

## **Q37 GREEN ROOFS**

To be read with Preliminaries/ General conditions.

### **GENERAL**

#### **130 EXTENSIVE GREEN ROOF TO PAVILION ROOF**

- Roof type: Warm roof
  - Substrate: Structural profiled deck to Structural Engineers details.
  - Slope: 0 degrees
- Waterproofing: Bauder Total Green Roof System as J41/110.
- Slip layer: Bauder PE Foil (loose laid) rolled out in single layer. Installation as clause 745.
- Protection Layer: Bauder FSM600 - 4 mm protection fleece. Installation as clause 750C..
- Drainage Layer: Bauder DSE40 - drainage / water storage panel. Installation as clause 770E.
- Filter Membrane: Bauder Filter Fleece. Installation as clause 780A.
- Growing medium: Bauder Extensive Substrate, depth 100 mm above the filter fleece. Installation as clause 790A.
  - Depth: 100mm
- Vegetation: Bauder XF118 UK Native Species Wild Flower Blanket. Installation as clause 800A.
- Accessories:
  - Bauder AL80/100 drainage and retention trim, fitted to all open perimeters to contain a pebble vegetation barrier. Installation as clause 820D.
  - Bauder ALU 250 Inspection chambers, to be installed over all internal rainwater outlets within soft landscaping areas. The lid of the chamber must be level with, or higher than the surrounding landscaping.
- Additional Requirements: As clauses 210, 710, 715A, 720, 910, 915E, 916, 920, 930.

### **PERFORMANCE**

#### **210 GENERAL DESIGN**

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

### **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.

#### **715A GREEN ROOF RELATED REQUIREMENTS**

- The following are vital to the accurate pricing, correct installation, and ultimately the long-term life of a green roof, and must, therefore, be included within the specification and tender documents: -
- Loadings: It is assumed that the architect or his advisors have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed green roof system and landscape both during construction and on completion of the works.
- Additional protection: A planned or contractual delay between the installation of the waterproofing and landscape will almost certainly necessitate additional/increased protection to the waterproofing. This protection may be temporary or permanent. The responsibility and cost of this possible extra protection should be clearly included within the tender documents.
- Detailed drawings: Correct detailing design and construction is essential to the long-term life of the green roof. It is essential, therefore, that detail drawings illustrating for the

construction are included with the tender documents, in order to enable the contractor to tender accurately.

- Minimum upstand height requirements: The waterproofing should be taken up all abutment upstands, pipes, detailing protrusions etc. a minimum of 150mm above finished landscape surface level to comply with British Standards and current code of practice BS8217:2005.
- Provision for living products in hot weather conditions: During hot weather conditions, living products such as plants, turf, sedum blankets etc. must be laid on the day of delivery to site. With regard to sedum blankets or turf, any rolls not installed should be laid out and kept watered prior to final installation.
- Watering / Irrigation: Adequate provision for watering the installed any form of planting must be in place on site before the product is installed. Irrigation systems if fitted should be operational. Initial watering should be by surface sprinklers to water in the fertiliser, where this is specified. All watering should be carried out in strict accordance with the Bauder watering requirements and guidance document.
- Final Inspection: No landscaping work should be installed until Bauder have carried out a final inspection to the waterproofing and have passed this as suitable for guarantee. It is the responsibility of the roofing contractor to advise and organise this inspection with Bauder. We cannot guarantee any waterproofing that has been landscaped without this inspection having been carried out and passed as acceptable.
- Damage risk from other trades: No landscaping should be installed while the roof area is subject to other site traffic. Bauder will carry out an inspection of the completed roof 4-6 weeks following installation and any site related damage by others will be reported to the client. Bauder accept no responsibility whatsoever for damage to the product or the installation caused by site work carried out by others after the landscaping has been installed.
- First year maintenance: The contractor must price into his tender the cost of post installation maintenance for a minimum period of 1 year to ensure the handover of a flourishing green roof.

#### 720 ADVERSE WEATHER

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

#### 745 SLIP LAYER INSTALLATION

- Installation: to be rolled out loose over the root resistant layer as specified (one layer for Extensive landscaping and two layers for Intensive landscaping).
- This product is only required for roofs with a fall between 0-3° (A slip layer is not necessary or advisable for slopes above 3°).
- Joints: Minimize.
- Overlaps (minimum): All laps to be 150mm with care being taken to ensure that roll sides join between layers.
- Upstands: Extend to top of growing medium. Sufficient foil must be allowed for to enable it to be taken up all upstand and edge details prior to installation of the protection layer.

#### 750C PROTECTION LAYER INSTALLATION

- Installation: Protection fleece rolled out and laid loose. Laps to be sealed by lightly heating overlap area with a propane gas torch to melt the polypropylene fibres and then press seal the two fleece sheets together.
- Joints: Minimize.
- Overlaps (minimum): Laps to be 150 mm
- Upstands: Sufficient protection fleece must be allowed for so that it may be installed to all abutment upstands and edge details, in accordance with the manufacturer's instructions. Extend to full height of the upstand and secure in place by using a lead or fabricated metal counter-flashing.
- Openings in landscape restraint kerbs: Where these kerbs are present (roof slopes above 5°), the protection layer should be cut away from the openings/ gaps to avoid impeding drainage.

#### 770E DRAINAGE / WATER STORAGE LAYER INSTALLATION

- Extent: Continuous over entire designated roof area.
- Fitting: Loose laid over the protection layer. Boards to overlap and interlock by one cup profile at sides and ends and each row be laid staggered. The 'X' stamped impression on the highpoint of the cup moulding indicates where boards overlap.

- Upstands: Carefully cut to fit closely around penetrations and outlets.
  - Construction of planter walls: The drainage/water storage board provides a suitable base surface for building concrete or brick kerbs/walls. The specified infill haunching should be installed over the board to required depth of cover, poured directly into the cells of board. These should be constructed to provide an adequate support for the raised masonry planters
- For the specification of the type of infill and all kerb/wall construction elements – please refer to the structural engineer's plans and the specification. An internal surface of the planter wall may be primed using bituminous primer and then lined with single layer of torch applied root resistant Bauder Plant-E. The bright green slate finish may be considered undesirable, but the slate is necessary for long-term UV protection of the bitumen. To disguise and blacken the slate colour, paint exposed areas above anticipated soil level with a light coat of bituminous primer.

#### 780A FILTER MEMBRANE INSTALLATION

- Joints: Minimize.
- Overlaps (minimum): 150 mm
- Fitting: Loose laid over drainage layer in accordance with manufacturer's recommendation.
- Upstands (soft landscaping): Extend up, between vegetation barrier and growing medium and trim flush with finished surface level.
- Upstands (Hard landscaping): Extend to top of perimeter abutments and trim flush just below finished surface level.

#### 790A 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 two equal layers, building up to required maximum depth.
- Sequence: Gently firm each layer before spreading the next. Allowance should be made for any settlement that may occur. It is recommended that measuring stick markers of the required depth be used around the roof area to ensure that a minimum acceptable thickness of growing medium is achieved.
- Supply: Depending on size and access of the project the 'substrate' can be supplied by various methods i.e. Tipper, Silo lorry (pumping directly onto the roof area), Big bags, or sacks. Prior to costing this element of the installation the 'Approved Contractor' must contact Bauder Ltd so that they may advise on the best solution on any specific contract.
- Important note regarding alternative substrates: If alternative substrates are required (e.g. topsoil...etc), Bauder does not take any responsibility for the performance of such substrates supplied from an alternative source. We recommend that alternative substrates should be covered by a technical data sheet and certified in writing as suitable to support the system and plants specified. Saturated weight loadings must be provided directly from the supplier of the substrate and should be the subject to a structural engineer's approval.

#### 800A WILD FLOWER VEGETATION BLANKET INSTALLATION

- Planting mix: Non-aggressive selected wild flowers (see manufacturers literature)
- Thickness: 25mm.
- Roll size: 2m x 1m
- Handling blankets and timing: Lay within 24 hours of delivery. Watering and installation over large areas should be carried out in sections that could be completed within four hour time frame.
- Laying blankets: Dry, damaged, frosty or waterlogged blankets: Do not lay.
- Excessive stacking: Not permitted.
- Method: Laid manually / two-man operation
- Pre-grown wildflower blankets should be supplied and installed in strict accordance with the manufacturers recommendations.
- Material loss (maximum): 3% of total surface area.
- Growing medium condition: Immediately prior to planting, the whole system should be thoroughly watered to ensure that the water storage/drainage board is filled and the substrate growing medium saturated
- Layers: Pre-grown wild flower blankets should be typically applied directly over a minimum of 100mm of prepared level or gently undulating substrate.
- Orientation: Perpendicular to slope of roof.

- Joints: Staggered/tight abut together to minimize any gaps. Do not stretch blankets. All excess vegetation should be removed from the overlap and the opposite leading edge of the blanket to ensure that the joints abut together tightly (as per the manufacturer's installation guideline).
- Edges: Finish with whole blankets.
- Consolidation: N/A
- Dressing: Bauder Xero Ter 3 substrate.
- Application: Brush in to fill joints.
- Watering: Thorough, immediately after laying and dressing, ensuring that the blanket and substrate are fully saturated before moving on to the next area.
- Slopes: When applying the system on roof slopes above 10°, on large or to exposed areas, the vegetation blankets should be secured in place by suitable bio-degradable landscaping pegs. Great care should be taken to prevent any damage to the waterproofing.
- Please note - Bauder Ltd does not take any responsibility for the design, performance or maintenance of any planting schemes.

#### 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: Additional piece of root capping sheet torched in place. To Bauder standard details.

#### 830 INSPECTION CHAMBER INSTALLATION

- Location: Install centrally over rainwater outlets.
- Orientation: Align parallel with adjacent features.
- Surround: Using 20/40 mm grade washed pebbles, the inspection chamber must be surrounded by a 500 mm vegetation barrier surround to prevent unwanted growth obstructing the drainage system.
- Positioning: Never place directly on the waterproofing membrane – see options below-  
Intensive / extensive soft landscaping: Placed directly on to the drainage / water storage layer.  
Inverted roof with pebble ballast: Placed directly on the vapour permeable membrane or filter layer.  
Decorative aggregate finishes: Placed directly on the protection layer or vapour permeable membrane / filter layer  
Important Note: Ensure that a suitably sized hole has been cut out of the underlying drainage board / protection layer to allow water to flow freely into the outlet.
- Chamber Height: The contractor should also allow for the installation of additional Bauder height adapter units as required, in order to bring the inspection chamber up to at least the height of the surrounding landscaping. These are available in either 50 mm or 100 mm units.
- Box gutters and gullies: Where a box gutter is to be constructed, provision should be made to accommodate the 250 mm diameter of the inspection chamber. The front support leg of the chamber will need to be removed (see installation guide) for the unit to fit inside a box gutter /gully. We recommend that all box gutters are constructed to a minimum finished width of 500mm to ensure that the support feet of the inspection chamber sufficiently clears the angle fillets within the gutter sole and leaves space to dress the pebble vegetation barrier around the main body of the chamber.
- Precautionary note: when cutting metal, please ensure that appropriate tools and personal protection equipment are used.

#### 840 VEGETATION BARRIER / DRAINAGE BARRIER

- A minimum 500 mm pebble vegetation barrier must be provided to all perimeters and roof penetrations and protrusions i.e. surrounds to roof light or plant upstand kerbs, rainwater outlets, soil vent pipes, man-safe posts etc. as specified.
- Every 40 m, there is a 30 mm high barrier constructed of non-flammable materials or a one metre wide strip of solid paving, gravel or pebbles.
- We recommend 20/40 mm rounded river washed pebbles. Stones or aggregates with sharp edges must not be used i.e. flint. Other materials may be used, but only after consultation and agreement with Bauder Ltd.
- At all open drainage perimeters AL80/100 drainage trim must be used to contain the vegetation barrier.

- For extensive green roofs where sedum blanket is specified, the vegetation barrier must cover the edges of the blanket by a minimum of 100 mm in order to protect the exposed edge of the blanket against wind uplift and substrate erosion.

#### 850A FERTILISER

- Bauder Organic Fertiliser slow release must be applied at a rate of 80g/m<sup>2</sup> onto the installed planting.
- This product is to be supplied by Bauder Ltd.
- Care must be taken to distribute the fertiliser evenly, through use of an approved applicator.
- The vegetation / vegetation blankets should then be thoroughly saturated by the use of sprinklers so as to promote rapid establishment. It is the responsibility of the roofing contractor to liaise with the main contractor/ building owner to provide water to ensure that the growing medium/ blanket does not dry out within the first month – refer document 'Watering Requirement Guidelines for Extensive and Bio-diverse green roof installations'.

### COMPLETION

#### 910 INSPECTION

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

#### 915E ESTABLISHMENT WATERING - XF118 WILDFLOWER BLANKET ONLY

- It is the responsibility of the roofing contractor to liaise with the main contractor/ building owner to provide water and ensure that the planted and fertilised growing medium is thoroughly irrigated immediately after installation.
- For wildflower blankets, it will be necessary to keep the blanket substrate damp for a period of at least 10 weeks during the period of vegetation establishment. It should be established at tender stage, who is to carry out this task and that they have all relevant information available regarding watering requirements.
- An adequate mains water supply of sufficient pressure must be available and operational prior to the plants being delivered and installed. Initial watering must be by surface mounted sprinklers. For larger roofs this will likely entail more than one watering point at roof level.
- See the Bauder Watering Guide document for detailed information on watering requirements and establishment irrigation.
- Bauder Ltd accepts no responsibility whatsoever for the condition of installed planting that is not properly watered or irrigated following landscaping works.

#### 916 POST INSTALLATION MAINTENANCE

- The installing contractor should price into the tender, the cost of carrying out post-installation maintenance for a contract period to be agreed with the client's representative. Following the final maintenance visit and application of slow release fertiliser at the end of the agreed contract period, the responsibility for the ongoing maintenance of the green roof planting becomes the responsibility of the building owner.
- Period of maintenance contract: one year.
- Scope of maintenance procedure: as per manufacturer's recommendations.

#### 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: as required by client.