J41 REINFORCED BITUMEN MEMBRANE ROOF COVERINGS

To be read with Preliminaries/ General conditions.

TYPES OF ROOF COVERING

110 BUILT-UP REINFORCED BITUMEN MEMBRANE WARM DECK ROOF COVERING TO PAVILION ROOF
- Substrate: Structural profiled deck to Structural Engineers details.
  - Preparation: As clause 610B.
- Vapour control layer: BauderTHERM DS1 Duo, 3.5 mm thick aluminium lined, elastomeric bitumen self-adhesive vapour barrier. Installation as clauses 670B, 710.
- Insulation: Bauder PIR FA-TE flat board, fire resistant, aluminium foil faced, zero ODP, highly efficient rigid urethane insulation 120 mm thick to achieve the required U value (refer Clause 230). Installation as clause 680A.
- Waterproof covering: BAUDER TOTAL GREEN ROOF SYSTEM
  - System manufacturer: Bauder Ltd, 70 Landseer Road, Ipswich, SUffolk, IP3 0DH. Tel: 01473 257671
  - Underlayer: BauderTEC KSA DUO, 3 mm thick, 200g/m² glass-fibre reinforced, elastomeric self-adhesive bitumen underlayer.
    Attachment: As clauses 710, 747A.
  - Intermediate layer: N/A
    Attachment: N/A
  - Top layer/ Capsheet: Bauder Plant-E, 5 mm thick, 250g/m² polyester reinforced, elastomeric bitumen root resistant, torch applied capping sheet.
    Colour: green slate finish.
    Attachment: As clauses 710, 750B.
  - Flashings and detail work: Bauder Plant-E root resistant capping sheet. Install as clause 775A.
- Surface protection: Extensive green roof landscaping - refer Section Q37/130
- Accessories: 2no. rainwater outlets as clause 490. Perimeter angles/ Edge trim as clause 345. Treated sw angle fillets surrounding rainwater outlet locations as clause 355A.

120 BUILT-UP REINFORCED BITUMEN MEMBRANE INVERTED ROOF COVERING UNDER ENTRANCE COURTYARD
- Substrate: Concrete on speed deck and abutment to pile cap all to Struct. Eng details
  - Preparation: As clause 610C.
- Waterproof covering: System 17000 APP Bituminous System
  - System manufacturer: Bailey, Blatchford Close, Horsham RH13 5RF. Tel: 01403 261844.
  - First layer: System 17000 (APP) Underlay.
    Attachment: Fully bonded by torching and as clause 710A & 740A.
  - Intermediate layer: N/A
    Attachment: N/A
  - Top layer: System 17000 Anti root Sanded Cap sheet
    Attachment: Fully bonded by torching as 735A.
  - Flashings and detail work: Underlay and Mineral Cap sheet
- Insulation: Cellular glassS3 as clause 430.
- Filter layer: Min K Fleece
- Surface protection/ Securement: Road/Car Park Build -up
- Accessories: Termination Bar, Screws

PERFORMANCE

210 ROOF PERFORMANCE
- General: Secure, free draining and weather tight.

230 INSULATION
- Thermal transmittance of roof: 0.18 W/m2K
- Finished surface: Suitably even, stable and robust to receive roof covering.
- Insulation compliance: To relevant British Standard or Agrément certified.

PRODUCTS

320 PRIMER
- Type: Bitumen cut back with volatile solvent.
- Characteristics when tested to BS EN 13357:
  - Volatile solvent content (minimum): 40% by mass.
  - Viscosity (maximum) (STV at 25°C, 4 mm orifice): 10s.

322 PRIMER
- Type: AMC High Penetration Bitumen Primer.
- Manufacturer: Bailey.
- Product reference: F-604-HP25.

325 BONDING COMPOUND
- Cellular glass slabs are to be adhered with hot oxidised type bitumen, type 95/25 (application temperature 150°C to 180°C) or type 115/15 (application temperature 190°C to 220°C). Heat and lay at a temperature sufficient to ensure bonding over the whole surface. Do not overheat.

330 TIMBER TRIMS, ETC
- 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: Please note organic solvent based timber preservatives are not permitted, as these attack bitumen based materials.

335A ANGLE FILLETS
- Material: Treated timber angle fillets
  - Size (minimum): 50mm x 50 mm.
  - 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: Please note organic solvent based timber preservatives are not permitted, as these attack bitumen based materials.
- Restriction: Fillets under torch-on bitumen membranes to be non-combustible.

345 PERIMETER TRIMS
- Type: Aluminium
- Manufacturer: Exceledge
  - Product reference: Roofedge
- Colour: Mill finish
- Size: 150mm upstand required
- Lengths (maximum): 3 m.

395 VAPOUR CONTROL
- Cellular glass slabs with bitumen filled joints will ensure damage and nuisance from interstitial condensation cannot occur.

430 WARM DECK ROOF INSULATION TO AREA BELOW COURTYARD
- Type: Cellular Glass
- Manufacturer: Pittsburgh Corning (United Kingdom) Limited. Tel: 0118 950 0655. www.foamglas.co.uk
  - Product reference: S3

Thermal conductivity for the life of the building λ_D: k=0.045 W/mK
Density: 130kg/m³
Compressive strength at breakpoint (EN 826, annexe A): 900 kN/m²
Water vapour resistance (EN ISO 10456): μ=∞ (impervious to water vapour)
Dimensional Stability: Co efficient of expansion 9x10⁻6/K
Specific heat: 1.0 kJ/ (kg.K)
Fire: Incombustible (AO – Euro Class A1)
BRE Green Guide Rating: A
Recycled Content: Minimum 68%
Guarantee: Insulation manufacturer to guarantee material will not absorb moisture from either internal or external environment and will retain original thermal efficiency for a minimum of 20 years.

Size: 600mm x 450mm
Thickness: 150 & tapered sheet, falling away from building at 1 in 60. Overall thickness at building threshold 270mm, dropping to 190 at edge of pile cap. Refer to drawing L223.
- Other requirements: Cellular glass insulation slabs should be stored under cover in dry conditions on a flat platform or level bearers to protect against wetting, mechanical damage and contamination.

441 DRAINAGE BOARD/SEPERATION LAYER
- Product: Polypropylene
- Thickness: 12mm
- Profile: Cupped, with Polyethylene Geotextile Fleece Bonded to the top side
- Installation: Lay with open cup side facing down, and fleece covered point up.

490 ROOF DRAINAGE OUTLETS
- Manufacturer: Wade Internation Ltd, Third Avenue, Halstead, Essex CO9 2SX. Tel: 01787 475151. Email: tech@wade.eu.
- Product reference: WC233 with T301 spigot.
- Size: To connect to 75mm dia. rainwater outlet concealed within roof void.

EXECUTION GENERALLY

515 ADVERSE WEATHER
- General: Do not lay coverings in high winds, wet or damp conditions or in extremes of temperature unless effective temporary cover is provided over working area.
- Unfinished areas of roof: Keep dry. Protect edges of laid membrane from wind action.

520 INCOMPLETE WORK
- End of working day: Provide temporary seal to prevent water infiltration.
- On resumption of work: Cut away tail of membrane from completed area and remove from roof.

530 APPLYING PRIMERS
- Coverage per coat (minimum): As per manufacturer's recommendations.
- Surface coverage: Even and full.
- Coats: Fully bond. Allow volatiles to dry off thoroughly between coats.

560 GENERAL WORKMANSHIP REQUIREMENTS
- Installation of the Bauder waterproofing system may only be carried out by trained and certified operatives approved by Bauder Ltd and who carry current ID badges. These should be available for inspection at all times.
- Workmanship must comply with Codes of Practice BS 8217:2005 (or alternatively Bauder Ltd.'s specification where otherwise stated). Non-compliant workmanship will not be permitted, even if the system is watertight. The client will be told that all such faults must be remedied, before the Guarantee is issued.
- All waterproofing materials and system components must be supplied by Bauder Ltd, unless otherwise stated. Any sub-standard materials or un-authorised alternatives will be rejected. Any building work which is the responsibility of the roofing contractor and has a bearing on the life of the Bauder System must be carried out by properly trained and qualified tradesmen.
- Any structural damage, peculiarities or details discovered that might affect the performance of the Bauder system, should be reported immediately to the client's representative and Bauder Limited in order that they may assist in overcoming the problem.
- The contractor is to ensure water tightness of the roof at all times. Proper day joints must be formed at the end of each working day to provide a temporary seal. No mopping or loose covers will be permitted.
- Where building works are to be carried out by other trades, following completion of the waterproofing, the contractor must make adequate provision for supplying protection to prevent damage to the new membranes. The final inspection will not be carried out by the Bauder Site Technician or the Bauder nominated Independent surveyor until all associated trades are complete and the roof areas are clear from all debris and protection layers.
- It is imperative that the Bauder Approved Contractor conforms to the workmanship criteria as listed above. Any deviation will result in the contract being considered unguaranteeable.

- All mechanical and electrical work to plant and equipment should be carried out by competent mechanical and electrical qualified tradesmen. All plant is to be reinstated and re-commissioned on completion of the roofing works in accordance with the client's detailed specification.
- Where building works are to be carried out by other trades, following completion of the waterproofing, the contractor must make adequate provision for supplying protection to prevent damage to the new waterproofing.
- If any items of plant/equipment are to be situated on the finished roof, a sacrificial layer of Bauder capping sheet is to be loose laid beneath. This is to extend a minimum 25mm past the point of contact on all sides. In the case of heavy items it may be necessary to introduce a load-spreading slab, please contact Bauder for further advice.
- All lead work to be carried out by skilled tradesmen and in accordance with current codes of practice and the recommendations of the Lead Development Association.

561 SITE INSPECTIONS

- Bauder Site Technicians will carry out regular inspections of the project during the course of the works. The Approved Contractor must give reasonable notice to Bauder of their intention to commence laying capping sheet. This will allow a discretionary inspection of the underlayer to take place, so that any remedial treatment necessary can be carried out prior to installing the capping sheet. This is particularly important when tapered insulation has been used to ensure that any areas of standing water that may remain can be addressed.
- Bauder must be notified when the roof is ready for final inspection and all related works and snagging complete. See also clauses 910A or 910B (Landscaped roofs).

SUBSTRATES/ VAPOUR CONTROL LAYERS/ WARM DECK ROOF INSULATION

610 SUITABILITY OF SUBSTRATE:

Before laying insulation, ensure that:
The base is to even falls with no areas which will pond.
Surfaces to be covered are firmly fixed, clean, dry, smooth, free from frost, contaminants, voids and protrusions.
All preliminary work including formation of upstands, kerbs, box gutters, sumps, grooves, chases, expansion joints, etc. and fixing of battens, fillets, anchoring plugs/strips, flashing, copings, roof outlets, pipe sleeves, ventilators, etc. is complete and satisfactory.

610B SUITABILITY OF SUBSTRATES (METAL)

- Substrates generally: Secure, clean, dry, smooth, and free from corrosion, contaminants, damage and protrusions.
- Falls: 0°. No deflections or back-falls present.
- Preliminary work: Complete including:
  - Formation of upstands, kerbs, box gutters, sumps, grooves, chases and expansion joints.
  - Fixing of battens, fillets and anchoring plugs/strips.
- Stability of substrate: Must not impair roof integrity.
- Preparation: The new metal deck should be of a suitable type/profile to support the vapour barrier and insulation. Approval of the specified deck should be first obtained from Bauder Limited at specification stage to confirm suitability. The approved waterproofing contractor to Inspect the installed deck and report any issues that may have a detrimental effect upon waterproofing system to the both the Clients representative and Bauder Limited. If there is any doubt as to the exact requirement Bauder Limited should be contacted for further advice. Prime all areas receiving the new waterproofing with bitumen primer, as clause 320, and allow it to dry.

660 JOINTS IN RIGID BOARD SUBSTRATES

- Cover strip: Lay centrally over substrate joints before laying vapour control layers or coverings. Adhere to substrate with bonding compound along edges only.

670B LAYING VAPOUR CONTROL LAYER

- Attachment: Cold applied and fully bonded to the crowns of the metal deck in accordance with manufacturer’s requirements.

- Side and end laps: minimum 100 mm, laid red over blue with all laps torch sealed to provide a 5-10 mm bitumen bead extrusion. Installation methods as recommended by manufacturer.
- Penetrations: Fully seal using bonding methods recommended by manufacturer.
- Edges of insulation at roof edges, abutments, upstands, kerbs, penetrations and the like: Enclose, with vapour control layer:
  - Dressed up 150 mm above surface of insulation, thus providing 100 mm (minimum) seal when overlapped by the roof covering.
  - Care should be taken to ensure adhesion when the temperature is below + 5º C.
- Please note: If BauderTHERM DS1 DUO Vapour barrier is left exposed for longer than two weeks as a temporary waterproof layer, the burn off release foil and surface of the torch-activated adhesion stripes will be effected by the exposure to ultra violet. This minor issue can be resolved by using more heat to activate the bitumen stripes, but the process will be slightly slower than when using newly laid material.

680A LAYING BAUDER WARM ROOF INSULATION

- Setting out:
  - Long edges: Fully supported (if metal deck - run at right angles to metal deck troughs)
  - End edges: Fully supported.
  - Joints: close butted together.
  - End joints: Stagger.
- Bedding: Fully bed into torch activated bonding stripes of vapour control layer surface.
- Multiple board layers: Where the total thickness of insulation required is greater than can be achieved by a single standard board, then additional boards of the same product can be adhered to make up the total thickness required. These additional boards should be bonded using Bauder Insulation Adhesive, either in linear stripes or snake bonded, achieving no less than an minimum overall bond of 50%.
- Protection to exposed edges of insulation: Reduced thickness treated timber batten as clause 640 (or equivalent plywood construction), a minimum width of 150 mm and 10 mm less in thickness than the insulation to accommodate the build-up of the waterproofing layers – all securely fixed to the deck. Outer edges chamfered at changes in level.
- Completion: Boards must be in good condition, well-fitting and stable.

680B LAYING FOAMGLAS WARM ROOF INSULATION:

Lay cellular glass slabs in parallel courses with staggered joints in hot bitumen on top of the primer and dry substrate.

The hot bitumen is poured on to the substrate in sufficient quantity and at the right temperature. The slabs are pressed down and pushed in a diagonal direction so that the bitumen is squeezed up into the joints until it shows on top, with the joints well butted together and fully adhered.

On completion of laying, ensure that the slabs are in good condition, well fitting and with no springing, flexing or rocking.

Storage of materials on finished surface: Not permitted.

The roof should be protected from subsequent traffic and high level working.

681B INSTALLING WARM ROOF INSULATION (INSULATED UPSTANDS)

- Bedding: Fully bonded to the vapour control layer by torch activating the membrane surface profiles. Board joints to be close butted. Upstand insulation boards should be installed before the insulation to the flat areas so that the vertical upstand insulation is retained both at the base and at the top. At vertical wall abutments that are cavity insulated, retention is obtained by mechanical fixing of the Bauder insulation support bracket.
- Protective hard edges: treated timber battens or Bauder Insulated upstand brackets (as appropriate to given detail situation) must be used at all right angled edges e.g. top edges of parapet walls or abutment upstands.
- Encapsulation seal: Provision must be allowed for forming a minimum 100 mm lap seal between the vapour control layer and underlayer, where the insulation finishes.

WATERPROOF MEMBRANES/ ACCESSORIES

710 LAYING REINFORCED BITUMEN MEMBRANES GENERALLY

- Direction of laying: Unrolled up the slope.
  - Where practicable, install so that water drains over and not into laps.

- Side and end laps: 100 mm, with the exception of mineral surfaced membranes, where side laps are 80 mm, but the head laps to remain 100 mm.
- Head and side laps: Offset.
- Intermediate and top layer/ capsheet: Fully bond.
- Successive layers: Apply without delay. Do not trap moisture.
- Strips of bitumen membrane for 'linear' details: Cut from length of roll.
- Completed coverings: Firmly attached, fully sealed, smooth, weatherproof and free draining.

710A LAYING REINFORCED BITUMEN MEMBRANES UNDER COURTYARD:
Application of the first layer of the roofing membrane should follow on immediately after every two completed rows of FOAMGLAS® insulation has been applied. The membrane shall be fully bonded with hot bitumen type 95/25 or type 115/15 to comply with clause 325.
Start at lowest point of roof and unroll felt up the slope with not less than 50mm side and 75mm end laps, ensuring that water will drain over and not into laps.
Break bond between layers with side laps staggered by one half sheet width in two layer coverings and one third sheet width in three layer coverings.
Apply successive layers with minimum delay, ensuring that moisture is not trapped.

735A POUR AND ROLL BONDING OF REINFORCED BITUMEN MEMBRANE (CAP SHEET) UNDER COURTYARD:
Before laying, obtain approval of appearance of lap positions and detailing of ridges, eaves, verges, hips, abutments, etc.
Lay sheets neatly, with carefully formed junctions. Do not mark, crease or stain metal face.
Avoid adhesion of excess bonding compound at laps and carefully remove any excess when set.
End laps will not be permitted.

740A TORCH-ON BONDING OF REINFORCED BITUMEN MEMBRANE UNDER COURTYARD:
Lay torch-on sheets using equipment and methods recommended by the membrane manufacturer, prior to torching the surface of the insulation slab, it should be coated with a layer of bitumen, poured and spread over the surface.
Lay sheets other than torch-on type on a continuous even coating of hot bitumen by the pour and roll method. Other methods will be permitted only where this is not practicable. Compound must still be fluid when sheets are laid.
Ensure that there is a full bond over the whole surface, with no air pockets.
Leave a continuous bead of compound at head and side laps of top layers.

747A SELF-ADHESIVE BONDING OF REINFORCED BITUMEN UNDERLAYER
- Bond: Full over whole surface, with no air pockets.
- Underlayer: Cold applied and fully bonded by removing the release foil sheet and installing in the approved Bauder manner, using the Bauder long handled roller to extrude a 5-10 mm bead of bitumen. Head laps to be 100 mm side laps to be 80 mm, lapping red strip over blue and torch sealing. All laps to upstands, edge details, flashings, etc., to be 100 mm. The underlayer must be taken up all upstands, edge details, in accordance with current British Standards and the manufacturer’s recommendations.
- Underlayer inspection: The Approved Contractor must give reasonable notice to the nominated Bauder Site Technician of their intention to commence laying capping sheet. This will allow a discretionary inspection of the underlayer to take place, so that any remedial treatment necessary can be carried out prior to installing the capping sheet.

750B LAYING REINFORCED BITUMEN TORCH-ON CAPPING SHEET
- Bond: Full over whole surface, with no air pockets.
- Excess compound at laps of top layer/ capping sheet: Leave as a 5 mm - 10 mm continuous bitumen bead extrusion.
- Laying top layer: Fully bonded to the underlayer by torching in the approved Bauder manner. Head laps to be 100 mm, side laps to be 80 mm. All laps to upstands, edge details, flashings, etc. to be 100 mm.
- Final Inspection: No landscaping is to be applied until the root resistant capping sheet has been thoroughly inspected by the Bauder Site Technician. This is to ensure that any remedial treatment that is necessary can be carried out prior to laying the landscaping elements. Failure to ensure the instigation of this inspection will result in the issuing of the Bauder guarantee being put in jeopardy.

775 SKIRTINGS AND UPSTANDS

- Angle fillets: Fix by bitumen bonding or nailing.
- Venting first layer of bitumen membrane: Stop at angle fillet.

Fully bond in bitumen for 300 mm strip around perimeters. Overlap onto upstand with strips of BS 8747, Class S1P1 bitumen membrane, fully bonded.

- Other layers of bitumen membrane: Carry in staggered formation up upstand, with each layer fully bonded. Where practicable, carry top layer over top of upstand.
- Upstands:
- At end of rolls: Form with bitumen membrane carried up without using separate strip.
- Elsewhere: Form with matching strips of bitumen membrane, maintaining laps.
- Additional fixing of bitumen membranes.

775A SKIRTINGS AND UPSTANDS

- Insulated upstand brackets: Bauder insulated upstand support brackets must be used at all vertical abutment wall upstands (where the wall cavity is insulated) in conjunction with 30 mm Bauder insulation. These are to be fixed at 400mm centres using suitable fixings through the vapour barrier, so that the top edge is a minimum of 300mm above the surface of the deck. A 3mm gap should be left between adjacent sections. The detail is to be carried out in accordance with the Bauder detail drawing, where provided.
- Angle fillets: Bauder PIR angle Fillets (61 mm x 61 mm) must be used at all right angled upstands, provisionally bonded in Bauder PUR membrane adhesive and subsequently retained once the underlay detailing is applied. Under no circumstances must fillets of an alternative material be incorporated (i.e. cork, fibre, etc.) as this would invalidate the guarantee.
- Layers of bitumen membrane: Carry in staggered formation up the upstand, with each layer fully bonded.
- Upstands:
- At ends of rolls: Underlay layer only, form with bitumen membrane carried up without using separate strip.
- Elsewhere: Form with matching strips of bitumen membrane, maintaining laps.
- Additional fixing of bitumen membranes: Mechanically fix the top leading edge of all upstand details in excess of 250 mm in height using appropriate fasteners. In the event of doubt, Bauder should be consulted regarding any specific requirement.
- Upstand details (minimum height): 150 mm. This must be taken from the surface of the finished landscaping. Special attention should be paid to all structures, such as rooflights, counter-flashings, window and door cills, pipes etc. Bauder cannot take responsibility for water ingress over waterproofing details constructed below the recommended minimum height.
- Flashings: Separate flashings must always be formed. Capping sheet taken up the upstand in one piece will not be permitted.

785D FIXING PERIMETER TRIMS

- First/ Intermediate layers bitumen membrane: Lay over roof edge upstand. Project free edge 25 mm from wall or fascia.
- Trim:
  - Setting out (minimum): 3 mm clear from wall or fascia.
  - Fasteners: Screw fasteners of type appropriate to kerb or deck substrate. Nail fixing is not permitted.
  - Fixing: 30 mm from ends and at 300 mm (maximum) centres.
  - Jointing sleeves: Fix one side only.
  - Corner pieces: Purpose made.
- Completion:
  - Contact surfaces: Prime.
  - Joints: Cover with 150 mm long pads of bitumen membrane, bonded to trim.
- Completion of bitumen membrane:
  - Top layer/ Capsheet: Butt joint to rear edge of trim.
  - Cover strip: Fully bond to trim and top layer/ capsheet of bitumen membrane. Carry over roof edge upstand and lap 75 mm onto roof.
    Cover strip material: Bauder K5K

SURFACING

810 LAYING INVERTED ROOF INSULATION

- Condition of substrate: Clean.
- Setting out: Loose lay insulation directly over the capping sheet to brick pattern with staggered joints. Minimize cutting and avoid small pieces at perimeters and penetrations. Dependent upon the total thickness required, it may be necessary to construct the insulation using two layers of board. The manufacturer/supplier can advise on the available combination options.
  - Cutting: Minimize.
  - Small cut pieces: Avoid at perimeters and penetrations.
  - Joints: Butt together.
- Projections, upstands, rainwater outlets, etc: Cut insulation cleanly and fit closely around.
  - Completion: Boards must be in good condition, well fitting and stable.
  - Cover as soon as practicable to prevent wind uplift and flotation.

COMPLETION

910B INSPECTION
- Interim and final roof inspections: in accordance with the manufacturer's requirements for guarantee.
- Notification: It is the responsibility of the approved contractor to advise Bauder Ltd when the roof is ready for Final Inspection. The 'Final Inspection' of the waterproofing must be carried out and approved by Bauder Ltd prior to any landscaping products/materials being installed, otherwise a guarantee cannot be issued.

940 COMPLETION
- Roof areas: Clean.
- Outlets: Clear.
- Work necessary to provide a weathertight finish: Complete.
- Storage of materials on finished surface: Not permitted.
- Completed membrane: Do not damage. Protect from chemicals, traffic and adjacent or high level working.

950B GUARANTEE
- A 20 year product and workmanship guarantee is to be provided upon completion following a Final Inspection by Bauder. Details regarding the full terms and conditions are available separately from Bauder Ltd upon request. This system must installed by a Bauder Approved Contractor, to be eligible for guarantee.