

**Kemper J31 Liquid Waterproofing NBS Specification with
Q37 Extensive Green Roof Covering, 31 Great James Street,
Cowper Griffiths Architects LLP.**

03 March 2014

J31 Liquid applied waterproof roof coatings

To be read with Preliminaries/General Conditions.

TYPES OF COATING

121A WARM DECK ROOF COATING Kemperol Stratex to roof

- Preparation Generally:

Before applying coatings ensure that the surfaces to be coated are firmly fixed dry, smooth and free from any contaminants that could inhibit adhesion.

Generally when cleaning, scrape and sweep away bulk of contamination then clean any remaining contamination by suitable means e.g. power washing, grit blasting or mechanical abrading. Use approved detergents for more effective washing and to remove oil and grease. Organic growth can be treated using an approved fungicidal wash. For cleaning or degreasing small areas use Kemperol MEK Universal Cleaner where appropriate to do so. All preliminary work including formation of upstands, kerbs, box gutters, sumps, grooves, chases, expansion joints, etc. and fixing of battens, fillets, anchoring plugs/strips, etc. is complete and satisfactory. For a given substrate, only use the primer recommended by Kemper System.

- Substrate: Exterior grade ply on softwood joists
Preparation: During installation allow suitable gaps between boards to allow for expansion/contraction. Install to manufacturer's recommendations.
- Vapour control layer: Kempershield Type 1 Vapour Barrier - Metal lined, peel and stick, bituminous vapour barrier
Preparation and Installation: Ensure the surface is clean and dry. The surface profile should be smooth and level without voids, sharp protrusions or blisters.

Priming: Apply Kempershield Type 1 Vapour Barrier by brush or perlon roller to the prepared substrate. The coverage rate is typically 250 g/m² but will depend upon substrate porosity and profile. Application should only take place when the air temperature is + 5 °C or greater and the substrate is +3°C (and rising) above the dew point.

Application: Generally, side and end laps to be minimum 40mm wide and sealed with a hand roller. Vapour barrier to be applied 50mm minimum above finished height of the insulation to allow linking with the waterproofing system. During application temperatures below 10°C, the laps should be pre-heated using an electric hot-air gun (300°C at a rate of 5 metres per minute) before rolling down. When using as temporary waterproofing the aluminium foil on the laps should be wiped with Kemperol MEK cleaner.

- Insulation: Kempertherm T - Tapered CFC & HCFC free rigid polyisocyanurate insulation board with a multi-layer Kraft and metal facing on both sides.
Manufacturer: Kemper System Limited, www.kempersystem.co.uk
<<http://www.kempersystem.co.uk>>, Tel 01925 445532
Specification and Installation: Thermal Performance: 0.023 W/mK
U-Value requirement 0.18W/m²K: average: TBC
Max/Min Thickness: Refer to scheme
Attachment: Kemperfix Adhesive Type 1- High foaming single component polyurethane adhesive.
Manufacturer: Kemper System Limited, www.kempersystem.co.uk
<<http://www.kempersystem.co.uk>>, Tel 01925 445532.

Preparation: Ensure surface is clean and dry and that rain is not imminent.

Installation: Pour the Kemperfix adhesive straight from the can to create a 5mm bead in a snake pattern on the surface of the Vapour Barrier. Install the insulation board within 10 minutes of adhesive application, to a minimum effective coverage rate of 0.3kg/m². Lay the

insulation so as to stagger the transverse joints in the boards. The work plan should allow for protection of board joints, perimeter edges and day joints from rainwater ingress. Full adhesive cure is obtained after approximately 1 hour but this is dependent upon ambient conditions. Application should only take place when the air temperature is + 5 °C or greater and the substrate is +3°C (and rising) above the dew point.

Preparation of Insulation prior to waterproofing: Ensure surface is clean and dry and that rain is not imminent. All board joints and perimeter edges should be treated with 75mm width self adhesive Kempertherm Aluminium Joint Tape before the priming operation to prevent the loss of waterproofing resin between the boards.

Overlay to insulation: Not required

Carrier membrane: Not required

- **Waterproof coating:** 3 component, fully reinforced cold liquid applied waterproofing system based on polyester resin.
 - System manufacturer: Kemper System Limited, www.kempersystem.co.uk, Tel: +44 1925 445532
Primer reference: Kempertec D-Primer
 - Mixing and Application: Mix parts A and B to an even consistency and apply by brush or nylon roller to seal and condition the substrate. Working time for the primer, from initial mixing is 25 minutes. Typical coverage is 300 g/m² and will vary depending upon substrate porosity and profile. The Kemperol waterproofing can be applied once the primer is tack-free. The primer will be rainproof after 3 hours and can be over-coated after 12 hours. Quoted working and drying times are based on ambient conditions of 23° C / 50% RH but are temperature dependant.
Application should only take place when the air temperature is + 5°C or greater and the substrate is +3°C (and rising) above the dew point. The primer must be overcoated within 8 days otherwise the bond of the waterproofing will be reduced. After 8 days the substrate must be re-primed. For an open working time with the primer, overscatter with Kemperdur kiln-dried quartz at a coverage rate of 2kg/m².
Coating reference: Kemperol V210/200
 - Mixing and Application: Mix the Kemperol CP catalyst powder (component C) thoroughly into Kemperol V210 component A. Dissolving time is approximately 20 minutes at 20°C. Stir Kemperol 210 Waterproofing component B thoroughly until no streaks are visible and mix thoroughly in a 1:1 ratio with the Kemperol V210 component A/C mixture, again ensuring no streaks are visible.
Apply using brush or nylon roller to fully saturate the Kemperol 200 reinforcement fleece. Approximately 2/3 of the waterproofing is applied to the substrate before the Kemperol fleece is applied and rolled with a perlon roller. Roll out any air bubbles and ensure a 5cm overlap of the fleece. The remaining 1/3 of the resin coverage is applied immediately over to ensure the fleece is fully saturated (wet on wet application). If the application is interrupted more than 12 hours, wipe the overlap with Kempertec MEK Cleaning Agent. Where possible carry out all detail work first. Working time for the Kemperol V210 is 15 minutes and the system will be rainproof after 30 minutes. The walk on time or over-coating time is 6 hours and the waterproofing will be fully cured after 3 days. Quoted working and drying times are based on ambient conditions of 20°C / 50% RH but are temperature dependant Minimum coverage rate is 3.4 kg/m² but will vary depending upon substrate profile.
Application conditions: minimum air temperature is + 5°C and the substrate should be +3°C (and rising) above the dew point. At temperatures between 5°C and 10°C mix KEMPEROL® UP-A Cold Activator into component B thoroughly for 1 minute, with a stirrer or a slow-running mixing machine, until no streaks are visible. At temperatures above 25°C mix KEMPEROL® UP-I Inhibitor into component B thoroughly for 1 minute, with a stirrer or a slow-running mixing machine, until no streaks are visible.
 - Reinforcement: Kemperol non-woven polyester fleece 200 g/m²
 - Minimum dry film thickness: 2.5 mm
 - Colour: Anthracite; Target RAL 7016; Grey; Target RAL 7030

- Surface protection: See Section Q37
- Detailing: The waterproofing should be installed in conformance to Kemper System standard detailing methodology. Where applicable the minimum upstand height should be 150mm above finished level

DETAILING

315 TIMBER TRIMS

- Quality: Planed, free from wane, pitch pockets, decay and insect attack (except ambrosia beetle damage).
- Moisture content at time of covering (maximum): 22%.
- Preservative treatment: To WPA Commodity Specification C8.

356 OUTLETS

- Type: Clients Choice
- Manufacturer: Clients Choice.
- Fixing: As manufacturers instructions.
- Preparation for waterproofing: Prepare and prime outlet as per Kemper recommendations appropriate for substrate.
- Application of waterproofing: Two thirds of the mixed resin is applied directly to the primed outlet, Kemperol reinforcement fleece neatly cut to the correct size and shape is embedded and saturated. The final one third of the mixed resin is then applied whilst the first application is still wet, ensuring removal of any air pockets or bubbles. The Kemperol waterproofing should lap onto the primed outlet 150mm and any fleece on fleece laps to be 50mm minimum

357A PIPE/PENETRATION COLLARS

- To be formed from Kemperol reinforcement fleece of the same specification as main field area.
- Preparation for waterproofing: Prepare and prime detail as per Kemper recommendations appropriate for substrate.
- Application of waterproofing: Apply two thirds of the mixed resin directly to the primed detail, Kemperol reinforcement fleece that has been neatly cut to the correct size and shape is embedded and saturated. The final one third of the mixed resin is then applied whilst the first application is still wet, ensuring removal of any air pockets or bubbles. The Kemperol waterproofing should lap onto the primed detail 150mm beyond any existing waterproofing and any fleece on fleece laps to be 50mm minimum

EXECUTION GENERALLY

410 ADVERSE WEATHER

- Do not apply coatings:
 - In wet conditions or at temperatures below 5°C, unless otherwise permitted by coating manufacturer.
 - In high winds (speeds > 7 m/s), unless adequate temporary windbreaks are erected adjacent to working area.
- Unfinished areas of roof: Keep dry.

420 SUITABILITY OF SUBSTRATE

- Substrates generally:
 - Secure, clean, dry, smooth, free from frost, contaminants, loose material, voids, protrusions and organic growths.
 - Compatible with coating system.
- Preliminary work: Complete, including:
 - Formation of upstands, kerbs, box gutters, sumps, grooves, chases and expansion joints.
 - Fixing of battens, fillets and anchoring plugs/ strips.
- Moisture content and stability: Must not impair integrity of roof.

NEW SUBSTRATES

610 FIXING TIMBER TRIMS

- Fasteners: Sherardized steel screws.
- Fixing centres (maximum): As drawing.

660A FIXING PERIMETER TRIMS

- Setting out: 3 mm clear from wall or fascia.
- Fasteners: As appropriate for substrate.
 - Fixing: 30 mm from ends and at 300 mm (maximum) centres.
- Jointing:
 - Sleeves: Fixed one side only.
 - GRP trims: Butt ends.
 - Aluminium trims: 3 mm gaps between ends.
- Corner pieces: Purpose made.

770A SKIRTINGS AND UPSTANDS

- Top edges of coatings: Where not protected by flashings, apply into chases cut to a minimum depth of 20 mm and immediately DPM where installed.
- Completion of chases: When coatings are fully cured, prepare chase and apply sealant as section Z22.
 - Sealant: Coelan Coegum or equal.
 - Colour: As coating.

COMPLETION

910 INSPECTION

- Coating surfaces: Check when cured for discontinuities.
 - Defective areas: Apply another coating.

940 COMPLETION

- Roof areas: Clean.
 - Outlets: Clear.
 - Flashings: Dressed into place.
- Work necessary to provide a weathertight finish: Complete.
- Storage of materials on finished surface: Not permitted.
- Completed coatings: Protect against damage.

Q37 Green roofs

GENERAL

131A EXTENSIVE GREEN ROOF Kempergro from Kemper System Limited

- Roof type: Warm.
 - Substrate: Exterior grade ply on softwood joists..
 - Slope: Flat.
 - Waterproofing: Fully reinforced cold liquid applied resin as section J31 .
 - Thermal insulation: Refer to section J31.
 - Root Resistance Barrier: Not required with Kemperol waterproofing systems
 - Drainage and Protection Layer: Drainage & Protection Layer: Consists of three components bonded together to create a single element; as clause 356C.
 - i. A filter textile which is bonded to the upper part of the reservoir board to provide a separation layer which filters particles and fines down to 100 microns (μm), preventing the substrate from any ingress into the reservoir layer.
 - ii. A 20mm thick drainage/reservoir board which attenuates and retains the optimal amount of water for the success of the plants and biodiversity of the roof, Storage capacity should be a minimum of 5.5ltr/m². The core is also perforated to allow the excess water to drain away, preventing pooling and oversaturation of the plants.
 - iii. A moisture retention & protection fleece is bonded to the underside of the reservoir/drainage board. It provides three functions protecting the waterproofing, retaining moisture for plants and controlling the rate of runoff for excess water.
 - Growing medium: Sedum Roof Mix: UK manufactured, 100% recycled high performance substrate, consisting of biodegradable green compost & crushed brick. The substrate is designed specifically for a variation of plants and grasses, its slow releasing nutrients can give long term support to this wide range of plants specific to the geographical location of the roof. .
 - Depth: as clause 391A .
 - Vegetation: Pre-grown Wild flower mat as clause 403A
- Accessories: 100mm x 100mm Aluminium Upstands to internal perimeters to separate firebreak & growing medium. 20-40mm washed pebble to perimeter & all major protrusions.

PERFORMANCE

211A GENERAL DESIGN

- Green roof and associated features: Complete the detailed design.
- Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

256A MAXIMUM PERMITTED GREEN ROOF LOADS

- Maximum Distributed Load:
Kemperol Warm Roof insulation: 20 kN/m²
- Dead loads:
 - Green roof layers: 100 Kg/m².
- Imposed loads:
 - Activity: To project specification.
 - Vegetation: To project specification.
 - Allowance for additional loads during construction: To project specification.
- Service loads: To project specification .
- Requirement: Restrict site activities to ensure that design loads are not exceeded, or submit proposals for temporary supports.

PRODUCTS

331A PROTECTION LAYER Refer to clause 356C

336A SEPARATION LAYER Refer to clause 356C

341A MOISTURE RETENTION MAT Refer to clause 356C

351A DRAINAGE LAYER Refer to clause 356C

356C COMBINED LAYERS Multi-Purpose Composite

- Manufacturer: Kemper System Limited, Kemperhouse, 30 Kingsland Grange, Warrington Cheshire WA1 4RW. www.kempersystem.co.uk .
 - Product reference: **KemperGro Type 3 Attenuation Layer**.
- Type: Factory bonded 3 part water storage and attenuation drainage composite with an upper root-permeable non-woven polypropylene filter fleece, high density cusped polyethylene reservoir and non-woven mixed polymer base retention felt..
- Material: HDPE upto 90% recycled.
 - Filter Fleece weight: 120 g/m²
 - Reservoir Cup depth: 20 mm
 - Reservoir Capacity: 5.5 litres
 - Lower Protection/attenuation layer weight: 300 g/m²
 - Flow Rate normal to plane: 2.5 l/m²
 - Weight Saturated: 7.5 kg/m²
 - Weight Dry: 1.72 kg/m²
 - Other requirements: N/A.

361 FILTER MEMBRANE Refer to clause 356C

391A EXTENSIVE GROWING MEDIUM

- Manufacturer: Kemper System Limited, Kemperhouse, 30 Kingsland Grange, Warrington Cheshire WA1 4RW. www.kempersystem.co.uk
 - Product reference: KemperGro Growing Medium: Biodiverse Roof Mix
- Material : Recycled Green Compost & Crushed Brick
- Minimum Depth: 100mm
- Declaration of analysis: Submit.
 - Parameters: Maximum stone size.

- 403A VEGETATION Pre-grown wild flower mat.
- Manufacturer: Kemper System Limited, Kemperhouse, 30 Kingsland Grange, Warrington Cheshire WA1 4RW. www.kempersystem.co.uk
 - Product Reference: KemperGro Wild Flower Mat.
 - Planting Mix: 34 species.
 - Speceies List: Autumn Hawkbit (*Scorzoneroideis autumnalis*), Black Medick (*Medicago lupulina*), Bladder Campion (*Silene vulgaris*), Birdsfoot Trefoil (*Lotus corniculatus*), Clustered Bellflower (*Campanula glomerata*), Common Knapweed (*Centaurea nigra*), Common Poppy (*Papaerva rhoeas*), Common Spotted Orchid (*Dactylorhiza fuchsii*), Common Toadflax (*Linaria vulgaris*), Common Vetch (*Vicia sativa ssp. Segetalis*), Corncockle (*Primula veris*), Cornflower (*Centaurea cyanus*), Cowslip (*Primula veris*), Hoary Plantain (*Plantago media*), Lesser Stitchwort (*Stellaria graminea*), Musk Mallow (*Malva moschata*), Perforate St John's-wort (*Hypericum perforatum*), Rough Hawkbit (*Leontodon hispidus*), Self-heal (*Prunella vulgaris*), Scarlet Pimpernel (*Anagallis arvensis*), Sheep's-bit (*Jasione montana*), Small Scabious (*Scabiosa columbaria*), Thrift (*Armeria maritima*), Viper's Bugloss (*Echium vulgare*), Wild Basil (*Clinopodium vulgare*), Wild Marjoram (*Origanum vulgare*), Wild Pansy (*Viola tricolor*), Wild Red Clover (*Trifolium pratense*), Wild Thyme (*Thymus polytrichus*), Yarrow (*Achillea millefolium*), Yellow Rattle (*Rhinanthus minor*), Crested Dogstail (*Cynosurus cristatus*), Sheep's Fescue (*Festuca ovina*), Slender Creeping Red Fescue (*Festuca rubra ssp. littoralis*).
 - Thickness: 35mm
 - Vegetation Coverage: (minimum) 80%
- 421A EDGE RETAINING PROFILE To exposed edges of greening
- Manufacturer: Kemper System Limited, Kemperhouse, 30 Kingsland Grange, Warrington Cheshire WA1 4RW. www.kempersystem.co.uk .
 - Product reference: KemperGro Aluminium Edge Retaining Profile .
 - Material: Aluminium .
 - Height: To suit depth of planting .
- 440A VEGETATION BARRIER To perimerters and penetration/pipe margins
- Material: 20-40 mm pebbles .
 - Depth: 100mm .
 - Width: 300mm .

EXECUTION

710 INSTALLATION GENERALLY

- Preparation: Clear all surfaces of debris.
 - Timing: After certification of waterproof membrane integrity.
 - Surface condition: Visually inspect waterproof membrane, report any damage.
- Faults in waterproof membrane: Report.
- Contamination: Do not use materials detrimental to healthy plant growth.
- Storage: Do not overload.
 - Point loads: Avoid.
- Outlets: Do not block.
 - Outlet grilles: Installed.

720 ADVERSE WEATHER

- Unfinished work: Secure from damage and wind uplift.
- Conditions: Do not install or work with frozen materials.

730 INSTALLATION OF INVERTED ROOF INSULATION

- Preparation: Clear roof of other trades.
- Condition of substrate: Clean.
- Fitting: Loose lay.
- Joints: Butt together.
 - End joints: Stagger.
- Cutting: Minimize.
 - Perimeters and upstands: Fit full sized pieces.
 - Penetrations: Cut cleanly and fit closely.
- Stability: Springing and rocking not permitted.
- Protection: Cover to prevent wind uplift.

771A DRAINAGE LAYER INSTALLATION

- Extent: Continuous over entire roof area.
- Fitting: Supplied in roll-form and laid in one layer directly onto completed Kemperol Waterproofing membrane. To be laid with the white filter layer as upper face. Adjacent runs installed so plastic cores butt together. the Geotextile edge lap to be taped using Kempergro Jointing tape .
- Upstands: Fit closely around penetrations and outlets.

791A GROWING MEDIUM INSTALLATION

- Handling: Minimize.
 - Conditions: Handle in the driest condition possible. Do not handle or install when wet or frozen.
- Layers: Start by applying consecutive layers, building up to the required maximum depth
 - Depth (minimum): 100mm
 - Sequence: Apply the growing medium directly on to the Kempergro attenuation composite to the required depth. Make provision to separate and contain 20-40mm stone borders. Make allowance for consolidation and settlement of the growing medium, typically 10%.

801A VEGETATION BLANKET INSTALLATION

Handling blankets:

- Timing: Lay within 24 hours of lifting from growing position.
- Excessive stacking: Not permitted.
- Material loss (maximum): 3% of total surface area.

Growing medium condition: Thoroughly watered.

Laying blankets:

- Dry, damaged, frosty or waterlogged blankets: Do not lay.
- Orientation: Diagonal or perpendicular to slope of roof.
- Joints: Stagger. Butt together or slightly overlap to prevent gaps. Do not stretch blankets.
- Edges: Finish with whole blankets.
- Consolidation: Firm as laying proceeds to ensure full contact with the growing medium.
- Do not use rollers.
- Dressing:
 - Application: Brush in to fill joints.
- Watering: Thorough, immediately after laying and dressing.

820 EDGE RETAINING PROFILE INSTALLATION

- Cutting: Neat, accurate and without spalling.
 - Junctions: vertical, secured using proprietary connectors.
- Position: True to line and level. Smooth continuous lines.
- Fixing: Manufacturer's standard .

COMPLETION

910 INSPECTION

- Timing: Before handover.
 - Give notice (minimum): 3 days.

920 COMPLETION

- General: Leave the works in a clean, tidy condition.
- Surfaces: Clean immediately before handover.
- Outlets: Clean and clear of obstructions.
- Completed green roof: Protect from adjacent or high level working.

930 DOCUMENTATION

- Timing: Submit at handover.
- Contents:
 - Growing medium declaration of analysis.
 - Manufacturers' guarantees and warranties.
 - Procedures for maintenance of the green roof.
 - Record drawings showing the location of planting and associated features.
- Number of copies: 2 .

Z22 Sealants

EXECUTION

61 SUITABILITY OF JOINTS

- Presealing checks:
 - Joint dimensions: Within limits specified for the sealant.
 - Substrate quality: Surfaces regular, undamaged and stable.
- Joints not fit to receive sealant: Submit proposals for rectification.

62 PREPARING JOINTS

- Surfaces to which sealant must adhere:
 - Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.
 - Clean using materials and methods recommended by sealant manufacturer.
- Vulnerable surfaces adjacent to joints: Mask to prevent staining or smearing with primer or sealant.
- Backing strip and/ or bond breaker installation: Insert into joint to correct depth, without stretching or twisting, leaving no gaps.
- Protection: Keep joints clean and protect from damage until sealant is applied.

63 APPLYING SEALANTS

- Substrate: Dry (unless recommended otherwise) and unaffected by frost, ice or snow.
- Environmental conditions: Do not dry or raise temperature of joints by heating.
- Sealant application: Fill joints completely and neatly, ensuring firm adhesion to substrates.
- Sealant profiles:
 - Butt and lap joints: Slightly concave.
 - Fillet joints: Flat or slightly convex.
- Protection: Protect finished joints from contamination or damage until sealant has cured.