Waterproofing

Overlay solutions made simple

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Introduction to

Overlay waterproofing solutions

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The global shift toward sustainable practices has placed increasing emphasis on resource efficiency, waste reduction, and long-term environmental responsibility across all sectors, including construction and infrastructure. Waterproofing membranes, a critical component of building envelopes, play a key role in ensuring durability and protection from water ingress. The lifecycle management of these membranes, particularly in refurbishment projects, presents an opportunity to align with sustainability goals.

Reduce waste

Traditionally, the replacement of aged or damaged waterproofing membranes involves complete removal, often generating significant waste and requiring the use of new materials. This practice not only depletes natural resources but also increases the carbon footprint of such projects. By adopting overlay solutions, where a new waterproofing system is applied over the existing membrane, stakeholders can reduce waste and minimise the environmental impact of construction activities.

Consider overlay first

Overlaying waterproofing membranes offers a practical solution that extends the service life of structures while adhering to sustainable construction principles. With sustainability at the forefront of all our minds the default approach should now be to consider options to overlay first. With the right expertise this can be achieved with modern, reinforced PMMA (polymethyl methacrylate) liquid applied waterproofing systems.

Here we explore the considerations to overlaying waterproofing membranes, providing a more sustainable alternative to traditional methods. By integrating innovative materials, best practices, and lifecycle considerations, this strategy supports the construction industry's transition toward a more sustainable and circular economy.

- **Overlay existing waterproofing membranes**
- **Negate strip up of existing roof build ups**
- **Reduces the risk of water ingress during works**
- **Reduce waste to landfill**
- **Reduce time on site**
  - **and associated energy use**
  - **and associated journeys to site or deliveries**
- **PMMA cold applied systems - No energy intensive hot works**

Flat roof waterproofing overlays

Top 10 properties of PMMA

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1. High compatibility: It adheres to most existing waterproofing membranes, reducing the need for substrate removal and enabling easy overlays.

2. Excellent adhesion: PMMA fully bonds to a wide range of substrates, creating a seamless, homogenous, waterproofing membrane.

3. Flexibility and crack bridging: PMMA accommodates structural movement and thermal expansion, ensuring durability in dynamic conditions.

4. Seamless application: Creates a monolithic self-terminating waterproofing membrane, unifying different existing materials and eliminating potential weak points at joints, seams and overlaps.

5. Rapid curing: Ultra fast curing, even at low temperatures, minimises project delays and allows year-round installation.

6. Lightweight solution: Minimal added weight makes PMMA ideal for structures with load constraints, and is applied easily with a roller.

7. No hot works and versatile application: Cold application eliminates fire risks, allowing installation with minimal disruption to occupants and with choice of UV stable, pigmented custom finishes.

8. Chemical and water resistance: Maintains integrity under standing water and chemical exposure, ensuring long-term performance.

9. Sustainability features: Reduces waste and carbon footprint by avoiding full membrane removal and low-VOC formulation align with sustainable building practices.

10. Durability and longevity: UV, weather, and aging resistance provide long-lasting waterproofing with certified 25-year service life.

PMMA compatible substrates:

- **Felt**
- **Asphalt**
- **Bitumen**
- **Single-ply membranes (e.g. PVC, PVC-P, EPDM, EVA, TPO, FPO, TPE, CPE, PIB, VET etc.)**
- **Cementitious materials (concrete, brickwork, masonry)**
- **Metals and coated metals**
- **Plastics**
- **Coatings (e.g. polyurethane, polyurea. polymethyl methacrylate, GRP, Solar reflective etc.)**
- **Glass**
- **Timber**

Assessment of suitability for overlay

Visual survey

A visual survey can help to assess the type and condition of the existing waterproofing system. It is important to understand the building's use, which may vary zonally under the same expansive flat roof. Such information gathering helps to comply with the requirements of BS 5250:2021, Management of moisture in buildings, for subsequent specification advice.

Of course, roofing professionals conducting the initial visual survey should undertake the necessary risk assessment and be trained and experienced in working at height. It's important to pay attention to the state of details and penetrations, as complex forms are often the most at risk of failure. In addition historic repairs, surface defects, deflection and ponding water should be documented. Failures evident topside and underneath need investigation to understand the cause for failure at these points.

The survey should include an assessment of plant equipment, access points, and maintenance access walkways. It should also identify areas where safety measures, such as edge protection, will be required for the project installation phase.

The Triflex Technical team provide a suite of free services nationally

- **Advice and site survey**
- **Testing**
- **On-site support**
- **Off-site support**
- **Bespoke project specification proposals**

Assessment for overlay solutions

- **Visual survey**
- **Core testing**
- **Peel strength adhesion testing**
- **PVC singly-ply plasticiser migration testing**

Assessment of suitability for overlay

Core testing

Removal of cores from the roof through drilling or cutting out can help determine the roofs construction. With roof drawings rarely available in refurbishment projects we find that core sampling is required to really understand the build-up and its condition.

Core sampling helps to determine:

Build-up: The current build-up of the roof above the structural deck, as well as the type of deck and presence of an air and vapour control layer can be confirmed.

Falls: Gains insight into how any falls are formed within the roof build-up / deck.

Condition: Determines the general condition of the roof and its components, including any warm roof build-up.

Defects: Helps to investigate the likely reasoning for defects associated with the current roof waterproofing and structure, such as water ingress, cracking, ponding, ruckles, blistering, cracks, de-bonded waterproofing and surfacing layers, spongy substrates etc.

Suitability for overlay: Fundamentally when used alongside condensation risk analysis, they help assess the suitability of the existing roof build-up for a Triflex overlay solution.

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Core testing is carried out to obtain accurate data on the existing material properties and conditions. This information is essential for determining the correct specification proposal, enabling precise calculations, and ensuring that the bespoke project specification complies with legislation and best practice.

Assessment of suitability for overlay

Peel strength adhesion testing

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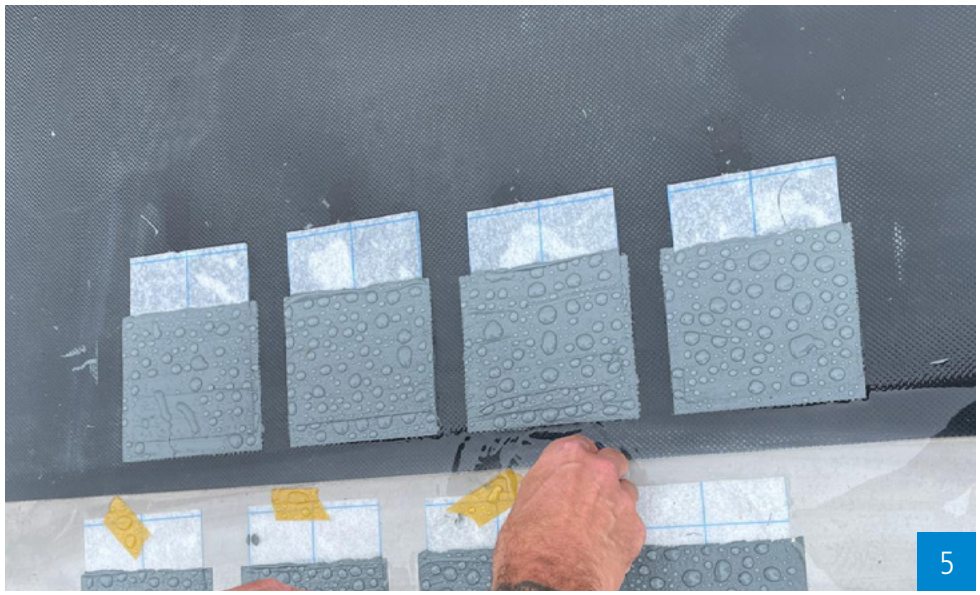
A peel adhesion test is used to assess the strength and quality of the bond between the proposed Triflex system to the substrate as well as that of any other existing waterproofing membranes and the substrate.

Whilst largely subjective, in experienced hands it is valuable in assessing the bond to substrates and details for suitability for overlay.

Here, a range of primers and preparation methods together with Triflex liquid applied membranes are evaluated in a controlled manner. Trial areas are selected to determine compatibility across the various substrate materials identified. The number of trial sites may also vary across the substrate, and should reflect the number of materials, nature of the conditions and defects.

Once the trial variants have cured, force is applied by pulling the exposed section of reinforcement fleece slowly away from the substrate at 90 degrees to assess how well it adheres.

The adhesion of the Triflex system provides evidence of material compatibility and helps determine whether any pretreatment is necessary or if a primer is required for the substrate as an overlay solution.



Assessment of suitability for overlay

PVC single-ply plasticiser migration testing

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All PVC single-ply membranes typically include plasticisers in their composition. Plasticisers can be 'baked out' of membranes through solar gain and heat. In addition, where coming into direct contact with other materials, they can migrate from one to another. This can leave the PVC single-ply harder, less flexible and causing shrinkage due to loss of mass. This could also lead to failure of the underlying PVC membrane which may be detrimental to the overlay system.

To assess the risk of this migration when overlaying, samples can be analysed under accelerated, controlled laboratory conditions.

By testing removed single-ply membrane samples, Triflex's scientific approach delivers confidence that the existing single-ply waterproofing membrane can be overlaid.

As seen on our Emirates Stadium project in London.

Considerations for overlay

Overlay existing waterproofing

Here, the existing system is in robust condition and a new Triflex waterproofing membrane is applied directly on top. Representative core sampling has confirmed the build-up and in the case of warm roofs, the insulation is sound.

If failure has occurred in some areas within the existing build-up, often these can be repaired locally, by removing and replacing affected areas of the flat roof above the structural deck. This avoids complete wasteful strip up and the new system provides a homogenous waterproofing membrane fully adhered to the substrate.

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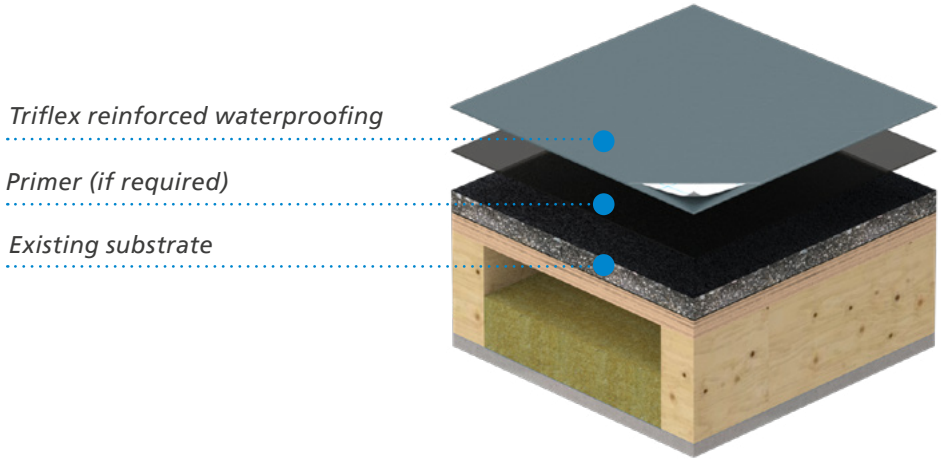
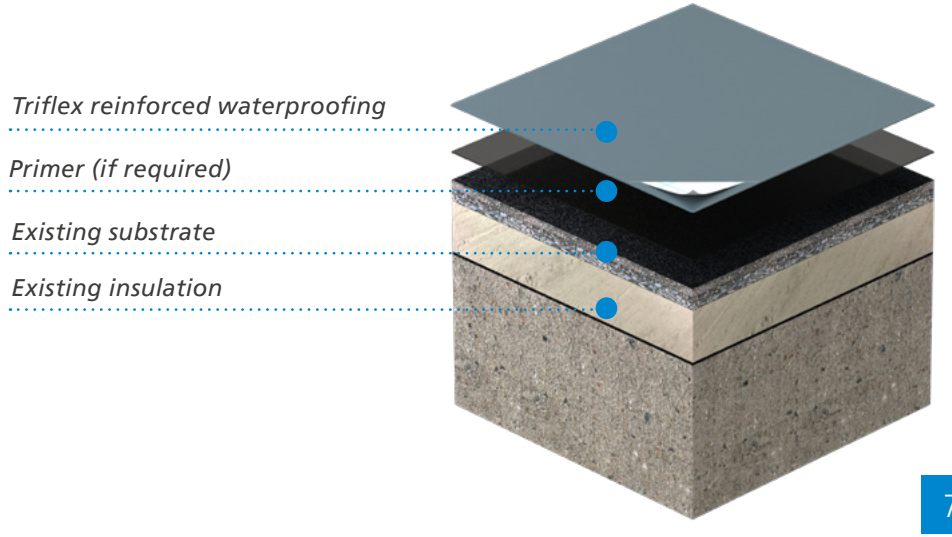
Overlay of existing cold roof system



Overlay of existing warm roof system



Considerations for overlay

Overlay inverted roof build-ups

In inverted roof build-ups, or buried systems, the waterproofing membrane is installed directly on the structural deck and a warm system sits above the waterproofing.

Refurbishment with an overlay approach means that the various overburden is removed, exposing the underlying waterproofing membrane. The existing waterproofing membrane is then overlaid with a Triflex liquid applied system.

To test for the suitability of the existing waterproof membrane for a Triflex overlay solution, small local areas of the inverted system are first removed to the waterproofing layer. Evaluation of the type and condition of the underlying substrate can then be undertaken, alongside compatibility testing to facilitate a bespoke project specification proposal with minimal disruption.

With these types of roof, there is also often an option to reinstate the previously removed insulation and overburden, reducing cost and waste. With a choice of insulation options thermal upgrades can be easily achieved raising the sustainability profile of the approach. Further consideration must be given to any restrictions of upstand heights, thresholds and details when refurbishing inverted roof build-ups.

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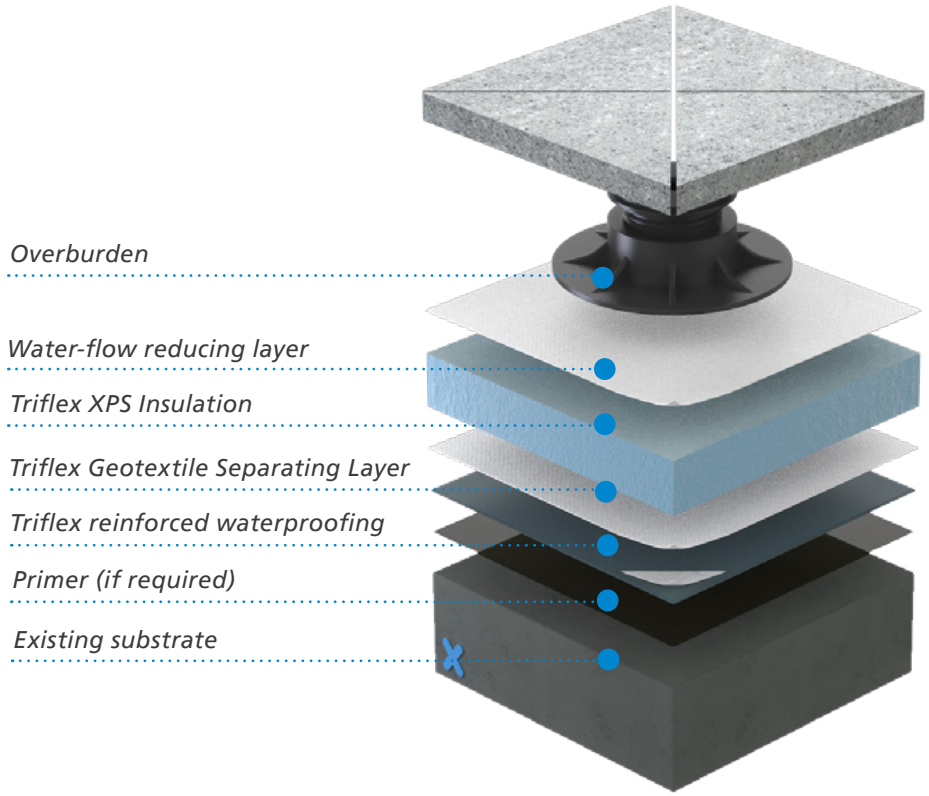
Inverted roof system



Considerations for overlay

Incorporating thermal improvement

An overlay can incorporate further thermal improvements to a higher standard. Tapered insulation schemes can also be introduced to improve drainage and reduce ponding water in problematic areas. Here it is particularly important to consider condensation risk analysis and ventilation requirements.

An existing asphalt system for example could be treated as an air and vapour control layer, with the new system build-up on top. This is subject to robust condensation risk analysis. Triflex have extensive experience in overlay waterproofing solutions. Whatever your existing build-up, we will work with you to find a solution. Our advice is free, so consult our experts today.

Triflex technical expertise provides a bespoke project specification for every scheme to meet your warm roof requirements. From Tapered insulation systems that address both drainage and U-value requirements in a single engineered build-up, to robust condenstaion risk analysis.

Renovation Triggers for Thermal Improvements

Thermal improvements are required if*:

- More than 50% of the surface of an individual thermal element (e.g. flat roof) is renovated
- More than 25% of the total external building envelope is renovated (e.g. includes cladding, windows, doors)

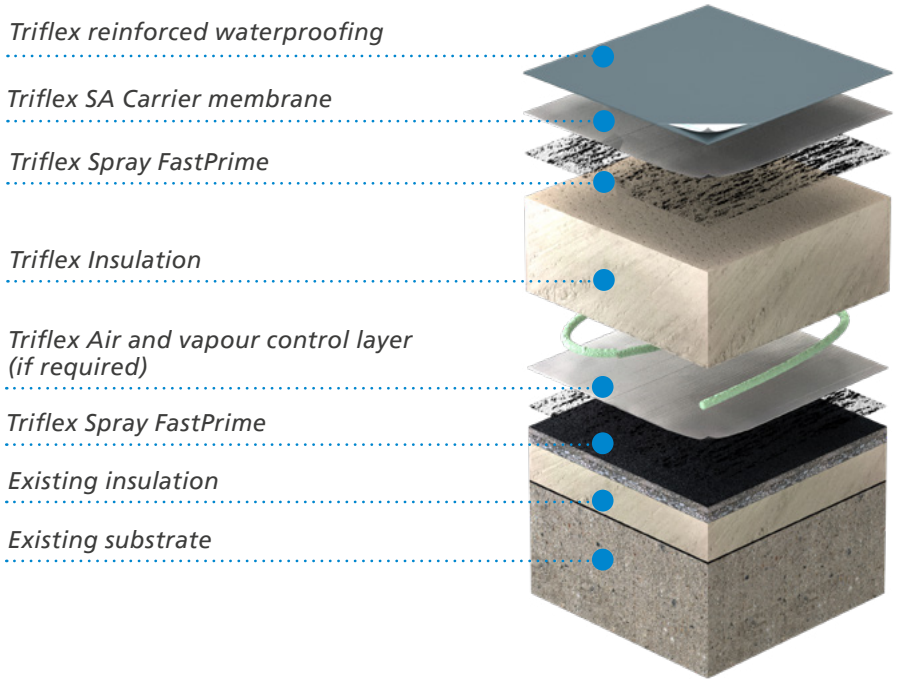
Replacing the waterproof membrane on a roof is classified as renovating a thermal element, and triggers the requirement to meet current U-value standards.

* Different rules apply in Scotland

Regional Standards Overview

- England & Wales: Approved Document L, Regulation 23 of the Building Regulations 2010
- Scotland: Section 6 of the Building Standards Technical Handbook
- Northern Ireland: Technical Booklet F1
- Ireland: Technical Guidance Document L
- Jersey: Technical Guidance Document Part 11
- Guernsey: Guernsey Technical Standards L1 & L2

Overlay with thermal improvement of existing warm roof system



Considerations for overlay

Ponding water

Flat roofs are prone to ponding or standing water, which can deteriorate many waterproofing systems. Water over a period of time will deteriorate traditional forms of roof waterproofing. This includes bituminous felts and asphalt as well as modern single ply membranes and other liquid chemistries such as PU. PMMA is resistant to water and chemical exposure, maintaining its properties even under prolonged submersion.

Ideally, ponding water should be removed as part of any flat roof refurbishment. Improving drainage and repairing defects is an important consideration prior to overlay. Incorporating tapered insulation schemes as part of any refurbishment, including overlay solutions can actively contribute too.

However sometimes flat roofs come with limitations of thresholds, upstand heights and the like. So whilst it would be ideal to remove any ponding water as part of a flat roof refurbishment, it is not always possible. It's good to know that PMMA hydrolysis resistant properties means that standing water poses no threat to its longevity.

Tapered insulation schemes can be used to redirect ponding water and improve drainage and thermal performance. These schemes are designed with varying thicknesses and are cut to falls. Tapered insulation can be implemented on improper roof slopes to reduce the chance of ponding water forming.

BS 6229-2025 guidelines recommend to maintain a minimum 1:80 finished fall for both the entire roof surface and any internal gutters and 1:85 at hipped valleys of tapered schemes.

To accommodate potential inaccuracies on-site and slight deck deflections, designers aim for a fall of 1:40 in the design of flat roof surfaces.

Condensation risk analysis and refurbishment

Old buildings in particular were built at a time when condensation in buildings was less understood, and as consequence may not comply with best practice.

Interstitial condensation

Condensation risk analysis should be calculated to predict the impact of any new flat roof waterproofing system. By also calculating the condensation risk of the existing build-up, issues can be identified and corrected. Evaluating the likelihood of interstitial condensation in the proposed roof build-up, provides reassurance for the flat roof refurbishment.

Building use

Any change of use of the building can have an impact as the humidity class and associated risks can also change. BS 5250 (2021): Management of moisture in buildings code of practice.

Humiditiy class	Building type	Relative humiditiy at internal temperature		
		15°C	20°C	25°C
1	Storage areas	<50	<35	<25
2	Offices, shops and dwellings with low occupancy	50-65	35-50	25-35
3	Dwellings with high occupancy and other buildings with unknown occupancy	65-80	50-60	35-45
4	Sports halls, kitchens, canteens, school classrooms, hospitals and buildings heated with unflued gas heaters	80-95	60-70	45-55
5	Special buildings (e.g. laundry, brewery, swimming pool)	<95	<70	<55

Table - Internal humidity classes: building types and limiting relative humidities at T_3=0°C

Surface condensation

In line with legislation as per limiting U values for existing elements in existing buildings, for those flat roofs with a U value of >0.35 W/M^2 K, consideration must be given to the risk of surface condensation too.

Triflex offer thermal calculation and condensation risk analysis as part of our bespoke project specification proposals.

Triflex solutions

Durability and longevity

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Waterproofing a building for the longest possible term is important, and to help extend the life cycle of the building. Liquid waterproofing systems are subject to testing to a standard, ETAG 005, or now known as EAD 030350-00- 0402.

Triflex was the first company to achieve certification under ETAG 005 - Liquid Applied Waterproofing Membranes issued by the European Organisation for Technical Approvals (EOTA), achieving an expected life of 25 years, the highest class. All Triflex reinforced waterproofing membranes feature British Board of Agrément (BBA) certification.

Triflex liquid roofing systems are resistant to weather influences such as hail, UV (ultraviolet light) and IR (infrared), chemical attack including that from pollution. They are also root and rhizome resistant, reassuring for green roofs and applications that may have direct contact with soil.

UK CA

FLL Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V.

EOTA

Triflex solutions

Reducing environmental impact

While there are many factors to consider when overlaying an in-situ waterproofing system, avoiding the removal of multiple components from the existing system prevents waste being sent to landfill.

Triflex cold liquid-applied PMMA systems, with their fast-curing properties even in winter temperatures, also eliminates the need for energy-intensive hot works and enables shorter project timelines.

This results in less time on site, fewer carbon intensive journeys, and minimal disruption. And it's not only a reuse of materials today to consider. With 20-year warrantied systems that readily adhere to themselves, a future overlay with a Triflex PMMA resin can provide a long-term durability and warranty reset. All of which help to reduce the overall environmental impact of the project with life cycle benefits.

- **Overlay solution reduces wastage by reusing existing waterproofing membrane**
- **Demonstrable reduction in waste to landfill by avoiding the removal of existing build-ups**
- **Cold application negates any energy intensive hot works**
- **Rapid curing means faster project times and lower costs**
- **Reduced time spent on site**
- **Fewer carbon intensive journeys**
- **Minimal disruption**
- **Highly durable with a service life in excess of 25 years**
- **Hydrolysis resistance offers peace of mind for longevity in changing climate**
- **Thermal improvement can be incorporated into overlay solutions**
- **Improve drainage solutions through overlay tapered insulation schemes**
- **Robust waterproofing for green roof build-ups**
- **Robust waterproofing and protection in blue roof schemes**

Sustainability information for specifiers

Triflex Sustainability Data Sheets

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Triflex can provide a suite of information about their resins products to help specifiers. These handy reference guides provide sustainability properties for Triflex resins, their classification, EPD, LEED and BREAM criteria compliance.

Click on the link here for quick access.

Typical properties of Triflex PMMA resin:

- Free from solvents as per Directive 2004/42/EC (Decopaint Directive)
- Free from lead, cadmium and tin stabilisers
- Free from halogens
- Free from formaldehyde
- Free from phthalate plasticisers
- Free from blowing agents
- VOC content, based on SCAQMD method 304-91 ≤ 0.9 %
- SVHC content (substances of very high concern) ≤ 0.1 %

Flat roof waterproofing system

Triflex ProTect®

Sustainability data sheet

Description	Triflex ProTect is a 2-component, pigmented waterproofing resin with a polymethyl methacrylate resin (PMMA) base. Triflex ProTect is reinforced with Triflex Reinforcement Fleece. The waterproofing resin is used on flat (<15°) and pitched roofs for new builds and refurbishment.
System components	• Triflex ProTect • Triflex Reinforcement Fleece • Triflex Catalyst
System build-up	Finish Waterproofing Primer Substrate
Sustainability properties	• Free from solvents as per Directive 2004/42/EC (Decopaint Directive) • Free from lead, cadmium and tin stabilisers • Free from halogens • Free from formaldehyde • Free from phthalate plasticisers • Free from blowing agents • VOC content, based on SCAQMD method 304-91 ≤ 0.9 % • SVHC content (substances of very high concern) < 0.1 % • Compliance with the EU REACH Regulation is ensured by the "Environment & Safety" department of our parent company Follmann Chemie GmbH.
Classification	• Model EPD EPD-DBC-20190116-IBE1-EN • GISCODE RMA10 • ETA ETA-03/0020 • BBA 13/5051 • UKTA 0836-22/6228
Technical documentation	The product information on the individual system components can be found on our website at www.triflex.co.uk, where you will also find CAD details, System overviews, Product data sheets, Colour cards and certification etc.
Disposal/recycling	Fully cured PMMA surfaces can be overcoated. When the applied Triflex product reaches the end of its life, it is removed from the substrate using suitable mechanical methods. According to current knowledge, cured PMMA as well as old coatings from dismantling measures should be disposed of as mixed construction waste due to possible adhesion of other substances.

Photovoltaic (PV) panels

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Solar PV panels for flat roofs

Flat roofs are increasingly used for the wider benefit of the environment from combatting climate effects on the urban environment to energy generation.

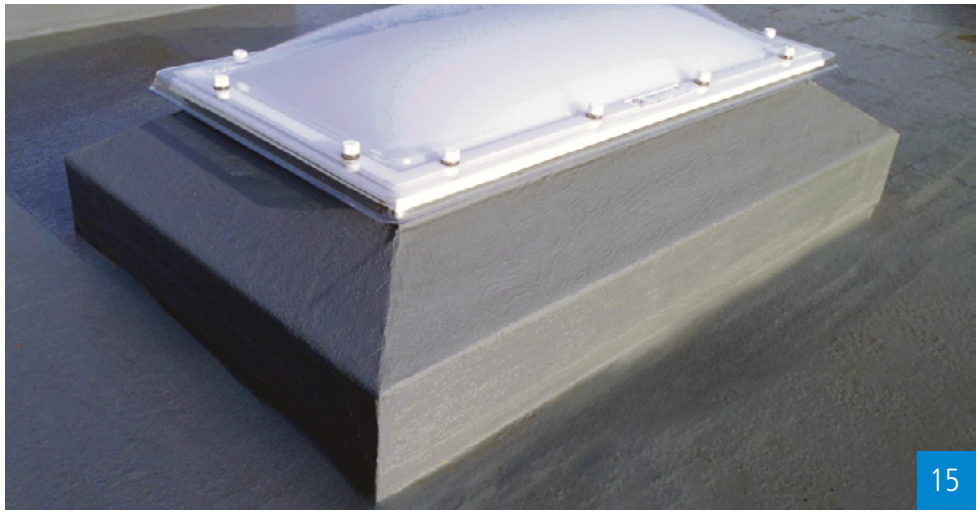
Increasingly solar PV panels are used as an energy source on a range of buildings. Where installed on flat roofs, they can be fixed using either a mechanical fixing, or ballasted.

Mechanical fixing is acknowledged to be a secure method of fixing the solar PV panel, lessening the vulnerability to wind lift. However, securing the PV mounting system often means penetrating the existing waterproofing membrane which means reinstatement of the waterproofing must be made.

Rapid detail waterproofing for efficient programme of works

Triflex ProDetail and Triflex ProFibre cold liquid applied PMMA waterproofing products have been developed especially for roof penetrations, upstands, gutters and roof details. Tried and tested on more than 1,400 substrates you can be confident that they will provide lasting protection whatever the flat roof waterproofing system the PV panels are installed onto. Incorporating PMMA resins, they are ultra-fast curing, in less than an hour, even down to winter temperatures of -5°C.

The simple, single coat application means that the seamless waterproofing is quick to install; a bonus with a potentially large number of details and penetrations to waterproof. And, as they are rainproof in 30 minutes, you can complete the job efficiently without compromise. Self terminating and suitable for the smallest detail, they offer exceptional movement accommodation and puncture resistance for a long lasting and durable solution.



Green / Blue roofs

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Robust waterproofing membrane is fundamental to green roofs

A green roof, or living roof incorporates plant medium to provide a roof covering that increases biodiversity, can absorb rainwater and can help combat urban heat island effects as well as providing thermal improvements.

Green roof system build-ups vary, but fundamental is the provision of a high-quality, robust waterproofing membrane to maintain the building's watertightness.

Whatever the planting used, the risk to buried waterproofing membranes from roots and rhizomes is an important consideration. Triflex PMMA resin based systems are inherently root and rhizome resistant and have been FLL certified, giving confidence in durability whatever the planting medium.

Green roofs can also be warm green roofs, with added insulation material included in the build-up.

Hydrolysis resistant properties deliver confidence in blue roofs

Blue roofs are increasingly used on flat roofs. They are designed to retain water and slowly release storm water to the drainage systems or to irrigate green roofs. They can provide an alternative to provision of attenuation for rainwater at ground level, and are a form of sustainable urban drainage system (SUDS) to alleviate urban flooding and storm water run off. Rainwater is released at a controlled rate, helping to manage water into the sewer network and drainage system.

With an unpredictable climate, the incorporation of blue roof systems into new build or refurbishment projects can help mitigate the effects of climate change in urban dense areas.

The changing landscape of flat roofs

Green / Blue roofs

Triflex durable waterproofing membranes for green or blue roofs

Rooftop blue roof systems can incorporate a green roof build-up too, and are increasingly used in dense urban areas.

In all instances the waterproofing membrane is critical to protecting the underlying structure from either the stormwater, or the soil medium and associated water, roots and rhizomes.

Due to the technologically advanced nature of Triflex PMMA resin-based systems, they are hydrolysis resistant, meaning they will not break down in water.

- **Triflex PMMA resins are inherently hydrolysis resistant**
- **PMMA does not break down in water**
- **No sacrificial layers are needed**
- **Triflex PMMA is root and rhizome resistant**

Plough Lane, Wimbledon

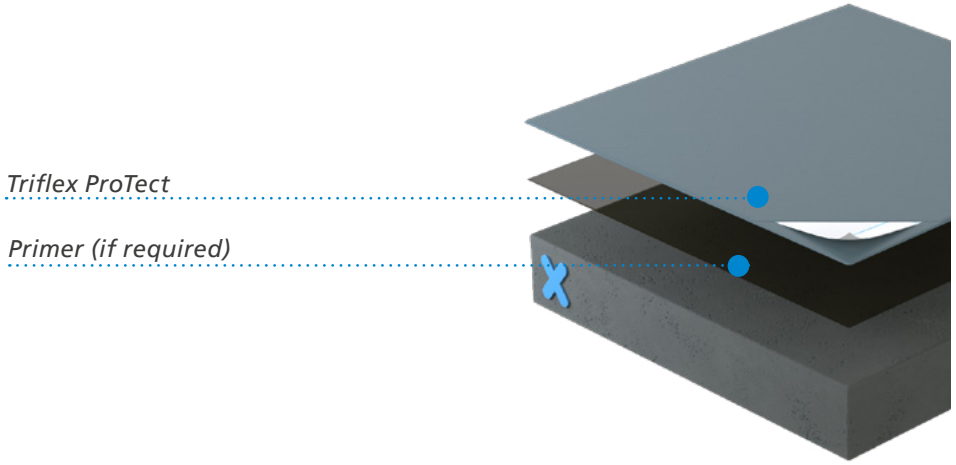
Hill House, London

Ouseburn Quay, Newcastle-upon-Tyne

Overview and build-ups

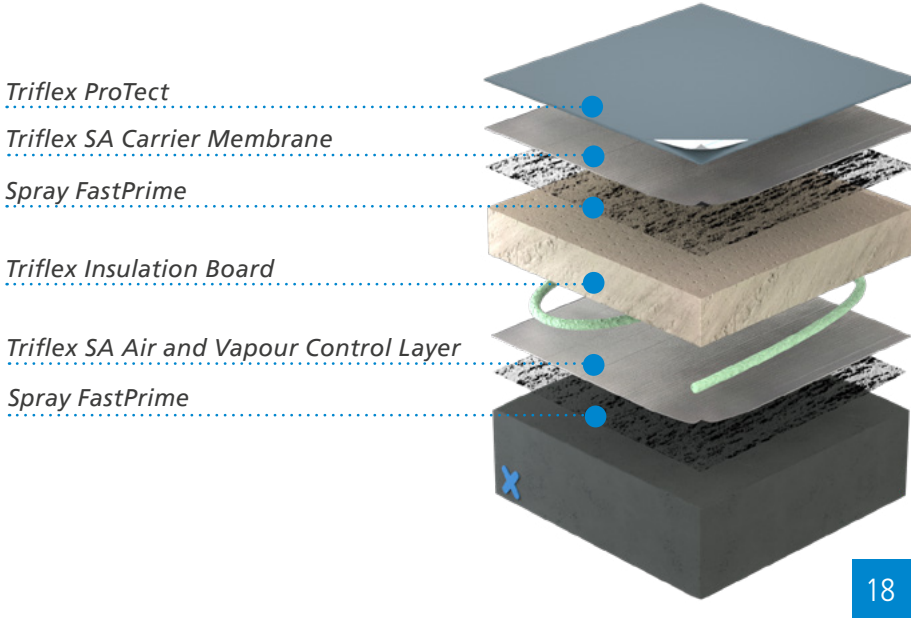
Triflex ProTect

- Totally cold applied, with no risk from hot works
- Compatible with virtually all roof substrates
- Suitable for virtually all roof build-ups and applications
- Exceptionally rapid curing / rainproof times, even at low temperatures
- Fully reinforced waterproofing technology
- Suitable for zero pitch / completely flat roofs
- Simple, single process waterproofing application
- Hydrolysis (standing and ponding water) resistant
- Heavy duty wearing layer options available



Triflex ProTect warm roof

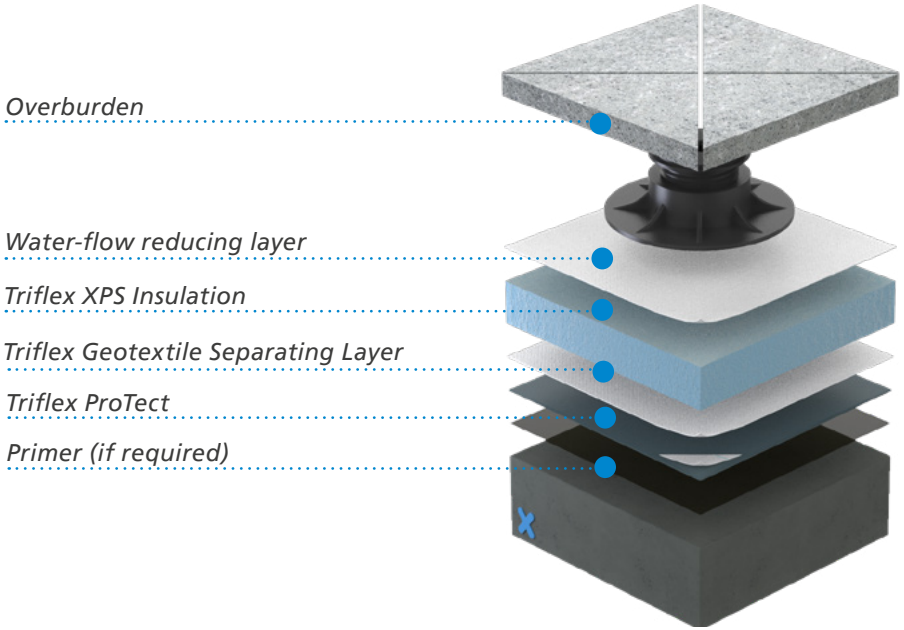
- Totally cold applied, with no risk from hot works
- Compatible with virtually all roof substrates
- Suitable for virtually all roof build-ups and applications
- Exceptionally rapid curing / rainproof times, even at low temperatures
- Fully reinforced with dynamic crack bridging membrane
- Suitable for zero pitch / completely flat roofs
- Simple, single process waterproofing application
- Hydrolysis (standing and ponding water) resistant
- Solvent, isocyanate and plasticiser free
- Heavy duty wearing layer options available



Overview and build-ups

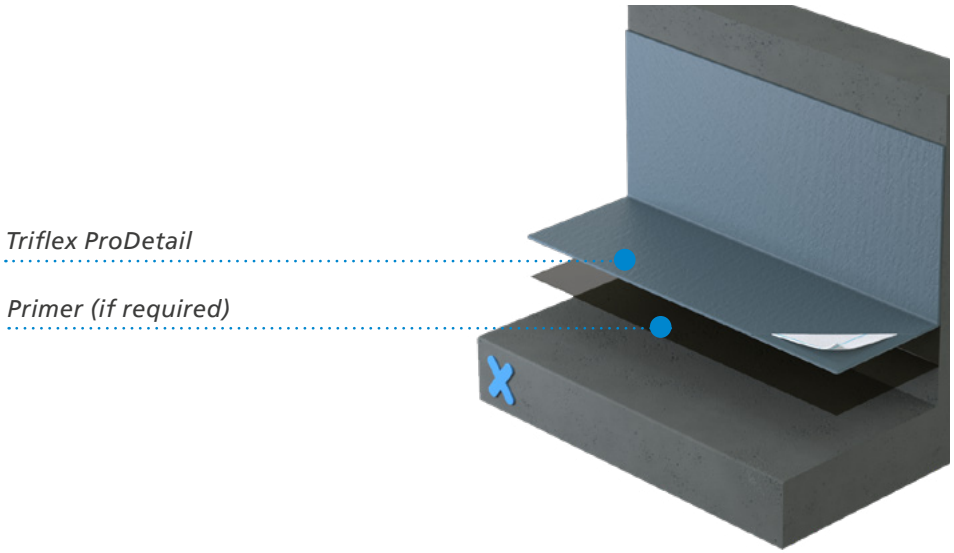
Triflex ProTect inverted roof

- Totally cold applied, with no risk from hot works
- Compatible with virtually all roof substrates
- Suitable for virtually roof build-ups and applications
- Exceptionally rapid curing / rainproof times, even at low temperatures
- Fully reinforced with dynamic crack bridging membrane
- Suitable for zero pitch / completely flat roofs
- Simple, single process waterproofing application
- Hydrolysis (standing and ponding water) resistant
- Solvent, isocyanate and plasticiser free



Triflex ProDetail

- Waterproof down to the smallest detail
- Compatible with virtually all substrates including asphalt
- Cold applied, fast curing with rapid installation
- Simple, single process waterproofing application
- Rapid curing system - even at low temperatures
- Fully reinforced technology
- Certified to the highest standards
- Designed for foot traffic and provides exceptional puncture resistance



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