

# FUNCTIONAL REQUIREMENTS

## 7.6 BALCONIES

### Workmanship

- i. All workmanship must be within the tolerances defined in Chapter 1 of this manual.
- ii. All work is to be carried out by a technically competent person in a workmanlike manner.

### Materials

- i. All materials should be stored correctly in a manner that will not cause damage or deterioration of the product.
- ii. All materials, products and building systems shall be appropriate and suitable for their intended purpose.
- iii. The structure shall, unless specifically agreed otherwise with the Warranty provider, have a life of not less than 60 years. Individual components and assemblies, not integral to the structure, may have a lesser durability, but not in any circumstances less than 15 years.

### Design

- i. The design and specifications shall provide a clear indication of the design intent and demonstrate a satisfactory level of performance.
- ii. Structural elements outside the parameters of regional Approved Documents must be supported by structural calculations provided by a suitably qualified expert.
- iii. Balconies must have appropriate guarding meeting the relevant Building Regulations.
- iv. The balcony design and construction must meet the relevant Building Regulations, British Standards, Eurocodes and other statutory requirements.

**Balconies, public access terraces and podium decks**

**7.6.1 Introduction**

This section should be read in conjunction with Chapter 7.10. Where appropriate, cross reference will be provided to the relevant section in 7.10. This provides specific advice and requirements in respect of balconies and terraces for the following situations only:

- Where the balcony or terrace forms part of or forms the entire roof to other occupied parts of a building and is either a 1) warm deck construction or 2) an inverted warm deck system of construction.
- Where the balcony or terrace projects beyond the building elevation and has a cold deck roof system.

**7.6.2 Design**

**7.6.2.1 Selection of system type**

**Selection of system type**

The cold deck roof system is not permitted on balconies or terraces that form part of the entire roof to other occupied parts of the building. In these circumstances, the selection of system type (warm deck or inverted warm deck) should be based upon the following criteria:

- Roof zone depth (height from ceiling to termination of waterproofing).
- Likely point loading.

- Construction process (a complete inverted warm deck roof, with suitable protection, and which may be suitable for storage or access by other trades; a warm deck roof may not be suitable for storing heavy loads).

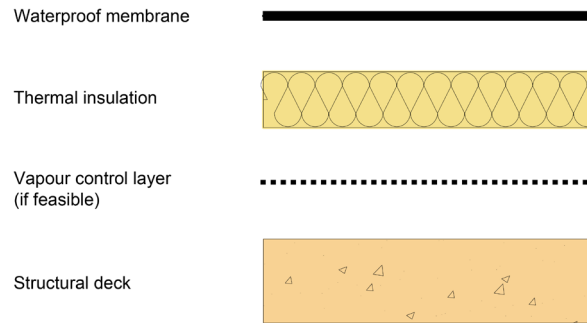


Figure 1: Warm roof (section)

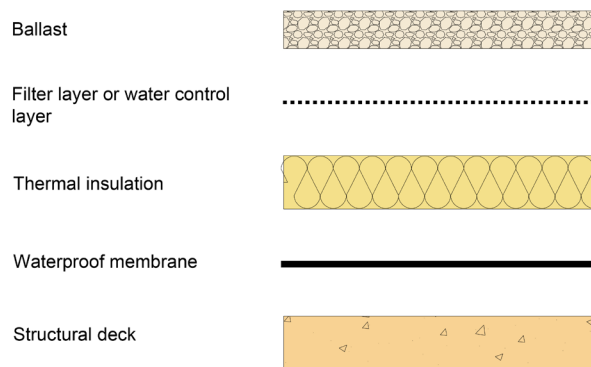


Figure 2: Inverted warm roof (section)

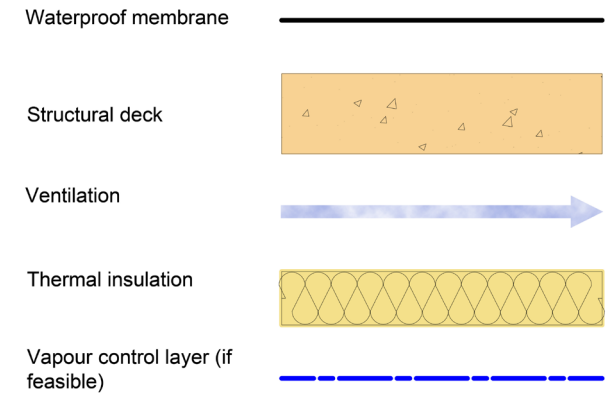


Figure 3: Cold roof (section)

**7.6.2.2 Loading**

**Statutory requirement**

Design for loading must comply with Statutory Building Regulations.

**Resistance to wind load**

In all situations, including ballasted and inverted roofs, a calculation of wind load to BS EN 1991-1-4 should be undertaken by a suitably competent person. Wind load acting on a balcony will be affected significantly by the design of the perimeter and by the geometry and finishes on the elevations of the building. Any changes to these elements will necessitate a review of the calculation output.

**Resistance to imposed loads**

At the earliest possible stage, the employer should define the range of potential imposed loads for which the balcony is to be designed, such as planters, storage and public access. In the absence of such a performance requirement, the loading limits of the balcony should be defined.

**7.6.3 Falls and drainage**

**7.6.3.1 Statutory requirement**

Design for drainage should comply with the Building Regulations 2000, Approved Document Part H – Drainage and waste disposal – Part H3 – Rainwater drainage.

**7.6.3.2 British and industry standards**

The requirements of BS 6229 should prevail in respect of balconies and terraces, whether or not they form part or the entire roof to occupied parts of a building, and irrespective of the type of Waterproof membrane.

Falls are not required for podium decks, provided:

- They are designed with pedestrian finishes, which allow rainwater to drain rapidly from the finished surface and not to accumulate upon it
- The waterproof membrane has current certification (see Chapter 7.10 Roof Coverings – Continuous Membranes) for use at zero falls **in this application.**

Wherever practical, balconies and terraces should be designed to fall away from the building elevation. If this is not practical for reasons of continuity of rainwater services, the falls should be arranged across the balcony, parallel to the elevation.

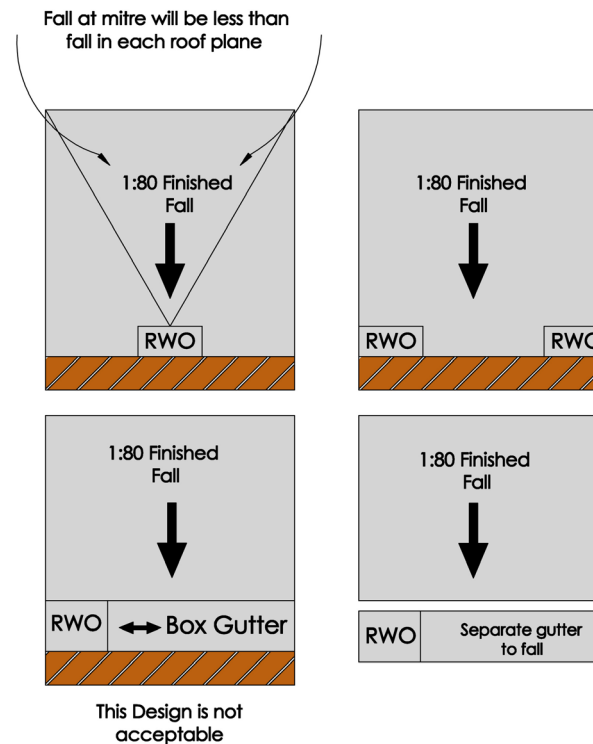


Figure 4: Drainage layout options

**7.6.3.3 Creation of falls**

Roof falls may be created either during the construction of the deck or alternatively through the use of tapered insulation systems (warm deck roof systems only).

Where the roof finish is to include paving on supports, consideration should be given to the height difference created by the falls and spacing of rainwater outlets so that the maximum height of paving supports is not exceeded, the minimum height of upstands is not affected or trip hazards created. On large balconies and terraces, it may be necessary to increase the number of outlets in order to reduce maximum roof zone depth.

**7.6.3.4 Drainage**

If a balcony is served by a single rainwater outlet, an overflow facility of equivalent capacity and clearly visible externally should be provided at or near the same location, no more than 50mm above the level of the waterproof membrane.

Rainwater outlets should be readily accessible, without disruption to the pedestrian finish. On finishes raised above the waterproof membrane (warm deck roofs) or Water Control Membrane (inverted roofs), this may be achieved by a suitably marked paving slab or demountable section of decking.

Where rainwater downpipes from other higher roof areas or balconies discharge via a lower balcony or terrace, an open downpipe shoe is not permitted. The downpipe should be connected

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directly to the downpipe serving the lower balcony or terrace.

### 7.6.4 Thermal performance

Design for thermal performance must comply with the current Building Regulations, as appropriate.

### 7.6.5 External fire performance

#### 7.6.5.1 Statutory requirement

Design for external fire performance must comply with the current Building Regulations.

### 7.6.6 Provision for access

#### 7.6.6.1 Statutory requirement

Balconies should have suitable access and drainage meeting the requirements of the current Building Regulations.

#### 7.6.6.2 Edge protection

The guarding to the perimeter of balconies, terraces and podium decks should be designed to provide the simplest means of achieving waterproofing integrity, given that installation of balustrade or glazing stanchions may occur after the installation of the roof system.

Acceptable examples include the following, in order of preference:

- Full-height parapet walls.

- Stanchions or rails secured to low parapet walls above the level of the waterproof membrane (incorporated in copings or secured to elevation).
- Stanchions secured, clamped and sealed to stainless steel bolts set in raised plinths, which were constructed prior to application of the waterproof membrane (suitable for warm deck and inverted warm deck roof systems).
- Stanchions secured, clamped and sealed to stainless steel bolts set at deck level, which were installed prior to application of the waterproof membrane (suitable for warm deck roof systems only).

If the design requires a collar of waterproof membrane at the stanchion, the stanchion should be of circular section at this point and should incorporate a weathering apron.

#### 7.6.6.3 Protection of waterproof system during construction

At the earliest possible stage, the anticipated loading of the balcony, terrace or podium area by plant and access during service should be assessed in terms of:

- Load, e.g. foot traffic, equipment
- Frequency
- Risk of impact

If such usage is intense or long-lasting during the construction phase, consideration should be given to temporary works only, with completion occurring after all non-roofing usage has ceased, as follows:

- Warm deck roof system: installation of temporary Vapour Control Layer (VCL), to be overlaid when remainder of system is installed.
- Inverted warm deck roof system: overlay of completed waterproof membrane with geotextile and continuous temporary decking, such as plywood, oriented strand board or compatible recycled thermoplastic board.

7.6.6.4 Pedestrian access finishes

The design should include protection to suit the anticipated conditions as appropriate:

Finish	Roof system type			Waterproof membrane type			
	Warm	Inverted	Cold (podium)	Single ply membrane	Bitumen membrane	Mastic asphalt	Liquid applied
Porous concrete tiles adhered to waterproof membrane <sup>(1)</sup>	Y	N	Y	N	Y	Y <sup>(2)</sup>	Y
Fired tiles bedded in screed and grouted <sup>(1)</sup>	Y	N	Y	Y	Y	Y <sup>(2)</sup>	Y
Precast concrete paving slabs on adjustable supports <sup>(3)</sup>	Y	Y	Y	Y	Y	Y	Y
Timber decking on timber supports <sup>(4)</sup>	Y <sup>(6)</sup>	Y <sup>(5,6)</sup>	N	Y <sup>(7)</sup>	Y	Y	Y

**Notes:**  
<sup>(1)</sup> Product should be certified for use with waterproof membrane (see Chapter 7.10);  
<sup>(2)</sup> Consideration should be given to the effects of solar gain on the stability of mastic asphalt under point loading in this situation;  
<sup>(3)</sup> Paving support pad bearing area should be suitable for the compressive strength of the insulation under design loadings;  
<sup>(4)</sup> Bearers should not impede drainage and should be sized to suit the compressive strength of the insulation under design loadings;  
<sup>(5)</sup> Decking should be of sufficient dead load to provide resistance to wind load and temporary flotation of insulation;  
<sup>(6)</sup> Suitable certification for external fire performance should be provided;  
<sup>(7)</sup> Membrane manufacturer's recommendations should be followed, regarding the protection layers required to isolate the waterproof membrane from spillage of liquids or timber preservatives.

Table 1: Pedestrian finishes for balconies, terraces and podium decks

7.6.7 Detailing

7.6.7.1 General principles

At an early stage in the design process, an audit of balcony, terrace or podium geometry should be carried out to establish what types of details will be required and whether they are to be weather proof (incorporating an upstand/cover flashing arrangement) or waterproof (providing continuous waterproofing across the detail).

The following key principles should be followed in the design of all details:

- Upstands to extend 150mm above finished roof level, except at door access to balconies and terraces (see Details section below).
- Downstands (of separate metal or other flashings) should lap the upstand by a minimum of 75mm.
- Where the balcony or terrace forms part of the entire roof of an occupied building, a continuous barrier to air leakage should be maintained.
- Reliance on sealant as the sole means of protection should be avoided.

The total roof zone depth should be assessed at critical points, such as the top of drainage slopes, to ensure there is enough free upstand available to create the minimum required 150mm of waterproofing protection above finished roof level. It is important that this minimum 150mm upstand is maintained at all points around the waterproofed area, except at door access to balconies (see

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continuous water checks and verges). Balconies are a frequent and acceptable exception due to the need for level or unobstructed access, provided the recommendations in this section are followed.

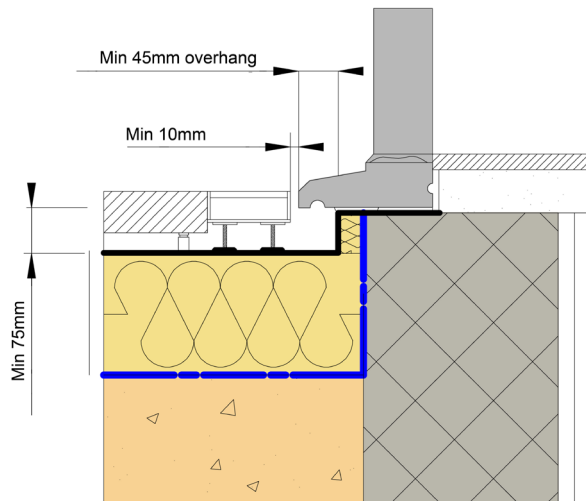


Figure 5: Details Principles: Upstand at door access: Warm deck roof: Level threshold

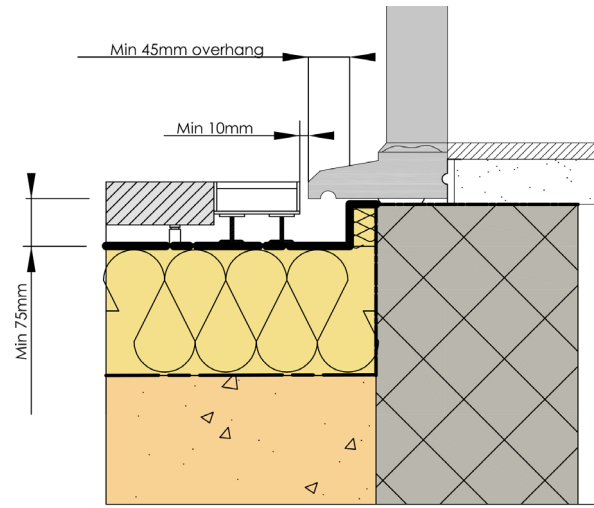


Figure 6: Details Principles: Upstand at door access: Inverted warm deck roof

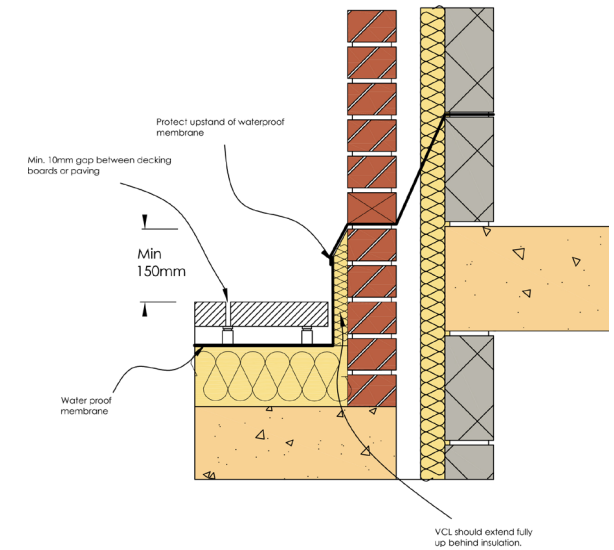


Figure 7: Details Principles: Upstand to decking and paving finishes, (e.g. balcony parapet): Warm roof.

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### 7.6.8 Design for sustainability

As per Chapter 7.10 - Roofing

### 7.6.9 Materials

As per Chapter 7.10 - Roofing

### 7.6.10 Installation

#### 7.6.10.1 Protection of the roof

##### Temporary protection (during construction)

Responsibility for temporary protection and a method statement for its use should be agreed prior to the commencement of works. Suitable materials should be selected in consultation with membrane manufacturers as appropriate, for example:

- Linked recycled thermoplastic sheets.
- Rolled recycled thermoplastic or elastomeric sheets.

Particular consideration should be given to locations of concentrated access, such as step-out areas onto the roof or where wheeled equipment may be used.

##### Permanent protection (during service)

Permanent protection should not be laid on routes where access is most likely, or routes where temporary ponding is likely, e.g. near parapet walls, in the absence of cross falls between rain water outlets.

It is recommended that concrete paving is laid on support pads as this allows adjustment, reducing risk of trip hazard. Recommendations are as follows:

- The height of support pads should not exceed the maximum recommended by the manufacturer.
- Paving should not be cut.
- Paving should be firmly butted up against support pad separating pegs.
- Support pad separating pegs should provide clear space for rapid disposal of rain water between paving slabs.
- Provision for movement at perimeters should comprise either a 75mm margin of washed stone or a compressible rubberised fill. In either case, drainage should not be obstructed and a suitable restraint trim should be used to ensure stone does not fall beneath the paving adjacent.

#### 7.6.10.2 Vapour Control Layer (VCL)

As per Chapter 7.10 - Roofing

#### 7.6.10.3 Thermal insulation

As per Chapter 7.10 - Roofing

#### 7.6.10.4 Waterproof membrane

As per Chapter 7.10 - Roofing

### 7.6.11 Testing

#### 7.6.11.1 Final inspection

At practical completion of the balcony, terrace or podium deck, all areas should be clear of stored material, other site operations and all protection. A thorough, recorded, visual inspection of all areas, including details, should be carried out with representation from the General Contractor and Roofing Contractor in attendance.

#### 7.6.11.2 Procurement of testing services

If testing to demonstrate waterproofing integrity is required, it should be undertaken by a third-party that is independent of the roofing contract. The testing service provider should provide evidence of the following:

- Efficacy of the method proposed in the circumstances of the project.
- Experience and training of operator.
- Membership of an appropriate trade association that sets a Code of Conduct for the service.

#### 7.6.11.3 Methods of test

##### Low voltage earth leakage

Low voltage earth leakage is a safe and effective method for the testing of waterproofing integrity in roofs, where the waterproof membrane is an electrical insulator and the deck provides an electrical earth. It is not suitable for testing flat roofs where the waterproof membrane has been



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overlaid with insulation and ballast (inverted roofs) or ballast only (ballasted warm roofs); therefore, testing should be carried out prior to completion of the roofing system.

### High voltage electrical discharge

The high voltage electrical discharge method is best suited to the testing of continuous thin films, such as liquid-applied coatings. Its use is not recommended with polymeric single ply, reinforced bitumen membranes and mastic asphalt.

### Vacuum

Vacuum testing of seams of membranes manufactured off-site is an effective means of quality assessment, but is not recommended as a method of demonstrating the integrity of flat roofs.

### Flood testing

Flood testing is a suitable method of demonstrating the integrity of balconies, terraces and podium decks. However, consideration should be given to the effect of possible ingress to the construction during the test and risk of entrapped water in insulation (warm deck roofs) and decks (all types). The area under any one test should not exceed 50m<sup>2</sup>.

### 7.6.12 Provision of Information

#### 7.6.12.1 Operation and Maintenance Manual

The following information is required:

- Specification, as-built:
  - Waterproof membrane: generic type, product(s) and (as appropriate) thickness.
  - Thermal insulation: generic type, product(s) and thickness.
  - Acoustic insulation: generic type, product and (as appropriate) thickness.
  - Vapour Control Layer: generic type, product (as appropriate) and thickness (as appropriate).
  - Rainwater outlets: type, product, capacity, location and means of access.
- Procedure for maintenance of waterproof membrane, including (where appropriate) recommended frequency and method of application of solar reflective finish.
- Procedure for repair of waterproof membrane.