6. Filter Fleece
- 5. Geodrain
- 4. Inverted Roof Board
- 3. Decothane Root Resistant Top Coat
- 2. Decothane Root Resistant Base Coat with Reemat Premium
- 1. Roof Deck

Depth: dependent on design

Wet weight: dependent on design

(Typical Inverted Roof design)

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Step 2

Step2 1A Turf Green Roof System - Flat 1B Brown Roof System - Flat



- 7B. Brown Roof Substrate
- 7A. Turf and Soil Mix
- 6. Filter Fleece
- 5. Geodrain
- 4. Inverted Roof Board
- 3. Decothane Root Resistant Top Coat
- 2. Decothane Root Resistant Base Coat with Reemat Premium
- 1. Roof Deck

Minimum Depth: 50mm

Wet weight: dependent on depth of system specified

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Extensive Green Roof System - Flat



- 10. Pre-grown Sedum Blanket
- 9. Sedum Substrate
- 8. Filter Fleece
- 7. Biodrain
- 6. Decothane Root Resistant Top Coat
- Decothane Root Resistant Base Coat with Reemat Premium 5.
- 4. Carrier Membrane
- 3. Decotherm[®] Insulation
- 2. Vapour Control Layer
- 1. Roof Deck

Maximum Depth: 110mm Wet weight: 110kg/m²

Step2 Extensive Green Roof System - Pitched



- 7. Pre-grown Sedum Blanket
- 6. Rigid Plastic Paver filled with Sedum Substrate
- 5. Capillary Mat
- 4. Decothane Root Resistant Top Coat
- 3. Decothane Root Resistant Base Coat with Reemat Premium
- 2. Carrier Membrane
- 1. Roof Deck
- Depth: 120mm
- Wet weight: 100kg/m²



ntensive

Typical Details - Inverted Roof Upstand





Typical Details - Warm Roof









Typical Details - Warm Roof



Perimeter Kerb



Design & Installation

It is important to consider the following:

Loading out

Consideration must be given to loading out of materials to ensure that the underlying structure is not compromised. Close liaison with the site management team is essential before any loading is carried out.

Where access to the roof may be required, via a telehandler for example, it may be necessary to remove part of the safety handrail. This operation must only be carried out by qualified personnel under the strict guidance of the site management team.

Roof Falls

Tapered insulation schemes for warm roofs can be designed to aid drainage if required.

Protection

It is essential that once the waterproofing system has been tested for leaks no other trades be allowed onto the waterproofed surface. Depending on the type of roof being laid a protection fleece must be laid to prevent scuffing or other damage and soft soled shoes must be worn.

Sharp tools (knives, spades, shovels etc) must not be used directly above the waterproofing membrane. Any fleece or drainage fabric must either be cut away from the works area or using stub ended scissors.

Roof Access

No access to the roof will be made unless it is safe to do so and only in accordance to the agreed method of working. Under no circumstances is access to the roof allowed without the prior knowledge of another qualified person on site who is fully conversant with the emergency procedure.

Wind Action

In exposed locations and on pitched roofs the action of wind scour can cause movement of soil or ballast and can lead to the redistribution of loading. The roof area should, therefore, be inspected regularly and the ballast size increased if necessary. Wind action can also have an effect on drying of the Green Roof System, therefore, irrigation may be required. Wind uplift calculations can be provided by our Technical Customer Services Department.



Irrigation

Consideration must be given to the installation of an irrigation system during construction. Irrigation is usually required in Intensive Green Roof Systems to prevent dehydration especially during periods of warmer temperatures and low rainfall.

Green Roof System Components

Geodrain



Filter Fleece

Drainage Channel



Inspection Chamber



Geodrain is a high quality recycled Polypropylene drainage layer, which removes water whilst retaining a base level of water. It is lightweight yet capable of withstanding heavy loads of up to 130 tonnes /m² . Weight: 2.6kg/m² Water flow rate: 5.75 L/Sec

ntensive

Filter Fleece is a non woven, 100% virgin Polypropylene fabric that is placed over Geodrain in Intensive Green Roof Systems. It is designed to prevent fines passing into and blocking up the system. Weight: 220g/m² Approximate water flow: 315 L/m²/sec

This is used where there is a small or low level difference between a door threshold and a pathway or other hard surface. The drain carries water away form the doorway. It can also be used where linear drainage is needed, for example through a path.

For use where drainage outlets, electrical junctions and so on, need to be accessed on a regular or emergency basis.

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Decorative & Concrete Kerbs



These are used where a change in level occurs, for example, a lawned area down to a path. They make a neat strong edge and have versatility in design and size to accommodate most applications.

Green Roof System Components @xtensive

Biodrain



Filter Fleece

Biodrain drainage layer is made from recycled, emission free PUR soft foam with a cuspated base. It contains a long term fertilizer to aid long term growth. These properties make it extremely lightweight, easy to install and biodegradable. Weight: 2.6kg/m² Water storage capacity: 15 L/m²

Filter Fleece is a non woven, 100% virgin Polypropylene fabric that is placed over Biodrain in Extensive Green Roof Systems. It is designed to prevent fines passing into and blocking up the system.

Weight: 220g/m²

Approximate water flow: 315 $L/m^2/sec$



Drainage Channel



Aluminium Retaining Edge

Used to contain the leading edge of an Extensive Green Roof System build-up. The edge prevents wash out of fines, whilst still allowing full drainage into a gutter. This product is also used where the edge of the sedum blanket and substrate is visible, thus providing a more aesthetic support detail.

Rigid Plastic Paver



For use with Extensive Green Roof Systems on pitched roofs with a slope of more than 10 degrees, where the sedum substrate needs to be restrained to prevent slippage. The Pavers are 40mm thick and form a series of interlocking tiles.

Inspection Chamber



For use where drainage outlets, electrical junctions and so on, need to be accessed on a regular or emergency basis.

Maintenance

Waterproofing System

Due to the Decothane Root Resistant Waterproofing System being situated below the landscaping element it is not subject to foot traffic, wear and tear, damaging UV light and other factors that may diminish its effectiveness. Therefore, the membrane is likely to last beyond its guaranteed design life and will not require regular maintenance.

Green Roof System

GREENFIX

Following the installation of a Green Roof System, our specialist green roof partner, Greenfix Ltd, will carry out an initial inspection after three months. They also offer Vegetation Health Check Packages for Extensive Green Roof Systems.* These help the longevity of the vegetation; help to keep the system looking healthy and prevent any drainage problems.

The package includes biannual visits, once in the spring to inspect, fertilise and spot weed and once in the autumn to inspect and spot weed. Greenfix Ltd are experienced with all Green Roof Systems and understand the key elements of long-term Green Roof success. The details of the packages available are as follows:

Extensive Green Roof Systems Vegetation Health Check Packages*

One visit in the spring to:

- Inspect the sedum growth
- Fertilise the sedum
- Spot weed (weeds over 150mm)
- Check drainage and clear foliage from
- accessible drains and outlets (if not accessible
- then the appropriate persons will be informed)
- Check for weather damage

Intensive Green Roof Systems



Intensive Green Roof Systems must be kept free from weeds to aid plant growth and turf should be cut regularly. They can also be irrigated to prevent dehydration, especially during periods of warmer temperatures and low rainfall.

*Minimum 100m² roof area

- Inspect the sedum growth
- Spot weed
- Check for weather damage

One visit in the autumn to:

Technical Service

Technical Service

In order to assist building owners and specifiers in the selection of the most appropriate system for any given project, we offer free technical and site support and detailed written specifications. The company's experienced technical team is available to provide expert advice on specification, application and maintenance.

Calculations

Our Technical Customer Services Department can provide condensation calculations, which will ensure that there is no condensation risk with Warm and Inverted Roof designs. They will also calculate the U-value to ensure that the correct thickness of insulation is used, thus complying with current Building Regulations and Standards. Wind uplift calculations are also available for high wind risk areas.

Specification Assistance

NBS Plus

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NBS is the industry standard specification system, which allows architects, specifiers and engineers to insert clauses into specifications by manufacturer and product, making the process quicker and more efficient. We have joined NBS Plus and therefore detailed up-to-date product information is readily available to create accurate specifications.

J31 - LIQUID APPLIED WATERPROOF COATINGS (which includes Warm and Inverted roof specifications). Q37 - GREEN ROOFS

Surveys and Measures

We carry out site inspections to enable a specification to be created.

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Detail Drawings

With your specification you will find CAD drawings of any details on your roof.

Tapered Insulation Drawings

Site surveys will be conducted in order to prepare tapered insulation schemes that may be required within your specification.

Photographic Project Information

Photographic information will form part of your specification which will enable you to see for yourself areas of roof failure.

Condensation Risk Analysis

On refurbishment projects, core samples will be taken to ascertain the exact roof structure. This will enable us to carry out condensation risk analysis calculations which will help us determine why the roof has failed.

In many instances our calculations will be calculated from information provided by either the specifier, building owner or contractor. It is for these individuals to ensure that this information provided is reliable and accurate. In this respect, the technical services calculations and measurements are for guide purposes only.

Continuing Professional Development (CPD)

CPD is designed to keep professionals up-to-date with new ideas, techniques and regulations. At Liquid Plastics, we understand the importance of CPDs in providing education on industry change, customers' needs, current legislation and changes to legislative acts and competition. We offer a variety of CPD seminars designed to be informative. To request a CPD please contact our enquiry line on **01772 255022**.

QA Contractor Programme

When specifying Liquid Plastics' products, we



recommend the use of our Quality Assured Contractor Programme, which is made up of independently audited contractors based throughout the UK. The programme offers clients guaranteed quality and assurance because QA Contractors have received full training from Liquid Plastics in all application techniques in order to help them to achieve our stringent standards. To promote strict professionalism, the programme is independently verified and has demanding entry criteria along with a stringent code of practice. Members of The Institute of Clerks of Works (ICW) are commissioned by Liquid Plastics to audit the offices of potential new members to ensure that the company has a sound corporate identity and follows excellent working practice.

QA contractors are based throughout the country and full contact details can be found on our website: www.liquidplastics.co.uk.

Guarantees



Underlining our commitment to reliability, when installed by a QA Contractor we can offer single point guarantees on Liquid Plastics waterproofing system of 25 years, covering both labour and materials.

Environmental Sustainability

Environmental responsibility is a key consideration for Liquid Plastics and this is reflected in our achievement of the ISO 14001 standard, Energy Star Status and the continual development of our Environmental Management System. Having both the head office and manufacturing facilities in Preston, Lancashire, enables us to control and minimise the environmental impact during the use of raw materials and production of finished products, as well as products sourced from external suppliers.

We have always remained well in advance of stringent legislation and continue to lead an international field in the search for ever more environmentally responsible technologies, whilst continuing to provide the client with dependable, cost-effective materials. Our dedicated Safety, Health and Environmental (SHE) Department focus on reducing our environmental impact from all areas of the business, which includes annually monitoring emissions from production.



ISO 14001: We are committed to minimising our environmental impacts, in doing so we have achieved ISO 14001. We continually strive to improve and comply with environmental requirements.



Energy Star: Decothane Root Resistant Detail Coat has achieved Energy Star accreditation, a US Environmental Protection Agency (EPA) Programme. The white coloured system exceeds the criteria for solar reflectance ultimately saving costs through the reduction of energy use that is typically associated with cooling a higher temperature building. This further highlights our commitment to developing products that have a positive effect on the environment.







Case Study



Project

Winston Way Primary School, Essex

Size

1800m² Products

Green Roof Systems

Client

Architects Department for London,

Borough of Redbridge

Contractor

Knight Asphalte Co. Ltd.

Background

One of two llford 'extended schools' planned for construction in 2007; Winston Way incorporates sustainable features in its design whilst serving the surrounding community, and has a total number of 630 pupils plus nursery.

The problem

The new build school has various roof substrates including metal deck, concrete and timber. Three of the roof areas required a green roof finish, with another area to be used as a large eco-garden. Hot works were not permitted on the roofs and a tight budget had been set for the project.



The solution

The design of the new school building provides a number of different roof areas, of which five had a Liquid Plastics' Cold Fusion Bonded Built-up Roof installation and another had a Liquid Plastics' Cold Applied and Seamless Inverted Roof installation. On the remaining roofs, two areas were covered with an Extensive Green Roof System and one – which would provide an educational, fully accessible area for the children – had an Intensive Green Roof to allow the pupils to learn about the different plant and flower species. All of the green roof installations include Liquid Plastics' Decothane EC root resistant grade membrane to ensure superior waterproof protection would be maintained even with the presence of plants.

The benefits

Liquid Plastics' systems were deemed to be best suited for the project because of the seamless nature of the waterproof membrane, which enabled the deck in places to be cast flat. Because Decothane is liquid applied, penetrations could be easily waterproofed, and every roof system installed on the school is backed by the BBA and guaranteed to last at least 25 years.

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In addition to Green Roof Systems, we also manufacture a range of other high performance products.

The following literature is available on request:

- Green Roof Systems
- Cold Fusion Bonded Built-up Roofing Systems •
- Inverted Roofing Systems
- Liquid Roofing Systems
- Functional and Decorative Waterproofing for Balconies and Communal Walkways
- · Decorative Weatherproof Systems for Walls
- Silver Ion Hygienic Coatings
- Hygiene Coatings Specification Guide
- Hygiene Coatings for the Food and Beverage Industry •
- Hygiene Coatings for the Hospital and Healthcare Facilities
- Hygiene Coatings for the Pharmaceutical Industry
- Asbestolok[®] Asbestos Encapsulation Systems

















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Liquid Plastics

Liquid Plastics Limited • lotech House • Miller Street Preston • Lancashire • PR1 1EA • England

> Enquiry line: +44 (0)1772 259781 Fax: +44 (0)1772 255670

e-mail: info@liquidplastics.co.uk (International) export@liquidplastics.co.uk



Visit our web site: www.liquidplastics.co.uk

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