

CHAPTER 11: External Works

CONTENTS

11.1 PAVING AND DRIVEWAYS

11.2 SITES SUSCEPTIBLE TO FLOODING

11.3 OUTBUILDINGS

FUNCTIONAL REQUIREMENTS

11.1 PAVING AND DRIVEWAYS

Workmanship

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

Materials

- i. All materials should be stored correctly in a manner which 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. 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. The materials, design and construction must meet the relevant Building Regulations and other statutory requirements, British Standards and Euro-Codes.

Limitations of Functional Requirements

External pathways and drives Functional Requirements apply only to the drive and pathway leading to principle entrance to the dwelling.

11.1.1 Preparation of ground

The area to be surfaced should be prepared by stripping away all vegetation and organic material. Land drainage should be considered for ground that is saturated.

Excavation trenches, (e.g. service trenches) should be backfilled with granular type material to the required level. The backfill should be compacted in layers no greater than 300mm, the fill material should at least have the same bearing capacity as the adjacent ground.

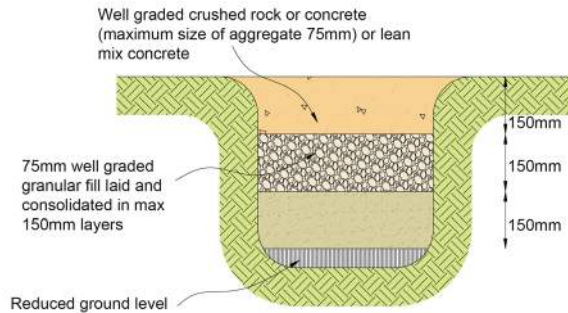


Figure 1: Backfilling of trenches

11.1.2 Laying of paths and drives

Paths and driveways should be effectively drained to prevent ponding of water adjacent to the building. Paths and drives should be laid to falls away from the building. Rain water should either discharge into a trapped gully or drained to garden land that is well drained. Gullies should

be trapped when discharging to a soakaway or combined drainage system (approval may be required by statutory sewerage undertaker).



Figure 2: Drive and pathway drainage

All paving and drives with exception of the principle level access into the dwelling should be laid at least 150mm below the damp proof course of the dwelling.

11.1.3 Sub-base

A suitable sub-base should be provided which is capable of supporting the finished surface material.

Suitable sub-base material is considered as:

- Weak mix concrete ST1 (site mixed acceptable).
- Well graded crushed stone or recycled concrete (minimum aggregate size 75mm).

The minimum thickness of sub-bases are indicated in Table 1:

Use of surface	Min sub-base thickness	Comments
Pathway	75mm	
Driveway (light duty)	100mm	Light domestic traffic
Drive (medium duty)	150mm	Suitable for carrying small lorries e.g. refuse, vehicles or fuel delivery

Table 1: Minimum thickness of sub-base

Crushed stone or recycled aggregate sub-bases should be well compacted to adequately support the pathway or drive (see Table 2).

Where the ground below the sub-base is weak or soft (typically <10% CBR), the sub-base should be designed by a Structural Engineer.

Compactor type	Compactor size	Minimum number of passes	
		100mm sub-base	150mm sub-base
Vibrating plate	1400-1800 kg/m ²	8	Unsuitable
	1800-2000 kg/m ²	5	8
	>2000 kg/m ²	3	6
Vibrating roller	700-1300 kg/m width	16	Unsuitable
	1300-1800 kg/m width	6	16
	1800-2300 kg/m width	4	6
Engine driven vibro-tamper	<65kg	5	8
	65-75kg	3	6
	>75kg	2	4

Table 2: Suitable compaction of sub-bases

11.1.4 Edgings

Edgings are to be provided to paths and driveways to prevent movement or displacement of the path or driveway. Edgings are not necessary if the driveway is in-situ concrete or any pathway made of precast concrete paving slabs laid on a mortar bed.

Edgings should be laid to ensure that there are no excessive gaps and laid with smooth alignment along the top of the edging. Concrete edgings should be bedded on a 200mm wide x 100mm deep ST1 mix concrete base. The concrete

should be haunched up the side of the edging to give adequate support.

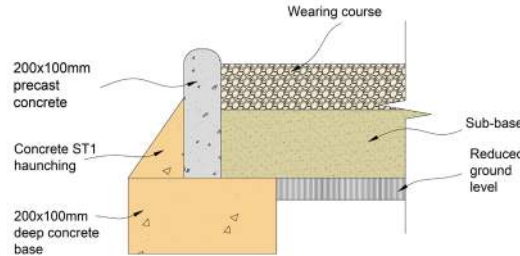


Figure 3: Typical edging detail

11.1.5 Surfacing of paths and drives

Surface variation should not exceed a difference of +/- 10mm from a 2m straight edge with equal offsets. Differences in the surface should not exceed a difference of +/- 10mm from a 2m straight edge with equal offsets. Some fracturing or weathering may also appear if the material is natural stone due to the natural make-up of the material. This tolerance applies to principle pathways and driveways to the dwelling which is required to meet the standards of Part M (Access to dwellings).

Suitable surfaces for paths and driveways

Suitable surfaces are considered as:

- Block paving;
- Pre-cast concrete paving slabs;
- Timber decking;
- Cast in-situ concrete;
- Rolled asphalt;
- Macadam.

Minimum Thickness of surfaces

Minimum thickness of surfaces are indicated in Table 3:

Surface type	Material specifications	Minimum thickness ⁽¹⁾		British Standard
		Path	Drive	
Macadam single course	40mm coated macadam	75	75	BS 4987
Rolled asphalt	Coarse asphalt 10mm nominal size	60	60	BS 594
Macadam two course	Nominal 20mm coated macadam,	60	60	BS 4987
	nominal 6mm wearing course	20	20	BS 4987
Block paving	Clay or calcium silicate	50	50	BS 6677
Block paving	Pre-cast concrete	60	60	BS 6717
Concrete	Designated mix	75	100mm ⁽²⁾	
Pre-cast concrete paving	Dense concrete	50	N/A	BS 7263:1

Notes:
⁽¹⁾ Drive minimum thickness assumes standard loadings for a typical family car, additional thicknesses are required where increased loads are applied e.g. LGV vehicles.
⁽²⁾ Drives increased to 150mm on poor ground or clay.

Table 3: Minimum thickness of surfaces for drives and paths

11.1.5.1 Paving slabs

Paving slabs should be placed on a 25mm bed of sharp sand or a semi dry mortar mix (mix ratio 3:1 sand:cement). Joints between slabs should be no greater than 4mm for straight edge paving slabs. Joints should be filled with kiln dried sand. A neat consistent joint should be provided to rustic slabs. Slabs should be cut with a diamond blade cutter or similar to give a neat finish.

11.1.5.2 Block paving

Block paving should be laid on a minimum of 50mm sharp sand, gaps between blocks should not exceed 5mm. All joints should be filled with kiln dried sand or similar. Blocks should be cut using a block splitter. The finished path or driveway should be compacted with a plate vibrator. Care should be taken to ensure that the surface of the paving is not damaged or scuffed.

11.1.5.3 Porous block paving joints

Where paving is designed to allow ground water to drain through the joints, the gaps between blocks and the material within the joints should meet the initial design specification. The joint material should be sufficient enough to prevent blocking and prevent moss growth.

11.1.5.4 In-situ concrete

In-situ concrete should be laid in maximum areas of 20m² to allow for movement. Where abutting an adjacent structure, the concrete should be isolated using a flexible jointing material. Where the sub

base is well drained, it is recommended that the concrete is cast onto a damp proof membrane.

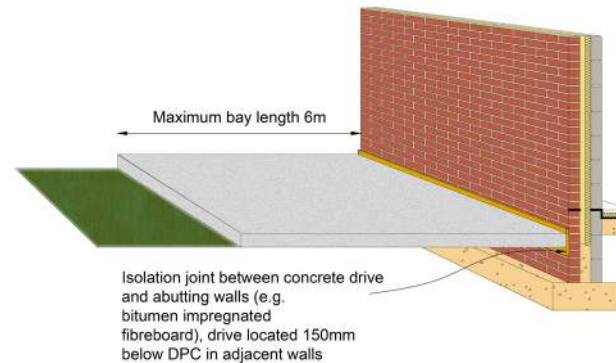


Figure 4: Typical cast in-situ drive or path abutting the dwelling

11.1.5.5 Macadam and asphalt

Ensure that sub-bases are dried and primed and that the surface is appropriately rolled with a vibratory roller to the required finish.

11.1.5.6 Timber decking

Only timber naturally resistant to decay or which can be treated by an industrial process to give longterm protection from decay shall be used.

Hardwoods: Only use species rated as durable or moderately durable.

Softwoods: Only use species / components with natural durability or which have been treated in accordance with BS EN 335 to a Use Class standard appropriate to their use i.e.

Use Class 4 treatment for posts and other structural components in direct ground or freshwater contact. Use Class 3 treatment for all components out of direct ground contact subject to frequent wetting.

Please note:

- i. Whitewood should not be used for posts embedded in the ground or for other elements (joists) in the ground or other non-permeable surface, e.g. concrete slab.
- ii. All crosscuts, notches or large boreholes shall be treated on-site with a suitable preservative. For full guidance on wood preservation specification contact The Wood Protection Association.

Timber grade (strength class): C16 minimum

The grade (strength class) of timber used for structural components such as posts, beams and joists shall be sufficient to cope with the loads placed upon it during its service life. Softwood with a strength class rating of C16 is considered the minimum standard for decks above 600mm in height and is a requirement of Building Regulations for such raised level structures. The higher strength classes, typically C18 and C24 should be specified where smaller component sections, longer spans or commercial deck performance design considerations are required.

For decks below 600mm in height the use of C16 timber is also recommended.

Posts can be made from laminated sections, solid timber or round poles and should have a load

bearing capability / size / spacing appropriate to the scale and end use of the structure. For extended life surface mounting of posts on pre-cast piers or metal shoes is recommended.

Please note:

- i. Do not exceed the recommended load and span for each strength class – refer to span tables in TDA / TRADA Timber Decking: The Professionals' Manual for detailed recommendations;
- ii. Use noggins / blocking to strengthen frames where appropriate to prevent flexing.

Timber moisture content at installation: 20% maximum.

To minimise the effects of shrinkage e.g. cupping, cracking, warping etc., install timber as close as possible to the equilibrium moisture content of the site. For outdoor wood, moisture content varies from 19% in winter to 13% in summer in the UK. For best results always install wood with moisture content lower than 20%. The stability of all wood used out of doors can be improved by the use of water repellent treatments.

Board spacing

5mm minimum – 8mm maximum: where board abuts a post allow 5mm, where board ends meet allow 3mm.

Metal fixings

All metal fixings shall be made from corrosion resistant materials such as stainless steel, hot

dipped, galvanised or other specialist coating. Before use, verify with the manufacturer that the fixings you have chosen are suitable for use with treated timber. Aluminium fasteners should not be used with treated wood. Prevent galvanic corrosion by using the same type of metal for both fixings and connectors.

Screws should be at least 2½ times the thickness of the board being fixed. Ideally, choose screws that are self-countersinking. Pre-drilling pilot holes will help prevent splitting. Always drill pilot holes 2mm oversize when fixing hardwoods. At all joist crossing points, secure boards with two fixings positioned at the outer ¼ points of the deck board, i.e. 25% in from either edge. On grooved boards, fixings should always be at the bottom of grooves. Take care using high pressure nail guns as they can damage timber.

Fall

To aid drainage, build a gentle fall of 1:100 into the deck, away from any adjacent property. Grooved deck boards are designed to assist drainage of surface water, lay them in the direction of fall.

11.1.6 Further specification references

- TDA / TRADA Timber Decking: The Professionals' Manual – second edition November 2006.
- TDA Technical Bulletin TB02: Statutory requirements.
- TDA Technical Bulletin TB04: Parapet design and construction.
- TDA Technical Bulletin TB08: Metal fixings.

- TDA Code of Practice TDA / RD 08/01: Raised timber decks on new homes - desired service life 60 years.
- Wood Protection Association: Timber Preservation Manual.

British Standards

The Standards set out below all have a relevance to the creation of high performance timber decks.

BS EN 335-1

Use Classes of wood and wood-based products against biological attack – Part 1: Classification of Use Classes.

BS EN 335-2

Use Classes of wood and wood-based products against biological attack – Part 2: Guide to the application of Use Classes to solid wood.

BS EN 335-3

Durability of wood and wood-based products – Definition of hazard classes of biological attack – Part 3: Application to wood-based panels.

BS EN 350-1

Durability of wood and wood-based products – Natural durability of solid wood – Part 1: Guide to the principles of testing and classification of the natural durability of wood.

BS EN 350-2

Durability of wood and wood-based products – Natural durability of solid wood – Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe.

BS EN 351-1

Durability of wood and wood-based products – Preservative-treated solid wood – Part 1: Classification of preservative penetration and retention.

BS EN 351-2

Durability of wood and wood-based products – Preservative-treated solid wood – Part 2: Guidance on sampling for the analysis of preservative-treated wood.

BS EN 460

Durability of wood and wood-based products – Natural durability of solid wood: Guide to the durability requirements for wood to be used in hazard classes.

BS EN 599-1

Durability of wood and wood-based products – Performance of wood preservatives as determined by biological tests – Part 1: Specification according to hazard class.

BS 8417

Preservation of timber – Recommendations. Guidance for specifiers on the treatment of timber drawing on relevant sections of BS EN Standards.

BS 5756:1985

Specification for visual strength grading of hardwood.

BS 6105:1981

Specification for corrosion resistant stainless steel fasteners.

BS 6399-1:1996

Loading for buildings. Code of Practice for dead and imposed loads.

BS 7359:1991

Nomenclature of commercial timbers, including sources of supply.

BS 5268-2:2002

Structural use of timber. Code of Practice for permissible stress design, materials and workmanship.

BS 6180:1999

Barriers in and about buildings – Code of Practice.

BS 6399-1:1996

Loading for buildings. Code of Practice for dead and imposed loads.

The following diagrams are considered as an acceptable provision to meet warranty standards:

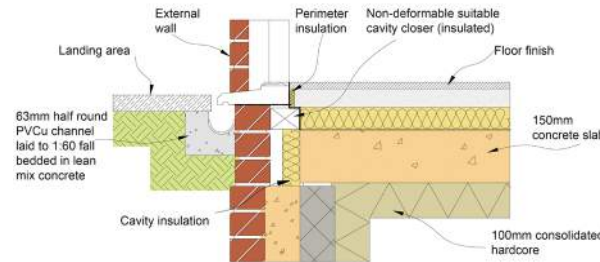


Figure 5: Level thresholds and access to dwellings

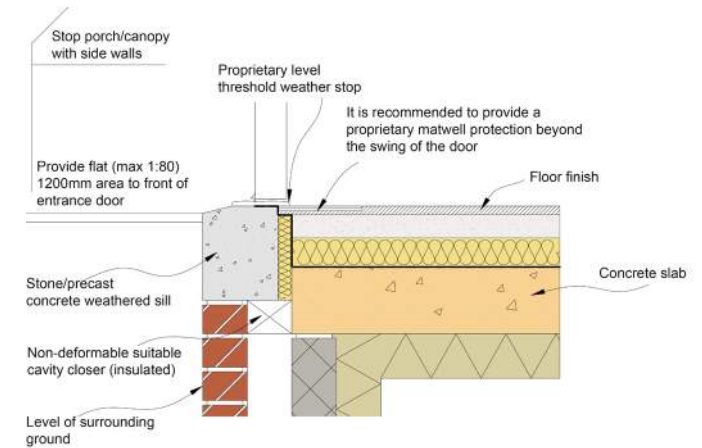


Figure 6: Typical level threshold cast in-situ concrete slab

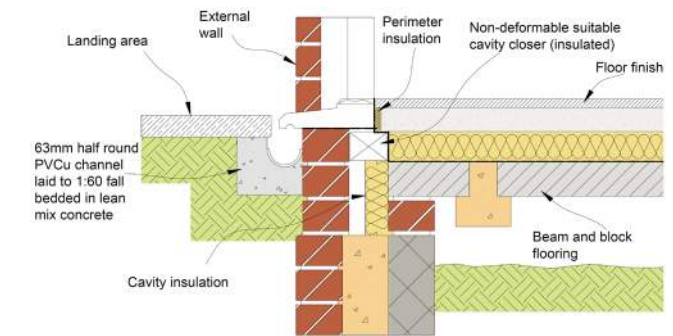


Figure 7: Level threshold cast in-situ concrete slab with canopy protection

FUNCTIONAL REQUIREMENTS

11.2 SITES SUSCEPTIBLE TO FLOODING

Workmanship

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

Materials

- i. All materials should be stored correctly in a manner which 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.

Design

- i. Design and specifications shall provide a clear indication of the design intent and demonstrate a satisfactory level of performance.
- ii. Any remedial strategy for flood risk must meet the relevant Building Regulations and other statutory requirements.
- iii. The design and construction must meet the relevant Building Regulations and other statutory requirements, British Standards and Euro-Codes.

11.2.1 Introduction

This Chapter of the Manual has been prepared to provide supplementary guidance for use by Developers, Site Audit Surveyors and others involved with new development in areas of high flood risk, in support of the Government's planning guidance on development and flood risk.

11.2.2 Planning guidance

Flooding can be caused by rivers and the sea, directly from rainfall on the ground surface (overland flows), rising groundwater levels, overwhelmed sewers and drainage systems, and from reservoirs, canals and other artificial sources.

11.2.3 Developments in England

Planning Policy Statement 25 (PPS25): Development and Flood Risk, which applies only to England, was published by Communities and Local Government in December 2006 and was subsequently revised in March 2010. It guides all parties involved in the planning and development process.

The aim of PPS25 is to ensure that flood risk is taken into account at all stages in the planning and development process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk. Under PPS25 a sequential risk-based approach to determining the suitability of land for development in flood risk areas must be undertaken. Preference should be given to

locating new development in areas at the lowest probability of flooding.

In exceptional cases, development may be permitted in areas at risk of flooding. In order to ensure that any flood risk at the site is appropriately managed, and that the development does not exacerbate flood risk in the surrounding areas, flood mitigation measures should be incorporated into the design of the development. These may include raising finished floor levels and the incorporation of flood resilient and resistant construction techniques and should make an allowance for the impacts of climate change.

PPS25 recommends that surface water flows arising from the redeveloped site should, so far as is practicable, be managed in a sustainable manner through the use of Sustainable Drainage Systems (SuDS). Typical SuDS components include soakaways, ponds, green roofs, and rainwater harvesting systems.

The Developer must demonstrate to their Site Audit Surveyor that the proposed development fulfils the above requirements

11.2.4 Developments in Wales

Technical Advice Note 15 (TAN15): Development and Flood Risk was published by the Welsh Assembly Government in July 2004 and provides guidance for assessing and managing the consequences of flood risk to a level which is acceptable for the nature and type of development, including its effects on the surrounding areas.

A precautionary framework is set out in order to ensure that development is directed to areas at lowest risk of flooding. However, TAN15 notes that some flexibility is necessary to enable the risks of flooding to be addressed whilst recognising the negative economic and social consequences if policy were to preclude development. It is the responsibility of the Local Planning Authority to determine whether development can be justified in areas at risk of flooding. If development is permitted in an area at risk of flooding appropriate flood mitigation measures should be incorporated into the design in order to ensure that the development remains safe over its lifetime, without increasing flood risk elsewhere.

TAN15 also champions the use of SuDS in the management of surface water runoff arising from the developed site.

11.2.5 Developments in Scotland

In Scotland, the requirements for flood risk management are set out in sections 196 to 211 of Scottish Planning Policy (SPP) dated February 2010, which supersedes Scottish Planning Policy 7: Planning and Flooding (February 2004). This is based on the Flood Risk Management (Scotland) Act 2009, which sets in place a statutory framework for delivering a sustainable and risk based approach to managing flood risk. The risk framework divides flood risk into three categories: little or no risk, low to medium risk, medium to high risk, and a range of details must be considered, including the characteristics of the site, the use and design of the development, the size of the area likely to flood, and the extent to which the

development, its materials and construction are designed to be water resistant. If a development is to proceed in an area where there is a risk of flooding, reference should be made to Planning Advice Note 69 (PAN 69) : Planning and Building Standards Advice (August 2004) on flooding which provides good best practice advice on planning and building standards. Guidance on the use of SuDS is provided in PAN 61: Planning and Sustainable Urban Drainage Systems, and PAN 79 Water and Drainage, both of which are currently being consolidated by the Scottish Government.

11.2.6 General principles of flood resistance design for new properties

Where a new development is proposed within areas of flood risk, measures are required to reduce the impact of flooding at both the site and surrounding areas. Such development can include new buildings and extensions to existing properties.

If a property is at low risk of flooding then steps to improve flood resistance are clearly unnecessary. The following list of general questions, which will be raised during the Technical Audit process, can help to assess whether flood protection measures are worth considering for a particular property:

- Has the property or surrounding land and gardens ever flooded in the past?
- Have neighbouring properties ever flooded?
- Is the property in a flood plain?
- Has the property been issued with a flood warning?

- Is the property close to a surface water drainage ditch or stream that could overflow?
- Is the property in a hollow or low-lying area?
- Is the property protected by river or coastal defences?

If 'No' is the answer to all of these questions the risk of flooding affecting a property is small and flood resistance measures are unlikely to be necessary. Conversely if 'Yes' is the answer to one or more of these questions then implementing flood resistance measures will be a requirement for cover under the policy to be provided.

11.2.7 The Technical Audit

In order to ensure the above is achieved it will be necessary for the plan appraisal process to include an assessment of the potential risk of flooding (by consideration of the questions identified in Chapter 11.2.6). Should a flood risk be identified on any particular site it will be necessary to include the following information in the audit process:

- A location plan at an appropriate scale that includes geographical features, street names and identifies all watercourses or other bodies of water in the vicinity;
- A plan showing site levels related to ordinance datum, both current and following development;
- An assessment of the cause of potential flooding – rivers, tidal, coastal, ground water, surface flow or any combination of these;
- A more detailed indication, if appropriate, of flood alleviation measures already in place,

detailing their state of maintenance and their performance.

11.2.8 Conclusion

All properties constructed in an identified flood risk area must be built fully in accordance with Building Control and the Environment Agency (EA) and Environment Agency Wales (EAW), best practice guidelines. Site Audit Surveyors will be required to make (and document) specific enquiries on flood risks for all properties; to liaise with Building Control, the EA and EAW and to monitor compliance with PPS25, TAN15, SPP and EA and EAW best practice advice.

This process must continue throughout the construction process, and any failure by Developers to comply with all requirements / recommendations will be notified to the Scheme Administrator.

Site Audit Surveyors will monitor all issues regarding flood aspects and specifically identify those properties encountered which are susceptible to any of the factors identified in Chapter 11.2.6 above and record details of remedial measures taken and lessons to be learnt for the future.

FUNCTIONAL REQUIREMENTS

11.3 OUTBUILDINGS

Workmanship

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

Materials

- i. All materials should be stored correctly in a manner which 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. Design and specifications shall provide a clear indication of the design intent and demonstrate a satisfactory level of performance.
- ii. Outbuildings should be constructed to adequately resist lateral and vertical loads.
- iii. Foundations should be designed and constructed to suit local ground conditions and adequately support the weight of the structure and imposed loads.
- iv. The materials and construction must meet the relevant Building Regulations and other statutory requirements. British Standards and Euro-Codes.

11.3.1 Limitations of requirements

This Chapter does not apply to outbuildings where:

- The building is heated or protected against frost damage;
- Is used as a habitable space including home offices;
- It is essential that the walls will resist wind driven rain.

11.3.2 Introduction

In order to achieve a satisfactory standard of performance, garages, conservatories, small outbuildings and extensions should be designed and constructed so that:

- They are able to sustain and transmit all normal loads to the ground, without affecting their own stability or that of the housing unit (or any adjacent buildings) by excessive deflection or deformation, which would adversely affect the appearance, value and serviceability of the building or the housing unit;
- They provide an acceptable and durable external surface and are not adversely affected by harmful or toxic materials in the atmosphere or from the ground;
- They are resistant to moisture and do not allow the passage of moisture to parts of the building which would be adversely affected by moisture;
- They encourage the rapid discharge of moisture due to rain or snow from their surfaces to suitable gutters and down pipes, or to some other form of collection and discharge,

- which prevents moisture from re-entering the building where it might have adverse effects;
- In the event of fire, they resist fire spread to the Housing Unit and to adjacent buildings;
- They are provided with sufficient locks or other devices to resist unauthorised entry;
- Where additional services installations are provided (such as central heating boilers or electrical or plumbing installations) these comply with Chapter 7 of this Manual;
- The risk of injury from accidental breakage of the glazing (where fitted) is reduced to a minimum.

A satisfactory performance for the design and construction of garages, conservatories, small outbuildings and extensions may be achieved by meeting the relevant parts of the Approved Documents.

11.3.3 Foundations

Foundations should be constructed so that loads are adequately transferred, further guidance can be found in Chapter 5 of this Manual.

11.3.4 Floors

Floors should have a minimum concrete thickness of 100mm and bear onto a suitable sub-base. The concrete should be float finished and to at least a GEN3 grade. Further guidance can be found in Chapter 6 of this Manual.

11.3.5 Walls

100mm single leaf walls are considered acceptable providing that the following provisions are met:

- The height of wall does not exceed 2400mm from ground level;
- Intermediate piers are provided in accordance with figure 7;
- The wall is adequately restrained at ceiling and verge level;
- The walls are capable of adequately transferring the roof loadings to the foundation;
- Walls are pointed both internally and externally;
- Walls should be provided with a suitable damp proof course located at least 150mm above ground level;
- Proprietary lintels should be provided over window / door openings.

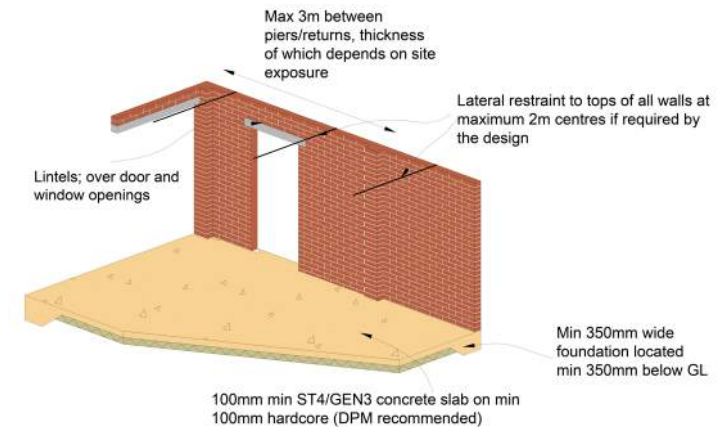


Figure 9: Small Detached Buildings

11.3.6 Roofs

Roofs should be weather tight and provided with a minimum fall of 1:40. Tiled roofs should be installed in accordance with the manufacturer's instructions including pitch, fixing and lap.

Roof structures should be durable enough to adequately support roof loadings. Timber trusses should be adequately braced and traditional cut roofs should have timber elements that meet relevant Building Regulations and supporting documents.

Further guidance can be found in Chapter 7 of this Manual

11.3.7 Walls between outbuildings

Where walls separate outbuildings between two different ownerships or tenancies, the separating wall should be taken up to the underside of the roof and fire stopped.