

Essential Information for Planning and Installation



Version 3 - July 2019



Foreword

A concise guide to the planning and installation of KEMPEROL® liquid waterproofing systems and associated KEMPER SYSTEM products.

The guidance provided in this document should be considered in line with accepted building practice and current health and safety legislation.

Version 3 - July 2019 (KSUK V 3.0 07/2019) of the Essential Information for Planning and Application supercedes the previously issued KSUK V 2.0 01/2017.





Essential Information for Planning and Installation

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1 About Us

KEMPER SYSTEM is a specialist in liquid applied waterproofing and coating systems. Headquartered in the centre of Germany with international operating subsidiaries, our company provides waterproofing solutions globally from the most basic roof to the most challenging projects.

It was Dr Heinz Kemper who gave his name to the system when, in 1957, he set up a company for plastics and paints in Vellmar near Kassel in the heart of Germany. The development of waterproofing products began soon after in the 1960s, and has continued to this day.

The company maintains subsidiaries in the United Kingdom, France, Italy, Poland, the USA, Canada, Mexico, India and China, plus partnerships with qualified contractors and distributors in over 30 countries. **KEMPER SYSTEM** has evolved to become a worldwide specialist for waterproofing and coatings based on liquid-applied resin systems.

Waterproofing..... surfacing..... coating - whatever the project **KEMPER SYSTEM** offer dedicated solutions that are purpose-designed for the task. Working with specifiers and engineers we offer total support from design through to completion.

1.1 Environmental Philosophy

KEMPER SYSTEM is fully committed to the conservation of natural resources. For many years, the existing environmental management system in accordance with DIN ISO 14001 has been guaranteeing regulated environmental processes, providing an excellent framework for environmental protection. All our production sites operate a fully automated and fully closed process that keeps waste and emissions to a minimum.

This includes:

- Optimum utilization of energy, water and raw materials.
- Prevention of environmental pollution from emissions, waste water, soil contamination and waste products.
- Adherence to environmental laws and regulations.
- Continuous improvement of technical and organisational measures for environmental protection and plant safety.
- Application of the best possible technologies whilst considering the economic significance and opportunities.
- Staff training to develop a sense of responsibility for the environment.
- Customer advice with regard to environmental-relevant topics and questions.
- Transparency due to public relations work at the production sites.

The effectiveness of the environmental policy is documented and analysed in the annual environmental management report. The implementation of environmental goals, audit results and data analyses ensure the continuous improvement and awareness of our environmental management system.

KEMPER SYSTEM has signed the chemical industry's unique global initiative 'Responsible Care'.

1.2 Sustainable, Renewable, Solvent-Free Liquid Waterproofing

Sustainable liquid-applied waterproofing – Is that really possible? Yes! KEMPEROL® 2K-PUR is a solvent-free waterproofing system applied in liquid form that meets all environmental and long-term performance requirements.

Roughly 80% of the applied polyols (resins) in KEMPEROL® 2K-PUR are obtained from the seeds of the tropical castor plant (*Ricinus Communis*) a renewable resource. The polyester reinforcing fleece used in all our waterproofing systems contains up to 25% recycled material.

Other products within our range such as KEMPERDUR® surfacing or KEMPERTEC® Primer, are also solvent-free allowing us to provide full solvent-free system solutions.

1.3 Certification

We develop and test new products in our own R&D laboratory. KEMPER SYSTEM complies with high quality standards. Compliance with those standards is monitored by our own QA staff and also independent institutes – test certificates, test reports and test marks are available for almost all our products; and are constantly updated or renewed.

1.4 Exclusion of Liability

The information published in this guide and any advice we give for application in word, writing and by way of tests is provided to the best of our knowledge, however, it may only be seen as information, even in regards to any industrial property rights of third parties. The consultancy does not release you from your obligation to examine our advice or the information provided and our products in regards to their suitability for the intended procedures and purpose. Application, use and processing of our products and the products produced by you based on our consultancy are carried out outside our possibilities for control and are therefore subject to your sole area of responsibility. The sale of our products is carried out in accordance with our General Terms and Conditions of Sales and Delivery.

1.5 Brief Description of the Products

The waterproofing and surfacing products of KEMPER SYSTEM can be divided into three product groups:

KEMPEROL® = waterproofing systems

Waterproofing systems using liquid polymers based on reaction resins and reinforced with polyester fleece.

KEMPERTEC® = primers and accessories

A diverse range of primers for enhancing the bond with the substrate; filling compounds and repair mortars, quartz sand, cleaning agents and accessories for use with the waterproofing systems.

KEMPERDUR® = decorative or functional surface finishes

Functional unreinforced coatings and anti-slip wearing courses with decorative chippings or mineral materials worked into the surface.

1.6 Application Options

KEMPEROL® waterproofing systems can be used for virtually any application in connection with waterproofing. There is a suitable product for almost every application. KEMPEROL® is the long-lasting, economic answer to waterproofing surfaces on flat roofs, inclined and vertical surfaces.

KEMPEROL® waterproofing systems are also ideal for waterproofing details because they adapt to the contours of the structure exactly and can also be combined with conventional waterproofing materials.

Special products and approved systems are available for internal waterproofing applications.

1.7 Technical Support

Technical support is crucial to the success of your projects. One of the most significant benefits of KEMPER SYSTEM is the expert technical experience of our staff. We provide a superior product as well as expert in-house and field technical support personnel.

1.8 General Information

The technical information and application instructions contained herein reflect the current level of knowledge and experience with our products. In each case, the new edition supersedes the previous technical information and renders it invalid. It is therefore necessary that you always refer to the current edition.



KEEP

THE SUBSTRATE

CLEAN

DRY

AND

STABLE

KEMPEROL® LIQUID WATERPROOFING

2 Substrate

2.1 Why Substrate Preparation Is Important?

A fundamental requirement for the success and long-term performance of KEMPER SYSTEM products is the bond with the substrate. Ignoring this requirement is the most common cause of defective workmanship, system defects and complaints.

2.1.1 Substrate Preparation Essentials

KEMPEROL® waterproofing systems can be extremely effective as an overlay to an existing failed system. Given the variety of existing systems, often old and in differing states of repair, it is important to understand the concept of the advice given as it is impossible to be specific for all situations you are likely to face.

KEMPEROL® waterproofing membranes are fully bonded and this is important to help achieve long lasting performance. To allow for both full and long term adhesion a degree of surface preparation is needed to allow the system primer to bond to the substrate. The substrate also needs to be to a certain standard of preparation to allow proper installation of the system as an uneven substrate will also affect the final look of the completed system.

The fundamental requirements are that all substrates shall be:

- Clean with no oils, grease, waxes, moss or vegetation, dust and dirt or other form of contamination.
- Dry.
- Firmly fixed and stable with no friable, loose or weathered materials.
- Suitably filled so any voids remaining are not larger than 2mm.
- Suitably prepared to remove any sharp aggregates or protrusions above 2mm.
- Complete with all preliminary work including formation of upstands, kerbs, box gutters, sumps, chases, and fixing of battens, fillets, and termination trims.
- Abraded at perimeter details (100mm wide) in the case of metal substrates to enhance adhesion (provide a mechanical key).

**Always remember to
keep the substrate:**

Clean - Dry - Stable

2.2 Types of Substrate

Common substrate classification. Please refer to 2.4.1 Common Substrate Preparation Guidelines (p.23).

2.2.1 Concrete

Polymer cement concrete (PCC)	PCC i.e. with a synthetic resin binder.
Concrete, screeds	Concrete slabs in the UK are typically designed to BS8217:2005. This standard deals with optimum properties in relation to drainage design, surface finish and moisture.

2.2.2 Masonry

Clay	Hard-fired, dense, highly weather-resistant clay bricks.
Aerated concrete, lightweight concrete	Lightweight concrete blocks that are not fired but rather cured in steam.
Stone	Differences in types of stone, e.g. granite and marble are dense and hard, with low porosity and high resistance to weathering. Conversely sandstone is generally soft with high porosity and is prone to weathering.

2.2.3 Ceramics - Tiles, terrazzo: Fine stoneware with diverse surface finishes

2.2.4 Flexible Bitumen Sheeting

PYE	Elastomeric bitumen sheeting.
PYP	Polymer-modified bitumen sheeting.
APP	Atactic polypropylene.
SBS	Styrene-butadiene-styrene.
Asphalt	Bitumen-based finish.

2.2.5 Flexible Synthetic Sheeting

ECB	Ethylene copolymer bitumen.
EPDM	Ethylene-propylene-diene rubber sheeting (terpolymer).
EVA	Ethylene vinyl acetate (terpolymer).
FPO	Flexible polyolefin.
PE-C	Modified polyethylene.
PIB	Polyisobutylene.
POCB	Polyolefin copolymer bitumen.
PVC-P	Plasticised polyvinyl chloride.

2.2.6 Panel Products

Timber	Windows, doors, OSB, T&G boards, blockboard, etc.
Fibre-cement	Mixture of cement, additives, organic textile, cellulose or synthetic fibres.

2.2.7 Metals

Steel, stainless steel	Steel can be divided into mild, medium and high grade. The level of carbon addition, use of other elements, and the rate of cooling of the steel during production all determine the properties of the steel and therefore how well a coating can adhere to it. Some steels are pre-coated to prevent rusting.
Aluminium	Anodised or plastic coated aluminium is easily worked and resists corrosion. It is available in various alloys (e.g. with manganese, tin, magnesium, etc.) which are used for roof coverings, balustrades, window frames, etc.
Zinc	The properties of zinc make it suitable for use in alloys for metalwork, wall cladding (titanium-zinc), fixtures and fittings (copper - zinc or copper-tin-zinc), etc. and as a protective coating for steel.
Copper	Relatively easily worked and resistant to corrosion. Copper may not come into contact with less noble metals, e.g. aluminium or iron.

2.2.8 Insulating Materials

Mineral-fibre	Glass wool, rock wool, obtained from a glass or stone melt.
Polystyrene	EPS – polystyrene granulate is expanded (foamed up) and then pressed to form boards. XPS – molten polystyrene is forced through a slot die (extruder) to form boards.
Cellular glass	Produced by foaming up a glass melt with carbon gas. Very high compressive strength, incombustible, impermeable to water and vapour, does not rot, resistant to acids and high temperatures.
Polyurethane (PUR)	PUR rigid foam. Excellent insulating value (thermal conductivity group WLG 025), mainly used for flat roofs and ground slabs.
Polyisocyanurate (PIR)	PIR is another type of rigid foam insulating material. Using a modified formulation and production process the resulting foam board has significantly better heat stability giving improved fire performance over PUR Insulation.
Cellulose	Produced from chopped scrap newspaper impregnated with mineral salts to protect against fire, e.g. "Isofloc".
Wood-wool lightweight boards	Wood-wool bonded with cement or magnesite.
Hemp	Renewable raw material, hemp insulating boards are made from 85% hemp fibres from indigenous sources plus 15% polyester fibres for stability.
Cork	The bark of the cork oak is mainly imported from Portugal. Scrap cork expands when exposed to heat and is pressed to form boards.

2.3 Assessing and Preparing Substrates

2.3.1 General Assessment

Substrates to which waterproofing systems are to be applied must be inspected for the following characteristics:

- Flatness of substrate.
- Falls.
- Cracks.
- Residual moisture.
- Surface bonding strength.
- Load-carrying capacity.
- Assessment of existing joints in the substrate.
- Contamination.
- Suitable temperature of the substrate.

2.3.2 Flatness of Substrate

Unevenness of the surface can lead to excessive use of materials and an untidy finish. Any sharp aggregate or surface imperfections below the membrane could lead to punctures if trafficked at a later date.

We recommend that low spots or high spots $\geq 2\text{mm}$ deep should be filled or levelled with a suitable material or mechanically prepared to provide a smoother surface. (See section 2.5 Repair Mortar).

2.3.3 Falls

The British Standard for Flat roofs with continuously supported flexible waterproof coverings – Code of practice was revised in the latter half of 2018. Section 4.4 gives guidance on roof falls to achieve effective drainage. Whilst it doesn't differentiate between roofs requiring refurbishment and new roofs it clearly recommends that all roof decks, this includes gutter beds, should be designed at 1:40 to achieve 1:80 when constructed taking into account building tolerances and settlement and/or deflection. These falls can be provided either by constructing a roof deck to falls or by the addition of tapered insulation over completely flat decks. When refurbishing existing roofs, improving the drainage on problematic roofs should be a major consideration. .

Key reasons for minimum falls are:

- Drainage of precipitation as quickly as possible.
(However, some roofs are sometimes designed to slow water run-off to reduce flash flooding or to hold water for irrigation of green roof elements or blue roof water storage).
- Preventing or at least minimising ponding.
- Minimising damage to waterproofing materials caused by shear forces or due to ice formation.
- Ponding can lead to overloading the structure of the roof or building.
- On roofs without falls, so-called true flat roofs, the entire roof build-up can be saturated as a result of damage at just one point only. By contrast, on roofs with falls, most of the roof will still function properly even in the event of local damage (seepage and the way the sheeting is laid are the governing criteria).

2.3.4 Cracks

Cracks in building components can only be treated after assessing them carefully and establishing the type of crack. Depending on the type, width and depth of a crack, the work required can be divided into the following areas:

- Pressure-injection to create a structural bond deep into the crack to restore strength to the building element.
- Filling with a brushed substance (max. 0.5mm deep) , slurry or filling compound to improve appearance or create a continuous surface to allow a coating system to be applied.
- Chasing out a crack to allow the installation of a strong polymer modified material, installed to manufacturers advice on width and depth. This is normally used to repair a static crack.
- Chasing out a crack to allow the installation of a suitable flexible polymer sealant material, installed to manufacturers advice on width to depth ratio to allow for the anticipated level of movement. This is commonly used to deal with dynamic cracks.

2.3.5 Residual Moisture

The moisture content of a substrate (homogeneous structure of concrete or screed) must be established in order to determine whether it is ready for receiving finishes. For sand cement screeds or concrete the moisture content must be <5% in the top 20mm.

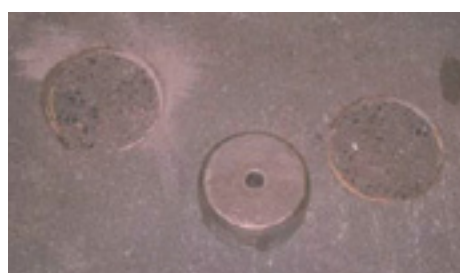
2.3.6 Bonding Potential

I Tensile Adhesion Tests

Tests are carried out to establish the potential adhesion of the proposed waterproofing or coating system before the full system is applied. The tests should be performed on the prepared surface, i.e. the substrate should be clean, firm and free from all substances that could reduce the bond. Enough tests should be performed to be able to make a decision on suitability. For each situation a minimum of three tests should be carried out. Tests can also be used to understand compatibility between the proposed primer and a substrate of unknown composition or stability. Application should not be carried out until tensile adhesion to the substrate is verified as being adequate.



Measuring instrument for testing the tensile strength (adhesion)



Marks left by measuring instrument

Adhesion test readings will vary depending upon the substrate material type and condition. Generally a value of 1 MPa (Mega Pascal) shows good adhesion. In more demanding applications, e.g. involving frequent trafficking or surfacing products a minimum value of 1.5 MPa is required. 1 Mega Pascal = 1n (newton)/mm².

Record the results including which surface has failed during the test. Photographs of the results will help record the findings and assist with any discussions about bond strength. If a figure is achieved less than is required, please consult KEMPER SYSTEM for further advice and guidance.

II Peel Test

On-site tests must be carried out before application work commences. This is a destructive test and poor results may mean a revision to the specification or additional preparation; costly if the work is complete!

If no specific adhesion value is quoted in the specification then a peel test is a good way to determine compatibility with that substrate on that project at that time. This is more representative than priming recommendation tables as these are only indicative guidelines resulting from assessment of new substrate material, fully clean and with tests carried out at laboratory temperature and humidity.

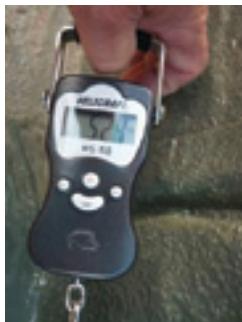
Peel tests are useful to provide an indication as to the weakest layer in a proposed build-up and the work or effort required to force a failure. The method is more subjective in terms of the force applied at failure, but is nevertheless a useful test. If reasonable force is applied and the KEMPER SYSTEM materials don't fail but the substrate fails cohesively (within the material itself), rips or cracks then it is an indication of compatibility and that the proposed system is stronger than the substrate it is overlaying.

If the KEMPERTEC® primer peels away from the substrate with minimal force applied then the primer may not be compatible on that substrate. These tests should be used in conjunction with the priming recommendations. Any queries should be discussed with the KEMPER SYSTEM Technical Department. All tests need to be carried out using properly mixed and cured materials.

To create a test surface, apply KEMPERTEC® primer with a roller to the existing waterproofing over a width of approximately 100mm, and length of approximately 150–200mm. Once the primer has cured (see Technical Datasheets for Primers), apply the appropriate KEMPEROL® waterproofing system to the primer. To do this, first apply approximately 2/3 of the quantity of liquid resin to the surface, then embed KEMPEROL® fleece in pieces measuring approximately 150mm x 500mm in to the wet resin (roll with nylon roller to remove all creases and air bubbles) and finally apply the remaining 1/3 of the liquid resin required (at the appropriate coverage rate) until the fleece is fully saturated.

Embed the fleece in such a way that, depending on the position of the peel test, approximately 150mm of the fleece is readily accessible.

After allowing approximately 3 days for the waterproofing to cure, wind the exposed end of the fleece around a bar and pull off the embedded fabric back from the test area at 45 degrees, pulling towards the bonded end of the test strip. Record where the failure occurs. You are looking for failure within the substrate material that the primer is bonded to. An easy peel of the primer from the substrate should be regarded as suspicious in terms of compatibility. Always record your results, noting the substrate type, level of preparation, ease of pull (or value if using scales) failing surface and age of primer and waterproofing. Supplement records with photos. Refer to the KEMPER SYSTEM Technical Department for further advice.



Images left to right:

Test ready for pulling / Use of digital scales for comparison purposes / Peel test and direction of pull.

2.3.7 Assessing Existing Joints and Cracks in the Substrate

Joints are planned breaks in the continuity of a building material. We distinguish between the following types:

- Movement joints (dynamic joints).
- Construction joints (static joints).

Generally static joints will only need filling. The only consideration here is the width and depth of the joint. Some filling materials have a maximum depth and may need building up in layers. This is particularly true for materials that give off heat during the curing process.

For dynamic joints the planned movement must be known so that proper consideration can be made. The client or client's representative should be consulted – don't take risks by making assumptions.

Cracks can be static or dynamic. They can exist due to a number of reasons including structural movement, thermal expansion, moisture or a material failure. Not all cracks are detrimental to the building structure or performance of a new waterproofing system.

All cracks should be investigated, logged and reported to the client or client's representative. If the Installer has the skills, knowledge and experience to understand the existence of a crack then that will help in any discussion with the client.

2.3.8 Contamination of the Substrate

A compatible substrate can be affected by contamination and substances that reduce the bond even during its construction (e.g. release agent on concrete, coatings on flexible sheeting). It may be the case that contamination and other detrimental substances are introduced as a result of environmental influences (natural and industrial pollutants) at some time between construction and waterproofing.

It should also be remembered that contamination by environmental influences could also take place in the period between applying the waterproofing and applying any further finishes. Therefore, in the event of longer periods between individual stages of the work, the substrate may need to be inspected, even cleaned, once again.

2.3.9 Suitable Temperature and Ambient Conditions

Owing to the general reaction sequence of KEMPER SYSTEM products, the temperature of the substrate, the materials and the surroundings should not drop below 5°C when considering the application of most KEMPER SYSTEM products. This is because of the detrimental effect that moisture or ice crystals present on or within the structure can have on adhesion and cure and therefore the performance and life span of the applied products.

Care must be taken as some products have different requirements. An example is KEMPERTEC® EP Primer which has a minimum application temperature of 10°C.

Always read the technical data sheet for the products being used.

2.3.10 Dew Point

As described in the relevant standards and in the instructions of the manufacturers, waterproofing systems produced from liquid polymers must adhere to the substrate over their full area (a so-called full bond). This is achieved with appropriate prior treatment and by preparing the substrate to be waterproofed. These measures include, for example, sandblasting a concrete surface to be primed, or drying a surface. Such measures are familiar to all persons involved in the waterproofing of structures.

However, less well known, but no less important, are the situations in which bonding is prevented due to the formation of condensation on the surface to be waterproofed. Condensation collects when the temperature of the surface is below that of the dew point. The dew point is the surface temperature at which the moisture in the surrounding air condenses on the surface. This water forms a separating film and thus prevents a full bond. Application should only take place when the air temperature is +5°C or greater and the substrate is at least +3°C above the dew point.

2.3.11 Dew Point Measurement Methods / Table

The dew point can be determined with a measuring instrument or the values measured can be used to determine the dew point from a table. **PLEASE NOTE:** Work must stop when the temperature drops below the dew point.

Tabular method:

1. Measure the surface temperature of the area to be waterproofed.
2. Measure the relative humidity.
3. Measure the ambient temperature.
4. Calculate the dew point by checking the corresponding value for the measured air temp and relative humidity in the table.
5. Compare the dew point to the measured substrate temperature and record all results including time and date.

Dew Point Table

Air Temp	Dew Point Temperatures in °C for a Relative Humidity of...										
°C	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
2	-7.77	-6.56	-5.43	-4.40	-3.16	-2.48	-1.77	-0.98	-0.26	+0.47	+1.2
4	-6.11	-4.88	-3.69	-2.61	-1.79	-0.88	-0.09	+0.78	+1.62	+2.44	+3.20
6	-4.49	-3.07	-2.10	-1.05	-0.08	+0.85	+1.86	+2.72	+3.62	+4.48	+5.38
8	-2.69	-1.61	-0.44	+0.67	+1.80	+2.83	+3.82	+4.77	+5.66	+6.48	+7.32
10	-1.26	+0.02	+1.31	+2.53	+3.74	+4.79	+5.82	+6.79	+7.65	+8.45	+9.31
12	0.35	1.84	3.19	4.46	5.63	6.74	7.75	8.69	9.60	10.48	11.33
14	2.20	3.76	5.10	6.40	7.58	8.67	9.70	10.71	11.64	12.55	13.36
15	3.12	4.65	6.07	7.36	8.52	9.63	10.70	11.69	12.62	13.52	14.42
16	4.07	5.59	6.98	8.29	9.47	10.61	11.68	12.66	13.63	14.58	15.54
17	5.00	6.48	7.92	9.18	10.39	11.48	12.54	13.57	14.50	15.36	16.19
18	5.90	7.43	8.83	10.12	11.33	12.44	13.48	14.56	15.41	16.31	17.25
19	6.80	8.33	9.75	11.09	12.26	13.37	14.49	15.47	16.40	17.37	18.22
20	7.73	9.30	10.72	12.00	13.22	14.40	15.48	16.46	17.44	18.36	19.18
21	8.60	10.22	11.59	12.92	14.21	15.36	16.40	17.44	18.41	19.27	20.19
22	9.54	11.16	12.52	13.89	15.19	16.27	17.41	18.42	19.39	20.28	21.22
23	10.44	12.02	13.57	14.87	16.04	17.29	18.37	19.37	20.37	21.34	22.23
24	11.34	12.93	14.44	15.73	17.06	18.21	19.22	20.33	21.37	22.32	23.18
25	12.20	13.83	15.37	16.69	17.99	19.11	20.24	21.35	22.27	23.30	24.22
26	13.15	14.84	16.26	17.67	18.90	20.09	21.29	22.32	23.32	24.31	25.16
27	14.08	15.68	17.24	18.57	19.83	21.11	22.23	23.31	24.32	25.22	26.10
28	14.96	16.61	18.14	19.38	20.86	22.07	23.18	24.28	25.25	26.20	27.18
29	15.85	17.58	19.04	20.48	21.83	22.97	24.20	25.23	26.21	27.26	28.18
30	16.79	18.44	19.96	21.44	23.71	23.94	25.11	26.10	27.21	28.19	29.09
32	18.62	20.28	21.90	23.26	24.65	25.79	27.08	28.24	29.23	30.16	31.17
34	20.42	22.19	23.77	25.19	26.54	27.85	28.94	30.09	31.19	32.13	33.11
36	22.23	24.08	25.50	27.00	28.41	29.65	30.88	31.97	33.05	34.23	35.06
38	23.97	25.74	27.44	28.87	30.31	31.62	32.78	33.96	35.01	36.05	37.03
40	25.79	27.66	29.22	30.81	32.16	33.48	34.69	35.86	36.98	38.05	39.11
45	30.29	32.17	33.86	35.38	36.85	38.24	39.54	40.74	41.87	42.97	44.03
50	34.76	36.63	38.46	40.09	41.58	42.99	44.33	45.55	46.75	47.9	48.98

2.4 Preparing the Substrate

The substrate should be prepared in such a way that a permanent, strong bond is achieved between the system to be applied and the substrate. To achieve this, the substrate must be consistently firm and free from all separating substances, sharp edges, burrs, flashes, fins, etc. The choice of a suitable preparatory method depends on the condition of the existing surface, the specification and the waterproofing system to be applied.

Besides the “traditional” methods of treatment:

- Grinding (grinder).
- Cutting (angle grinder, concrete saw).
- Chiseling (chisel).
- Hammering (scabbler, needle gun).
- Brushing (brush, rotary brushes, brush machine).
- Planing (planer).
- Sweeping (broom, sweeping machine).
- Blowing off (hot/warm air).
- Vacuuming (industrial vacuum cleaner).

The following cleaning and blasting methods:

- Water-jet cleaners up to 5 N/cm².
- Steam cleaners up to 5 N/cm².
- High-pressure water-jet cleaners up to 4000 N/cm².
- Wet-blasting equipment with blasting medium recovery.
- Wet mist abrasive sandblasting equipment.
- Wet abrasive sandblasting equipment.
- Dry-blasting equipment with blasting medium recovery.
- Free-jet pressure equipment.
- Liquid nitrogen cleaning.
- Infrared radiation.

Cleaning methods using detergents – particularly useful for greasy soiling and/or flexible synthetic sheeting – could be added to this list.

What Do I Have To Check?

- Residual moisture.
- Unevenness.
- Freedom from cracks.
- Joints.
- Fall.
- Temperature conditions.
- Firmness of surface.
- Air humidity.
- Cleanliness of surface.
- Adhesion.

2.4.1 Common Substrate Preparation Guidelines

These should be seen as indicative guidelines; it is important that the substrate is continually assessed as work progresses to ensure that any previously unknown conditions are correctly prepared to ensure maximum waterproofing adhesion.

I Bituminous Sheet (SBS)

Removes loose chippings where applicable. Cut back to base badly cracked and defective areas of felt. Star cut blisters, dry out and re-bond. On a solid wall construction, where practicable, prepare the wall 100mm beyond the existing sheet to allow sound termination of the KEMPEROL® waterproofing. On a cavity wall, pin back or remove the flashing and cut away the bituminous sheet 100mm below the cavity tray and prepare the surface to allow a sound termination of the KEMPEROL® membrane. Any voids greater than 2mm should be filled prior to the application of the system. This includes any brickwork which should be filled flush. Replace flashing as required. Ensure the surface is dry and free from contamination before priming.

II Bituminous Sheet (APP)

Cut back to base badly cracked and defective areas of felt. Star cut blisters, dry out and re-bond. On a solid wall construction, where practicable, prepare the wall 100mm beyond the existing sheet to allow sound termination of the KEMPEROL® waterproofing. On a cavity wall, lift or remove the flashing and cut away the bituminous sheet 100mm below the cavity tray and prepare the surface to allow a sound termination of the KEMPEROL® membrane. Any voids greater than 2mm should be filled prior to the application of the system. This includes any brickwork which should be filled flush. Replace flashing as required. Ensure the surface is dry and free from contamination before priming.

III Asphalt (Weathered)

Where applicable remove chippings. Any blisters or defects in the asphalt should be cut out and filled to give a sound supporting substrate. Any voids greater than 2mm should be filled level prior to the application of the waterproofing. As a general rule upstands should be cut away to leave them flush with the deck area unless they are considered suitable to offer a sound supporting substrate for the life of the newly installed KEMPEROL® waterproofing. Where there is doubt they should be removed. If the asphalt is covered with promenade tiles then these shall be removed. The uneven bitumen surface left behind should be dried, cleaned and all loose residue removed. Prime the surface and once cured fill with KEMPERTEC® self-levelling repair mortar. (See section 2.5 Repair Mortar).

IV Single Ply Sheet (PVC)

Before removing the single ply termination/fixing bars ensure the field area is securely anchored; this may entail installing additional fixings to the horizontal element of the single ply membrane at all perimeters. This is particularly important with PVC membranes due to their tendency to shrink over their lifetime. You can then remove the single ply termination bars and cut back the sheet to allow minimum 100mm bonding of the KEMPEROL® to the perimeter substrate. On large roofs it may be necessary to cut the sheet and remove slack material. Consider securing and sealing cuts with additional fixings and temporary waterproofing to prevent water ingress prior to overlaying. Do not use bitumen products as temporary waterproofing over any PVC sheet. Ensure the surface is dry and free from any contamination that could inhibit adhesion. Use a proprietary degreaser to clean the surface. Where the use of solvents is permitted, small areas can be degreased using KEMPEROL® MEK cleaner. Ensure the surface is dry and free from contamination before priming.

V Single Ply Sheet (TPO / TPE)

Remove the single ply termination bars and cut back the sheet to allow minimum 100mm bonding of the KEMPEROL® to the perimeter substrate. On large roofs it may be necessary to cut the sheet and remove slack material. Consider securing and sealing cuts with additional fixings and temporary waterproofing to prevent water ingress prior to overlaying. Do not use bitumen products as temporary waterproofing over any PVC sheet. Ensure the surface is dry and free from any contamination that could inhibit adhesion. Use a proprietary degreaser to clean the surface. Where the use of solvents is permitted, small areas can be degreased using KEMPEROL® MEK cleaner. Ensure the surface is dry and free from contamination before priming.

VI Single Ply Sheet (EPDM, ECB, PVC-P, PE PP, PIB, EVA)

Remove the single ply termination bars and cut back the sheet to allow minimum 100mm bonding of the KEMPEROL® to the perimeter substrate. On large roofs it may be necessary to cut the sheet and remove some slack material. Consider securing and sealing cuts with additional fixings and temporary waterproofing to prevent water ingress prior to overlaying. The cuts can be temporarily sealed using KEMPERSHIELD® Type 1 Vapour Barrier where compatibility allows. Ensure the surface is dry and free from any contamination that could inhibit adhesion. Use a proprietary degreaser to clean the surface. Ensure the surface is dry and free from contamination before priming.

VII Brickwork, Stonework, Blockwork

Ensure brickwork is firmly fixed and remove any spalling. Fill mortar joints as well as any spalled areas level (*2). Ensure the surface is dry and free from any contamination that could inhibit adhesion. If using a third party repair mortar ensure the product is fully cured with a moisture content of less than 5% in the top surface. Mechanical abrading the surface will improve adhesion and this must be carried out on engineering brick to enable adhesion. On blockwork, due to the excessive porosity of the material, it may well require two coats of primer. In such a situation, two separate coats will be a more effective seal than one thick coat.

VIII Concrete/Screed

New cement based surfaces should be fully cured and over 28 days old. Surfaces should be dry with a moisture content of less than 5% in the top 20mm. Surface should be free from friable material, laitance or any contamination to allow suitable adhesion of the waterproofing system. Uneven concrete with peaks or voids greater than 2mm can either be levelled (*1/2), or mechanically prepared to give the required finish. The moisture content of the concrete/screed is important as any residual moisture may cause vapour pressure and blisters. This would be more apparent on a frequent use area like a balcony or terrace.

IX Plastic Modified Screed and Mortar

New cement based surfaces should be fully cured in accordance with the manufacturer's instructions. Surfaces should be dry; with moisture content of less than 5% in the top 20mm. Surface should be free from friable material, laitance or any contamination to allow suitable adhesion of the waterproofing system. Uneven concrete with peaks or voids greater than 2mm can either be levelled (*1/2), or mechanically prepared to the required finish.

X Glass/Glazing

Ensure surface is dry and free from any contamination that could inhibit adhesion. Mechanical abrading the surface will enhance adhesion and is necessary at terminations. Use a proprietary degreaser or where appropriate, KEMPEROL® MEK universal cleaner to degrease the surface.

XI New Galvanised Steel

For new galvanised steel the surface should be degreased using a proprietary degreaser or KEMPEROL® MEK cleaner. Once degreased, it can be pre-primed with Mordant Solution (T- wash). This will turn the surface black and once cured can be primed with KEMPERTEC® D-Primer or R-Primer.

XII Copper, Aluminium, Lead, Zinc, Special Steels, Weathered Galvanised Steel

Ensure surface is dry and free from any contamination that could inhibit adhesion. Carry out adhesion or peel tests. If results are inadequate then mechanical abrading may enhance adhesion. Carry out small preparation area and test to check if adhesion is improved before preparing the whole roof. Use a proprietary degreaser as required to degrease the surface.

XIII Exterior Grade Plywood & OSB

During installation allow suitable gaps between boards to allow for expansion / contraction. Install to manufacturer's recommendations. All joints and perimeter edges should be treated with 75mm wide KEMPERTHERM® Joint fleece during the priming operation to prevent the loss of waterproofing resin between the boards. Surface should be dry and swept to remove any contamination that could impair system adhesion.

XIV KEMPERTHERM® FR OSB

Ensure surface is dry and free from any contamination that could inhibit adhesion. Install 75mm wide KEMPERTHERM® Joint fleece during the priming operation to prevent the loss of waterproofing resin between the boards. Surface should be dry and swept to remove any contamination that could impair system adhesion. Protect the insulation boards from getting wet from the point of delivery until the boards are overcoated. Ensure all insulation is primed and fully sealed to the deck/substrate at the end of each working session to ensure no moisture becomes trapped below or within the system. Mechanical fix only.

XV KEMPERTHERM® FR, SR & TR Reinforced insulation board

Ensure surface is dry and free from any contamination that could inhibit adhesion. Install 75mm wide KEMPERTHERM® Joint fleece during the priming operation to prevent the loss of waterproofing resin between the boards. Surface should be dry and swept to remove any contamination that could impair system adhesion. Protect the insulation boards from getting wet from the point of delivery until the boards are overcoated. Ensure all insulation is primed and fully sealed to the deck/substrate at the end of each working session to ensure no moisture becomes trapped below or within the system. Adhesive or mechanically fixed.

PLEASE NOTE: KEMPERTEC® EP and EP5 primers may be used in conjunction with KEMPERDUR® KR Quartz to provide either a trowelable repair or levelling mortar as described in section 2.5 below.

2.5 Repair Mortar

KEMPERTEC® EP or EP-5 Primer as Levelling/Repair Mortar: Two component solvent free epoxy primer with the addition of KEMPERTEC® KR Quartz as a levelling/filling material to level/fill/repair substrate voids from 2-20mm.

Part 1: Substrate priming. Mix and apply KEMPERTEC® EP or EP5 Primer to the prepared substrate and whilst the primer is still wet continue as part 2 (a or b)

Part 2a: Levelling/filling voids 2-6mm: Mix parts A and B to an even consistency, transfer to a new container and again mix and slowly add the KEMPERTEC® KR Quartz using a mechanical stirrer to produce a uniform mix. KEMPERTEC® EP/EP5-Primer is mixed with KEMPERTEC® KR Quartz Sand Mixture at a ratio of 1:4/1:2 (EP/EP5) (by weight) and applied to the prepared and primed substrate. Working time for the mortar, from initial mixing is 25/20 (EP/EP5) minutes. The mix will be rainproof after 6/3 (EP/EP5) hours and can be over-coated after 16/4 (EP/EP5) hours. The KEMPEROL® waterproofing can be applied once the mortar mix is tack-free. Quoted working and drying times are based on ambient conditions of 23°C/50% Relative Humidity, but are temperature dependent.

Part 2b: Repairing/filling voids 2-20mm: Mix parts A and B to an even consistency, transfer to a new container and again mix and slowly add the KEMPERTEC® KR Quartz using a mechanical stirrer to produce a uniform mix. KEMPERTEC® EP/EP5-Primer is mixed with KEMPERTEC® KR Quartz Sand Mixture at a ratio of 1:9/1:5 (EP/EP5) (by weight) and applied to the prepared and primed substrate to. Working time for the mortar, from initial mixing is 25/20 (EP/EP5) minutes. The mix will be rainproof after 6/3 (EP/EP5) hours and can be over-coated after 16/4 (EP/EP5) hours. The KEMPEROL® waterproofing can be applied once the mortar mix is tack-free.

The KEMPERTEC® EP/EP5/AC Primer to KEMPERTEC® KR Quartz mixing ratios may be varied to accommodate differing surface profiles and porosities.

Quoted working and drying times are based on ambient conditions of 23°C/50% RH but are temperature dependent. Application should only take place when the air temperature is + 10/5°C (EP/EP5) or greater and the substrate is +3°C (and rising) above the dew point.



3 Priming Guide

3.1 Priming Tables

The following priming recommendation tables represent a guide for the user and should be regarded only as a recommendation.

Depending on the building, it may be necessary to carry out suitability tests (individual testing), because the overall structure must always be considered.

All substrates must be evenly solid and free of separating substances (oil, separating agents, free granules). Other substrates not listed must always be checked with regard to their adhesion performance.

Key:

	Green	=	Applicable.
	Yellow	=	Individual test is necessary (refer to 2.3.6)
	White	=	Not suitable or not recommended - This primer should not be used as it is not compatible or a significantly better primer is available for that substrate.

In most cases a KEMPERTEC® primer is available that will provide adhesion. Sometimes the adhesion will depend upon factors such as the substrate manufacturer, formulation, age and condition.

If in any doubt it would be safer to check with KEMPER SYSTEM for advice before proceeding.

Table Notes:

- 1 N/A - Not applicable to this edition.
- 2 Mechanical pre-treatment and cleaning with KEMPERTEC® MEK Cleaning Agent is necessary.
- 3 Low adhesion – At waterproofing terminations protect the KEMPEROL® from weathering using a cover flashing. Where a cover flashing cannot be used or adhesion is inadequate, secure by mechanically fixing a suitable termination bar. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 4 N/A - Not applicable to this edition.
- 5 The KEMPERTEC® AC Primer has to be scattered with KEMPERTEC® Natural Quartz NQ 0712.
- 6 Partition layer required. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 7 Prevent the loss of resin at joints. Refer to KEMPER SYSTEM Technical Department for specific project advice.

When using the priming tables, it is necessary to follow KEMPER SYSTEM preparation guidelines and technical advice.

3.1.1 KEMPEROL® V210M Waterproofing

Published 12/2016

- Green** = Applicable.
- Yellow** = Individual test is necessary (refer to 2.3.6)
- White** = Not suitable or not recommended - This primer should not be used as it is not compatible or a significantly better primer is available for that substrate.

Substrate	KEMPERTEC® EP / EP5 Primer	KEMPERTEC® D / R Primer	KEMPERTEC® AC Primer
Bitumen roof sheet (V 13, V 60, G 200, PYE (SBS))			
APP-Bitumen roof sheet, granulated			
Asphalt, weathered			
Plastic sheets (EPDM, ECB, PVC-P, PE, PP, PIB, EVA)			
FPO or TPO Plastic sheets			
Cementitious Board			
Clinker, Bricks, visible brickwork stones (grinded)			
Concrete, screed			
Modified screed and mortar			
Stones for construction (lightweight, gas or pumice concrete, cement and calcareous sandstone)			
Glass (uncoated) - MEK cleaned			
Zinc, galvanised steel	2,3	2	
Copper, lead	2,3	2	
Steel, special steels (V2A, V4A), Aluminium	2,3	2,3	6
Insulating materials (polystyrene, rock wool)	6	6	6
KEMPERTHERM® FR OSB Insulation			
KEMPERTHERM® SR, TR and FR Insulation			
Wood panels, plywood, chipboard, OSB	7	7	

- 2 Mechanical pre-treatment and cleaning with KEMPERTEC® MEK Cleaning Agent is necessary.
- 3 Low adhesion – At waterproofing terminations protect the KEMPEROL® from weathering using a cover flashing. Where a cover flashing cannot be used or adhesion is inadequate, secure by mechanically fixing a suitable termination bar or collar. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 6 Partition layer required. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 7 Prevent the loss of resin at joints. Refer to KEMPER SYSTEM Technical Department for specific project advice.

When using this priming table, it is necessary to follow KEMPER SYSTEM preparation guidelines and technical advice.

3.1.2 KEMPEROL® 2K-PUR Waterproofing

Published 12/2016

Green = Applicable.

Yellow = Individual test is necessary (refer to 2.3.6)

White = Not suitable or not recommended - This primer should not be used as it is not compatible or a significantly better primer is available for that substrate.

Substrate	KEMPERTEC® EP / EP5 Primer	KEMPERTEC® D / R Primer	KEMPERTEC® FPO Primer	KEMPERTEC® AC Primer
Bitumen roof sheet (V 13, V 60, G 200, PYE (SBS))				5
APP-Bitumen roof sheet, granulated				5
Asphalt, weathered				5
Plastic sheets (EPDM, ECB, PVC-P, PE, PP, PIB, EVA)				
FPO or TPO Plastic sheets				
Cementitious Board				5
Clinker, Bricks, visible brickwork stones (grinded)				5
Concrete, screed				5
Modified screed and mortar				5
Stones for construction (lightweight, gas or pumice concrete, cement and calcareous sandstone)				5
Glass (uncoated) - MEK cleaned				
Zinc, galvanised steel	2,3	2		
Copper, lead	2,3	2		
Steel, special steels (V2A, V4A), Aluminium	2,3	2,3		
Insulating materials (polystyrene, rock wool)	6	6		
KEMPERTHERM® FR OSB Insulation				
KEMPERTHERM® SR, TR and FR Insulation				5
Wood panels, plywood, chipboard, OSB	7	7		5

- 2 Mechanical pre-treatment and cleaning with KEMPERTEC® MEK Cleaning Agent is necessary.
- 3 Low adhesion – At waterproofing terminations protect the KEMPEROL® from weathering using a cover flashing. Where a cover flashing cannot be used or adhesion is inadequate, secure by mechanically fixing a suitable termination bar or collar. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 5 The KEMPERTEC® AC Primer and EP / EP5 Primer has to be scattered with KEMPERTEC® Natural Quartz NQ 0712.
- 6 Partition layer required. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 7 Prevent the loss of resin at joints. Refer to KEMPER SYSTEM Technical Department for specific project advice.

When using this priming table, it is necessary to follow KEMPER SYSTEM preparation guidelines and technical advice.

3.1.3 KEMPEROL® AC Speed (PMMA) Waterproofing

Published 12/2016

- Green** = Applicable.
- Yellow** = Individual test is necessary (refer to 2.3.6)
- White** = Not suitable or not recommended - This primer should not be used as it is not compatible or a significantly better primer is available for that substrate.

Substrate	KEMPERTEC® AC Primer
Bitumen roof sheet (V 13, V 60, G 200, PYE (SBS))	
APP-Bitumen roof sheet, granulated	
Asphalt, weathered	
Plastic sheets (EPDM, PE, PP, PIB)	
Plastic sheets (PVC-P, EVA)	
FPO or TPO Plastic sheets	FPO Primer
Cementitious Board	
Clinker, Bricks, visible brickwork stones (grinded)	2
Concrete, screed	
Modified screed and mortar	
Stones for construction (lightweight, gas or pumice concrete, cement and calcareous sandstone)	
Zinc, galvanised steel	2
Copper, lead	2
Steel, special steels (V2A, V4A), Aluminium	2, 6
Insulating materials (polystyrene, rock wool)	6
KEMPERTHERM® FR OSB Insulation	
KEMPERTHERM® SR, TR and FR Insulation	
Wood panels, plywood, chipboard, OSB	

- 2 Mechanical pre-treatment and cleaning with KEMPERTEC® MEK Cleaning Agent is necessary.
- 3 Low adhesion – At waterproofing terminations protect the KEMPEROL® from weathering using a cover flashing.
Where a cover flashing cannot be used or adhesion is inadequate, secure by mechanically fixing a suitable termination bar or collar. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 6 Partition layer required. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 7 Prevent the loss of resin at joints. Refer to KEMPER SYSTEM Technical Department for specific project advice.

When using this priming table, it is necessary to follow KEMPER SYSTEM preparation guidelines and technical advice.

3.1.4 KEMPEROL® 1K-PUR Waterproofing

Published 12/2016

Green = Applicable.

Yellow = Individual test is necessary (refer to 2.3.6)

White = Not suitable or not recommended - This primer should not be used as it is not compatible or a significantly better primer is available for that substrate.

Substrate	KEMPERTEC® EP / EP5 Primer	KEMPERTEC® D / R Primer	KEMPERTEC® FPO Primer
Bitumen roof sheet (V 13, V 60, G 200, PYE (SBS))			
APP-Bitumen roof sheet, granulated			
Asphalt, weathered			
Plastic sheets (EPDM, ECB, PVC-P, PE, PP, PIB, EVA)			
FPO or TPO Plastic sheets			
Cementitious Board			
Clinker, Bricks, visible brickwork stones (grinded)			
Concrete, screed			
Modified screed and mortar			
Stones for construction (lightweight, gas or pumice concrete, cement and calcareous sandstone)			
Glass (uncoated) - MEK cleaned			
Zinc, galvanised steel	2,3	2	
Copper, lead	2	2	
Steel, special steels (V2A, V4A), Aluminium	2,3	2,3	
Insulating materials (polystyrene, rock wool)	6	6	
KEMPERTHERM® FR OSB Insulation			
KEMPERTHERM® SR, TR and FR Insulation			
Wood panels, plywood, chipboard, OSB	7	7	

2 Mechanical pre-treatment and cleaning with KEMPERTEC® MEK Cleaning Agent is necessary.

3 Low adhesion – At waterproofing terminations protect the KEMPEROL® from weathering using a cover flashing. Where a cover flashing cannot be used or adhesion is inadequate, secure by mechanically fixing a suitable termination bar or collar. Refer to KEMPER SYSTEM Technical Department for specific project advice.

6 Partition layer required. Refer to KEMPER SYSTEM Technical Department for specific project advice.

7 Prevent the loss of resin at joints. Refer to KEMPER SYSTEM Technical Department for specific project advice.

When using this priming table, it is necessary to follow KEMPER SYSTEM preparation guidelines and technical advice.

3.1.5 KEMPEROL® LF Waterproofing

Published 04/2019

- Green** = Applicable.
- Yellow** = Individual test is necessary (refer to 2.3.6)
- White** = Not suitable or not recommended - This primer should not be used as it is not compatible or a significantly better primer is available for that substrate.

Substrate	KEMPERTEC® Primer
Bitumen roof sheet (V 13, V 60, G 200, PYE (SBS))	No Primer Required 8
APP-Bitumen roof sheet, granulated	
Asphalt, weathered	
Plastic sheets (EPDM, ECB, PVC-P, PE, PP, PIB, EVA)	
FPO or TPO Plastic sheets	
Cementitious Board	
Plastic elements (PVC-U, PVC-C)	EP5 Primer + KEMPERTEC® Natural Quartz NQ 0712 7
Clinker, Bricks, visible brickwork stones (grinded)	
Concrete, screed	
Modified screed and mortar	
Stones for construction (lightweight, gas or pumice concrete, cement and calcareous sandstone)	No Primer Required 2
Glass (uncoated), tiles - MEK cleaned	
Zinc, galvanised steel	
Copper, lead	
Steel, special steels (V2A, V4A), Aluminium	No Primer Required 8
Insulating materials (polystyrene, rock wool)	
KEMPERTHERM® FR OSB Insulation	
KEMPERTHERM® SR, TR and FR Insulation	
Wood panels, plywood, chipboard, OSB	

- 2 Mechanical pre-treatment and cleaning with KEMPERTEC® MEK Cleaning Agent is necessary.
- 3 Low adhesion – At waterproofing terminations protect the KEMPEROL® from weathering using a cover flashing.
Where a cover flashing cannot be used or adhesion is inadequate, secure by mechanically fixing a suitable termination bar or collar. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 6 Partition layer required. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 7 Prevent the loss of resin at joints. Refer to KEMPER SYSTEM Technical Department for specific project advice.
- 8 Any queries, please speak to a member of our Technical team on 01925 445532 or email technical@kempersystem.co.uk

When using this priming table, it is necessary to follow KEMPER SYSTEM preparation guidelines and technical advice.

3.2 Application and Curing Mechanisms of KEMPERTEC® Primers

Only carry out laying work when the temperature of the materials, substrate and surroundings is at least 5°C (10°C for KEMPEROL® EP Primer). If problems are experienced with outgassing (air bubbles in the primer) from a concrete deck then carry out the work in the afternoon as the temperature is falling so the primer is sucked into the substrate to seal the pores. Take care that the dropping temperature does not affect curing i.e. during winter months. Use a nylon roller (with a rubber blade if necessary) and do not interrupt the work until the substrate has been fully saturated with the primer. Avoid accumulations of material.

When using KEMPERTEC® EP or EP5 Primers, broadcast the surface with KEMPERTEC® Natural Quartz NQ 0408 while the primer is still wet (typically 2kg/m² of quartz).

When using KEMPERTEC® AC Primer, broadcast the surface with KEMPERTEC® Natural Quartz NQ 0408 as indicated in the priming table while the primer is still wet (typically 2kg/m² of quartz).

For other primers like AC, D and R primer, once the time specified in the Technical Datasheet has expired, apply a further coat of primer provided the surface is tack-free and dry. However, the maximum waiting time should not be exceeded. To extend this time period broadcast quartz into the wet primer as detailed above.

3.2.1 PUR – Polyurethane

The polyaddition reaction of the KEMPERTEC® D, KEMPERDUR® Deko and solvent-free KEMPERDUR® Deko 2K, KEMPERDUR® High-Build Coating, KEMPERDUR® QB1 Binder, KEMPERDUR® EP Finish and KEMPERDUR® Finish combines isocyanides and alcohols to form polymers.

3.2.2 PMMA – Polymethyl Methacrylate

The KEMPER SYSTEM AC products (KEMPERTEC® AC Primer, KEMPERDUR® AC Coating and KEMPERDUR® AC Finish) make use of the radical polymerisation of methacrylates initiated by the AC Hardener.

3.2.3 EP – Epoxy Resin

Polyaddition of epichlorohydrin and biphenyls takes place in the KEMPERDUR® EP Finish and the KEMPERTEC® EP and EP5 primers.

3.3 Overcoating and Working Times of Primers at 23°C

Primers	Working Time	Rain-Resistant After	Ready For Foot Traffic After	Ready For Further Coatings After	Maximum Overcoating Times
KEMPERTEC® D	25 min	3 hrs	12 hrs	12 hrs	8 days*
KEMPERTEC® R	8 min	2 hrs	2–3 hrs	2–3 hrs	8 days*
KEMPERTEC® EP5 (broadcast with natural quartz)	20 min	3 hrs	4 hrs	4 hrs	No max
KEMPERTEC® EP (broadcast with natural quartz)	25 min	6 hrs	16 hrs	16 hrs	No max
KEMPERTEC® FPO	5 min	30 min	30 min	30 min	24 hours
KEMPERTEC® AC	15 min	30 min	30 min	30 min	8 days*

* No maximum if broadcast with natural quartz.

3.4 Coverage Index - Roofing / External Primers

Coverage Primers				
Area	D / R Primer	EP / EP5 Primer	AC Primer	FPO Primer
m ²	Minimum coverage rate per kg			
1	0.5	0.5	0.5	0.05
10	5	5	5	0.5
20	10	10	10	1
30	15	15	15	2
40	20	20	20	2
50	25	25	25	3
100	50	50	50	5
150	75	75	75	8
200	100	100	100	10
250	125	125	125	13
300	150	150	150	15
350	175	175	175	18
400	200	200	200	20
450	225	225	225	23
500	250	250	250	25
750	375	375	375	38
1000	500	500	500	50

Coverage rates are based upon typical values.

1. Coverage rates may decrease over smooth, non porous substrates.
2. Primer coverage may increase on porous or uneven substrates.
3. On excessively porous substrates an additional application of primer may be required.
4. On excessively uneven substrates further preparation should be carried out to provide a smoother surface.
5. Ensure no ponding of FPO Primer.

3.5 Mixing Primers

It is very important that the KEMPER SYSTEM primers used are mixed correctly.

PLEASE NOTE: KEMPER SYSTEM products must not be mixed with other manufacturers' products.

3.5.1 Mixing Kempertec Primer (Sachets)

KEMPERTEC® primers usually consist of 2 components. This means there are two ingredients that need to be mixed together.

- Open the container and remove the foil bags.
- As required tear open a foil bag and remove the sachet.
- The two components can clearly be seen.
- Lay the sachet flat and remove the first part of the dividing strip.
- Turn the sachet over and remove the second strip.
- The two components can now mix freely together.
- Whilst still in the sachet, mix the two components thoroughly until the mixture is streak free.
- Hold the sachet upright and cut open above your hand with a pair of scissors.
- To avoid any mixing inconsistencies, pour the contents of the sachet into a clean, dry container.
- Squeeze out any remaining primer.
- Stir thoroughly to ensure all of the components are mixed together.
- The Kempertec primer is now ready to use.

3.5.2 KEMPERTEC® D and EP Primer

- Mix the two components together in the container supplied.
- Transfer to a clean, dry container and mix again to avoid any inconsistencies.

3.5.3 Mixing KEMPERTEC® AC Primer with Catalyst Powder

KEMPERTEC® AC-Primer must only be mixed with KEMPEROL® CP Catalyst Powder.

- One sachet (minimum 2% to activate).
- Two sachets (maximum 4%) to maintain the curing time at colder temperatures.
- Stir thoroughly to ensure all of the components are mixed together.



4 Waterproofing

KEMPEROL® is a complete resin-based liquid waterproofing system. Applied wet-on-wet, KEMPEROL® bonds directly to virtually any substrate to provide a seamless, elastomeric, UV-stable, monolithic membrane that cannot delaminate.

4.1 Curing Mechanisms of KEMPEROL® Products

4.1.1 FUP – Flexible Unsaturated Polyester

The KEMPEROL® V210 / V210M and KEMPEROL® BR waterproofing systems are made from polyester, with styrene as a reactive solvent. The reaction (radical polymerisation) is initiated by the catalyst in powder form.

PLEASE NOTE: Due to the nature of the products, both KEMPEROL® V210 / V210M and KEMPEROL® BR have a strong odour during application. Depending on the shape of the building, system build-up and application conditions, it is possible that these products will have a characteristic odour once cured.

KEMPEROL® V210 / V210M can cure with a waxy finish, despite being mixed and applied correctly. To reduce dirt retention, and tackiness, this can be overcome by the brush application of KEMPEROL® TP Talcum Powder over the cured surface a minimum 12 hours after the application of KEMPEROL® V210 / V210M.

Consideration must be made at the planning stage if product odour could be an issue to the client during the service life of the product e.g. when used on schools, hospitals, offices, food handling facilities etc. In such cases solvent-free and odourless KEMPEROL® 2K-PUR should be used.

4.1.2 PUR – Polyurethane

The polyaddition reaction of the KEMPEROL® 1K-PUR and KEMPEROL® 2K-PUR waterproofing systems, KEMPERDUR® Deko and solvent-free KEMPERDUR® Deko 2K, KEMPERDUR® High-Build Coating, KEMPERDUR® QB1 Binder, KEMPERDUR® EP Finish and KEMPERDUR® Finish combines isocyanides and alcohols to form polymers.

4.1.3 AC - PMMA Polymethylmethacrylate

Radical polymerisation of methacrylates initiated by an AC hardener.

4.1.4 LF - Silane Terminated Polymer

Polycondensation - Cures under the influence of ambient humidity.

Cures from outside to inside (humidity range 30-90%).

4.2 Overview of Working Times

Product	Working Time (23°C)	Rain Resistant After	Ready for Foot Traffic After	Ready for Further Coating After	Job Interruptions and Further Coating
KEMPEROL® V210M	15 min	30 min	6 hrs	6 hrs	Note 1
KEMPEROL® BR	15 min	30 min	6 hrs	12 hrs	Note 1
KEMPEROL® 2K-PUR	30 min	2 hrs	16 hrs	3 days	Note 2
KEMPEROL® 1K-PUR	30 min	60 min	24 hrs	3-7 days	Note 3
KEMPEROL® AC Speed	20 min	35 min	35 min	60 min	Note 1
KEMPEROL® LF	90 min	2 hrs	16 hrs	24 hrs	Note 3

1. **KEMPEROL® V210M / BR / AC Speed** - After 12 hours, laps and any linking areas must be cleaned thoroughly using MEK cleaning agent. Enough time should elapse to allow the cleaner to evaporate from the surface before application of the KEMPEROL® V210 / V210M or KEMPEROL® BR.
2. **KEMPEROL® 2K-PUR** - After 24 hours and before 7 days, laps and linking areas must be thoroughly cleaned using MEK cleaning agent. Enough time should elapse to allow the cleaner to evaporate from the surface before application of the KEMPEROL® 2K-PUR. After 7 days, any laps or linking areas will require abrading using P40 paper and thoroughly cleaned using MEK cleaning agent.
3. **KEMPEROL® 1K-PUR / LF** - After 12 hours, laps and any linking areas must be cleaned thoroughly using MEK cleaning agent. Enough time should elapse to allow the cleaner to evaporate from the surface before application of the KEMPEROL® 1K-PUR.

4.3 Coverage Index - Roofing / Waterproofing

Coverage	KEMPEROL® Waterproofing		
Area	V210M / 2K-PUR / BR / LF 165 Fleece	AC Speed 165 Fleece	1K-PUR 165 Fleece
m²	kg	kg	kg
1	3	2.5	3.5
10	30	25	35
20	60	50	70
30	90	75	105
40	120	100	140
50	150	125	175
100	300	250	350
150	450	375	525
200	600	500	700
250	750	625	875
300	900	750	1050
350	1050	875	1225
400	1200	1000	1400
450	1350	1125	1575
500	1500	1250	1750
750	2250	1875	2625
1000	3000	2500	3500

Coverage rates are based upon typical values.
Waterproofing coverage may increase on uneven substrates.

4.4 Mixing KEMPEROL® Waterproofing Systems

It is very important that the KEMPER SYSTEM resins used are mixed correctly.

PLEASE NOTE: Always use the full amount of catalyst powder or additives prescribed.
KEMPER SYSTEM products must not be mixed with any other manufacturers' products.

Waterproofing	Operations
KEMPEROL® V 210M Waterproofing System	- Thoroughly mix KEMPEROL® Catalyst Powder CP (component C) directly in to KEMPEROL® V210M drum for approximately 2 minutes using a slow speed paddle mixer. Use immediately. - To avoid mixing errors transfer to a different container and mix again with a slowly rotating mixer for approximately 1 minute.
KEMPEROL® Cold Activator for KEMPEROL® V210M	Operations - At temperatures <10°C mix into component A prior to adding Catalyst Powder CP to reduce pot life by approximately 60%.
KEMPEROL® Inhibitor for KEMPEROL® V210M	Operations - At temperatures >25°C mix into component A prior to adding Catalyst Powder CP to extend pot life by approximately 60%.
KEMPEROL® 2K-PUR Waterproofing System (container)	- Add KEMPEROL® 2K-PUR, component B (hardener), to KEMPEROL® 2K-PUR (component A). Scrape out the hardener container until it is completely empty. - Mix with a mixing paddle until there are no bubbles or streaks. - To avoid mixing errors, transfer to a different container and mix again with a slowly rotating mixer for approximately 1 minute.
KEMPEROL® 2K-PUR Waterproofing System (sachets)	- Knead contents of sachet then pull away the rubber separating cord so that both components can be mixed together. - Knead the bag quickly and thoroughly for approximately 60 seconds so that a streak free homogenous mixture is formed. - Pour into another container and stir again.
KEMPEROL® 2K-PUR Speedshot (KEMPEROL® 2K PUR Accelerator Additive)	- Mix KEMPEROL® 2K-PUR and add KEMPEROL® 2K-PUR SPEEDSHOT. - Stir with a stirring stick or low speed paddle mixer until there are no streaks in the mixture. Mixing time approximately 1 minute.
KEMPEROL® 1K-PUR Waterproofing System	Mix KEMPEROL® 1K-PUR with a wooden stick until there are no streaks. The result should be a uniform colour (re-move any skin that may have formed).
KEMPEROL® 1K- PUR Thinner	- Mix into the KEMPEROL® 1K-PUR resin at temperatures < 10°C. - Use as a "liquid lid" on containers that have already been opened.
KEMPEROL® AC Speed Waterproofing System	Thoroughly mix KEMPEROL Catalyst Powder directly into KEMPEROL AC Speed resin drum for approximately ??? minute and use immediately.
KEMPEROL® LF Waterproofing System	Mix KEMPEROL® LF with a wooden stick until there are no streaks. The result should be a uniform colour (re-move any skin that may have formed).
KEMPEROL® BR Waterproofing System	- Thoroughly mix KEMPEROL® Catalyst Powder CP (component C) into KEMPEROL® waterproofing system (component A) with a slow speed paddle mixer. Time taken to dissolve: approximately 20 min at 20°C. - Thoroughly stir component B. - Mix together KEMPEROL® waterproofing system component B and mixture of components A+C in the ratio 1:1 and stir until free from streaks using a slow speed paddle mixer. - To avoid mixing errors, transfer to a different container and mix again with a slowly rotating mixer for approximately 1 minute.

4.5 Applying KEMPEROL® Resin and Fleece

Mask off adjoining areas and protect them against contact with the KEMPEROL® waterproofing system.

Approximately 2/3rd of the required KEMPEROL® resin should be applied to the primed substrate prior to embedding the KEMPEROL® Fleece. Roll out the KEMPEROL® fleece directly into the liquid KEMPEROL® waterproofing system ensuring there are no folds, creases or air bubbles, allowing for 50mm on fleece overlaps. Use a roller or brush to remove any air bubbles and then apply the remaining approximately 1/3 of the KEMPEROL® waterproofing resin while the first coat is still wet until the fleece is fully saturated. Avoid accumulations of material.

All overlaps in the fleece should be fully saturated to ensure continuity of the system, and be a minimum of 50mm. Connections to the surface waterproofing should be made with a minimum 100mm overlap.

Lay the fleece right up against the masked-off areas so that there are no strips of waterproofing without fleece. Remove the masking while the waterproofing system is still wet.

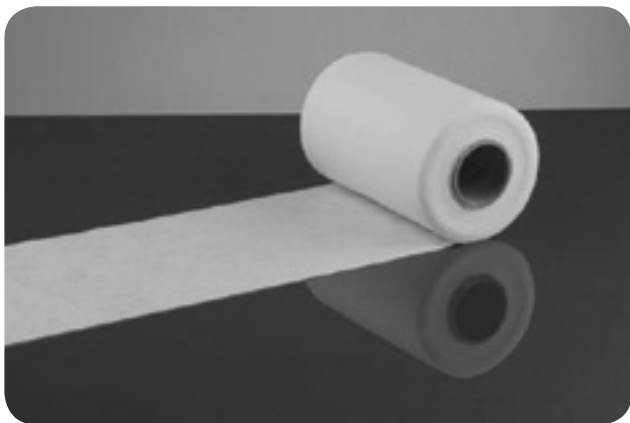
4.6 Reinforcement Fleece

4.6.1 KEMPEROL® Fleece

KEMPEROL® 165 Fleece (165 g/m²) for use with KEMPEROL® 2K-PUR, V210M, 1K-PUR, BR, AC and LF

Rolls in widths between 10.5cm and 105cm are available depending on the area to be waterproofed.

Always use the fleece as it in the direction it unwinds off the roll (see below).



Always ensure an overlap of at least 50mm between adjacent rolls of fleece when laying.

Overlaps with adjoining substrates (including outlets, penetrations, drip trims etc) should also be at least 100mm wide. Pieces of fleece neatly cut to suit are required at all internal and external corners, penetrations and roof outlets (see Technical Information).

When cutting pieces of fleece from the roll for use in detailing work we recommend that you mark the upper face of the fleece for ease of identification ('x' with a pen).

4.6.2 Fleece Type and Use

KEMPEROL® Fleece 165	
Uses	As reinforcement for KEMPEROL® waterproofing systems • V210M • 2K-PUR • 1K-PUR • AC Speed • LF
Features	• System tested and adapted to the specific purpose. • Regulates the layer thickness. • Suitable to every shape of the surface.
Pack Sizes	Rolls Length in metres: 50 Width in cm: 105 / 70 / 52.5 / 35 / 26.25 / 21 / 10.5
Shelf Life	Keep away from dampness, store dry, flat and crease free.
Properties	Form: solid Colour: white Weight (g/m ²): approximately 165



4.7 Detailing methods

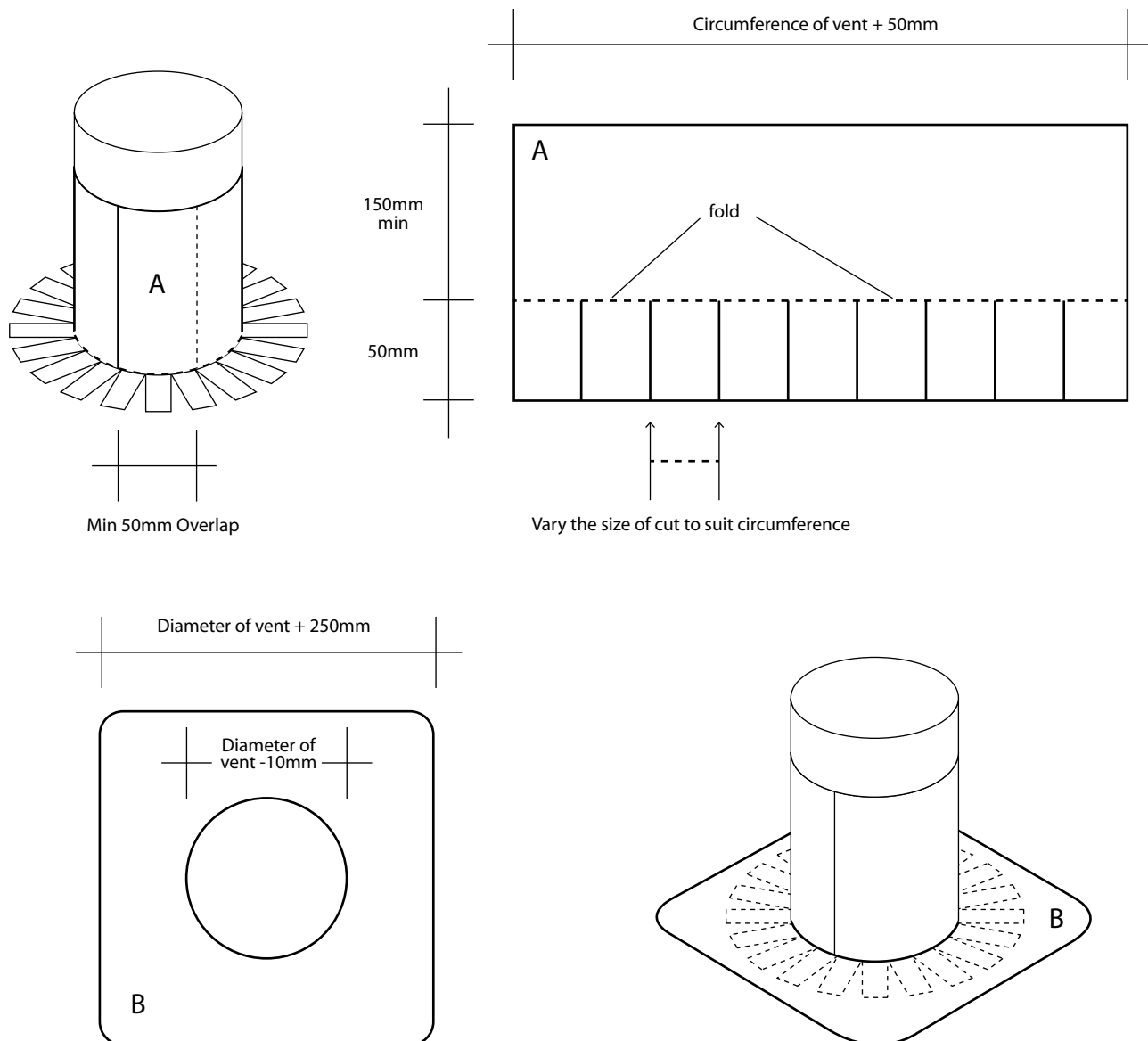
A good quality pair of scissors, and a pencil or marker, are all you will need for accurate fleece cutting.

The following fleece cut diagrams illustrate:

- I Pipe Penetrations
- II Rainwater Outlets
- III Internal Corners
- IV External Corners
- V Parapet Details
- VI Perimeter Terminations

4.7.1 Pipe Penetrations

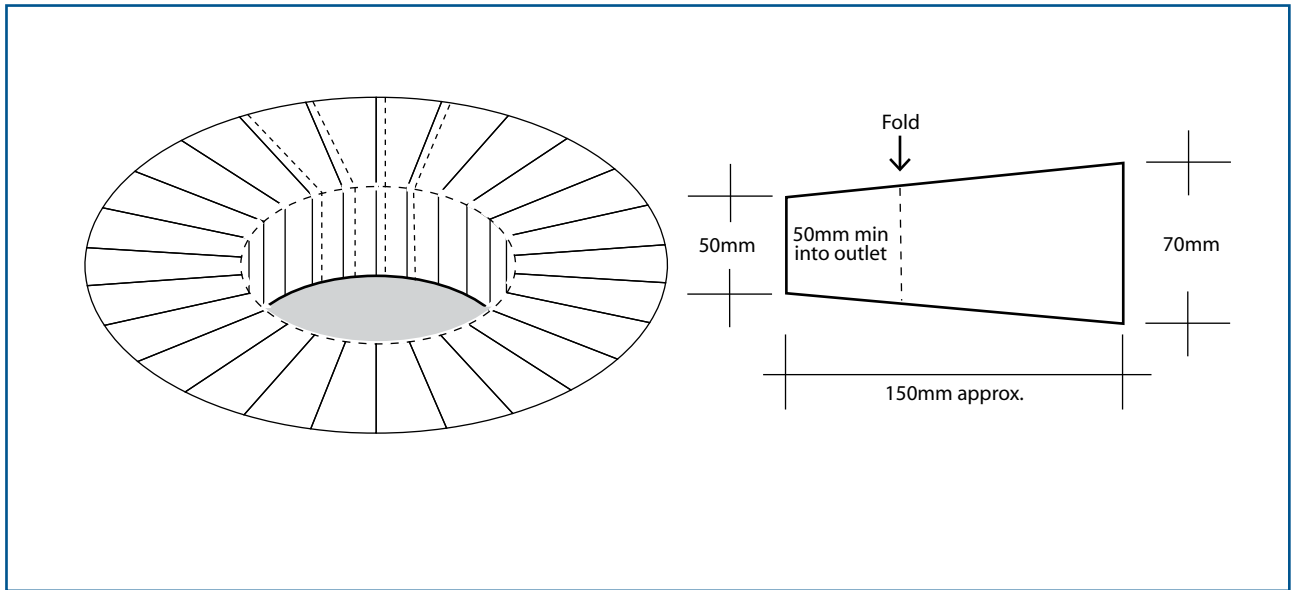
1. Cut the first piece of fleece (A) to wrap the pipe to the dimensions as shown below.
2. Next cut the fleece collar (B) to the dimensions as shown below and round off the corners. Make sure the hole is 10mm less than the diameter of the pipe, as it will need to be stretched slightly to provide a good fit.



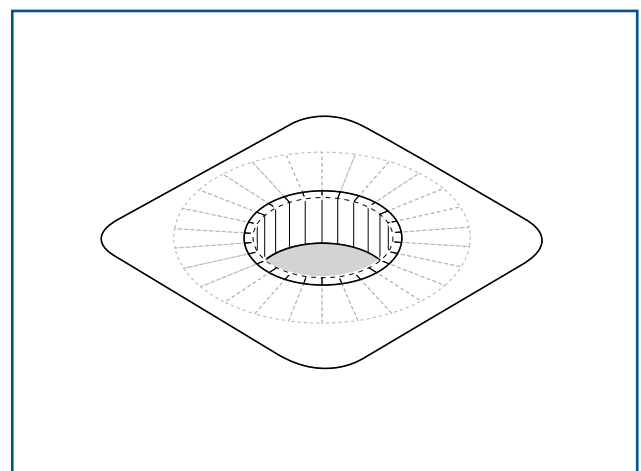
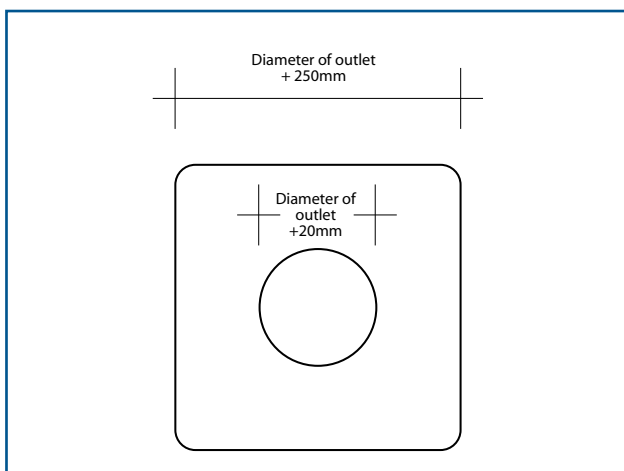
3. To ensure a neat appearance, mask the pipe just above 150mm from the deck and begin applying the KEMPEROL® resin to the pipe and the deck to the same sized area that will be covered by the fleece.
4. Wrap the pipe with fleece (A) making sure each "fin" is at right angles to the vent and firmly push the fleece into the resin. Apply more resin and roll or brush to remove any air bubble or creases, until the fleece is saturated. Make sure there is adequate KEMPEROL® resin between the fleece layers at the overlaps.
5. Place the second piece of fleece (B) over the vent pipe without disturbing the first piece of fleece. Press down onto the substrate and smooth out.
6. Continue to apply more resin with a brush or nylon roller until the fleece is completely saturated and all air bubbles and creases have been removed.

4.7.2 Rainwater Outlets

1. Cut sufficient strips of wedge shaped fleece to cover the outlet in overlapping layers.
2. Dip the individual strips in KEMPEROL® resin, ensuring saturation of each.
3. Apply KEMPEROL® resin to the top and inside of the outlet making sure no resin drips into the drain.
4. Remove any excess resin from the strips and lay in an overlapping pattern until the whole outlet is covered.
5. Brush out any air bubbles or creases and apply extra resin to the fleece (if needed), taking care to brush away from the overlapping edges.

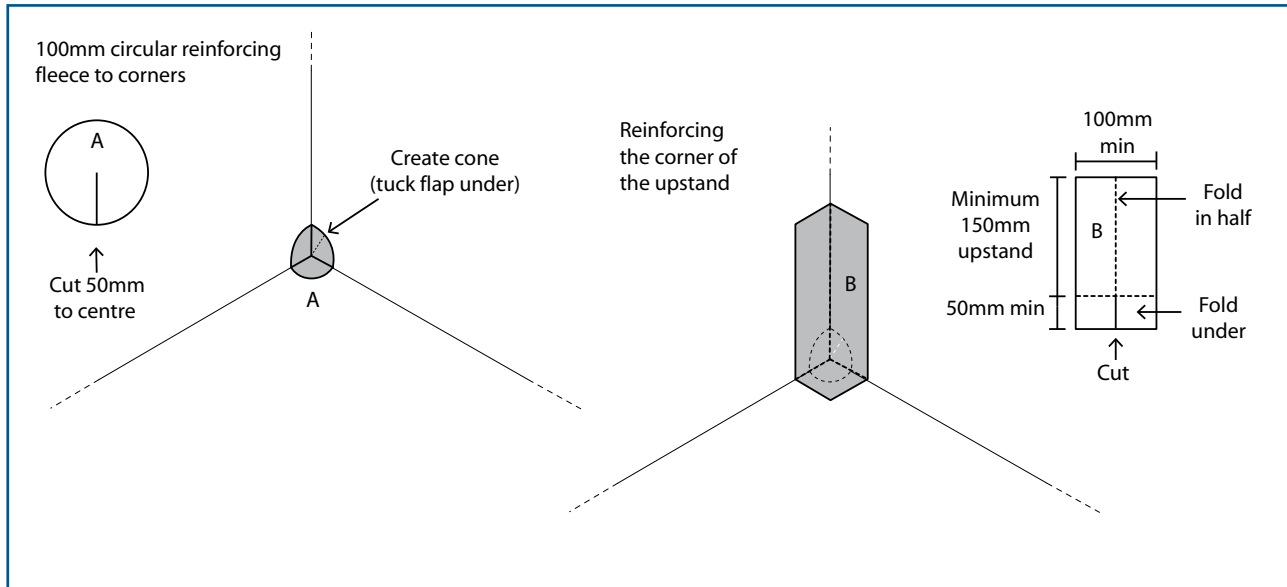


6. Cut the square cover fleece as shown. Saturate with KEMPEROL® resin, then squeeze off any excess resin and lay onto the deck over the outlet.
7. Brush or roller this to remove air bubbles or creases and to ensure the fleece is fully saturated and pressed firmly down.

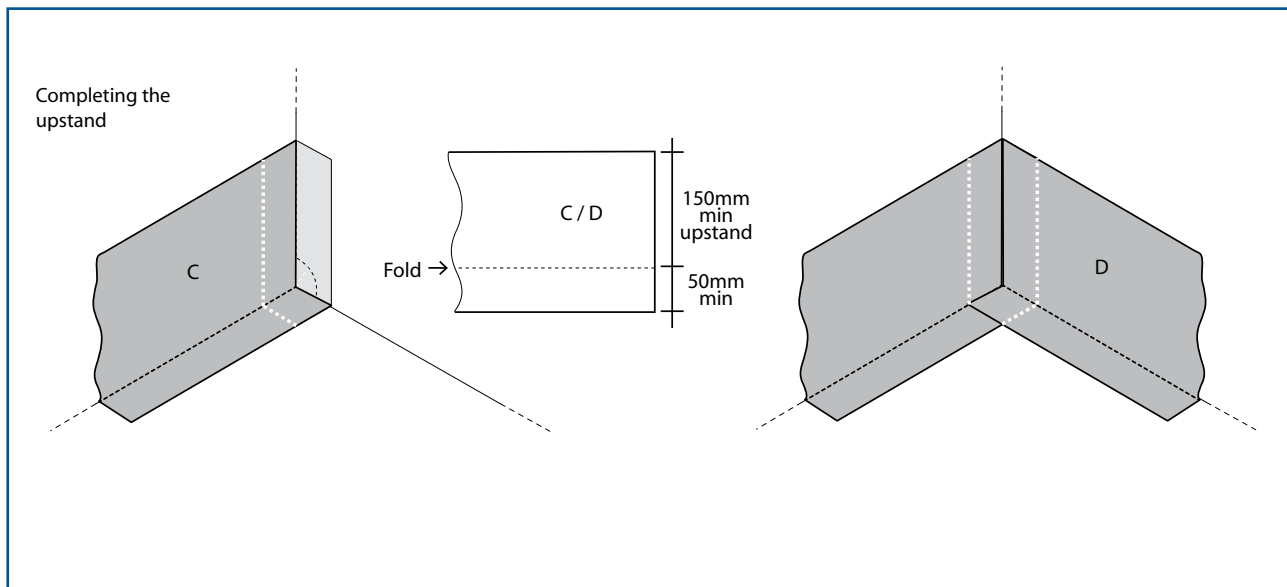


4.7.3 Internal Corners

1. Cut circular corner reinforcement (A) from fleece (also available to purchase), dip in KEMPEROL® resin until saturated, squeeze off any excess resin and position in place as shown below.
2. Cut and fold first strip of fleece (B), apply KEMPEROL® resin to the upstand and horizontal deck, and position fleece as shown. Ensure a minimum 50mm fleece either side of the horizontal. Brush or roller the fleece with additional resin whilst removing air bubbles or creases until the fleece is saturated (none of the white fleece material is visible through the resin).

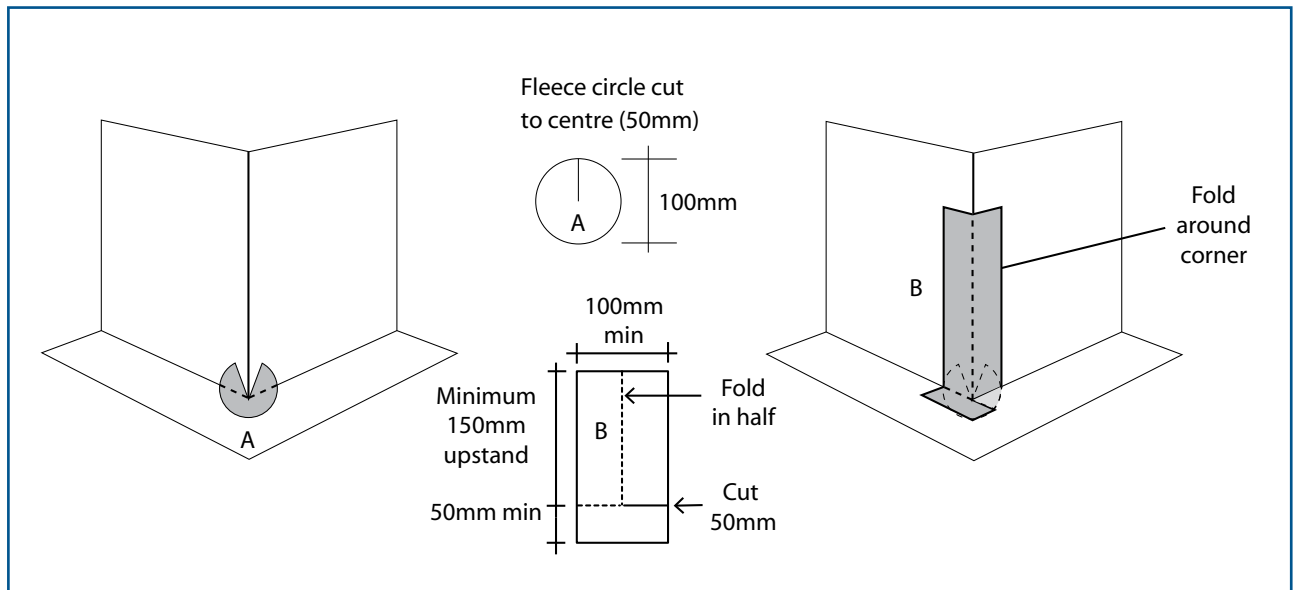


3. Cut and fold the second strip of fleece (C). Apply KEMPEROL® resin to the other side of the detail, and position the fleece, as shown, into the corner. Again brush or roller the fleece until it is saturated with KEMPEROL® resin, and any trapped air or creases are removed.
4. Repeat process for third piece of fleece (D). The length of C and D will be determined either by the width required for the section to be completed or that can easily be managed.

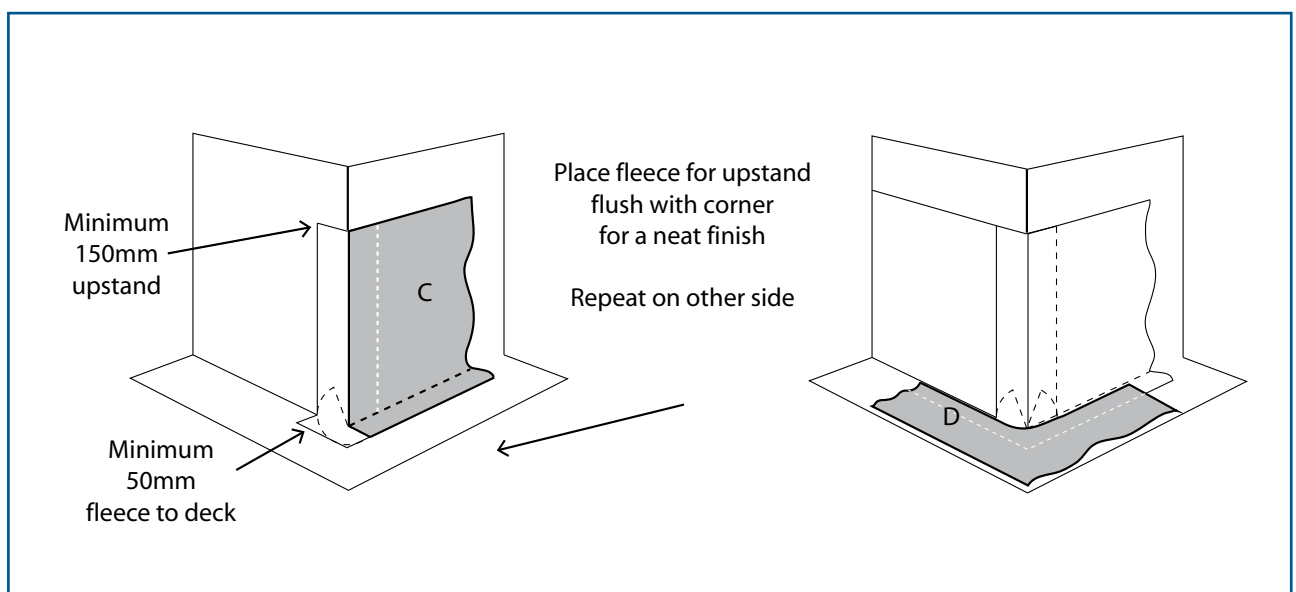


4.7.4 External Corners

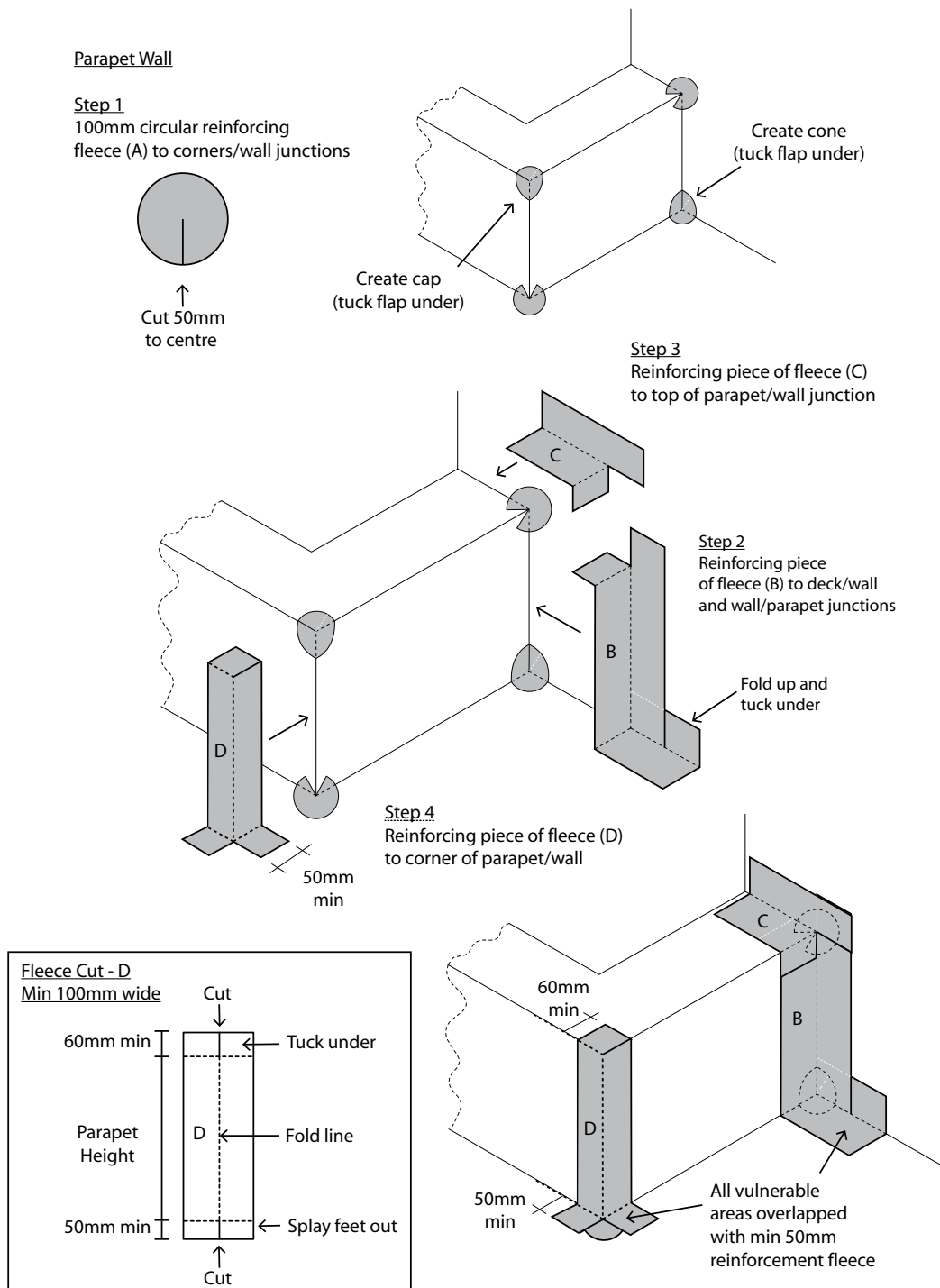
1. Cut circular corner reinforcement (A) from fleece (also available to purchase), dip in KEMPEROL® resin until saturated, squeeze off any excess resin and position in place as shown below.
2. Cut and fold first strip of fleece (B), apply KEMPEROL® resin to the upstand and horizontal deck, and position fleece as shown. Ensure a minimum 50mm fleece either side of the horizontal. Brush or roller the fleece with additional resin whilst removing air or creases until the fleece is saturated (none of the white fleece material is visible through the resin).



3. Cut and fold the second strip of fleece (C). Apply KEMPEROL® resin to the upstand, and position the fleece, as shown, up to the corner. Again brush or roller the fleece until it is saturated with KEMPEROL® resin, and any trapped air or creases are removed.
4. Apply further KEMPEROL® resin to the deck prior to positioning the main horizontal fleece (D), which is brushed or rolled as before. Round off the corner of the fleece, as shown, prior to applying the final KEMPEROL® resin to all areas to ensure full saturation of the fleece is achieved.



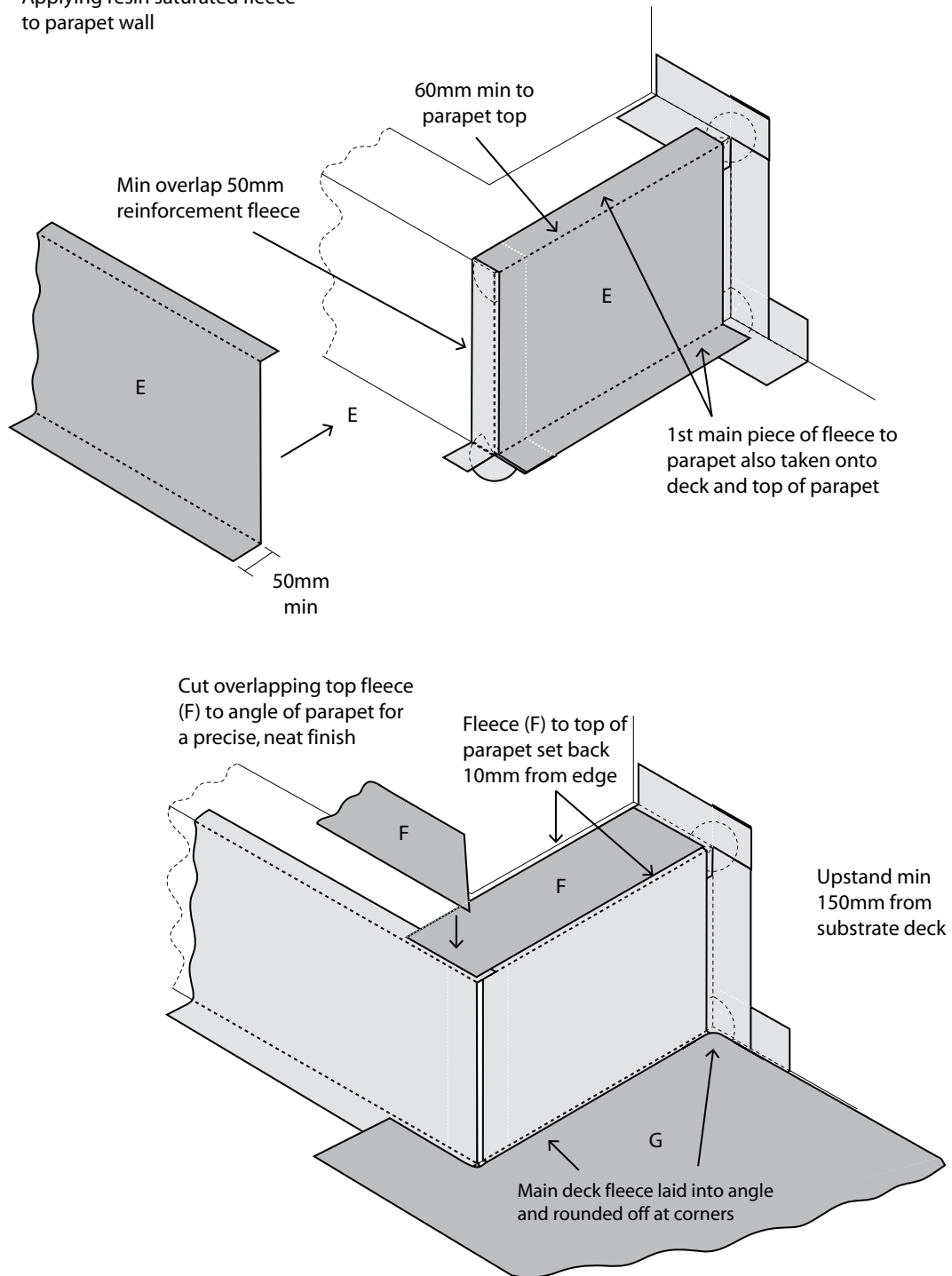
4.7.5 Parapet Detail



4.7.5 Parapet Detail Continued...

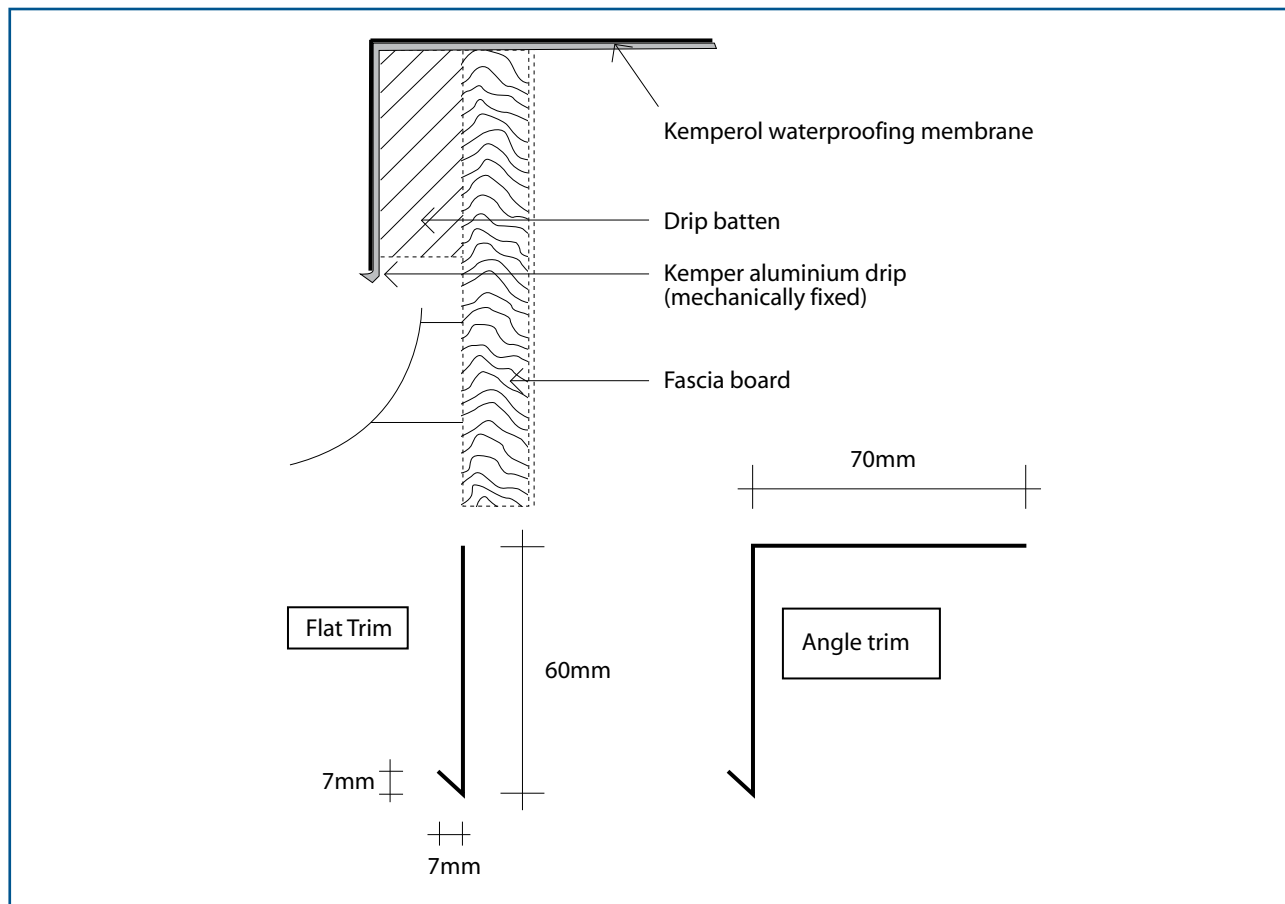
Step 5

Applying resin saturated fleece to parapet wall

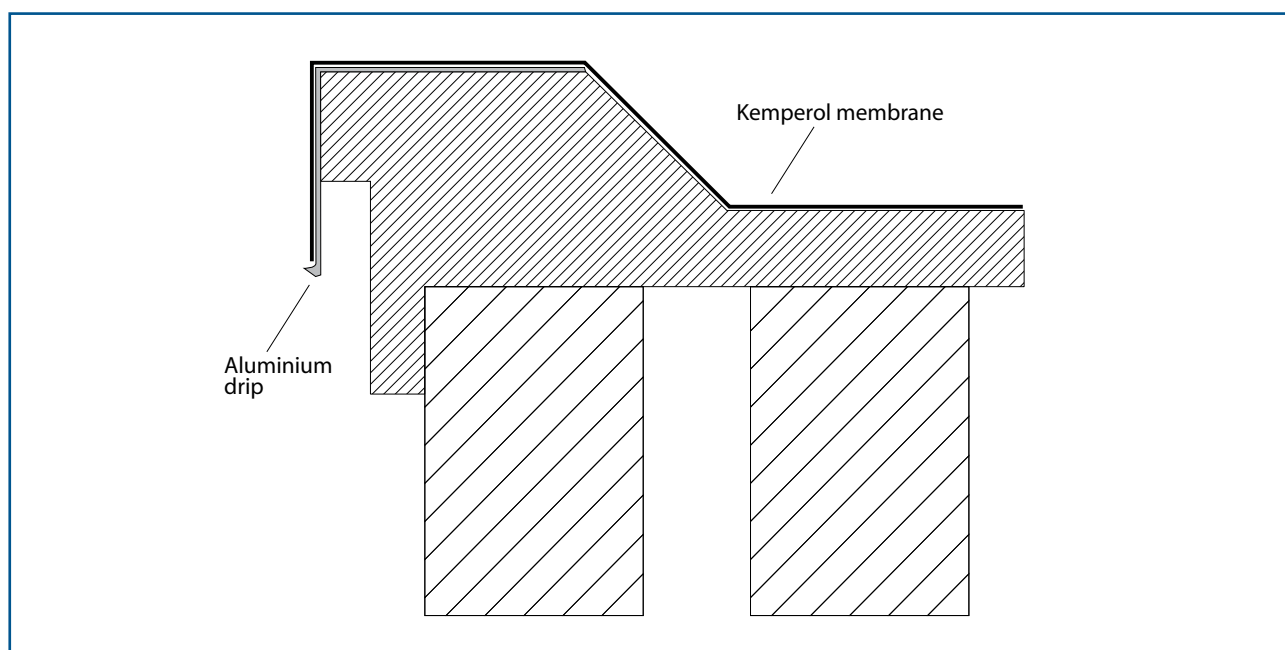


4.7.6 Perimeter Terminations

Aluminium Drip Trim

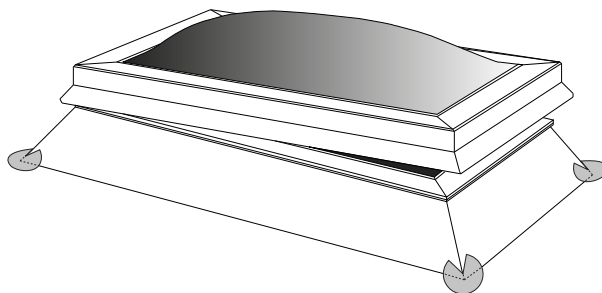
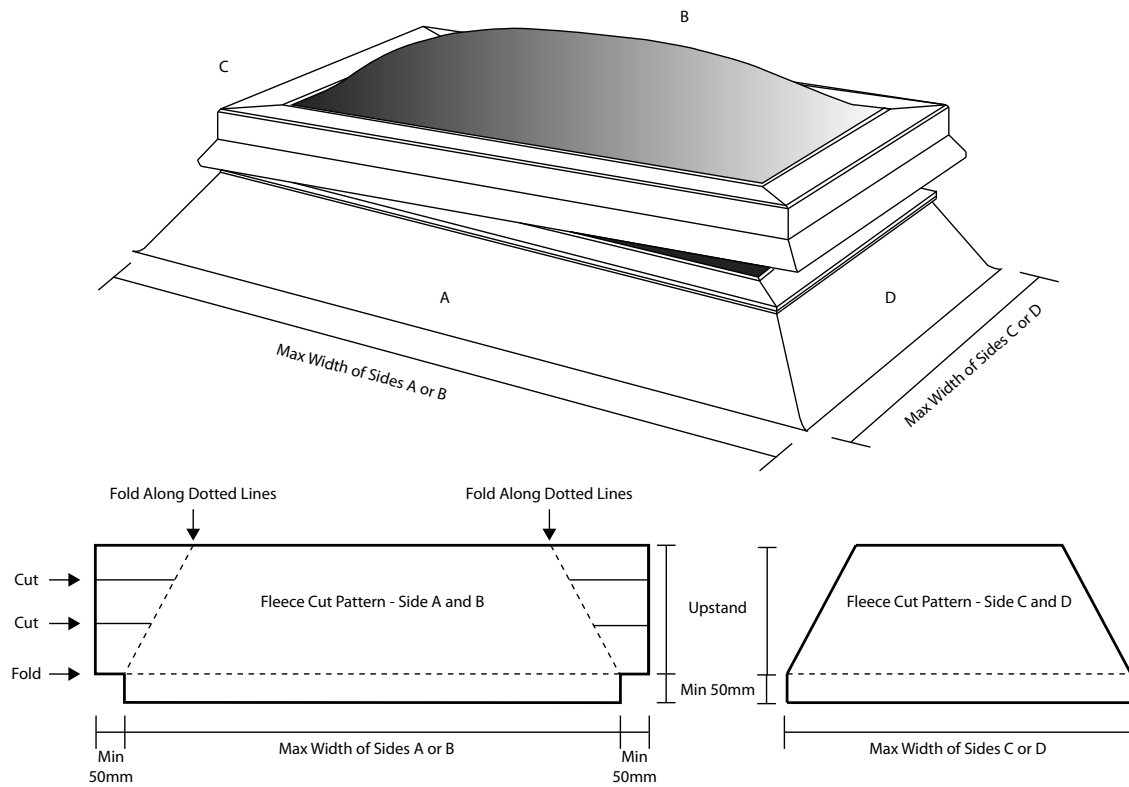


Check Kerb Detail

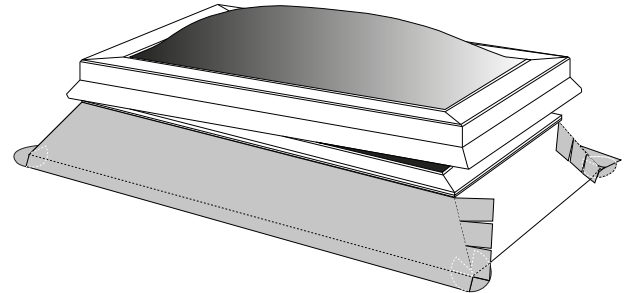


4.7.7 Domed Skylights

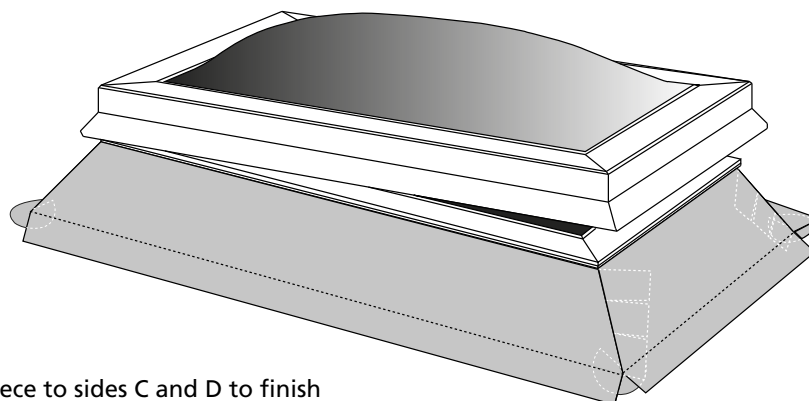
Step 1 - Measure skylight and cut fleece



Step 2 - 100mm circular reinforcing fleece to corners



Step 3 - Apply cut fleece to sides A and B
(Fold flaps on to sides C and D respectively)



Step 4 - Apply cut fleece to sides C and D to finish

4.8 Movement Joints

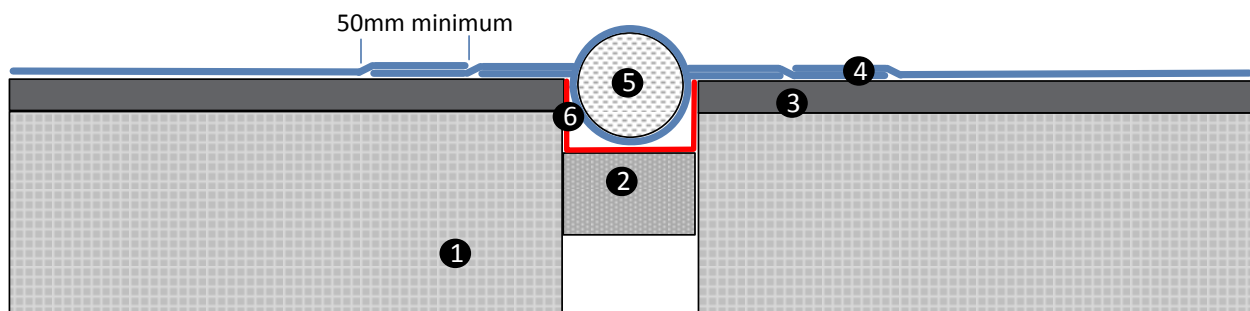
Movement joints, also often called expansion joints, accommodate changes in length and hence the associated movements between different parts of a structure. Changes in length can have various causes, e.g. temperature fluctuations, settlement.

Movement joints are highly stressed elements in a structure, also in terms of waterproofing, and therefore great care must be taken when planning such joints, selecting the waterproofing materials and carrying out the work on site. That is the only way to ensure that movement joints will perform properly and remain watertight over the long-term.

When waterproofing movement joints with KEMPEROL® waterproofing systems, the movement joints must continue through all the layers of a construction. Movement is accommodated by providing the waterproofing system in the form of a loop.

4.8.1 Typical Movement Joint Detail - Existing asphalt over concrete deck

The diagrams below shows the broad principle:



1. Concrete deck.
2. Foam filler strip.
3. Existing asphalt, prepared and primed with KEMPERTEC® primer as per specification.
4. KEMPEROL® waterproofing membrane installed to project specification.
5. Polyethylene cord to suit expansion gap.
6. Internal face of joint to be waxed to prevent KEMPEROL® waterproofing bonding to the substrate.

4.9 Upstand / Skirting Height / Balcony Access

Upstands to perimeters and any penetrative items should be 150mm high in common with industry accepted good practice; however KEMPER SYSTEM recognise that this isn't always possible where unimpeded access through doorways is required for instance on balconies and terraces. This may be reduced to 75mm provided the following points are met:

- The termination of the KEMPEROL® Waterproofing is placed on the horizontal element immediately below the door threshold, the minimum required overlap is achieved and the edge of the KEMPEROL® is protected from peeling back.
- The junction between waterproofing and threshold is sealed with an appropriate sealant.
- The sill / threshold projects beyond the waterproofed upstand 45mm minimum
- The reveals immediately surrounding the doorway revert to 150mm minimum
- The balcony/terrace allows free drainage away from this area
- Where freestanding paving or other supported finishes are specified there is a 10mm horizontal gap between the finishes and the door threshold

For new domestic projects additional guidance can be obtained in NHBC Technical Document; Standards Extra 46 February 2010. This document is available to download from the Approved Contractors Area of the KEMPER SYSTEM website.

4.10 Tall Upstands / Parapets

Where taller upstands are required for instance on balcony and roof parapets then it is recommended that the KEMPERTEC® Primer receives a blinding of KEMPERTEC® NQ0712 whilst the primer is still wet to assist with positioning of the KEMPEROL® Reinforcement Fleece and to minimise slumping. Where possible the use of KEMPEROL® 105cm Reinforcement Fleece should be avoided. Generally it is advisable to keep the maximum length of reinforcement to 2 metres to assist application; where this is not possible temporary fixings/pins may be inserted along the top edge of the saturated fleece, removing them once the KEMPEROL® has sufficiently cured and before continuing with the next section.

4.11 Self Termination of KEMPEROL® Waterproofing

Self-termination of KEMPEROL® is defined as a method by which the application of the KEMPEROL® waterproofing system is finished at a given point on a non-horizontal surface without the need for additional weathering protection such as a cover flashing. This method shall only be considered if all of the following conditions are satisfied.

- The terminating substrate is compatible to allow the required adhesion with the KEMPEROL® waterproofing system.
- The terminating detail does not allow water or moisture to pass or sit behind the KEMPEROL® upstand.
- The terminating substrate is installed correctly and will support the KEMPEROL® waterproofing system for the duration of its intended use.
- The correct primer is used for that termination substrate and the type of waterproofing system being installed.
- Sufficient preparation, inspection, testing and recording is carried out by the installing contractor to allow and demonstrate that the bond level is in excess of 1.0 MPa.
- The application of the KEMPEROL® waterproofing system is carried out as per manufacturer's instruction.

Responsibility

Any specification issued by KEMPER SYSTEM will define either the specifier's choice of, or provide the option for either self-termination or a cover flashing where applicable.

To minimise risk of failure, all KEMPER SYSTEM specifications shall recommend the use of a chase in the substrate to detail-finish the waterproofing system on relevant non-horizontal surfaces. In such a case the detail shall be finished with a bead of mastic sealant of appropriate type and quality to the requirements of the situation. Due to the varying types and performance of mastic sealants this should be regarded as a maintenance item.



5 Surface Finishes and Protection

KEMPEROL® waterproofing systems will accept, without damage, the limited foot traffic and loads associated with both installation and maintenance. Where this is likely to be exceeded, such as on balconies and terraces, additional measures should be taken to ensure that the waterproofing integrity isn't compromised and may include loose finishes such as paving or decking on spacers, fully bonded/bedded tiling or paved finishes, green roof finishes or non-slip maintenance walkways.

5.1 KEMPERDUR® Surface Finishes and Wearing Courses

We strongly advise that when considering decorative surface finishes or wearing courses that only the KEMPEROL® 2K-PUR liquid waterproofing system is used as the waterproofing element on BBA certified solutions.

If it is required to add anti-slip to a KEMPEROL® V210M installation, quartz sand should either be broadcast directly in to the wet resin during application; or if this is not possible, KEMPERDUR® AC Primer should be used to receive a coverage of quartz sand and sealed with KEMPERDUR® Finish.

PLEASE NOTE: When overlaying KEMPEROL® V210M with KEMPERDUR® AC Primer, the cured KEMPEROL® membrane should be fully cleaned of surface wax and any contaminants using a suitable detergent prior to application.

5.2 Alkalinity Protection / Bedded / Rendered Finishes

Where either tiling, paving, coping stones, render or any cementitious based product is to be used over the KEMPEROL® waterproofing it must be protected with a continuous coating of either KEMPERTEC® EP or EP5 Primer at a coverage rate of 0.4 to 0.6 kg/m² minimum which is then blinded whilst the primer is still wet with KEMCO® 0712 Natural Quartz ensuring full coverage (approximately 2kg/m² or more until full coverage is completed).

If an alkalinity protection layer is required over KEMPEROL® V210M, KEMPERTEC® AC Primer blinded with KEMCO® 0408 Natural Quartz must only be used.

One component products e.g. KEMPEROL® 1K-PUR should only be overcoated after 3-7 days. Two component products like KEMPEROL® 2K-PUR and V210 can be overcoated after 24 hours. Once the coating has been applied it needs to cure to a sufficient level before being overlaid with screed or other alkaline product. The cure times are 3 days for KEMPERTEC® EP primer, 2 days for KEMPERTEC® EP 5 Primer and 1 day for KEMPERTEC® AC-Primer.

5.3 Loose Finishes - Paving / Decking on Spacers / Green Roof Coverings / External Insulation

Before covering the newly applied KEMPEROL® waterproofing with a loose finish the membrane should firstly be checked for any discontinuities (snagging etc) which should be addressed. Ensure the KEMPEROL® is free from any contamination or sharps that may cause damage before laying 140g/m² minimum non-woven geotextile fleece which has been neatly trimmed to suit the installation. Any laps in the fleece should be sufficient to prevent the ingress of sharp objects that may work their way to the KEMPEROL® membrane with time.

5.4 Green Roofs - Resistance to Root Penetration

The roots of plants detect moisture in joints and even the finest cracks or leaks and grow in that direction.

Waterproofing materials should be able to resist the penetration of certain types of plant root tested according to DIN 4062 and the FLL guidelines.

Two different methods can be used to measure the root penetration resistance: Lupin test (quick test to DIN 4062)

The "Lupin test" involves bedding bitter Lupin plants, known for their particularly strong root growth, on a waterproofing system and carrying out an inspection after 6–8 weeks to see whether the waterproofing system has been damaged. The requirements for issuing an ETA called for KEMPEROL® waterproofing systems to pass such a test.

FLL test (German Landscape Research, Development & Construction Society)

This test takes place over four vegetation periods using fire thorn (Pyracantha) and couch grass (Agropyron repens) plants. At the end of these vegetation periods, the waterproofing system should show no signs of root or rhizome penetration. A corresponding test according to the FLL method is available for KEMPEROL® waterproofing systems.

5.5 Resistance to Chemicals

The KEMPEROL® V210M, KEMPEROL® 1K-PUR, KEMPEROL® 2K-PUR and KEMPEROL® AC waterproofing systems have been exposed to a test liquid (for test groups see literature) for a defined period of time. Following the period of exposure, the products were inspected for surface damage, swelling and changes in thickness.

This resulted in three categories:

Full Resistance	No change in the specimen after being immersed in the given medium for 60 days at 20°C.
Short-term Resistance	No change in the specimen after being immersed in the given medium for 3 days at 20°C (i.e. the waterproofing system is only resistant in the case of small amounts and prompt removal of the medium).
No Resistance	Severe change in the specimen immersed in the given medium.

These tests (see list of chemical resistance) were carried out with pure chemicals. Therefore, independent tests should be carried out in the case of blends of chemicals and other ambient conditions.

Do not make assumptions with chemical resistance. If necessary, specific tests can be carried out. Typical testing time is 6 weeks.

5.5.1 Chemical Resistance From A to Z

Survey Table for Chemical Resistance of:

- Unsaturated Polyesters (FUP) KEMPEROL® V210M Waterproofing
- One-component polyurethanes (1K-PU) KEMPEROL® 1K-PUR Waterproofing KEMPERDUR® Deko
- Two-component polyurethanes (2K-PU) KEMPEROL® 2K-PUR Waterproofing KEMPERDUR® Deko 2K KEMPERDUR® HB High Build KEMPERDUR® FC Floor Coating
- Polymethyl methacrylates (PMMA) KEMPEROL® AC Waterproofing KEMPERDUR® AC Finish
- Epoxy resins (EP) KEMPERTEC® EP / EP5 Primer

Key:



Green = **Resistant** - no alteration of the KEMPEROL® System after 60 days exposure at 20°C (68°F) to the listed material



Yellow = **Resistant with restrictions** - no alteration of the KEMPEROL® System after 3 days exposure at 20°C (68°F) to the listed material (i.e. waterproofing system is stable when only small amounts are present and are removed immediately)



White = **Not resistant** - severe alteration of the KEMPEROL® System when exposed to the listed material

Note: Specific testing is required for unlisted chemicals, mixtures, concentrations and temperatures; do not make any assumptions.

Substance	Form of Substance			Chemical Resistance				
	Solid	Solution	Liquid	FUP	1K-PU	2K-PU	PMMA	EP
Accumulator Acid		x		o	o	o	+	+
Acetic Acid < 10 %		x		o	o	o	+	+
Acetic Acid conc.			x	-	-	-	-	-
Acetone			x	-	-	-	-	-
Aluminium chloride Solution 30%		x		+	+	+	+	+
Ammonia		x		-	-	-	+	+
Ammonium Carbonate	x	x		+	+	+	+	+
Ammonium Chloride	x	x		+	+	+	+	+
Ammonium Perchlorate	x	x		o	o	o	+	+
Ammonium Phosphate	x	x		+	+	+	+	+
Ammonium Sulphate	x	x		+	+	+	+	+
Aqua Regia		x		-	-	-	-	-
Barium Chloride	x	x		+	+	+	+	+
Barium Hydroxide	x			o	o	o	+	+
Barium Hydroxide solution		x		-	-	-	+	+
Barium Nitrate	x	x		+	+	+	+	+
Beer			x	+	+	+	+	+
Bleach			x	-	-	-	-	o
Borax	x	x		+	+	+	+	+
Boric Acid		x		+	+	+	+	+
Butanal			x	-	-	-	-	-
Butanol			x	o	o	o	+	+
Butylacetate			x	-	-	-	-	+
Butyric Acid			x	-	-	-	+	o
Calcium Chloride	x	x		+	+	+	+	+
Calcium Formiate	x	x		+	+	+	+	+
Calcium Hydroxide	x			+	+	+	+	+
Calcium Hydroxide moist		x		-	-	-	+	+
Calcium Hydroxide Solution		x		-	-	-	+	+
Calcium Nitrate	x	x		+	+	+	+	+
Carbon Tetra Chloride			x	-	-	-	-	-
Castor Oil			x	o	o	o	o	+
Caustic potash solution 10% (lye)		x		-	-	-	+	+
Caustic potash solution 10-50 % (lye)		x		-	-	-	o	+
Caustic potash solution conc. (lye)		x		-	-	-	-	+
Caustic Soda 10 % (lye)		x		-	-	-	+	+
Caustic Soda 10-50 % (lye)		x		-	-	-	o	+
Caustic Soda conc. (lye)		x		-	-	-	-	+
Chloracetic Acid	x	x		-	-	-	-	-
Chlorinated Water		x		o	o	o	o	o
Chlorinated Water (Swimming pools)		x		+	+	+	+	+
Chloroform			x	-	-	-	-	+
Chromic Acid 10%		x		-	-	-	-	-
Citric Acid	x	x		o	o	o	+	+
Cobalt Chloride	x	x		+	+	+	+	+
Cobalt Nitrate	x	x		+	+	+	+	+

Substance	Form of Substance			Chemical Resistance				
	Solid	Solution	Liquid	FUP	1K-PU	2K-PU	PMMA	EP
Copper Chloride	x	x		+	+	+	+	+
Copper Sulphate	x	x		+	+	+	+	+
Cyclohexanol			x	o	o	o	+	+
Cyclohexanon			x	o	o	o	-	o
Dibutyl Phthalate	x			o	o	o	o	+
Diocetyl Phthalate	x			o	o	o	o	+
Ethanol < 50 %			x	o	o	o	+	o
Ethanol conc.			x	-	-	-	+	o
Ether			x	o	o	-	-	-
Ethylacetate (Aceticacidethylester)			x	-	-	-	-	o
Ethylglycol Acetate			x	-	-	-	-	o
Ferrum Chloride	x	x		+	+	+	+	+
Ferrum Chloride Solution 50%		x		+	+	+	+	+
Ferrum Sulphate		x		+	+	+	+	+
Ferrum Sulphate	x	x		+	+	+	+	+
Fertilizer	x	x		o	o	o	o	o
Formaldehyde 30-40% (Formalin)			x	o	o	o	-	+
Formic Acid < 30 %		x		o	o	o	o	o
Formic Acid 31-85 %		x		-	-	-	-	-
Fuel Oil EL			x	+	+	+	+	+
Fuel, Petrol			x	o	o	o	o	+
Glucose	x	x		+	+	+	+	+
Glycerin			x	+	+	+	+	+
Glycol			x	o	o	o	+	o
Hydrobromic Acid		x		o	o	o	+	o
Hydrochloric Acid 20 %		x		-	-	-	o	+
Hydrochloric Acid conc.		x		-	-	-	o	o
Hydrofluoric Acid			x	-	-	-	-	-
Isopropyl Alcohol			x	o	o	o	+	o
Lactic Acid 10%		x		+	+	+	+	+
Lactic Acid conc.		x		o	o	o	o	+
Lead Acetate	x	x		+	+	+	+	+
Lime Chloride	x			o	o	o	o	o
Lubricating Grease	x			+	+	+	+	+
Lubricating Oil			x	+	o	+	+	+
Magnesium Chloride	x	x		+	+	+	+	+
Magnesium Nitrate	x	x		+	+	+	+	+
Magnesium Sulphate	x	x		+	+	+	+	+
Maleic Acid	x		x	+	+	+	+	+
Manganese Sulphate	x	x		+	+	+	+	+
Margarine	x		x	+	+	+	+	+
Mercury			x	+	+	+	+	+
Mercury Chloride	x	x		+	+	+	+	+
Methanol			x	-	-	-	+	-
Methyl Acetate			x	-	-	-	-	-
Methyl Chloride			x	-	-	-	-	-

Substance	Form of Substance			Chemical Resistance				
	Solid	Solution	Liquid	FUP	1K-PU	2K-PU	PMMA	EP
Methylamine			x	-	-	-	-	-
Methylethylketone (MEK)			x	-	-	-	-	-
Methylisobutylketone			x	-	-	-	-	-
Milk			x	+	+	+	+	+
Mineral Oil			x	+	+	+	+	+
Molasses (Beet)			x	+	+	+	+	+
Nickel Chloride	x	x		+	+	+	+	+
Nickel Sulphate	x	x		+	+	+	+	+
Nitric Acid (Azotic Acid)		x		-	-	-	-	o
Oil for cooking			x	+	+	+	+	+
Oil for Engines			x	+	+	+	+	+
Oil from Flax (Linen)			x	+	+	+	+	+
Oxalic Acid	x	x	x	o	o	o	o	+
Ozone				+	+	+	+	+
Paraffin			x	+	+	+	+	+
Perchloric Acid < 10 %		x		o	o	o	+	o
Perchloric Acid 70 %		x		-	-	-	-	+
Petroleum			x	o	o	o	o	+
Phenol	x		x	-	-	-	-	-
Phosphoric Acid 10 %		x		o	o	o	+	+
Phosphoric Acid 50 %		x		-	-	-	o	o
Phosphoric Acid conc.		x		-	-	-	-	-
Phthalic Acid	x			+	+	+	+	+
Potassium Bromate	x	x		o	o	o	+	+
Potassium Carbonate	x	x		+	+	+	+	+
Potassium Chlorate	x	x		o	o	o	+	+
Potassium Chloride	x	x		+	+	+	+	+
Potassium Chromate	x	x		o	o	o	+	+
Potassium Cyanide	x	x		+	+	+	+	+
Potassium Dichromate	x	x		o	o	o	+	+
Potassium Fluoride	x	x		+	+	+	+	+
Potassium Iodide	x	x		+	+	+	+	+
Potassium Nitrate	x	x		+	+	+	+	+
Potassium Permanganate	x	x		o	o	o	+	+
Potassium Phosphate	x	x		+	+	+	+	+
Potassium Sulphate	x	x		+	+	+	+	+
Propanol			x	o	o	o	+	o
Propionic Acid 10 %		x		o	o	o	+	o
Propionic Acid conc.		x		-	-	-	o	-
Salicylic Acid	x	x		o	o	+	+	+
Salt	x	x		+	+	+	+	+
Salt moist		x		+	+	+	+	+
Silver Nitrate	x	x		+	+	+	+	+
Sodium Acetate	x	x		+	+	+	+	+
Sodium Bromate	x	x		o	o	o	o	o
Sodium Bromide	x	x		+	+	+	+	+

Substance	Form of Substance			Chemical Resistance				
	Solid	Solution	Liquid	FUP	1K-PU	2K-PU	PMMA	EP
Sodium Carbonate	x	x		+	+	+	+	+
Sodium Chlorate	x	x		o	o	o	o	o
Sodium Chloride	x	x		+	+	+	+	+
Sodium Cyanide	x	x		+	+	+	+	+
Sodium Fluoride	x	x		+	+	+	+	+
Sodium Hypochlorite	x	x		+	+	+	+	+
Sodium HypoChlorite Solution			x	o	o	o	o	o
Sodium Nitrate	x	x		+	+	+	+	+
Sodium Perborate	x	x		o	o	o	o	o
Sodium Perchlorate	x	x		o	o	o	o	o
Sodium Peroxide	x	x		-	-	-	-	-
Sodium Phosphate	x	x		+	+	+	+	+
Sodium Sulfite	x	x		+	+	+	+	+
Sodium Sulphate	x	x		+	+	+	+	+
Sodium-Potassium Silicate		x		o	o	o	o	+
Stearic Acid	x	x		+	+	+	+	+
Styrene			x	-	-	-	-	o
Succinic Acid	x	x		+	+	+	+	+
Sugar	x	x		+	+	+	+	+
Sugar moist		x		+	+	+	+	+
Sulphuric Acid 10 %		x		+	+	+	+	+
Sulphuric Acid 20 %		x		+	+	+	+	+
Sulphuric Acid 40 %		x		o	o	o	+	o
Sulphuric Acid 60 %		x		-	-	-	+	o
Sulphuric Acid conc.		x		-	-	-	-	-
Sulphuric Acid conc.		x		-	-	-	-	-
Table Salt	x	x		+	+	+	+	+
Table Salt Solution		x		+	+	+	+	+
Tannic Acid			x	+	+	+	+	+
Tartaric Acid	x	x		+	+	+	+	+
Tetra Hydro Furane (THF)			x	-	-	-	-	-
Tin Chloride	x	x		+	+	+	+	+
Toluene			x	-	-	-	-	-
Tri Sodium Phosphate	x	x		o	o	o	o	o
Trichlorethane			x	-	-	-	-	-
Trichlorethylene			x	-	-	-	-	-
Triethanolamine			x	-	-	-	-	-
Triethylamine		x		-	-	-	-	-
Turpentine			x	o	o	o	o	o
Urea	x	x		+	+	+	+	+
Urine			x	o	o	o	+	+
Washing Powder 5%		x		+	+	+	+	+
Wasser (destillated)			x	+	+	+	+	+
Water (Sea-, Mineral-,Potable)			x	+	+	+	+	+
Wine		x		+	+	+	+	+
Xylol			x	-	-	-	-	o
Zinc Chloride	x	x		+	+	+	+	+
Zinc Nitrate	x	x		+	+	+	+	+
Zinc Sulphate	x	x		+	+	+	+	+

5.6 Fire Performance

For roofs this is split into two parts; one deals with the individual components such as insulation, waterproofing resin, primers etc, whilst the second looks at the ability of a roof to resist a fire from outside the building; it is not concerned with the spread of flame / fire from within the building.

5.6.1 Reaction to fire is classified according to BS EN 13501-1 for the majority of construction materials and is concerned with individual components such as insulation, waterproofing resin, primers, substrates etc. The classification is split into three parts:

- i. Combustibility: This is represented by a letter, A1, A2, B, C, D, E and F with A1 being the highest performance. Both A1 and A2 are non-combustible with F being the lowest where no performance can be determined. Many plastic based materials fall into the E category.
- ii. Smoke: This is represented by the letter 's' followed by a number; s1 is the highest performance and s3 the lowest. Where a product has a main rating of E or lower there isn't a requirement to specify the smoke category.
- iii. Droplets: Represented by the letter 'd' and indicates, if any, the size of flaming droplets that are formed during a fire; d0 is the highest with d2 being the lowest.

5.6.2 Classification and method of test for external fire exposure to roofs is used to determine a roof build-up's ability to resist a fire from an adjacent fire source. There are two test methods; BS-476-3 and the more recent Euroclass TS 1187 B(roof)T4. Any roof build-up, in England or Wales, can be classed as unrestricted provided the roof build-up, the covering and any other layers, including the base substrate, achieves either BS:476-3 Ext F.A.A, BS:476-3 Ext F.A.B, BS:476-3 Ext F.A.C, or TS 1187 B(roof)T4.

KEMPEROL® V210M and KEMPEROL® 2K-PUR both achieve BS:476-3 Ext F.A.A, when applied as per their appropriate BBA certificates.

6 Storage of Products

- All containers must be stored under cover in a cool, dry, ventilated location away from other chemicals and any source of ignition.
- All materials should be protected from sub-zero temperatures and direct sunlight, up to and including the point of use.
- Rolls of KEMPEROL® Fleece should be stored flat in a dry, clean environment protected from moisture.
- Ensure products are within their 'use by date' (if applicable - refer to tin / container / packaging).
- Refer to the individual product data sheets for more information.

7 Waterproofing Care and Maintenance

KEMPEROL® membranes are suitable for general roof access for maintenance and inspection purposes. It is normally recommended that roof inspection and clearing of outlets, is carried out after leaf fall in autumn, and in the spring.

- Persons on the roof should wear soft-soled footwear.
- Any equipment carried onto the roof should be placed on suitable protection in order to prevent damage to the membrane.
- Decorative wearing finishes to balconies and access decks should be kept clean by regular brushing.
- Any vegetable matter such as leaves and flowers left to degrade on the surface may lead to staining of the surface due to the micro-porosity of the system.
- Plant pots should be stood on impervious trays/containers.
- Washing may be carried out using detergents, water, and soft brushes.

PLEASE NOTE: Organic solvents (cellulose thinners, acetone, etc.) and strong alkali solutions (caustic soda, bleach, etc) should not be allowed to come into contact with the waterproofing materials.

Refer to KEMPER SYSTEM for advice of any chemical treatment of the membrane for the purposes of cleaning or removal of vegetation.

PLEASE NOTE: No hot material above 150°C (302°F) to come into contact with the membranes or finishes, otherwise permanent damage may occur.

Any damage to either the wearing surface or the membrane should be repaired as soon as possible to maintain the waterproofing integrity of the systems.

Unforeseen spillages of chemical, oils and greases should be referred back to KEMPER SYSTEM, or the installing contractor, with information of material involved, nature of contamination, and duration of exposure.



8 Health and Safety

8.1 Personal protective equipment (PPE)

Always wear your personal protective equipment!

PPE consists of protective clothes, footwear, gloves and correctly fitting eye protection. Wear suitable protective gloves (Nitril, Viton or equivalent) to suit the products and methods being used (e.g. dipping). Latex gloves should not be used as they only protect against splashes and must be changed immediately once soiled.

Note: Refer to manufacturers safety data sheets to assist with the compilation of project specific method and risk assessments..

8.2 Disposal

8.2.1 Residues From Operations

Only dispose of cured resins and tools with deposits of cured materials as non-hazardous industrial waste.

DO NOT dispose of any unmixed or uncured resins.

Always adhere to relevant waste regulations for disposal.

Waste treatment methods:

Recommendation - Cured resin (catalyzed) will solidify and may be disposed of at proper landfill and/or incinerated. Obey all relevant regulations. Unpolymerized resin should be catalyzed. If you need to dispose uncatalyzed resin, it must be treated as hazardous waste.

Waste disposal key number: Use EWC

European waste catalogue:

08 04 09 waste adhesives and sealants containing organic solvents or other dangerous substances
08 04 10 waste adhesives and sealants other than those mentioned in 08 04 09

Uncleaned packaging:

- Recommendation: Disposal must be carried out according to official regulations.

8.2.2 Spillages

Cover spillages with a liquid binder and subsequently remove. Rags, tools with deposits of uncured material and liquid binders contaminated with spilt material must be collected separately from industrial waste and disposed of by specialist contractors.

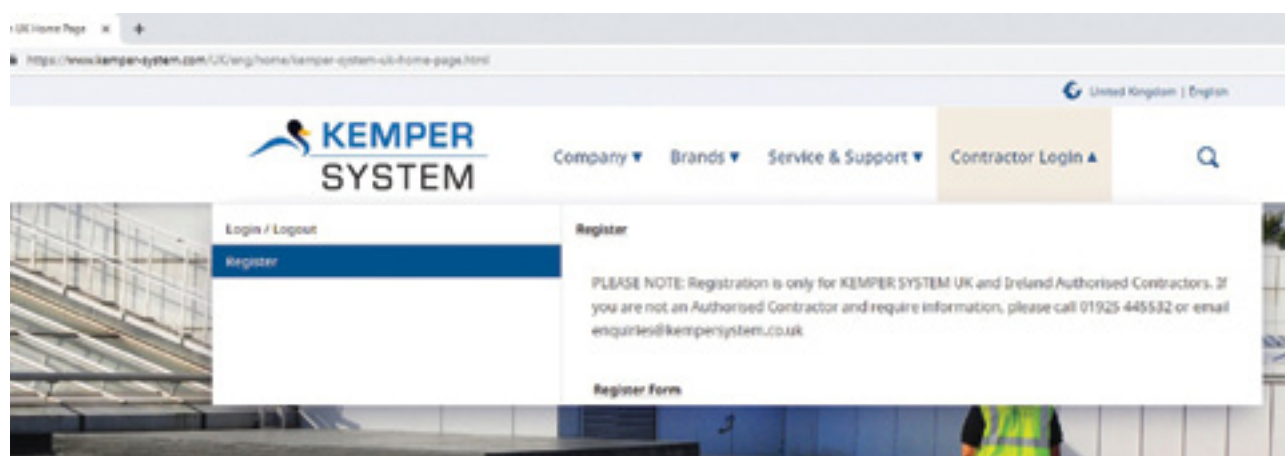
- Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
- Dispose of contaminated material as waste according to relevant disposal considerations.
- Ensure adequate ventilation.
- Send for recovery or disposal in suitable containers.



9 Authorised Contractors Area

Once you become a trained, authorised contractor, registering your details for the Authorised Contractors Area of the KEMPER SYSTEM website will give you access to all the latest technical information, material safety data sheets, product approval certificates, brochures, case study magazines, warranty application forms, training materials and much more.

All you need to do is follow this link <https://www.kemper-system.com/UK/eng/contractor-login/> and click on 'Register Form' as shown in the following box on the KEMPER SYSTEM home page.



Your username must be your email address, then just choose a memorable password.

Once complete, hit the 'Submit' button.

An email will then be sent to your inbox for validation. Once you have confirmed that you made the registration request, your details will be sent to our website administrator for approval. We will endeavour to respond as quickly as possible, but please be patient as this process may take a few working days.

Once you receive an approval email you will be free to access the information in the Authorised Contractors Area by entering the Email (user name) and password you chose.

If you forget your password, click on the 'Forgot Password' link in the 'Log In Form / Log Out' box.

10 Contact Us

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