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## **J31 Liquid applied waterproof roof coatings**

SPECIFICATION NUMBER 104000 / J31

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Revision: C1 - Clause 740 replaced by clause 741 in accordance with response to BAM B/40 12.06.14

Revision C2 - Manufacturer's additional notes and clauses 50, 101, 102, 130B, 133, 134, 210A, 230A, 240A, 270, 340B, 342, 354, 365B, 410A, 420A, 422, 425, 430, 440, 710, 720A, 740A, 750A, 770A, 772, 780, 830A, 832, 840A, 850A, 910A, 920A, 940A and 941 added; clauses 130A, 340A and 370 amended; clauses 210, 230, 240, 365, 410, 420, 741, 750, 770, 830, 840, 850, 910, 920 and 940 omitted; note added on WSPG Movements and Tolerance Specification; all as DCR 002. 08.07.14

Revision C3 - Clause 130A, 130B, 130C, 133A, 355A, 357A, 430A, 710A, 740B, 750B, 760B, 770B, 772A, 780A added, as DCR 007a. 19-08-14

Revision C4 - Manufacturer's Additional Notes, Clause 130A, 130B, 130C, 133A and 941 as DCR 008. 03.09.14; Issued for construction 27.10.14

Revision C5 Clause 130A Accessories paragraph added as DCR 038 13-03-2015

Revision C6 Manufacturers additional notes updated under DCR A-045 02.04.15

Revision C7 roofing system revised; issued under DCR A-078 21.07.15

TO BE READ WITH PRELIMINARIES/ GENERAL CONDITIONS, GUARATEC RUBBERIZED HOT MELT, BBA AGREEMENT CERTIFICATE NO 00/3701 AND WSPG MOVEMENTS AND TOLERANCE SPECIFICATION

## TYPES OF COATING

### 100 GUARATEC HOT MELT (PROTECTED WATERPROOFING) SYSTEM FOR NEW BUILD AND REFURBISHED ROOF AREAS (CONCRETE DECKS)

- *Substrate: In situ concrete, precast concrete planks grouted, cement particle board.*
- *Outlets:*
  - *For new build refer to clause 310a.*
  - *For refurbishment re-use existing outlets.*
- *Preparation: As clause 610h. Surface to be dry, clean and free from all contaminants including oil, grease, laitance, dirt and debris. Advance bond tests must be carried out by certified personnel and recorded on all areas.*
- *Priming: for new build or refurbishment refer to clause 320a, applied as clause 655.*
- *Timber for trims: as clause 330A.*
- *Edge trims: as clause 345A.*
- *Horizontal Waterproofing: to falls/slopes not exceeding 5° from horizontal covering to decks. Cappings to kerbs, channels, gutters and the like:*
  - *Manufacturer: Manufacturing Division, Guaranteed Asphalt Limited, Elstree Industrial Estate, Princewood Road, Corby, Northants NN17 4AP  
Tel: 020 7277 8773; Email: info@guaranteedasphalt.com; Web: www.guaranteedasphalt.com.*
  - *Product reference: GuaraTEC 6mm thickness - as clauses 353A and 655a, or equal and approved.*
- *Protection Sheet layer: GuaraFELT protection sheet clause as clause 353A laid per clause 655a, or equal and approved.*
- *Movement joints: as clause 380A.*
- *Sub surface drainage layer: as clause 391A.*
- *Insulation: as clause 440a.*
- *Upstands: coverings to upstands, kerbs and the like as clause 750c. Refer to Guaranteed Asphalt for recommendations and advice.  
Tel: 020 7277 8773; email: info@guaranteedasphalt.com; web: www.guaranteedasphalt.com.*
- *Stone ballast: as clause 460a.*
- *Surface protection: (See insulation 440a) paving slabs on support pads per clause 465 or 20-40 ballast or living roof options available. refer to Guranteed Asphalt for recommendations and advice. Tel: 020 7277 8773; email: info@guaranteedasphalt.com; web: www.guaranteedasphalt.com.*
- *Seperating layer: as clauses 695a-h.*
- *Guarantees: as clause 940b.*
- *Completion: as clauses 910a and 940a.*

## 130C INVERTED ROOF COATING TO CONCRETE DECK to Level 02 Coutyard

L2, inverted flat green roofs (Intensive) on concrete deck

" *Substrate: Cast in situ structural concrete to BS 8110, zero falls with a smooth surface finish as achieved by using a wood float, skip float, pan float, or easy float. Also refer to NBS E41 worked finishes to in situ concrete clause 240A. Concrete density to be no less than 2100 kg/m<sup>3</sup>. Steel trowelled, power floated or tamped will be deemed unsatisfactory. Cured for 21 days to make certain complete hydration and to ensure all free water has been released. For shorter periods consult Radmat Building Products Limited. Please refer to Radmat Building Products Limited Pre Installation Guide and Quality Assurance procedures for important information relating to substrate construction and preparation.*

- *Preparation: Substrates to be coated must be cured, dry and load bearing, free of loose and brittle particles, laitance, organic growths and contaminants that would impair adhesion. Fixtures, fittings and protrusions must be made secure and prepared accordingly. All preliminary work including formation of upstands, kerbs, box gutters, sumps, grooves, chases, expansion joints, fixing of battens, fillets, anchoring plugs/strips, welding etc, is complete and satisfactory.*

- *Making Good Existing Surfaces: Remove defective areas dry out base and patch level with existing surface using approved compatible materials. These must be allowed to cure before over coating.*

- *Adhesion Test(s): Before commencement of full application, carry out a trial area to determine priming requirements and/or system suitability. Make arrangements with the contractors and coating manufacturer for inspection of test areas. Obtain approval before proceeding with full application.*

" *Waterproofing coating: Dow Verdiseal SG by Radmat Building Products Ltd, BBA Certificate 11/4855.*

- *System Distributor: Radmat Building Products Limited, Esha House, St Mary's Business Park, Albany Road, Market Harborough LE16 7EB Tel: 01858 410372, Fax 01858 410572 email: [techenquiries@radmat.com](mailto:techenquiries@radmat.com), Web: [www.radmat.com](http://www.radmat.com)  
Primer reference: E4 Primer. The E4 Primer is a high build, non-solvented two-component epoxy primer applied by brush or roller. Dressed with 0.3 – 0.6mm quartz sand to ensure extended over coating times are permitted. Consult Dow Hyperlast technical literature for correct preparation of substrates/surfaces and coverage rates.*

*Coating Reference: Verdiseal Membrane SG. The Verdiseal Membrane SG is a spray applied two-component rapid curing elastomeric membrane that can be trafficked within 30 minutes and over coated within 1hour at temperatures as low as 0°C. The Elastomeric waterproof membrane shall have a minimum DFT of 2mm. Ensure a seamless watertight application is achieved and stripe coats are applied around detailing, angles, junctions and other protrusions.*

- *Application: In accordance with the manufacturer's printed instructions including all necessary bond checks.*

- *Attachment: as clause 760B.*

- *Minimum dry film thickness: (nominal) 6mm in two 3mm coats, plus access or protection sheet as specified.*

- *Colour: Green*

" *Shear Key/ Traffic Coat: Verdiseal Wear Coat. The Verdiseal Wear Coat is a two-component, hand-applied binder that can be trafficked within 4 hours of application at 20°C. The Verdiseal Wear Coat is broadcast to refusal with the chosen dry crystallized quart aggregate as approved by the manufacturer. The DFT of the shear key coat including aggregate shall be 2mm.*

*Attachment: as clause 780A.*

" *Root protection Barrier: as Q37/320; to manufacturers recommendations.*

" *Filter layer: Radmat TS filter sheet, with Laps 300mm.*

*Attachment: as clause 832.*

" *Insulation: N/A.*

" *Protection :*

60mm Stone ballast as clauses 365B, 840A  
 50mm Paving slabs as clauses 370, 850A  
 Timber Decking as per architects specification. See Radmat drawing RAD-PQ-SD-D07  
 Green roof/ Bio Diverse Roof as per Q37.  
 " Accessories:  
 Paving Slab Supports as clause 373  
 Metal Internal rainwater outlets (supplied and installed by others). See clause 343  
 " Warranty: 25 Years as clause 941

133A DETAILING OF J31/130C (MANUFACTURER'S ADDITIONAL NOTES)

" Skirtings and upstands do not require a saw cut.  
 " The detailing of Verdiseal to Mechanical Joints shall be approved by the engineer and Dow Hyperlast on a case by case basis.  
 " Metal Upstands, Penetrations and Flashings Prime with E5 Primer (depending on metal).  
 After priming to the height specified (minimum 150mm higher than overburden), apply a stripe coat of Verdiseal Membrane SG membrane vertically to the same height at 2mm DFT.  
 " When the deck is sprayed, these areas will receive another 2mm DFT (total 4mm DFT).  
 " Apply Topcoat PUR, as specified, vertically to same height if the green color of the Verdiseal Membrane is not acceptable.  
 " Concrete kerbs and walls.  
 Preparation as required by Manufacturer.  
 Apply Verdiseal Membrane SG to a neat, straight line to the heights specified.  
 The detailing on walls wh movement joints shall be approved by the engineer and DOW Hyperlast on a case by case basis.  
 " Metal Drains and protrusions:  
 - Preparation by light mechanical abrasion or as required by the manufacturer.  
 - Prime with E5 primer.  
 - When the deck is sprayed, these areas will receive another 2mm DFT (total 4mm DFT).  
 - Apply Verdiseal Wear Coat as specified, up to the edge of the drain (not into or onto the drain detail).  
 - The detailing of the Verdiseal system to drains that are not metal shall be approved by Dow Hyperlast on a case by case basis.  
 " Deck/Wall Corners:  
 - Preparation as required by manufacturer.  
 - After priming to the specified height, (minimum 150mm higher than overburden), apply a stripe coat of Verdiseal Membrane SG waterproofing membrane at 2mm DFT into and 50mm either side of the corner.  
 - When the deck is sprayed, these areas will receive another 2mm DFT (total 4mm DFT).  
 " Wall Ties, Stone Anchor Hangers, and Fixings:  
 - Should be installed prior to applying the Verdiseal System.  
 - If this cannot be done then these items will require coating with the system (including 4mm DFT Verdiseal Membrane SG), after their installation.  
 - Should this still not be possible, resin anchor bolts or a proprietary sealant must be used to waterproof these details when they are installed through Verdiseal membrane.  
 " This work must be done or be supervised by the Verdiseal applicator.

**INTERSTITIAL CONDENSATION****220 AVOIDANCE OF INTERSTITIAL CONDENSATION IN WARM AND INVERTED ROOFS**

- Interstitial condensation risk of roof construction: Assess as recommended in BS 6229.
- Basic design data:
  - Outdoor notional psychrometric conditions, winter:
    - Temperature: -5°C.
    - Relative humidity: 90%.
    - Vapour pressure: 0.36 kPa.
    - Duration: 60 days.
  - Outdoor notional psychrometric conditions, summer:
    - Temperature: 18°C.
    - Relative humidity: 65%.
    - Vapour pressure: 1.34 kPa.
    - Duration: 60 days.
  - Indoor notional psychrometric conditions:
    - Temperature: 20°C.
    - Relative humidity: 55%.
    - Vapour pressure: 1.28 kPa.
- Winter interstitial condensate (warm roof):
  - Calculated amount (maximum): 0.35kg/m<sup>2</sup>.
  - Calculated annual net retention: Nil.
- Vapour control layer: If necessary, provide a suitable membrane so that damage and nuisance from interstitial condensation do not occur.

## 280a GENERAL DESIGN REQUIREMENTS

- *All works must comply with all current relevant standards, codes of practice, and the building Regulations to provide a secure, free draining and completely weathertight roof, including but not limited to:*
  - *BS 6229*  
*Flat roofs with continuously supported coverings, code of practice*
  - *BS 5250*  
*Code of practice for control of condensation in buildings*
  - *BS EN 1991-1-4 Eurocode 1*  
*Actions on structures, general actions, wind actions*
  - *BS EN 12056-3*  
*Gravity drainage systems inside buildings, roof drainage, layout and calculation*
  - *BS EN ISO 6946*  
*Building components and building elements, thermal resistance and thermal transmittance, calculation method*
  - *The Building Regulations Approved Document Part L1 or Part L2*  
*Conservation of fuel and power.*
  - *The design must take account of all structural factors to ensure that the waterproof covering is able to accommodate the effect of movement in order to avoid stress and deformation under these conditions. The waterproofing components' resistance to dead and imposed loading must be assessed to avoid failure of the component and/ or reduction in performance. Where resistance is deemed to be inadequate, suitable measures to mitigate load intensity will need to be considered.*  
*Insulation must be incorporated to avoid cold bridges as determined by building control and/ or appointed design professional.*  
*The design must ensure that the continuity of the waterproof covering is maintained for a vertical height of at least 150mm above the finished roof level at all abutments, parapets, etc.*  
*The building owner or their appointed design professional must have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed specification.*  
*It is strictly the responsibility of the client and/ or their design professional to ensure the compliance of the proposed specification with all relevant Building Regulations by consultation with Building Control. In the event of any doubt about the interpretation or application of the Building Regulations in relation to any particular new build or refurbishment works, clarification must be sought directly from Building Control.*

**PRODUCTS**

## 310a DRAINAGE OUTLETS

- *Type: aluminium.*
  - *Manufacturer: Guaranteed Asphalt Ltd*
  - *Product reference: guaraDRAIN (to suit drainage design) or equal and approved.*
  - *Accessories: select from flat grate, terrace grate, extension piece.*  
*GuaraDRAIN rainwater outlets. Refer to Guaranteed Asphalt Technical Services (tel. no: 020 7277 8773) for type to suit location, board to be specified. Outlets to be generally fixed at maximum 15m centres.*

## 320a PRIMER

- *Type: for flat decks - fully bonded upstands and slopes over approximately 10° and all metal surfaces in contact with the GuaraFLEX System.*
- *Manufacturer: Guaranteed Asphalt limited (as above).*
  - *Product reference: GuraPRIMER Bitumen Primer - brush roller or spray applied at a rate of 6-8m<sup>2</sup> per litre and allowed to dry to the touch.*

## 330a TIMBER FOR 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: As recommended by mastic asphalt manufacturer.*

## 345a EDGE TRIMS

- *Type: GRP.*
- *Manufacturer: Guranteed Asphalt Limited.*
  - *Product reference: Asphalt section GRP edge trim.*
  - *Colour: Consult with Guaranteed Asphalt for recommendations and details.*
  - *Length (maximum): 3m.*

## 353A WATERPROOF COATINGS

- *Type: hot melt liquid applied formulation combined with integral reinforcements and protection sheet.*
- *Manufacturer: Guranteed Asphalt ltd*
  - *System reference: GuaraTEC Waterproofing System or equal and approved.*
  - *Certification: GuaraTEC BBA certification.*
- *Primer type: Solvent based low viscosity bitumen primer, black in colour.*
  - *Product reference: GuaraPRIMER*
  - *Density: 0.89 kg/litre +/-0.02.*
  - *Packaging: 25 litre drums.*
- *Coating: hot melt rubberized bitumen comprising 100% solids and containing modified bitumen, synthetic rubbers and wood ash/ limestone fillers.*
  - *Manufacturer: Guaranteed Asphalt Ltd*
  - *Product reference: GuaraTEC*
  - *Density: 1230 kg/m<sup>3</sup>*
  - *Recycled content: 25%.*
  - *Packaging: polythene wrapped 25kg cakes, individually packed in 250x200x460mmcardboard boxes.*
  - *Approximate coverage: 6.5 kg/m<sup>2</sup> subject to the nature of the surface.*
- *Reinforcement type: spun bonded polyester fabric.*
  - *Product reference: GuaraFLEECE*
  - *Performance data: tensile strength - longitudinal 60 N/50mm, transverse 60N/50mm.*
  - *Air permeability 3600l/m<sup>2</sup>s(200Pa)*
  - *Roll size: width 1.02mx200m length, thickness 0.5mm.*
- *Protection sheet type: glass/ polyester reinforced SBS modified bitumen membrane.*
  - *Product reference: GuaraFELT protection sheet.*
  - *Colour: black/sanded/mineralfinish (dependemt on buried or shown work).*

## 380A MOVEMENT JOINTS

- *Manufacturer: Trelleborg Sealing profiles, International House, Stafford park, 11 telford GB -West Midkands, TF3 3AY .*
- *Product reference: Consult with chosen manufacturer for recommendations and details.*
- *Contact: Expansion Joints Ltd, Unit 3a Fatyerford farm, Okehamptoin, Devon EX201QQ.*

## 391A SUB SURFACE DRAINAGE LAYER

- *Type: geo-composite unit, comprising a non-woven geotextile filtration layer that is bonded to a high-density polyethylene (HD-PE) cuspated core.*
  - *Manufacturer: Guaranteed Asphalt Ltd.*
  - *Product reference: GuaraMAT.*
  - *Performance data: compressive strength 700 kPa (core), CBR puncture resistance 1.5kN (fabric).*
  - *Roll size: width 1mx100m length, thickness 6mm.*



## 393A TERMINATION BAR

- *Type: aluminium.*
  - *Manufacturer: Guaranteed Asphalt Ltd.*
  - *Product reference: Termination bar.*
  - *Size: width 1500mm .*

## 394A SEALANT

- *Type: low modulus sealant.*
  - *Manufacturer: Guaranteed Asphalt Ltd.*
  - *Product reference: Fixall mastic sealant.*
  - *Application: to seal the connection between roofing membranes to all common building materials.*
  - *Packaging: 290ml cartridge.*
  - *Colour: grey.*

## 395a VAPOUR CONTROL LAYER

- *Type: high performance bitumen sheet*
  - *Manufacturer: Guaranteed Asphalt Ltd.*
  - *Product reference: GuaraFELT CP membrane. Consult with Guaranteed Asphalt for recommendations and details..*
  - *First layer: GuaraFELT 2mm high performance bitumen membrane.*
  - *Second layer: not required.*

**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.

## 430A ROOF PENETRATIONS THROUGH MEMBRANES (MANUFACTURER'S ADDITIONAL NOTES FO 130C)

- *Reinforcement strip: Apply a stripe coat of Verdiseal 2mm DFT at the junction of the penetration and cast in situ concrete deck. Then apply full Verdiseal Wwaterproofing system over the localised stripe coat at 2mmDFT. Localised total thickness 4mm DFT.*
  - *Bedding: Preliminary coating application*
  - *Bond: Continuous over whole surface, with no air pockets.*
  - *Condition at completion: Smooth*
- " *Reinforcement strip: Radmat debonding tape to be used in all other abutment situations to bridge gaps i.e. vertical concrete planks, plywood, cement particle board, plywood, metal or in any location where localized movement is possible. Apply Stripe coat of Verdiseal prior to application Radmat PQ2060 Uncured Neoprene must also be used at all outlets, penetrations, fixings etc.*
  - *Bedding: Preliminary coating application*
  - *Joints: Lap in length 75mm.*
  - *Bond: Continuous over whole surface, with no air pockets.*
  - *Condition at completion: Smooth*

- 440a EXPANDED POLYSTYRENE INVERTED ROOF INSULATION/ PROTECTION
- *Material: expanded polystyrene board.*
  - *Manufacturer: Jablite Limited*
    - *Product |reference: Jablit Flat Roof Invcerted Board, or equal and approved.*
    - *Grade - roofing/ vehicle decks: Consult with Guranateed Asphalt technical Services for advice on specific projects.*
    - *Edges: Consult with Guranateed Asphalt technical Services for advice on specific projects.*
    - *Intergal topping: Consult with Guranateed Asphalt technical Services for advice on specific projects.*
    - *Thickness: 130mm.*
- 453A APPLYING COAT
- *Cut excess wrapping from black with a sharp knife or scissors.*
  - *Heat in purpose made oil or air jacketed melter in accordance with operating instructions and manufacturer's guidelines.*
  - *Temperature of compound: operating temperature ranges from 162°C to 232°C. Do not overheat.*
    - *Normal operating temperature range from 177° to 218°C. Do not heat above 232°C.*
  - *Application: full over whole surface by squeegee.*
- 460a STONE BALLAST
- *Type: Washed, no fines. Grade 20-40mm.*
  - *laying: thickness 50mm, laid loose over membrane.*

## 462A GENERAL NOTES/ REQUIREMENTS

- *Prior to installation, the project specification associated drawings, and manufacturer's installation instructions for all materials should have been studied and understood, and must be followed.*
- *These proposals relate to the roof waterproofing area only. They do not include associated work to be carried out by other trades, which may be required to complete a satisfactory refurbishment.*
- *All preliminary work including alterations to detailing, where applicable, is complete and satisfactory.*
- *Installation may only be carried out by GuraTEC approved operatives, who have sufficient training for each specialist system and awareness to work safety, under the direction of qualified supervisors.*
- *Where applicable, all operatives must be able to produce their individual ID card upon demand, whilst installing the system for which they are approved. these should be available for inspection at all times.*
- *Contractors are advised to visit site when deemed necessary and make themselves fully acquainted with the extent of the works and the conditions under which they are to be executed.*
- *It is the sole responsibility of the contractor to ensure that all roofing works shall be installed in accordance with the appropriate sections of all current relevant codes of practice, Building Regulations, and manufacturer's installation instructions for product supplied by its company.*
- *Outlet/s shall be set at a level to compensate for the thickness of the outlet flange and avoid any check against the flow of water. All outlets are to include a clamping ring to secure the waterproof covering. outlets and apertures must be protected from ingress of debris to prevent blockage of downpipe/s; protection should be removed during non-operating periods.*
- *Where applicable, all roof services and plant, access walkways, platforms, pipes clearance above the roof membrane, in order to facilitate access for future inspection/ maintenance or repair.*
- *The contractor must ensure that satisfactory aesthetic appearance of the completed works is achieved.*

## 463A SITE INSPECTIONS

- *Site inspections will be made by Guaranteed Asphalt Ltd during the works to ensure that the installation is executed in accordance with the GuraGUARD warranty requirements and current codes of practice. A site visit report from, along with supporting photographs will be issued to the client/ contractor following each inspection. the reports will identify and monitor the works observed during the inspections and will, where applicable, make recommendations for appropriate rectification which the contractor is to undertake in order to satisfy the warranty requirements.*

## 464A HEALTH AND SAFETY

- *It is strictly the contractor's responsibility to ensure that all works are executed in accordance with current health and safety legislation. Guidance may be taken from HSE publication HSG33 - Health and Safety in Roof Work.*
- *Safety scaffolding, the location of rubbish skips, access ladders etc, should be agreed with the client/ principal contractor and be in accordance with current health and safety regulations.*
- *Product data and MSDS documents are available for all relevant products supplied by Guaranteed Asphalt Ltd.*

- 465 PRECAST CONCRETE PAVING SLABS
- *Precast concrete: To BS 7263-1 hydraulically pressed.*
  - *Manufacturer: Guranteed Asphalt Limited.*
  - *Product reference: Consult with Guranteed Asphalt technical Services for advice on specific projects.*
  - *Colour/ finish: Consult with Guranteed Asphalt technical Services for advice on specific projects.*
  - *Size: Consult with Guranteed Asphalt technical Services for advice on specific projects.*
- 466a STORING OF MATERIALS
- *Materials must be stored carefully on a clean dry surface, under cover and raised clear of the ground.*
  - *Roll materials must be stored on end.*
  - *The load-bearing capacity of the structure must be checked if material is to be stored at roof level.*
  - *Consult with Guaranateed Asphalt technical Services for advice on specific projects.*
  - *Only sufficient materials for the day's schedule should be taken out of store, or uncovered, and placed close to the area being worked.*
- 520A INCOMPLETE WORK
- *Daywork joints in edges of phased roofing: Adequately protect and weathertight.*
- 530A APPLYING PRIMERS
- *Application: To upstands and slopes over approximately 10°, and pipes etc.*
  - *Surface coverage: Even and full.*
  - *Coats: Fully bonded. Allow volatiles to dry off thoroughly between coats.*
- 610a PREPARATION - SUITABILITY OF SUBSTRATES
- *Generally:*
    - *Secure, even textured, clean and dry and free from frost.*
    - *Horizontal surfaces: to even falls/ flat within tolerances.*
  - *Preliminary work: complete - including*
    - *formation of upstands and kerbs*
    - *penetrations/ outlets*
    - *chases (not less than 10x25mm)*
    - *external angles - chamfered where required to maintain full thickness.*
  - *Moisture content and stability:*
    - *must not impair integrity of roof.*
- 610b PREPARATION
- *Sweep clean and remove all standing water. make good as necessary to provide a base free from ridges, hollows and indentations.*

## 610h SUITABILITY OF SUBSTRATE (TO RECEIVE GUARATEC)

- *Suitability of base: ensure that the structural tolerances of the structure which the works are being installed are within permissible deviation of a level surface and satisfactory to receive the proposed specification. the existing surface is to be even and free from any irregularities that may compromise the works and/ or performance. it is the responsibility of the appointed contractor to verify and report any deficiencies so that they can be corrected prior to commencing with the application.*
- *Screed compatibility: structural screed is susceptible to absorbing moisture which may compromise the integrity of the bond caused by the installation at high temperature and is to be avoided. Further guidance should be sought from Guaranteed Asphalt Ltd's technical services, if applicable.*
- *Substrates generally: secure, clean, dry, smooth free from frost, contaminants, voids and protrusions.*
- *Preliminary work: complete including*
  - *formation of upstands, kerbs, box gutters, sumps, grooves, chases and expansion joints*
  - *Fixing battens, anchoring plugs/ strips.*
- *Moisture content and stability of substrate: must not impair roof integrity*
- *Acceptable methods of drying of roof areas, where required, must be agreed with the client prior to the commencement of works.*

## 640A INSTALLING TIMBER FOR TRIMS

- *Fasteners: shearardized steel screws*
- *Fixing centres (maximum): 600mm.*

## 650A ADHESION TESTS

- *Requirement: carry out advance bond tests to determine stability.*
- *Execution of test: apply a small amount of embrane by squeegee onto the test area and allowing it to cool completely. Cut a triangular shaped incision through the membrane in the centre of the test area. If this triangular area of membrane can be peeled from the substrate easliy thene the substrate is not ready. If it is not possible to pull the membrane away without distorting it, then the bond is deemed to be satisfactory. Temporarily apply a piece of protection sheet over the test area to keep dust off, removing it only when the main ,material application takes place. the test material wil reactivate and blend in with the susequent application.*
- *test results: proceed with membrane installation if satisfactory.*

## 655 APPLYING PRIMERS/ CONDITIONERS

- *Coverage per coat (minimum):*
  - *Asphalt/ concrete (wood float or similar): 8-16m<sup>2</sup>/litre.*
  - *metal eg base plats/metal angles, not applicable, degrease thorioughly*
  - *Dilute: 50/50 with white spirtit (if required)*
  - *Surface coverage: even and full.*
- *Application: Apply by brush, roller or spray and allow to dry completely. Surfaces must be clean and free from all oil, grease, dirt, dust and losse debris. on metal surfaces all loose rust should be removed using a wire bristled brush, and where advanced signs of corrosion are evident, these areas should initially be treated with a rush inhibitor. Bituminiuos primer is resistant to rainfall within 20-30 minutes of its application.*

## 655a APPLICATION OF ROOF COATINGS

- *Apply product to suitably prepared substrate by squeegee, in two layers of total (nominal) thickness of 6mm (not including protection sheet), reinforced with GuaraFLEECE (where appropriate).*
  - *GuaraFLASH is to be fully bonded into the first 3mm coat of membrane and brushed in with a soft broom or brush. Side and end laps 75mm (also sealed with GuraTEC).*
  - *Fully bond guaraFELT protection sheet onto second 3mm coat of membrane, with 100mm side and end laps sealed by gas torch (laps must be kept free of GuaraTEC).*
  - *Thickness: monitor by taking regular thickness tests using a depth gauge, to ensure consistent and correct thickness and coverage of membrane. Seal pinhole after removal of gauge by applying direct pressure.*
  - *Continuity: maintain full thickness of coatings around angles, junctions and features.*
  - *Rainwater outlets: form with water tight joints.*
  - *Drainage systems: do not allow liquid coatings to enter piped rainwater or foul systems.*

## 660a PREPARATION - JOINTS IN PLYWOOD SUBSTRATES

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

## 670a LAYING VAPOUR CONTROL LAYER

- *Attachment: partial bonding.*
- *Appearance on completion: Flat with no wrinkles.*
- *Laps: (100mm) seal using method recommended by Guranteed Asphalt Limited.*
- *Upstands, kerbs and other penetrations: enclose edges of insulation. Fully seal at abutment by bonding or taping.*

## 695a SEPARATING LAYER

- *GuaraFELT CP super, high performance bitumen felt membrane.*
- *Laying: loose with 100mm sealed laps.*

## 695b SEPARATING LAYER

- *GuaraFELT CP, nominal 2mm thick high performance bitumen felt membrane.*
- *Laying: loose with 100mm sealed laps.*

## 695c SEPARATING LAYER

- *GuaraFELT CP, nominal 2mm thick high performance bitumen felt membrane.*
- *Laying: torch bonding to base with 100mm laps.*

## 695d SEPARATING LAYER

- *GuaraFELT CP super, high performance bitumen felt membrane.*
- *Laying: torch bonding to base with 100mm laps.*

## 695e SEPARATING LAYER

- *GuaraSCRIM bitumen impregnated scrim tissue.*
- *Laying: loose laid over primed concrete base with 100mm laps.*

## 695f SEPARATING LAYER

- *Guaranteed overlay board, 13mm thick, one face bitumen coated.*
- *Laying: loose or spot bonded over existing coverings, close BUTT jointed, bitumen face uppermost.*

## 695g SEPARATING LAYER

- *GuaraGLASS glass fibre tissue.*
- *Laying: loose laid over concrete base with 100mm laps.*

## 695h SEPARATING LAYER

- *GuaraTEC fully bonded layer, nominal 3mm GuaraTEC rubberised rubber, on a primed deck.*

**ROOF COATING SYSTEM**

## 710a DELIVERY

- *Condition of mastic asphalt delivered to site: hot prepared OR blocks - re-melt on site. Temperature of material not to exceed 230°C.*

## 730a ON-SITE TRANSPORTING

- *Transport distances: minimise to avoid excessive cooling of molten mastic asphalt.*
- *Buckets, barrows or dumpers used for mastic asphalt: line with minimum quantity of fine inert dust. (Use silica or similar acid resisting dust where acid resisting mastic asphalt is being used).*

## 735 LOCALIZED HEATING

- *Blowlamps and gas torches: use only types with controlled gradual heating during laying, removal and repair of mastic asphalt.*

## 740B MOVEMENT JOINTS IN SUBSTRATE (MANUFACTURER'S ADDITIONAL NOTES FOR 130C)

" *Reinforcement strip to movement joints +/- 6mm:PQ2060 Uncured neoprene reinforcement.*

" *Application: Unroll into a pre-coating of Verdiseal using the Verdiseal as a Bonding glue ensuring an overlap of at least 75mm either side of the construction. Apply a stripe coat of Verdiseal 2mm DFT where the upstand is either monolithically cast in situ, subsequently cast in situ or concrete block work. Then apply full Verdiseal Wwaterproofing system over the localised stripe coat at 2mmDFT. Localised total thickness 4mm DFT.*

" *Detail:*

- *Bedding: Preliminary coating application*
- *Joints: Lap in length 100mm.*
- *Bond: Continuous over whole surface, with no air pockets.*
- *Condition at completion: Smooth*

" *Reinforcement strip to movement joints +/- 25mm:Radflex 125 Butyl laminate.*

" *Application: Installed by Radflex and bonded to either side expansion joint, 150mm wide and bedded in epoxy mortar bonded to the concrete. Apply a stripe coat of Verdiseal 2mm DFT where the upstand is either monolithically cast in situ, subsequently cast in situ or concrete block work. Then apply full Verdiseal Wwaterproofing system over the localised stripe coat at 2mmDFT. Localised total thickness 4mm DFT.*

" *Detail:*

- *Bedding: Epoxy adhesive as specified by Radflex.*
- *Joints: As specified by Radflex.*
- *Bond: Continuous over whole surface, with no air pockets.*
- *Condition at completion: Smooth*

750B PRELIMINARY LOCAL REINFORCEMENT (MANUFACTURER'S ADDITIONAL NOTES FOR 130C)

" Reinforcement strip: Apply a stripe coat of Verdiseal 2mm DFT where the upstand is either monolithically cast in situ, subsequently cast in situ or concrete block work. Then apply full Verdiseal W waterproofing system over the localised stripe coat at 2mm DFT. Localised total thickness 4mm DFT.

- Bedding: Preliminary coating application
- Bond: Continuous over whole surface, with no air pockets.
- Condition at completion: Smooth

" Reinforcement strip: Radmat debonding tape to be used in all other abutment situations to bridge gaps i.e. vertical concrete planks, plywood, cement particle board, plywood, metal or in any location where localized movement is possible. Apply Stripe coat of Verdiseal prior to application Radmat PQ2060 Uncured Neoprene must also be used at all outlets, penetrations, fixings etc.

- Bedding: Preliminary coating application
- Joints: Lap in length 75mm.
- Bond: Continuous over whole surface, with no air pockets.
- Condition at completion: Smooth

750c INSULATED UPSTANDS

- Material (inverted roof): Jablite Flat Roof Inverted Board.
  - Manufacturer: Jablite Limited.
  - Product reference (Inverted Roof): Jablite Flat Roof Inverted Board or equal and approved.
  - Thickness: Consult with Guaranteed Asphalt Technical Services for advice on specific projects. The board thickness and type will depend on the u-value requirements.
    - Fixing: Jablite Flat Roof Inverted Board, spot bonded with low modulus mastic adhesive over GuaraFLASH T.
- Waterproofing for insulated upstands:
  - Installing: Flexible upstands, coverings to kerbs and the like.
  - Setting out: Neatly with carefully formed junctions.
  - Application:
    - First layer: GuaraFLASH U underlay, torch bonded to primed base, terminating over the top of the upstand. torch bonding 100mm onto GuaraFELT CP/CP Super at the base prior to laying horizontal asphalt. 100mm wide vertical and horizontal laps.
    - Second layer: GuaraFLASH U self-finish for inverted roofs torch bonded to GuaraFLASH underlay with 100mm vertical and horizontal laps, terminating over the top of the upstand.



## 760B APPLICATION OF ROOF COATINGS (MANUFACTURER'S NOTES FOR 130C)

- " *Waterproof Membrane – Verdiseal Membrane SG. The Verdiseal Membrane SG is a spray applied two-component rapid curing elastomeric membrane that can be trafficked within 30 minutes and over coated within 1hour at temperatures as low as 0°C. The Elastomeric waterproof membrane shall have a minimum DFT of 2mm. Ensure a seamless watertight application is achieved and stripe coats are applied around detailing, angles, junctions and other protrusions.*
- " *Thickness:2mm DFT*
- " *Continuity: Maintain thickness of coatings around angles, junctions and features.*
- " *Shear Key/ Traffic Coat – Verdiseal Wear Coat. The Verdiseal Wear Coat is a two-component, hand-applied binder that can be trafficked within 4 hours of application at 20°C. The Verdiseal Wear Coat is broadcast to refusal with the chosen dry crystallized quart aggregate as approved by the manufacturer. The DFT of the shear key coat including aggregate shall be 2mm.*
- " *Rainwater outlets: Form with watertight joints using stripe coat of 2mm DFT prior to the installation of the waterproofing system localised thickness of 4mm DFT*
- " *Drainage systems: Do not allow liquid coatings to enter piped rainwater or foul systems.*
- " *Adhesion: The finished membrane must firmly adhere to background and be free from pinholes, blisters, foreign matter and other defects likely to permit the passage of water.*
- " *Protection: Prevent damage to membrane and apply protection sheet as soon as the membrane has been applied.*

## 770a SKIRTINGS AND UPSTANDS

- *Preparation: prepare the substrate to provide an acceptable base for waterproofing.*
  - *Prime substrate with the specified primer (as clause 530A)*
  - *Bedding: bonded into the first 3mm coat of membrane and gently smoothed in by gloved hand*
  - *Side and end laps: 75mm (also sealed with GuraTEC)*
  - *Bond: continuous over whole surface, with no air pockets, apply second 3mm coat fully encapsulating the reinforcement. A protection sheet of GuarFELT is laid over the completed GuaraTEC membrane.*
- *Flashing and detail work:*
  - *The design should ensure that the continuity of the waterproof covering is maintained for a vertical height of 150mm above the finished roof level at all abutments, parapets etc. Guaranteed Asphalt Ltd cannot take responsibility in the event of water ingress over and above the termination of its waterproofing.*
  - *Additional fixing of membranes: where applicable, mechanically fix termination bar at 300mm (max) centres plated at the top edge of the flashing detail, sealed with GuaraSTICK.*
- *In any situation where a structural expansion detail is to be incorporated into the GuaraTEC waterproofing and the percentage movement is less than 50%, the contractor is to install the detail as per the relevant nominal width of joint. Should any expansion joint detail require a degree of movement in excess of 50%, consult with the coating manufacturer for guidance.*
- *Leadwork: where applicable, code 4 or 5 lead is required for flashing of details. Maximum lengths and girth should be established and carried out in accordance with the lead Sheet Association recommendations.*
- *Seal the connection between roofing membranes to all common building materials: Apply GuaraSTICK polymer sealant to all exposed edges, termination bars, flashings, connections with roof penetrations etc. Surfaces must be dry, clean and free from contaminants.*
- *Additional requirements: the contractor is to install all details in a manner to comply with current quality assessment recommendations for the installation of the specified system. Should any detail arise where it is not clear how this can be achieved, the contractor is to seek advice and approval for all proposals from Guaranteed Asphalt Ltd before completing the works.*

## 770b INSTALLING MOVEMENT JOINTS

- *Location: centre over structural movement joint, and bed to exact finished level.*
- *Joint width: Consult with Guaranteed Asphalt for recommendations and details.*
- *Bedding: epoxy mortar.*
- *Fixing: Consult with Guaranteed Asphalt for recommendations and details.*
- *Separating layer: Dress onto horizontal surface of edgings, either side of joint.*
- *Joints: prepare and apply sealant as section Z22.*
- *Sealant: Consult with Guaranteed Asphalt for recommendations and details.*
- *Size: submit proposal.*
- *Colour: submit samples.*

## 770B SKIRTINGS AND UPSTANDS (MANUFACTURER'S NOTES FOR 130C)

" Preliminary reinforcing stripe coat: the correct reinforcing stripe coat detail must first be applied at all right angled abutments, penetrations, outlets and fixings etc before the application of the Verdiseal SG detailing. Please see clause 750B. If unsure about the correct reinforcing material of any given situation, please refer to the Radmat pre-installation control procedures and quality assurance manual or contact Radmat technical department for confirmation or further information.

" Waterproof Membrane – Verdiseal Membrane SG. The Verdiseal Membrane SG is a spray applied two-component rapid curing elastomeric membrane that can be trafficked within 30 minutes and over coated within 1hour at temperatures as low as 0°C. The Elastomeric waterproof membrane shall have a minimum DFT of 2mm. Ensure a seamless watertight application is achieved and stripe coats are applied around detailing, angles, junctions and other protrusions.

" Thickness: 2mm DFT

" Continuity: Maintain thickness of coatings around angles, junctions and features.

" Shear Key/ Traffic Coat – Verdiseal Wear Coat. The Verdiseal Wear Coat is a two-component, hand-applied binder that can be trafficked within 4 hours of application at 20°C. The Verdiseal Wear Coat is broadcast to refusal with the chosen dry crystallized quart aggregate as approved by the manufacturer. The DFT of the shear key coat including aggregate shall be 2mm.

" Rainwater outlets: Form with watertight joints using stripe coat of 2mm DFT prior to the installation of the waterproofing system localised thickness of 4mm DFT.

" Termination: Termination bar to be used to fix the waterproofing and protection sheet which finishing on a vertical face. Fixings to be a maximum 300mm centers. Radmat Mastic sealant to be applied in a neat bead both behind and along the top edge of the termination bar as per our suggested detail P12

## 772A DETAILING TO OUTLETS (MANUFACTURER'S ADDITIONAL NOTES FOR 130C)

- " Preparation: Cast metal outlet to be fixed by others, to the deck, preferably with the flange flush with the surface of the concrete deck or better recessed in location 20mm below concrete surface, with the clamping ring temporarily removed.

" Preliminary reinforcing stripe coat: the correct reinforcing stripe coat detail must first be applied at all right angled abutments, penetrations, outlets and fixings etc before the application of the Verdiseal SG detailing. Please see clause 750B. If unsure about the correct reinforcing material of any given situation, please refer to the Radmat pre-installation control procedures and quality assurance manual or contact Radmat technical department for confirmation or further information.

" Waterproof Membrane – Verdiseal Membrane SG. The Verdiseal Membrane SG is a spray applied two-component rapid curing elastomeric membrane that can be trafficked within 30 minutes and over coated within 1hour at temperatures as low as 0°C. The Elastomeric waterproof membrane shall have a minimum DFT of 2mm. Ensure a seamless watertight application is achieved and stripe coats are applied around detailing, angles, junctions and other protrusions.

" Thickness: 2mm DFT

" Continuity: Maintain thickness of coatings around angles, junctions and features.

" Shear Key/ Traffic Coat – Verdiseal Wear Coat. The Verdiseal Wear Coat is a two-component, hand-applied binder that can be trafficked within 4 hours of application at 20°C. The Verdiseal Wear Coat is broadcast to refusal with the chosen dry crystallized quart aggregate as approved by the manufacturer. The DFT of the shear key coat including aggregate shall be 2mm.

" Rainwater outlets: Form with watertight joints using stripe coat of 2mm DFT prior to the installation of the waterproofing system localised thickness of 4mm DFT.

" Completion: Fix and secure clamping ring and grille.

- 780 ACCESS/PROTECTION SHEET (MANUFACTURER'S ADDITIONAL NOTES)
- Location: All areas, including upstands and details.
  - Material: Radmat specified protection sheet to be rolled into the 2nd layer of PermaQuik 6100 hot melt rubberized bitumen, while it is hot, to ensure a full bond. A wide headed brush used when rolling in will assist in avoiding wrinkles and prevent entrapping air bubbles.
  - Laps: Laps to be 75mm and sealed by ensuring that there is hot melt bitumen within the laps, or bleeding the bitumen torch applied laps using torch.
- 780A ACCESS/PROTECTION SHEET (MANUFACTURER'S ADDITIONAL NOTES FOR 130C)
- *Access/Protection sheet*
  - " *Location: All areas, including upstands and details.*
  - " *Shear Key/ Traffic Coat – Verdiseal Wear Coat. The Verdiseal Wear Coat is a two-component, hand-applied binder that can be trafficked within 4 hours of application at 20°C. The Verdiseal Wear Coat is broadcast to refusal with the chosen dry crystallized quart aggregate as approved by the manufacturer. The DFT of the shear key coat including aggregate shall be 2mm.*
- 785a INSTALLING EDGE TRIMS
- *Separating layer: GuaraFELT CP/CP Super carried under trim to reinforce the joint.*
  - *Clear distance from wall or fascia: 3mm (minimum).*
  - *Fasteners: Countersunk wood screws to BS 1210.*
  - *Type: Consult with Guranateed Asphalt for recommendations and details.*
  - *Spacing: 30mm from ends of trims and 300mm (maximum) centres.*
  - *Jointing sleeves: fix one side only.*
  - *Expansion gap between ends of trim: Consult with Guranateed Asphalt for recommendations and details.*
  - *Corners: use purpose made corner pieces.*

## **SURFACING**

- 810a LAYING INVERTED ROOF INSULATION
- *Preparation: clear roof of other trades.*
  - *Condition of substrate: clean.*
  - *Setting out: loose lay to brick pattern. Minimise cutting and avoid small cut pieces at perimeters and penetrations.*
  - *Joints: butt together.*
  - *Protections, upstands, rainwater outlets etc: Cut insulation cleanly and fit closely around.*
  - *Completion: boards to be in good condition, with no springing or racking. Cover to prevent wind uplift as soon as possible.*
- 833a LAYING SUB SURFACE DRAINAGE LAYER
- *Condition of substrate: clean.*
  - *Setting out:*
    - *Loose lay ensuring that the filter fabric is uppermost and facing the backfill. Adjacent rolls should be positioned so that the cusped cores are butt-jointed.*
    - *the filter fabric has a 100mm wide lap for lapping over the fabric of the adjoining unit prior to backfilling.*
  - *Completion:*
    - *Must be in a good condition, well fitting and stable.*

## 860a LAYING PAVING TILES

- *Condition of substrate: Clean and dry.*
- *Setting out: Minimise cutting.*
- *bedding: Consult with Guaranteed Asphalt for bedding recommendations and separating layers for cementitious beds.*
- *Joints:*
  - *Open.*
  - *Width generally: 3mm.*
  - *Expansion gap intervals: 3m, nominal 25mm wide.*
  - *Perimeter/ upstands: stop tiles on line of Guraflash T .*

**COMPLETION**

## 910a FINAL INSPECTION

- *Interim and final roof inspections: strictly in accordance with Guaranteed Asphalt Ltd's requirements to satisfy the GuaraGUARD warranty requirements.*
- *Rainwater goods must be tested by the Contractor upon completion of the works prior to handover.*
- *Guaranteed Asphalt Ltd will conduct a final inspection upon notification of completion by the contractor. This must take place prior to the application of any surfacing above the waterproof covering. Failure to instigate a final inspection may jeopardise approval and/or warranty release.*

## 912a PROTECTION

- *As soon as an area of waterproofing has been completed, it should be inspected and tested upon notification and completion by the contractor. Completed areas should not be used as a building platform or as an access route by other trades. If unavoidable, appropriate protection must be provided for the duration of the construction period. Care should be taken not to mark or dent the works while laying any additional protection. Inspection and/ or leak testing must always take place after removal of such protection.*
- *Roofs accessed for regular maintenance of plant, or parts of the building, should be given consideration in providing a predetermined route to and from the entry point to minimise potential hazards.*

## 920a ELECTRONIC ROOF INTEGRITY TEST

- *Testing authority : to be a member company of WITA - waterproofing Integrity test Association (contact: 020-7448-3857) .*
- *Timing of test : prior to applying finishes to the waterproofing and/ or handover .*
- *Condition of roof prior to testing:*
  - *Coating: Complete to a stage where integrity can be tested.*
  - *Surface: Clean and free of site debris.*
  - *Breaches detected: re-test immediately following repair.*
- *Test results: Submit on completion, to include a plan of area tested.*
- *Waterproof integrity certificate: submit on completion of a single test or series of tests to the nominated roof or section thereof.*
  - *The issue of the GuaraGUARD warranty is conditional upon the provision of such a leak test certificate.*

920A ELECTRONIC ROOF INTEGRITY TEST (MANUFACTURER'S ADDITIONAL NOTES IN ITALICS)

- Testing authority: *Leaktector or similar independent test authority .*
- Timing of test: *immediately before applying finishes .*
- Condition of roof prior to testing:
  - Coating: Complete to a stage where integrity can be tested.
  - Surface: Clean.
    - *Ensure that roofing work has been completed to a stage where the integrity of the coating can be tested, that obvious defects have been made good and that the roof has been cleared of all materials, debris, dust, etc.*
- Test results: Submit.
- *If any leaks/defects are discovered, mark the location on the roof, prepare report and submit to the CA together with proposals for remedial measures.*
- After making good of any defects by the coating contractor, retest locally to verify integrity of repair.
- Waterproof integrity certificate: On completion of testing, submit.

940a 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. protect from petroleum based solvents and other chemicals, traffic and adjacent or high level working.*

940b GUARANTEES

- *This specification is covered by the manufacturers dual signature guarantee for workmanship and materials for an agreed period to fulfill employers requirements, subject to terms and conditions.*
- *This specification and guarantee can be insurance backed, subject to the terms and conditions of the insurers, and secured by a one off premium directly in accordance with the current requirements of the Financial Services Authority (FSA).*

941a MANUFACTURERS WARRANTY

- *The above specification/s shall be installed in accordance with the appropriate sections of all the current relevant codes of practice, Building Regulations, and manufacturer's installation instructions for product supplied by the company. The works shall only be installed by GuraTEC approved operatives, and, as agreed in the contract, the GuaraGUARD warranty shall be issued to the building owner on satisfactory completion.*

942a MAINTENANCE

- *It is recommended that all flat roofs be inspected at a minimum frequency of twice a year. Ideally, inspections should be carried out in spring and autumn accounting for the effects of annual extremes of weather to be checked. Inspection should also be carried out following works on the roof by other trades, or following installation of new roof equipment.*
- *All inspections and/ or maintenance actions carried out at roof level must be in full compliance with the appropriate health and safety regulations, and particularly those specifically dealing with working at height.*
-