Building control guidance document

Domestic Extensions

Building Regulations 2010 (with 2013 amendments)
For use in Wales

May 2013 Edition

Guidance produced for Monmouthshire County Council Building Control by Anthony Gwynne of Forest of Dean District Council
Contents:

Part A: Structure
Part B: Fire safety and means of escape
Part C: Site preparation and resistance to contaminates and moisture
Part D: Toxic substances
Part E: Resistance to passage of sound
Part F: Ventilation
Part G: Sanitation, hot water safety and water efficiency
Part H: Drainage and waste disposal
Part J: Combustion appliances and fuel storage systems
Part K: Protection from falling, collision and impact (inc glazing)
Part L: Conservation of fuel and power (Existing dwellings)
Part M: Access and use of buildings (For disabled persons)
Part P: Electrical safety (Dwellings)
Materials and Workmanship
Acknowledgements for contributions to the guidance document
About the author
Guidance notes copyright
Part A: Structure

Contents
A1: Substructure
  Foundations
    (i) Site mixed concrete (Standardised Prescribed mix ST)
    (ii) Ready mixed concrete (Designated mix GEN, RC and FND)
    (iii) Hand mixed concrete
    Guidance Table 1: Concrete mixes for foundations
  Foundation types
    Strip foundations
    Guidance Diagram 1: Strip foundation section detail
    Trench fill foundations
    Guidance Diagram 2: Trench fill foundation section detail
    Guidance Diagram 3: Stepped foundation section detail
    Guidance Diagram 4: Foundation projections to piers, buttresses and chimneys
    Guidance Table 2: Minimum width of strip/trench fill foundations
    Guidance Table 3: Minimum depth of strip/trench fill foundations
  Building near trees, hedges, shrubs or in clay sub soils
    Guidance Diagram 5: Heave precautions for trench fill foundations with suspended beam and block floors in shrinkable clay sub soils
    Guidance Table 4: Minimum void dimensions and clay heave protection for foundations and suspended beam and block floors
    Guidance Diagram 5.1: Heave precautions for trench fill foundations with suspended cast in-situ reinforced concrete floor in shrinkable clay sub soils
    Guidance Table 4.1: Minimum void dimensions and clay heave protection for foundations and suspended in-situ reinforced concrete floors and beams
  Alternative foundation designs
    Raft foundations
    Guidance Diagram 6: Raft foundation section detail
    Piled foundations
  Retaining walls and basements
    Guidance Diagram 7: Basement section detail
    Basements and tanking systems
  Ground floors and sub structure walls
  Sub structure walls
    Guidance Diagram 8: Walls supporting differences in ground levels
  Ground floors
    Ground bearing solid concrete floors
    Guidance Diagram 9: Typical section through a ground bearing solid concrete floor and foundation
    Guidance Table 5: Examples of insulation for ground bearing floor slabs
    Suspended reinforced in-situ concrete ground floor slab supported on internal walls.
    Guidance Diagram 10: Typical section through a suspended reinforced in-situ concrete ground floor slab supported on internal walls.
    Suspended beam and block ground floors
    Guidance Diagram 11: Typical section through a suspended beam and block ground floor
    Guidance Table 6: Examples of insulation for suspended beam and block ground floors.
    Proprietary under floor heating systems
    Floating floors
    Guidance Table 7: Examples of insulation for floating floors
    Suspended timber ground floor
    Guidance Diagram 12: Typical section through a suspended timber ground floor
    Guidance Table 8: Examples of insulation for suspended timber ground floors
    Garage ground bearing concrete floor
    Guidance Diagram 13: Typical section through a ground bearing garage floor and foundation
A2: Superstructure
  Minimum headroom heights
  Maximum height of residential buildings up to 3 storeys
  Maximum storey heights
  Maximum wall lengths
Guidance Diagram 14: Measuring wall lengths (plan detail not to scale)
Vertical lateral restraint to walls
Minimum thickness of external walls, compartment walls and separating walls constructed of
coursed brick or block work.
Guidance Table 9: Minimum thickness of certain external walls, compartment walls and separating
walls constructed of cours ed brick or block work.
Minimum thickness of internal load-bearing walls
Buttressing wall design
Pier and chimney design providing restraint:
Buttressing, sizes of openings and recesses in cavity walls
Guidance Table 10: Compressive strength of masonry units

External cavity wall construction
Cavity wall construction
Natural stone faced cavity walls
Guidance Diagram 15: Stone faced cavity wall with concrete block backing forming clear cavity
Guidance Diagram 16: Stone faced cavity wall with concrete block backing forming clear cavity
Guidance Diagram 17: Stone faced cavity wall with cavity wall spacer system or shuttered cavity
Guidance Diagram 18: Stone faced cavity wall with cavity wall spacer system or shuttered cavity
Guidance Table 11: Cavity wall tie spacing
Guidance Table 12: Examples of partial cavity fill insulation for external cavity walls
Guidance Table 13: Examples of partial cavity fill insulation for external cavity walls
Guidance Table 14: Examples of full cavity fill insulation for external cavity walls
Guidance Table 15: Examples of full cavity fill insulation for external cavity walls
Walls between heated and un-heated areas
Guidance Table 16: Examples of insulation for solid walls between heated and un-heated areas
External timber framed walls with separate brick or block finish
Guidance Table 17: . Examples of insulation for cavity walls with internal timber frame:
Guidance Diagram 19: Typical section through external timber framed walls with separate external
brick or block wall and cavity
External timber framed walls with render finish
Guidance Diagram 20: Typical section through external timber framed walls with painted render
finish
External timber framed walls with cladding
Guidance Diagram 21: Typical section through external timber framed walls with
Upvc/timber weather board finish
Guidance Table 18: Examples of insulation for timber frame walls with external tile/render/cladding
finishes:

Detached garage (or similar single storey building) with SINGLE SKIN external walls
Guidance Diagram 22: Design criteria for small detached single storey garages or similar

Wall abutments
Lintels and weep holes
Structural columns/beams etc
Movement joints
Guidance Table 19: Movement joint widths and spacing in walls
Cavity closers
Lateral restraint strapping of upper floors to walls
(i) Strapping of floor joists parallel to walls
Guidance Diagram 23: Strapping of floor joists parallel to walls
(ii) Strapping of floor joists at right angles to walls
Guidance Diagram 24: Strapping of floor joists at right angles to walls
Lateral restraint strapping of roofs to walls
Strapping of roofs to gable end walls
Guidance Diagram 25: Strapping of roofs to gable end walls
Strapping of wall plates and roofs at eaves level
Guidance Diagram 26: Strapping of wall plates and roofs at eaves level
Lateral restraint strapping of walls at ceiling level

A3: Separating walls and floors
Masonry party walls separating dwellings
Guidance Diagram 27: Section detail of masonry separating wall as Wall type 2.1 of ADE
Double leaf timber frame party walls separating dwellings
Guidance Diagram 28: Plan detail of timber stud separating wall as Wall type 4.1 (new buildings) of
ADE
Upgrading sound insulation of existing party walls separating dwellings

4
Guidance Diagram 29: Plan of upgrading masonry separating wall as Wall type 4.2 (material change of use) of ADE
Party floors separating buildings
Sound testing requirements
A4: Internal partitions
- Internal load bearing masonry partitions
- Internal load bearing timber stud partitions
- Internal masonry non-load bearing partitions
- Internal timber studwork non-load bearing partitions
A5: Intermediate upper floor(s)
- Floor Joists
  Guidance Table 20: Timber sizes and spans for domestic floor joists (Strength Class C24)
  Trimming and trimmer joists
  Guidance Table 21: Timber sizes and spans for trimmer joist supporting trimmed joists
  (Strength Class C24)
  Guidance Table 22: Timber sizes and spans for trimmer joist supporting trimmer joist
  (Strength Class C24)
  Guidance Diagram 30: Typical plan layout of opening formed in suspended timber floor(s) using
  trimming, trimmer and trimmed joists.
- Notching and drilling of structural timbers
- Sound insulation to floors within the dwelling
- Soil and vent pipe (SVP) boxing internally
- Exposed intermediate upper floors
- Guidance Diagram 31: Typical section through an upper floor
- Guidance Table 23: Examples of insulation for exposed upper floors
A6: Pitched roofs
- Pitched roof coverings
- Pitched roof structure
  (i) Roof trusses (including attic and girder trusses)
  (ii) Cut roof construction
- Notching and drilling of structural timbers
- Guidance Diagram 32: Typical section through pitched roof with ceiling joists at wall plate level
- Guidance Diagram 33: Typical section through a pitched roof with purlins and high collars
- Guidance Table 24: timber sizes and permissible clear spans for single span common jack rafters
  at 400mm spacing (Strength Class C24)
- Guidance Table 25: Timber sizes and permissible clear spans for purlins
  (Strength Class C24)
- Guidance Table 26: Timber size and permissible clear spans for ceiling joists at 400mm spacing
  (Strength Class C24)
- Guidance Table 27: Timber sizes and permissible clear spans for ceiling binders
  (Strength Class C24)
- Roof restraint
- Roof insulation and ventilation gaps
- Guidance Table 28: Examples of roof insulation fixed between/under rafters.
- Guidance Table 29: Examples of roof insulation laid horizontally between and over ceiling joists
- Guidance Table 30: Examples of roof insulation fixed over/between rafters
- Guidance Diagram 34: Typical section through a dormer roof (not to scale)
- Guidance Diagram 35: Typical roof valley detail
- Guidance Diagram 36: Typical lean too roof abutment with cavity wall detail
- Pitched roof ventilation requirements when using a non breathable roof membrane
  (i) Duo pitched roof with horizontal ceilings and insulation at ceiling level
  (ii) Mono pitched roofs with horizontal ceilings and insulation at ceiling level
  (iii) Duo pitched roof with insulation following slope of rafters (rooms in the roof)
  Proprietary vapour permeable roof membrane
  Valleys and lead work
- Lofts hatches, doors and Light wells to roof spaces
A7: Flat roof construction
- 4 options as follows:
  Option 1. Flat roof with ‘cold deck’
  Flat roofs with unlimited access/habitable use
  Guidance Diagram 37: Typical section through a flat roof with ‘cold deck’
  Guidance Table 31: Examples of ‘cold roof’ insulation fixed between/under flat roof joists
  Option 2. Flat roof with ‘warm deck’
Flat roofs with unlimited access/habitable use
Guidance Diagram 38: Typical section through a flat roof with 'warm deck' Guidance
Table 32: Examples of 'warm roof' insulation fixed above flat roof joists Option 3. Flat roof with inverted 'warm deck' (insulation on top of waterproof coverings) Option 4. Flat roof with green roof on 'warm deck' (Either intensive or extensive) Intensive green roof Extensive green roof
The design, workmanship and selection of materials for flat roofs
Cavity closers
Guidance Table 33: Timber sizes and permissible clear spans for joists for flat roofs - with access and use for maintenance and repairs only (Strength Class C24)
Guidance Table 34: Timber sizes and permissible clear spans for joists for flat roofs - with unlimited access (Strength Class C24)
A8: Mortars, renders and gypsum plasters
Cement mortars and renders
Guidance Table 35: Cement mortar - general mix ratio
Guidance Table 36: Cement render - general mix ratio
Guidance Table 37: Thickness of render coats
Gypsum plasters
Guidance Table 38: Gypsum plaster for internal finishes - general mix ratio
Foundations

Concrete mixes for foundations
Foundation work to comply with BS 8000:1, 2 and 5 and BS 8004. General purpose concrete mixes for non hazardous conditions to comply with BS 8500 and BS EN 206-1.

(i) Site mixed concrete (Standardised Prescribed mix ST)
Site mixed concrete for domestic construction activities to be in accordance with the guidance table below, designed using materials and mix proportions given in BS 5328: 1 Section 4. Standard mixes should not be used in soils, ground waters or adjoining materials containing sulphates or other aggressive chemicals.

(ii) Ready mixed concrete (Designated mix GEN, RC and FND)
Ready mixed concrete designed and specified in accordance with BS 5328:1 Section 5, produced and mixed under quality controlled conditions in accordance with BS EN ISO 9001. Note: GEN to be used for general purposes, RC is used for reinforced concrete and FND to be used in soils containing sulphates, in accordance with the guidance table below.

(iii) Hand mixed concrete
Hand mixed concrete proportions must be agreed with building control before works commence on site.

Guidance Table 1: Concrete mixes for foundations

<table>
<thead>
<tr>
<th>Application</th>
<th>Site mixed (Standardised prescribed mix)</th>
<th>Ready mixed (Designated mix)</th>
<th>Compaction method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blinding, Strip foundations, trench fill foundations and mass concrete fill</td>
<td>ST2</td>
<td>GEN1</td>
<td>Mechanical vibration/ poker or tamping by hand</td>
</tr>
<tr>
<td>Reinforced concrete foundations (i.e. raft foundation)</td>
<td>Designed by a suitably qualified specialist</td>
<td>RC35- designed by a suitably qualified specialist</td>
<td>Designed and specified by a suitably qualified specialist</td>
</tr>
<tr>
<td>Foundations in sulphate Conditions*</td>
<td>n/a</td>
<td>FND- designed by a suitably qualified specialist</td>
<td>Designed and specified by a suitably qualified specialist</td>
</tr>
</tbody>
</table>

Notes: *Foundations in sulphate conditions to be in accordance with BS 5328:1 Table 7a
Foundation types

Strip foundations
Strip foundations to have a minimum width in accordance with the table below (typically 600mm wide for 300mm thick cavity walls and 450mm wide for 100mm thick walls), a minimum thickness of 150mm (typically 225mm in practice) and minimum depth below ground level in accordance with the guidance table below and as required by building control. Maximum depth is to be restricted to 1.0m deep for health and safety for persons working in trenches. Foundation for three storey buildings should be designed by a suitably qualified person i.e. structural engineer. Any services should pass through the sub structure walls protected by precast concrete lintels and not through the foundation - for more details see pipes penetrating though walls in Part H of this guidance. Foundations should be located centrally under all external and internal walls and taken to a depth below the influence of drains and or surrounding trees and taken to natural undisturbed ground of adequate ground bearing capacity.

Guidance Diagram 1: Strip foundation section detail (not to scale)
See Diagram 23 of ADA for full details

Trench fill foundations
Trench fill foundations to have a minimum width of 450/500mm, a minimum thickness and a minimum depth below external ground level in accordance with the guidance diagram and tables below and as required by building control. Foundation for three storey buildings or depths in excess of 2.5m should be designed by a suitably qualified person i.e. structural engineer. Any services passing through trench fill concrete should be ducted or sleeved or wrapped in flexible material (e.g. fiberglass and polythene sheet fixed around drainage pipes or services to allow space for movement and to prevent differential movement damaging the services). Pipes through foundations should have flexible joints either side of the foundation- see pipes penetrating though walls in Part H of this guidance for more details. Foundations should be located centrally under all external and internal walls and taken to a depth below the influence of drains and or surrounding trees and taken to natural undisturbed ground of adequate ground bearing capacity.

Guidance Diagram 2: Trench fill foundation section detail (not to scale)
Guidance Diagram 3: Stepped foundation section detail (not to scale)
Steps in strip foundations should not exceed its thickness and should overlap by twice its thickness or 300mm if greater as detailed in the simplified diagram below (see Diagram 21 of ADA for full details).

Guidance Diagram 4: Foundation projections to piers, buttresses and chimneys
(Plan detail not to scale) see Diagram 22 of ADA for full details.

Guidance Table 2: Minimum width of strip/trench fill foundations
(See Table 10 of ADA for full details)

<table>
<thead>
<tr>
<th>Type of ground (including engineered fill)</th>
<th>Condition of ground</th>
<th>Field test applicable</th>
<th>Total load of load-bearing walling not more than (kN/linear metre)</th>
<th>Minimum width of strip/trench fill foundation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Rock</td>
<td>Not inferior to sandstone, limestone Or firm chalk</td>
<td>Requires at least a pneumatic or other mechanically operated pick for excavation</td>
<td>20 30 40 50 60 70</td>
<td>In each case equal to the width of the wall</td>
</tr>
<tr>
<td>II Gravel or sand</td>
<td>Medium dense</td>
<td>Requires pick for excavation. Wooden peg 50mm square cross section hard to drive beyond 150mm</td>
<td>250 300 400 500 600 650</td>
<td></td>
</tr>
<tr>
<td>III Clay Sand clay</td>
<td>Stiff</td>
<td>Can be indented slightly by thumb</td>
<td>250 300 400 500 600 650</td>
<td></td>
</tr>
<tr>
<td>IV Clay Sand clay</td>
<td>Firm</td>
<td>Thumb make impression easily</td>
<td>300 350 450 600 750 850</td>
<td></td>
</tr>
<tr>
<td>V Sand Silty sand Clayey sand</td>
<td>Loose</td>
<td>Can be excavated with a spade. Wooden peg 50mm square cross section can be easily driven</td>
<td>400 600 Note: Foundations on soil type V do not fall within the provisions of this section if the total load exceeds 30kN/m</td>
<td></td>
</tr>
<tr>
<td>VI Silt Clay Sandy clay or silt</td>
<td>Soft</td>
<td>Finger pushed in up to 10mm</td>
<td>450 650 Note: Foundations on soil type V I do not fall within the provisions of this section if the total load exceeds 30kN/m</td>
<td></td>
</tr>
</tbody>
</table>

The table is applicable only within the strict terms of the criteria described within it.
Guidance Table 3: Minimum depth of strip/trench fill foundations
(to be in compliance with paragraph 2E4 of ADA)

<table>
<thead>
<tr>
<th>Ground condition</th>
<th>Minimum foundation depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock or low shrinkage firm natural gravel, sand or chalk sub soils (not clays or silts)</td>
<td>450mm minimum in frost susceptible soils</td>
</tr>
<tr>
<td>Low shrinkage clay sub soils²</td>
<td>750mm³</td>
</tr>
<tr>
<td>Medium to High shrinkage clay sub soils²</td>
<td>900 - 1000mm⁴</td>
</tr>
</tbody>
</table>

Note 1: Minimum foundation depth is taken from external ground level to formation level (trench bottom). If finished ground level is above existing ground level and freezing is likely to occur, the foundation depth should be taken from the existing ground level and not the finished levels.

Note 2: Clay with a Modified Plasticity Index less than 20% has a low volume change potential in accordance with BRE Digest 240

Note 3: Clay with a Modified Plasticity Index 20 to 40% has a medium volume change potential and 40 to 60% has a high volume change potential in accordance with BRE Digest 240

Note 4: Foundations should be taken to a depth below the influence of drains and or surrounding trees and taken to natural undisturbed ground of adequate ground bearing capacity to support the total loads of the building to the approval of the building control surveyor.

Building near trees, hedges, shrubs or in clay sub soils

Foundations in shrinkable cohesive clay soils to be taken to a depth below the influence of any existing or proposed trees, hedges or shrubs near the building which can take moisture from the ground, causing significant volume changes, resulting in possible ground settlement and damage to the foundations and building.

Foundation depths should be in accordance with the NHBC foundation depth calculator (or other foundation depth calculator acceptable by building control) which calculates the foundation depth from the type of sub soil and tree type including the mature height and water demand.

Calculators obtained at a charge from: www.nhbc.co.uk

Foundations, substructure and services should incorporate adequate precautions to prevent excessive movement due to ground heave in shrinkable clay sub soils in accordance with design details from a suitably qualified specialist. Typical heave precautions for trench fill foundations with suspended floors in shrinkable sub soils should be carried out in accordance with requirements of building control and the guidance diagrams and tables below.

Guidance Diagram 5: Heave precautions for trench fill foundations with suspended beam and block floors in shrinkable clay sub soils (section detail not to scale)
Guidance Table 4: Minimum void dimensions and clay heave protection for foundations and suspended beam and block floors

<table>
<thead>
<tr>
<th>Volume change potential in soil</th>
<th>Minimum NHBC void dimension against side of foundation (mm)¹</th>
<th>Thickness of 'Claymaster' against side of foundation (mm)²</th>
<th>Minimum NHBC void dimension under suspended beam and block floors (mm)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low shrinkage clay sub soils (10-20%)</td>
<td>0</td>
<td>Not required</td>
<td>200</td>
</tr>
<tr>
<td>Medium shrinkage clay sub soils (20-40%)</td>
<td>25</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>High shrinkage clay sub soils (40-60%)</td>
<td>35</td>
<td>75</td>
<td>300</td>
</tr>
</tbody>
</table>

Notes: ¹The void dimension is measured from the underside of the beam/joist to the top of the ground level under the floor (includes 150mm ventilated void). Where the void beneath suspended floors are liable to flooding, drainage is to be provided.
²Compressible 'Claymaster' products to be installed in accordance with the manufacturer’s details. Information and products can be obtained from: www.cordek.com or other approved compressible products with BBA or other approved technical accreditation.
Source: includes information from The NHBC (www.nhbc.co.uk) and information from CORDEK Ltd
(Reproduced by kind permission from Cordek)

Guidance Diagram 5.1: Heave precautions for trench fill foundations with suspended cast in-situ reinforced concrete floor in shrinkable clay sub soils (section detail not to scale)
### Guidance Table 4.1: Minimum void dimensions and clay heave protection for foundations and suspended in-situ reinforced concrete floors and beams

<table>
<thead>
<tr>
<th>Volume change potential in soil</th>
<th>Minimum NHBC void dimension against side of foundation (mm)¹</th>
<th>Thickness of 'Claymaster' against side of foundation (mm)²</th>
<th>Minimum NHBC void dimension under suspended in-situ reinforced concrete floors and beams (mm)¹</th>
<th>Thickness of 'Cellcore' under suspended in-situ reinforced concrete floors and beams (mm)²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low shrinkage clay sub soils (10-20%)</td>
<td>0</td>
<td>Not required</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>Medium shrinkage clay sub soils (20-40%)</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>160</td>
</tr>
<tr>
<td>High shrinkage clay sub soils (40-60%)</td>
<td>35</td>
<td>75</td>
<td>150</td>
<td>225</td>
</tr>
</tbody>
</table>

**Notes:**
¹The void dimension should be able to accommodate the clay heave and compressible product. The void dimension shown is the minimum void dimension after collapse of the compressible product. Compressible products to be installed in accordance with the manufacturer's details. Where the void beneath suspended floors are liable to flooding, drainage is to be provided.

²Compressible 'Claymaster' and 'Cellcore' products to be installed in accordance with the manufacturer's details. Information and products can be obtained from: [www.cordek.com](http://www.cordek.com) or other approved compressible products with BBA or other approved technical accreditation.

Source: includes information from The NHBC ([www.nhbc.co.uk](http://www.nhbc.co.uk)) and information from CORDEK Ltd (Reproduced by kind permission from Cordek)
Alternative foundation designs
Alternative foundation designs, i.e. raft foundations (as detailed below) and pile foundations are required instead of strip foundations on soft/loose soils or filled areas which have low bearing capacity and should be designed for the particular project by a suitably qualified person and design should be approved by building control before works commence on site. Note: insulation details in this guidance is to be read in conjunction with Part L of this guidance.

Raft foundations
Raft foundations should be designed for the particular project by a suitably qualified specialist (i.e. structural engineer) constructed normally as a cast in-situ reinforced concrete slab with thickened edges normally 450mm below ground level typically as detailed in the guidance diagram below.

Guidance Diagram 6: Raft foundation section detail (not to scale)
Suitable for basic and full radon protection (U-value 0.22 W/m².K)

Piled foundations
Piled foundations should be designed by a suitably qualified specialist (i.e. structural engineer) for a particular project and is outside the scope of this guidance.
Retaining walls and basements

Retaining walls and basements (typically as detailed below) to be designed for the particular project by a suitably qualified person (i.e. structural engineer) and the design should be approved by building control before works commence on site.

Guidance Diagram 7: Basement section detail (not to scale) Suitable for basic and full radon protection (U-value 0.22 W/m².k)

The diagram below contains suggested construction details only and the actual details must be in accordance with a structural engineers details and calculations. The tanking and insulation details in the diagram below are suggested details only and the actual details must be in accordance with a tanking specialist and insulation specialists details and specification which has been produced for the particular project as detailed in the guidance commentary below the diagram.

Notes:
1. All pipe/service penetrations through the sub structure should be avoided
2. Radon gas sump and depressurisation pipe for full radon gas protection to be installed below the concrete slab & upstand extended above ground level with cap & radon pipe signage ready for connection of future radon gas fan & flue if required by building control for full radon gas protection
3. Suggested construction details have been indicated above- actual design to be carried out in accordance with Structural Engineers details and calculations which must be approved by building control before works commence on site.
4. Condensation risk analysis to be carried out by specialist for a particular situation/project and proposed tanking/insulation system.
Basements and tanking systems

**Site investigation and risk assessment** to be carried out before works commence to establish: ground conditions and water table levels, presence of any contaminants and radon gas, including location of drains and services etc.

**Basement sub structures** to be constructed in compliance with structural engineers details and calculations suitable for the ground conditions, loadings and proposed tanking system.

Provide all necessary temporary protection, support, shoring and working platforms etc in compliance with current health and safety requirements and structural engineer’s details which are to be erected, maintained, certificated, dismantled and removed by suitably qualified and insured specialist.

**Tanking systems** providing either barrier, structural or drained protection to the building must be assessed, designed and installed for the particular project in compliance with BS 8102: 2009 Code of Practice for Protection of Below Ground Structures Against Water from The Ground. Tanking systems can be installed internally or externally in accordance with a tanking specialists details.

The illustrated tanking section details above are suggested details only and actual details must be approved by building control before works commence on site. Forms of tanking include: bonded sheet materials; liquid applied membranes; mastic asphalt, drained cavity membranes and cementitious crystallization and cementitious multi coat renders.

Suitable tanking systems to have British Board of Agreement (BBA or other approved third party) accreditation and individually assessed by a tanking specialist as suitable for the proposed situation.

Tanking systems must be designed/installed/applied by a tanking specialist for the particular project in compliance with tanking manufacturer’s details to resist the passage of water into the building and prevent condensation and mould growth within the building and where required prevent radon gas entering the building.

Tanking systems to be properly connected to and made continuous with wall damp proof courses/radon dpc trays. Perforation of the tanking system by service entry pipes etc should be avoided or carried out strictly in accordance with the tanking manufacturer’s details.

**Important note:** The risk of condensation with any tanking system should be assessed by a specialist, a condensation risk analysis should be carried out for the particular project and the tanking and thermal insulation system should be designed and installed to prevent any potential condensation/interstitial condensation problems.
Ground floors and sub structure walls

Sub structure walls
Walls below DPC level up to 1m deep are to be constructed with two skins of 7N/mm² 100mm or 140mm if over 1m deep concrete blocks 1:3 - 4 cement mortar with plasticiser and in-filled with concrete to a maximum of 225mm below DPC level. Block and cavity width and wall tie spacing, etc, to be same as the wall above, but with a row of wall ties to support the cavity wall insulation below DPC level. All materials to be frost resistant. If sulphates are present in the ground- use sulphate resisting cement.

Guidance Diagram 8: Walls supporting differences in ground levels (not to scale)
See Diagram 11 of ADA for full details

Combined dead and imposed load W should not exceed 70kN/m at base of wall

Note: Where the cavity wall retains higher external ground levels, the ground must be level for a distance not less than 1.25 x H
Ground floors

Ground bearing solid concrete floors (U-value 0.22 W/m².K)
Is suitable for areas where basic radon protection is required but is not suitable where full radon protection is required or for use over clay sub soils which can shrink or heave and damage the floor.

Topsoil and vegetable matter to be cleared from site and floor area to be in filled between walls with minimum 150mm/maximum 600mm clean, sand blinded, mechanically compacted, hardcore. 1200g (300 micrometer) continuous polythene damp proof membrane (DPM) and radon gas proof barrier is to be laid over sand blinded hardcore, lapped and sealed at all joints and linked to DPC’s in walls. To provide basic protection from radon gas, the damp-proof course within the cavity wall should be in the form of a cavity tray and sealed to DPM to prevent radon from entering the building through the cavity. Sealing of joints in the barrier and sealing around service penetrations are also required with radon gas proof tape in compliance with part C of this guidance.

Lay floor grade insulation over DPM, minimum thickness and type in accordance with the guidance table below including 25mm thick insulated up-stands between slab and external walls.

Lay 100mm minimum thick ST2, or Gen1 concrete floor slab with a trowel smooth surface ready for finishes over insulation, (note: 500g polythene separating layer is to be installed between the concrete slab and insulation if using a foil faced polyurethane/ PIR type insulation board.) Insulation to be omitted and concrete thickness increased in areas where non-load bearing partitions are to be built off the floor slab (load bearing partitions should be built off a foundation). Where area of fill exceeds 600mm the floor is to be suspended as detailed in this guidance.

Guidance Diagram 9: Typical section through a ground bearing solid concrete floor and foundation. (not to scale)

*Note: Ground supported floor slabs are only suitable for basic radon protection- see other options in guidance for full radon protection.
**Guidance Table 5: Examples of insulation for ground bearing floor slabs**

U-value no worse than 0.22 W/m²K

**NOTE:** Where P/A ratio has not been calculated use insulation thickness stated in 1.0*

<table>
<thead>
<tr>
<th>Insulation product</th>
<th>K value</th>
<th>Calculated Perimeter/Area ratio (P/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.0*</td>
<td>0.9</td>
</tr>
<tr>
<td>Kingspan Kooltherm K3 Floorboard</td>
<td>0.020-0.023</td>
<td>75</td>
</tr>
<tr>
<td>Celotex GA4000</td>
<td>0.022</td>
<td>80</td>
</tr>
<tr>
<td>Jablite Jabfloor Premium</td>
<td>0.030</td>
<td>105</td>
</tr>
<tr>
<td>Styrofoam Floormate 300A and Knauf Polyfoam Floorboard</td>
<td>0.035</td>
<td>110</td>
</tr>
<tr>
<td>Rockwool Rockfloor</td>
<td>0.038 (50-100mm)</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>0.040 (25-40mm)</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Figures indicated above should be rounded up to the insulation manufacturer's nearest thickness

Note 2.* Where P/A ratio has not been calculated use insulation thickness stated in 1.0* above

Note 3. Insulation to be installed in accordance with manufacturer's details

Suspended reinforced in-situ concrete ground floor slab supported on internal walls. (U-value 0.22 W/m².K) Is suitable for areas where basic or full radon protection is required. Is suitable for use over clay sub soils which can shrink or heave.

Topsoil and vegetable matter to be cleared from site and floor area to be in filled between walls with minimum 150mm/maximum 600mm clean sand blinded compacted hardcore. Minimum void dimensions and compressible materials below slab in clay sub soils to be in accordance with guidance diagram and table above (in clay sub soils, the floor slab should be designed and restrained to prevent uplift from the compressible materials). Where full radon protection is required, a sub floor sump, depressurisation pipe with up stand is to be positioned below the concrete floor slab and compressible materials in radon gas permeable hardcore-in accordance with sump manufacturer's details and part C of this guidance. Shutter and cast reinforced concrete floor slab supported on inner leaf of the cavity wall in accordance with structural engineers details and calculations to prevent settlement of the slab and rupture of the radon-proof barrier. 1200g (300 micrometer) continuous polythene damp proof membrane (DPM)/radon gas proof barrier is to be laid over concrete slab surface, lapped and sealed at all joints and linked to DPC’s in walls. To provide basic protection from radon gas, the damp-proof course within the cavity wall should be in the form of a cavity tray and sealed to DPM to prevent radon from entering the building through the cavity. Sealing of joints in the barrier and sealing around service penetrations are also required with radon gas proof tape.

Floor grade insulation to be laid over DPM, minimum thickness and type in accordance with guidance table including 25mm thick insulated up-stands between slab and external walls. 75mm sand/cement thick structural screed (mix between 1:3 - 1:4½). Laid over insulation with trowel smooth finish ready for finishes, screed area should be limited to room sizes, floor areas exceeding 40m² should have expansion/contraction joints as detailed in the note below. Screed be laid over insulation with a trowel smooth surface ready for finishes. (500g polythene separating layer is to be installed between the screed and insulation if using a foil faced polyurethane/PIR type insulation board.) Insulation to be omitted in areas where non-load bearing partitions are built off the floor slab. See guidance below for installation of proprietary under floor heating system.

Guidance Diagram 10: Typical section through a suspended reinforced in-situ concrete ground floor slab supported on internal walls. (not to scale)
**Suspended beam and block ground floors** (U-value 0.22 W/m².k)

*Is suitable for areas where basic and full radon protection is required. Is suitable for use over clay sub soils which can shrink or heave.*

Remove top soil and vegetation and lay to 1:80 falls to outside of building, minimum void dimension below underside of suspended floor to be in accordance with the guidance above. PCC beams to be supplied and fixed in accordance with beam manufacturer’s plan layouts and details. (copies to be sent to Building Control and approved before works commence on site).

Typically for domestic loading, pre-stressed beams to have 100mm minimum bearing onto DPC course and load bearing walls. All garage floors to be designed suitable for loadings. Wet and grout all joints with 1:4 cement/ sand mix. Below non-load bearing parallel partitions provide double beams. Sub structure void to be vented on opposing sides to provide cross ventilation using 225 X 150mm proprietary ventilators at 2m centers and 450mm from wall corners, sub floor level to be above external ground levels and if the void is liable to flood, drainage is to be provided. 1200g (300 micrometer) continuous polythene damp proof membrane (DPM) and radon gas proof barrier is to be laid over beam and block floor, taken across cavity, cut back from face of masonry wall by at least 15mm to avoid capillary action and ingress of water, lapped and sealed at all joints and linked to DPC’s in walls. To provide basic radon gas protection, the damp-proof course within the cavity wall should be in the form of a cavity tray and sealed to the DPM to prevent radon gas from entering the building through the cavity. Sealing of joints in the barrier and sealing around service penetrations are also required with radon gas proof tape. Where full radon protection is required, provision is to be made for connection of future depressurization pipe to vented floor and up stand in accordance with manufacturer’s details. Floor grade insulation to be laid over DPM, minimum thickness and type of insulation to be in accordance with guidance table below including 25mm thick insulated up-stands between screed and external walls. 75mm sand/cement thick structural screed (mix between 1:3 - 1:4½). Laid over insulation with trowel smooth finish ready for finishes, screed area should be limited to room sizes, floor areas exceeding 40m² should have expansion/contraction joints as detailed in the note below (500g polythene separating layer is to be installed between the concrete slab and insulation if using a foil faced polyurethane/PIR type insulation board.) Insulation to be omitted where non-load bearing partitions are built off the beams to beam manufacturer’s design details. See guidance below for installation of proprietary under floor heating system.

**Guidance Diagram 11:** Typical section through a suspended beam and block ground floor (not to scale)

Notes: *For full radon protection a radon gas fan and flue should be connected to the floor vents if required*  
**Not suitable full radon protection at clay sub soils which may shrink/heave- where radon gas proof membrane should be fitted above suspended floor to prevent if rupturing*
Guidance Table 6: Examples of insulation for suspended beam and block ground floors.
U-value no worse than 0.22 W/m²k. Block K value = 0.18.
NOTE: Where P/A ratio has not been calculated use insulation thickness stated in 1.0*

<table>
<thead>
<tr>
<th>Insulation product</th>
<th>K value</th>
<th>Calculated Perimeter/Area ratio (P/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.0*</td>
<td>0.9</td>
</tr>
<tr>
<td>Kingspan Kooltherm K3 Floorboard</td>
<td>0.020-0.023</td>
<td>65</td>
</tr>
<tr>
<td>Celotex GA4000</td>
<td>0.022</td>
<td>75</td>
</tr>
<tr>
<td>Jablite Jabfloor Premium</td>
<td>0.030</td>
<td>95</td>
</tr>
<tr>
<td>Styrofoam Floormate 300A and Knauf Polyfoam Floorboard</td>
<td>0.035</td>
<td>100</td>
</tr>
<tr>
<td>Rockwool Rockfloor</td>
<td>0.038 (50-100mm) 0.040 (25-40mm)</td>
<td>130</td>
</tr>
</tbody>
</table>

Note 1. Figures indicated above should be rounded up to the insulation manufacturer's nearest thickness
Note 2. Where P/A ratio has not been calculated use insulation thickness stated in 1.0* above
Note 3. Insulation to be installed in accordance with manufacturer's details

Proprietary under floor heating systems
Proprietary under floor heating system to be installed it should be fixed above insulation and under screed layer in compliance with heating pipe manufacturer's/heating specialist details. Screeds over under floor heating should be sub divided into bays not exceeding 40m² in area. Expansion/contraction joints in screeds should be consistent with joints in slabs, and pipes protected in accordance with heating pipe manufacturer's/heating specialist details.

Floating floors
Alternatively instead of cement/sand floor screed, a floating timber board floor to be laid over the insulation using 22mm minimum thick moisture resistant tongue and grooved timber floor board sheets with all joints glued and pinned and secured at perimeters by skirting boards, with allowance for expansion joints in compliance with floor board manufacturer's details (typically 10-15mm) and current BS EN standards. Minimum thickness and type of insulation as table below

Guidance Table 7: Examples of insulation for floating floors U-value no worse than 0.22 W/m²k
NOTE: Where P/A ratio has not been calculated use insulation thickness stated in 1.0*

<table>
<thead>
<tr>
<th>Insulation product</th>
<th>K-value</th>
<th>Calculated Perimeter/Area ratio (P/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.0*</td>
<td>0.9</td>
</tr>
<tr>
<td>Kingspan Kooltherm K3 Floorboard</td>
<td>0.020-0.023</td>
<td>95</td>
</tr>
<tr>
<td>Kingspan Thermafloor TF70 and Celotex GA4000</td>
<td>0.022</td>
<td>75</td>
</tr>
</tbody>
</table>

Note 1. Figures indicated above should be rounded up to the insulation manufacturer's nearest thickness. Note 2* Where P/A ratio has not been calculated use insulation thickness stated in 1.0* above
Note 3. Insulation to be installed in accordance with manufacturer's details
**Suspended timber ground floor (U-value 0.22 W/m².k)**

Is suitable for areas where basic radon protection is required and is not suitable in clay sub soils which can heave and rupture the sub floor radon membrane and damage the floor.

Remove top soil and vegetation and 150mm min thick sand blindered hardcore, lay 100mm min thick concrete over site at 1:80 gradient to outside of building (concrete mix should be in accordance with BS 8110, BS 5328, mix type ST2 or GEN1 or RC grade if reinforcement is required), on 1200g (300 micrometer) damp proof membrane (DPM)/radon gas proof membrane which should extend across foot print of building and cavity wall for basic radon gas protection.

Radon barrier should be no more than 225mm below external ground level and positioned to prevent water collection. A sub floor sump, depressurization pipe with up stand is to be positioned below the over site concrete floor slab in radon gas permeable hardcore—in accordance with sump manufacturer’s details and Part C of this guidance below.

Allow a ventilated air space at least 75mm from the top of the over site concrete to the underside of any wall plates and at least 150mm to the underside of the suspended timber floor or insulation. Provide sub floor ventilation using 225 x 75mm grilled air bricks and proprietary telescopic vents through two opposing external walls at 2m centers and 450mm from wall corners to vent all parts of the floor void. If the floor void is liable to flood a beam and block floor should be used instead of timber. Joists to be built into walls off dpc and sealed with silicon or supported off proprietary heavy duty galvanized joist hangers built into new masonry walls or fixed to treated timber wall plate (same size as joists), resin bolted to existing walls at 600mm centers using 16mm diameter high tensile bolts. Where necessary, floor joists can be supported in the span on treated wall plates and damp proof course (DPC) onto masonry honeycombed sleeper walls built off over site concrete. Floor joists sizes should be in accordance with upper floor guidance table below (depth to be increased where necessary to match floor levels). Proprietary galvanized steel strutting to be fixed at mid span for 2.5 - 4.5m span and 2 rows at 1/3rd points for spans over 4.5m. Floor to be insulated in accordance with the guidance table below and friction fixed between joists. Fix 22mm thick moisture resistant tongue and grooved timber floor boards laid with joints staggered, long edge fixed across the joists and all joints positioned over joists/noggin. All boards to be glued and screwed to floor joists with all joints glued (using water proof glue) and pinned, in accordance with floor board manufacturer’s details and current BS EN standards. Allow expansion gap around wall perimeters as manufacturer’s details (typically 10-15mm).

**Guidance Diagram 12: Typical section through a suspended timber ground floor (not to scale)**

*Note: Timber suspended floors are not as robust as concrete floors and even for basic radon protection, a radon gas sump and depressurization pipe should be installed below the over site concrete slab and upstand extending above ground level with cap and radon pipe signage ready for connection of future radon gas fan and lue if required.*
**Guidance Table 8: Examples of insulation for suspended timber ground floors**

U-value no worse than 0.22 W/m²K.

**NOTE:** Where P/A ratio has not been calculated use insulation thickness stated in 1.0*

<table>
<thead>
<tr>
<th>Insulation product</th>
<th>K value</th>
<th>1.0*</th>
<th>0.9</th>
<th>0.8</th>
<th>0.7</th>
<th>0.6</th>
<th>0.5</th>
<th>0.4</th>
<th>0.3</th>
<th>0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Thermafloor TF70</td>
<td>0.022</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>70</td>
<td>70</td>
<td>65</td>
<td>60</td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>Celotex FR4000</td>
<td>0.022</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>70</td>
<td>70</td>
<td>65</td>
<td>60</td>
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<td>35</td>
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<tr>
<td>Jablite Jabfloor Premium 70</td>
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<td>140</td>
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<td>125</td>
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<td>115</td>
<td>105</td>
<td>80</td>
</tr>
<tr>
<td>Jablite Jabfloor 70</td>
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<td>160</td>
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<td>155</td>
<td>150</td>
<td>145</td>
<td>135</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Rockwool Flexi</td>
<td>0.038</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>140</td>
<td>140</td>
<td>140</td>
<td>140</td>
<td>120</td>
<td>90</td>
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<tr>
<td>Knauf Earthwool loft roll 40</td>
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<td>170</td>
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<td>170</td>
<td>170</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>100</td>
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<tr>
<td>and loft roll 44</td>
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<td>200</td>
<td>200</td>
<td>200</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>150</td>
<td>150</td>
<td>100</td>
</tr>
</tbody>
</table>

Note 1. Figures indicated above should be rounded up to the insulation manufacturer’s nearest thickness

Note 2*. Where P/A ratio has not been calculated use insulation thickness stated in 1.0*

Note 3. Insulation to be installed in accordance with manufacturer’s details

Garage ground bearing concrete floor
Power floated 150 mm thick concrete slab (concrete mix should be in accordance with BS 8500 and BS EN 206-1, mix type ST4 or GEN3 for non hazardous conditions with 1 layer anti-crack steel mesh positioned mid depth of the slab where required- typically A193 or A252) on 1200g polythene damp proof course/radon barrier on sand blinding on 150mm minimum well consolidated sulphate free clean hardcore. (No reclaimed or demolished material is permitted).

1:80 fall is required on floor from back of garage to front garage door opening, floor to be thickened to 300mm at garage entrance.

Provide 25mm polystyrene compressible clay board to perimeter of walls. Where area of fill exceeds 600mm the floor is to be suspended in compliance with structural engineers details and calculations which must be approved by building control.

100mm high non combustible step or ramp down into garage (including FD30 fire door as guidance details) to be provided at doorways from attached domestic accommodation.

Radon gas protection is to be provided in garages integral with the dwelling in accordance with the above ground floor details depending on level of radon protection required.

Guidance Diagram 13: Typical section through a ground bearing garage floor and foundation (not to scale)
A2: Superstructure

Minimum headroom heights
There are no minimum head room height requirements in the building regulations for habitable rooms in single occupancy dwellings except for stairs and ramps (see Part K of this guidance), however a minimum ceiling height of 2.3m is recommended.

Maximum height of residential buildings up to 3 storeys
See paragraph 2C4 and Diagram 1 of ADA.

(i) The maximum height of the building constructed of coursed brick or block work measured from the lowest finished ground level adjoining the building to the highest point of any wall or roof should not be greater than 15m, subject to paragraph 2C16 and Tables a, b and c of Diagram 7 of ADA, correlating to various site exposure conditions and wind speeds. A map showing wind speeds and topographic zones is given in Diagram 6 of ADA.
(ii) The height of the building H should not exceed twice the least width of the building W1
(iii) The height of wing H2 should not exceed twice the least width of the wing W2 where the projection P exceeds twice the width W2.
(iv) Floor area limit should not exceed the following: 70m² where floor is bounded by walls on all 4 sides and 36m² where floor is bounded by walls on 3 sides

Maximum storey heights
Storey heights should not exceed 2.7m in accordance with Diagram 8 of ADA for buildings constructed of coursed brick or block work.

Maximum wall lengths
External walls, compartment walls and separating walls, wall lengths should not exceed 12m for buildings constructed of coursed brick or block work in accordance with Paragraph 2C17 of ADA and Table 3 of ADA and as illustrated in the guidance diagram below.

Guidance Diagram 14: Measuring wall lengths (plan detail not to scale)

Vertical lateral restraint to walls
The ends of every wall should be bonded or otherwise securely tied throughout their full height to a buttressing wall, pier or chimney. Long walls may be provided with intermediate buttressing walls, piers or chimneys dividing the wall into distinct lengths within each storey; each distinct length is a supported wall for the purposes of this section. The intermediate buttressing walls, piers or chimneys should provide lateral restraint to the full height of the supported wall, but they may be staggered at each storey.
Minimum thickness of external walls, compartment walls and separating walls constructed of coursed brick or block work.

To be carried out in accordance with the guidance table below and paragraphs 2C5 - 2C18 and Table 3 of ADA.

Guidance Table 9: Minimum thickness of certain external walls, compartment walls and separating walls constructed of coursed brick or block work.

<table>
<thead>
<tr>
<th>Height of wall</th>
<th>Length of wall</th>
<th>Minimum thickness of wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 3.5m</td>
<td>Up to 12m</td>
<td>190mm for whole of its height</td>
</tr>
<tr>
<td>3.5m - 9m</td>
<td>Up to 9m</td>
<td>190mm for whole of its height</td>
</tr>
<tr>
<td></td>
<td>Exceeding 9m</td>
<td>290mm from the base for the height of one storey and 190mm for the rest of its height</td>
</tr>
<tr>
<td>9m - 12m</td>
<td>Up to 9m</td>
<td>290mm from the base for the height of one storey and 190mm for the rest of its height</td>
</tr>
<tr>
<td>9 - 12m</td>
<td></td>
<td>290mm from the base for the height of two storeys and 190mm for the rest of its height</td>
</tr>
</tbody>
</table>

Minimum thickness of internal load-bearing walls

All internal load-bearing walls (except compartment walls and separating walls) should have a thickness (in accordance with paragraph 2C10 of ADA) not less than:

Minimum thickness of wall from guidance table 9 above (as Table 3 of ADA) - 5mm

Buttressing wall design

If the buttressing wall is not itself a supported wall, its thickness should not be less than:

a. half the thickness required by this section for an external or separating wall of similar height and length less 5mm; or
b. 75mm if the wall forms part of a dwelling house and does not exceed 6m in total height and 10m in length; and
c. 90mm in other cases.

The length of the buttressing wall should be at least 1/6 of the overall height of the supported wall and be bonded or securely tied to the supporting wall and at the other end to a buttressing wall, pier or chimney. The size of any opening in the buttressing wall should be restricted as shown in Diagram 12 of ADA.

Pier and chimney design providing restraint:

a. piers should measure at least 3 times the thickness of the supported wall and chimneys twice the thickness, measured at right angles to the wall. Piers should have a minimum width of 190mm (see Diagram 13 of ADA.); b. the sectional area on plan of chimneys (excluding openings for fireplaces and flues)should be not less than the area required for a pier in the same wall, and the overall thickness should not be less than twice the required thickness of the supported wall (see Diagram 13 of ADA.).

Buttressing, sizes of openings and recesses in cavity walls

Openings, buttressing and sizes of openings and recesses should be in accordance with diagrams 12, 13 and 14 of ADA. Openings exceeding 2.1m in height or openings less than 665mm measured horizontally to an external corner wall should be in accordance with details and calculations from a suitably qualified person (i.e. structural engineer).
## Guidance Table 10: Compressive strength of masonry units

The declared compressive strength of masonry units to be in compliance with the guidance table below and Paragraph 2C21, Diagram 9 and Tables 6 and 7 of ADA.

<table>
<thead>
<tr>
<th>Single storey building</th>
<th>Masonry unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wall position</strong></td>
<td><strong>Clay bricks</strong></td>
</tr>
<tr>
<td><strong>Inner &amp; outer leaf of cavity wall</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to roof level</td>
<td>9 N/mm²</td>
</tr>
<tr>
<td><strong>Internal walls</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to roof level</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two storey building</th>
<th>Masonry unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wall position</strong></td>
<td><strong>Clay bricks</strong></td>
</tr>
<tr>
<td><strong>Inner &amp; outer leaf of cavity wall</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to gnd floor level</td>
<td></td>
</tr>
<tr>
<td>• Up to 1.0m</td>
<td>9 N/mm²</td>
</tr>
<tr>
<td>• More than 1.0m</td>
<td>13 N/mm²</td>
</tr>
<tr>
<td>Gnd floor to roof level</td>
<td>9 N/mm²</td>
</tr>
<tr>
<td><strong>Internal walls</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to gnd floor level</td>
<td></td>
</tr>
<tr>
<td>• Up to 1.0m</td>
<td>9 N/mm²</td>
</tr>
<tr>
<td>• More than 1.0m (see #1)</td>
<td>13 N/mm²</td>
</tr>
<tr>
<td>Gnd floor to roof level</td>
<td>9 N/mm²</td>
</tr>
</tbody>
</table>

**Notes: #1.** Where internal walls exceed 1.0m below ground floor level, wall thickness to be increased to 140mm min thickness if block work or 215mm min thickness if brickwork.

<table>
<thead>
<tr>
<th>Three storey building</th>
<th>Masonry unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wall position</strong></td>
<td><strong>Clay bricks</strong></td>
</tr>
<tr>
<td><strong>Outer leaf of cavity wall</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to roof level</td>
<td>13 N/mm²</td>
</tr>
<tr>
<td><strong>Inner leaf of cavity wall</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to 1st floor level</td>
<td>25 N/mm²</td>
</tr>
<tr>
<td>1st floor to roof level</td>
<td>9 N/mm²</td>
</tr>
<tr>
<td><strong>Internal walls</strong></td>
<td></td>
</tr>
<tr>
<td>Fnd to 1st floor level (see #1)</td>
<td>13 N/mm²</td>
</tr>
<tr>
<td>1st floor to roof level</td>
<td>9 N/mm²</td>
</tr>
</tbody>
</table>

**Notes: #1.** Wall thickness to be increased to 140mm min thickness if block work or 215mm min thickness if brickwork.
External cavity wall construction

Cavity wall construction (U-value not worse than 0.28 W/m².k)
External walls constructed in either 100mm minimum thickness reconstituted stone facings; facing brickwork or 2 coat render on 100mm thick dense concrete block skin with a 100mm minimum thickness insulation/dense block inner leaf with either a 15mm lightweight plaster finish or 12.5mm plasterboard on dabs skimmed dry lining as guidance table below.

Proprietary purpose made lintels to be constructed over all external openings in accordance with lintel manufacturer’s details which should be approved by building control before works commence on site. Walls should be built in 1:5-1:6 cement /sand mortar mix with plasticiser and tied with British Board of Agreement (BBA or other third party accredited) stainless steel wall ties suitable for cavity width as guidance table below.

Full fill or partial fill insulating material to be placed in the cavity between the outer leaf and an inner leaf of masonry walls subject to the suitability of the cavity wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC.

Subject to the suitability of the cavity wall construction, insulation to be positioned in the wall in compliance with the insulation guidance tables below and installed to prevent cold bridging and also any possible capillary attraction of water between the insulation and cavity surfaces past the damp-proof courses into the building in accordance with the insulation manufacturer's details.

Proprietary British Board of Agreement (BBA or other third party accredited) acoustic/thermally insulated/fire resistant cavity closers/ cavity barriers are to be provided to all cavity openings/ closings, tops of walls and junctions with other properties in accordance with manufacturer's details.

Tops of cavity walls can be closed using a proprietary British Board of Agreement (BBA or other third party accredited) 30 minutes fire resistant rigid board to prevent the passage of fire, fixed in accordance with manufacturer's details.

Typical cavity wall construction details are indicated in sub structure guidance diagrams above
Natural stone faced cavity walls (U-value not worse than 0.28 W/m².K)
100-150mm thick natural stone facings fixed against one of the following backing options to form a uniform cavity within the cavity wall:
(i) 100mm thick dense concrete block backing course connected together with stainless steel wall ties as detailed below and foundation widths increased to 750mm as detailed in guidance diagrams 19 and 20 below or;
(ii) British Board of Agreement (BBA or other third party accredited) proprietary cavity spacer system installed strictly in accordance with manufacturer’s details as detailed in guidance diagrams 21 and 22 below or;
(iii) 100mm wide clear continuous cavity, shuttered and formed with temporary shuttering in 450mm vertical stages between wall ties, moved as work proceeds the following day (subject to proposed height of wall and building control approval).

Proprietary purpose made lintels to be constructed over all external openings with extended flange to suit thickness of stone- normally 150mm thick. Lintels must be designed and installed in accordance with lintel manufacturer’s details and calculations which should be approved by building control before works commence on site.

Walls should be built in 1:5:1:6 cement /sand mortar mix with plasticiser and tied with British Board of Agreement (BBA or other third party accredited) approved stainless steel wall ties suitable for cavity width as guidance table below.

Cavity wall insulation and insulation inner block skin to be positioned in the wall in compliance with the insulation guidance tables below (together with proprietary insulated closers to prevent cold bridging which have been omitted for clarity). The wall insulation should be continuous with roof insulation level and taken below floor insulation levels in compliance with manufacturer’s details.

Guidance Diagram 15: Stone faced cavity wall with concrete block backing forming clear cavity - (section detail not to scale)
Guidance Diagram 16: Stone faced cavity wall with concrete block backing forming clear cavity (plan detail not to scale)

- 100mm minimum width dense concrete block backing
- 150mm natural stone facings tied to block backing with stainless steel wall ties at spacings to suit cavity walls as guidance details
- All external windows and doors to be double glazed (see options in guidance table) & all joints to be sealed with mastic
- Proprietary purpose made insulated steel lintels with damp proof course over all external openings with extended flange to suit thickness of stone- normally 150mm thick. Lintels must be detailed and installed in accordance with lintel manufacturers details and calculations which should be approved by building control before works commence on site

Guidance Diagram 17: Stone faced cavity wall with cavity wall spacer system or shuttered cavity (section detail not to scale)

- British Board of Agreement (BBA) or other approved accredited cavity wall spacer system (SURECAV or other approved) to provide permanent shutter for stone facings and form 50mm clear cavity, fixed strictly in accordance with manufacturers details (or alternatively, construct temporary shutter to back of stone in 450mm high stages (between wall ties) to form a continuous 100mm wide clear cavity)
- All external windows and doors to be double glazed (see options in guidance table) All ext. junctions to be sealed with silicon sealant
- 100mm minimum width insulation block closing cavity at openings with damp proof course at junctions with external wall (see insulation block options in guidance table)
- Wall grade insulation (see options in guidance table)
- British Board of Agreement (BBA or other approved accredited cavity wall spacer system (SURECAV or other approved) to provide permanent shutter for stone facings and form 50mm clear cavity as detailed above
- Stainless steel wall ties and spacings as detailed in guidance & positioned as cavity wall spacer manufacturers details
- radon dpc tray 225mm deep minimum sealed with gas proof tape to dpm/radon barrier*

*Notes: 1. Ground supported floor slabs are only suitable for basic radon protection- see other options in guidance for full radon protection. 2. Surecav can also be fixed against a timber frame in accordance with manufacturer’s details (details differ from those illustrated above) 3. Surecav details and product are available from: www.surecav.com
Guidance Diagram 18: Stone faced cavity wall with cavity wall spacer system or shuttered cavity (plan detail not to scale)

Guidance Table 11: Cavity wall tie spacing

<table>
<thead>
<tr>
<th>Wall tie position</th>
<th>Maximum spacing of wall tie</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Horizontally (mm)</td>
</tr>
<tr>
<td>Cavity up to 75mm wide</td>
<td>900</td>
</tr>
<tr>
<td>Cavities 75-100mm wide</td>
<td>750 (may need to decreased to 600 if retaining partial fill insulation)</td>
</tr>
<tr>
<td>Cavities over 100mm wide</td>
<td>To wall tie manufacturer’s details</td>
</tr>
<tr>
<td>Jamb openings (windows and Doors etc) and movement joints</td>
<td>Within 225 of opening</td>
</tr>
</tbody>
</table>

Notes: 1. Wall ties to be staggered. 2. Wall ties to be built at least 50mm in to each wall leaf. 3. Wall ties to be built above and below the damp proof course. 4. All wall ties to be stainless steel in accordance with British/European Standards and have British Board of Agreement (BBA or other third party accredited) certification. Wall ties to be installed in accordance with manufacturer’s details

### Guidance Table 12: Examples of partial cavity fill insulation for external cavity walls

100mm dense brick outer leaf, cavity, partial fill insulation, block inner leaf and internal finishes

**U-value no worse than 0.28 W/m²k**

<table>
<thead>
<tr>
<th>Clear cavity width required</th>
<th>Insulation type and Minimum thickness</th>
<th>Overall cavity width required</th>
<th>Internal Block Type and Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>50mm¹</td>
<td>40 mm Kingspan Kooltherm K8 Cavity Board. K value 0.021</td>
<td>90mm¹</td>
<td>100 mm insulation block-K value 0.14 or lower with 13mm lightweight plaster</td>
</tr>
<tr>
<td>50mm¹</td>
<td>40mm Celotex CW4000 K value 0.022</td>
<td>90mm¹</td>
<td>100 mm insulation block-K value 0.12 or lower with 13mm lightweight plaster</td>
</tr>
<tr>
<td>50mm¹</td>
<td>50 mm Kingspan Kooltherm K8 Cavity Board. K value 0.020 or 50mm Celotex CW4000 K value 0.022</td>
<td>100mm¹</td>
<td>100 mm dense concrete block (K value 1.13) with 13mm lightweight plaster</td>
</tr>
</tbody>
</table>

Notes: ¹Clear cavities can be reduced to 25mm in compliance with certain insulation manufacturer’s details - subject to building control approval and any building warranty providers approval where applicable. Note 2. Insulation to be installed in accordance with manufacturer's details subject to the suitability of the cavity wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC. Source: A representative selection of values taken from Technical Note 10, U-values of Elements (Approved Document L1B2010) produced by Hertfordshire Technical Forum for Building Control. Reproduced by kind permission of Hertfordshire Technical Forum for Building Control

### Guidance Table 13: Examples of partial cavity fill insulation for external cavity walls

100mm dense block with render finished external leaf, cavity, partial fill insulation, block inner leaf and internal finishes

**U-value no worse than 0.28 W/m²k**

<table>
<thead>
<tr>
<th>Clear cavity width required</th>
<th>Insulation type and Minimum thickness</th>
<th>Overall cavity width required</th>
<th>Internal Block Type and Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>50mm¹</td>
<td>40 mm Kingspan Kooltherm K8 Cavity Board. K value 0.021 or 40mm Celotex CW4000 K value 0.022</td>
<td>90mm¹</td>
<td>100 mm insulation block-K value 0.11 or lower with 13mm dense or lightweight plaster</td>
</tr>
<tr>
<td>50mm¹</td>
<td>50 mm Kingspan Kooltherm K8 Cavity Board. K value 0.020 or 50mm Celotex CW4000 K value 0.022</td>
<td>100mm¹</td>
<td>100 mm dense concrete block (K value 1.13) with 12.5mm plaster board on dabs and skim</td>
</tr>
</tbody>
</table>

Notes: ¹Clear cavities can be reduced to 25mm in compliance with certain insulation manufacturer’s details - subject to building control approval and any building warranty providers approval where applicable. Note 2. Insulation to be installed in accordance with manufacturer’s details. Note 2. Insulation to be installed in accordance with manufacturer’s details subject to the suitability of the cavity wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC. Source: A representative selection of values taken from Technical Note 10, U-values of Elements (Approved Document L1B2010) produced by Hertfordshire Technical Forum for Building Control. Reproduced by kind permission of Hertfordshire Technical Forum for Building Control
Guidance Table 14: Examples of full cavity fill insulation for external cavity walls
100mm dense brick outer leaf, full fill insulation, block inner leaf and internal finishes
U-value no worse than 0.28 W/m²k

<table>
<thead>
<tr>
<th>Clear cavity width required</th>
<th>Insulation type and Minimum thickness</th>
<th>Overall cavity width required</th>
<th>Internal Block Type and Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>100mm Earthwool DriTherm 32 K value 0.032</td>
<td>85mm</td>
<td>100 mm insulation block-K value 0.15 or lower with 12.5mm plaster board on dabs and skim</td>
</tr>
<tr>
<td>n/a</td>
<td>100mm Earthwool DriTherm 37 K value 0.037</td>
<td>100mm</td>
<td>100 mm insulation block-K value 0.11 or lower with 12.5mm plaster board on dabs and skim</td>
</tr>
<tr>
<td>n/a</td>
<td>100mm Earthwool DriTherm 32 K value 0.032</td>
<td>100mm</td>
<td>100 mm dense concrete block (K value 1.13) with 12.5mm plaster board on dabs and skim</td>
</tr>
</tbody>
</table>

Notes. 1. Insulation to be installed in accordance with manufacturer's details subject to the suitability of the cavity wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC.


Guidance Table 15: Examples of full cavity fill insulation for external cavity walls
100mm dense block with render finished external leaf, full fill insulation, block inner leaf and internal finishes
U-value no worse than 0.28 W/m²k

<table>
<thead>
<tr>
<th>Clear cavity width required</th>
<th>Insulation type and Minimum thickness</th>
<th>Overall cavity width required</th>
<th>Internal Block Type and Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>100mm Earthwool DriTherm 32 K value 0.032</td>
<td>75mm</td>
<td>100 mm insulation block-K value 0.15 or lower with 13mm dense or lightweight plaster</td>
</tr>
<tr>
<td>n/a</td>
<td>100mm Rockwool cavity batts K value 0.037</td>
<td>80mm</td>
<td>100 mm insulation block-K value 0.11 or lower with 13mm lightweight plaster</td>
</tr>
</tbody>
</table>

Notes. 1. Insulation to be installed in accordance with manufacturer's details subject to the suitability of the cavity wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC.


Walls between heated and unheated areas (U-value 0.28 W/m².k)
Walls between heated and unheated areas such as garages etc, to be constructed and insulated as external walls or constructed with 2.8/m² 100/215mm solid dense concrete blocks with light weight plaster/plaster board on dabs finish to one side, 25 x 50mm timber battens to the opposite side, with insulation fixed across face of battens (as detailed in table below), with integral 12.5mm vapour checked plaster board (or 500g polythene vapour check) and 5mm skim coat plaster finish.
Guidance Table 16: Examples of insulation for solid walls between heated and un-heated areas
U-value no worse than 0.28 W/m²K

<table>
<thead>
<tr>
<th>Insulation product</th>
<th>Minimum thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Kooltherm K18 Insulated Plasterboard K value 0.020</td>
<td>62.5 fixed over battens</td>
</tr>
<tr>
<td>Celotex PL 4000 Insulated Plasterboard K value 0.022</td>
<td>72.5 fixed over battens</td>
</tr>
</tbody>
</table>

Notes. 1. Insulation to be installed in accordance with manufacturer’s details.

External timber framed walls with separate brick or block finish

General: Design, manufacture, supply, erection and certification of the complete timber frame including roof, walls, lintels and floors etc to be carried out by a specialist timber frame manufacturer in compliance with structural engineers details and calculations. Shell of building to be air sealed and fitted with protective coverings and measures to prevent condensation within the building. All details to be approved by building control before works commence on site. Moisture content of timber should not exceed 20% and to be kiln dried and grade C24, workmanship to comply to BS 8000:5. All timber to be treated using an approved system and all fixings to be stainless steel or other approved.

Sole plates: 38 x 140mm CCA preservative treated C16 CLS kiln dried timber, set level, securely fixed to sub structure which must puncture the dpc/dpm/radon gas barrier and must not overhang or set back from the wall edge by more than 12mm and must be protected from damp.

External timber framed stud walls
Prefabricated panels - factory fabricated, timber framing with 38 x140mm C16/24 CLS kiln dried, preservative treated timber studs, secured at 600mm maximum centres, including sole and head plates and bracing to structural engineers details. Panels to be accurately aligned, plumb and level and fixed together with suitable rust resistant fixings. Holes and notches to be in accordance frame manufacturer's/structural engineer's details. Structural beams, lintels and columns etc- factory fixed for the timber superstructure only as dictated by Structural Engineer’s recommendations. Window/ Door Closers - 38x89mm timber closers/cavity barriers with dpc fixed around all external openings.

Notches / holes/cuts in structural timbers
Notches / holes/cuts in structural timbers should be carried out in accordance with BS 5268-2002 and should not be deeper than 0.125 times the depth of the joists and should be not closer to the support than 0.07 times the span and not further away than 0.25 times the span. Holes should have a diameter not greater than 0.25 times the depth of joist and should be drilled at the joist centre line. They should be not less than 3 diameters (centre to centre) apart and should be located between 0.25 and 0.4 times the span from the support. Notches or holes exceeding the above requirements or cut into other structural members should be checked by a structural engineer.

External boarding: 12mm preservative treated OSB (Orientated Strand Board) or other approved structural sheathing boards to BS EN 622; 634:2; 314; 636 and BS 1982:1, nail fixed using galvanized/stainless steel fixings to the timber studwork or in accordance with board manufacturer's details.

Breather Membrane: Proprietary British Board of Agreement (BBA or other third party accredited) breather membrane, factory fixed as manufacturer's details to external sheathing by stainless steel staples fixed through white proprietary tape to distinguish wall tie positions.

Thermal insulation and fire resistance: thermal insulation to be fitted between studs in accordance with guidance tables and manufacturer's details, and stud walls finished internally with 500g sheet polythene vapour check and 12.5mm thick plaster board fixed to studs and 3mm skim coat of finishing plaster (to achieve 30 minutes fire resistance- increased to 2 x 12.5mm thick layers of plaster board with joints staggered for 60 minutes fire resistance within 1.0m of a boundary in accordance with part B of this guidance). All junctions to have water and air tight construction, seal all perimeter joints with tape internally and with silicon sealant externally.
External walls: to be 100mm minimum thickness brick/reconstituted stone/ painted sand and cement render (render to BS 5262), on 100mm medium dense external concrete as required. Masonry walls/mortar/render details are contained elsewhere in this guidance. External masonry skin to be tied to timber frame studs (not the sheathing) using British Board of Agreement (BBA or other third party accredited) proprietary flexible stainless steel wall ties in compliance with manufacturer’s details, BS 5628 and BS EN 845-1, typically at spacings not exceeding 600mm horizontally and 375 mm vertically and 225mm max at reveals. Wall ties should be embedded in mortar to a minimum depth of 75mm with a slight fall towards the external brickwork. Provide proprietary flexible water and fire resistant cavity barriers at eaves level, gable end walls and vertically at junctions with separating walls and horizontally at separating walls with continuous dpc tray over, installed in compliance with manufacturer’s details.

Proprietary steel lintels: to BS EN 845 to be provided with 150mm bearing over all external openings to support external masonry skin, fitted with continuous dpc tray and retaining clips. Lintel type and sizes to be in accordance with manufacturer’s details suitable for proposed clear spans and loadings. Weep holes using proprietary insect proof vents to be provided at 900mm spacing at base of wall above dpc tray and above all lintels (2 weep holes minimum per lintel)

Separation of combustible materials from solid fuel fire places and flues: Minimum separating distance from combustible materials from a chimney/fire place should be in compliance with Part J of guidance details and Diagram 21 of ADJ as follows:
(i) at least 200mm thick solid non combustible masonry wall should separate combustible materials from a flue liner
(ii) at least a 40mm air gap is required between combustible materials and a solid non combustible masonry wall which is up to 200mm thick (but must not be less than 100mm minimum thickness)

Ensure all gaps and all voids are sealed to prevent any air leakage.

Guidance Table 17: : Examples of insulation for cavity walls with internal timber frame:
103mm dense brick/100mm dense block with render finished external leaf, 50mm clear cavity with breather membrane, structural board, timber studs at 600 and 400mm centers and 12.5mm vapour checked plasterboard and 3mm skim internal finish.

<table>
<thead>
<tr>
<th>External wall</th>
<th>Clear cavity width required</th>
<th>Timber stud (mm)</th>
<th>Insulation type and Minimum thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brick or rendered dense block</td>
<td>50mm</td>
<td>100</td>
<td>80mm Kingspan Kooltherm K12 Framing Board between studs K value 0.020</td>
</tr>
<tr>
<td>Brick or rendered dense block</td>
<td>50mm</td>
<td>150</td>
<td>70mm Kingspan Kooltherm K12 Framing Board between studs K value 0.020</td>
</tr>
<tr>
<td>Rendered dense block</td>
<td>50mm</td>
<td>100</td>
<td>90 mm Celotex FR4000 between studs K value 0.022</td>
</tr>
<tr>
<td>Rendered dense block</td>
<td>50mm</td>
<td>150</td>
<td>75 mm Celotex FR4000 between studs K value 0.022</td>
</tr>
<tr>
<td>Brick</td>
<td>50mm</td>
<td>150</td>
<td>140 mm Knauf Earthwool Frame Therm 38 slab between studs K value 0.038</td>
</tr>
<tr>
<td>Brick</td>
<td>50mm</td>
<td>150</td>
<td>140 mm Rockwool Flexi slab between studs K value 0.035 using 140mm insulation thickness</td>
</tr>
</tbody>
</table>

Notes. 1. Insulation to be installed in accordance with manufacturer’s details subject to the suitability of the cavity wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC.

35
**External timber framed walls with render finish** (U-value 0.28 W/m².k)

Render finish (to comply to BS 5262) - applied in 3 coats at least 16mm – 20mm thick overall to render lath as detailed below. Typical render mixes for first and second coats 1:3 (cement : sand with plasticiser). final coat 1:6 (cement : sand with plasticiser)- proportions by volume . Render should be finished onto an approved durable render stop, angle beads or jointing sections-stainless steel or other approved using drilled or shot fired fixings.

Stainless steel render lath fixed (using stainless steel staples) to vertical studs at 600mm max centers with all laps wired together at 150mm centers (Mesh to be backed by a water resistant membrane) and fixed to: Treated battens - 25 x 50mm preservative treated battens fixed vertically to studs at max 600mm centers using 75mm long hot dipped galvanized or stainless steel annular ring nails, fixed to:

British Board of Agreement (BBA or other third party accredited) proprietary breathable membrane (suitable for timber framed walls): fixed as manufacturer’s details to:

12mm external quality plywood or other approved structural water proof sheathing, (joints covered by dpc and battens) fixed to 100/150 X 50mm timber studs at 400mm ctrs with 100/150 X 50mm timber head and sole plates and 2 rows noggins and diagonal bracing as structural engineers details. Studs exceeding 2.5m high should be designed by structural engineer.

Thermal insulation to be fixed between/over studs in accordance with the insulation guidance table below, with vapour check and plaster board fixed to internal face of studs (increase thickness of plaster board in certain circumstances for increased fire resistance in accordance with Part B of this guidance), finished with 3mm skim coat of plaster. All junctions to have water tight construction, seal all perimeter joints with tape internally and with silicon sealant externally.

**Guidance Diagram 20: Typical section through external timber framed walls with painted render finish (not to scale)**

- Masonry paint finish
- 16-20mm thick render finish
- Stainless steel render lath with water resistant membrane to stop render filling cavity
- 25 x 38mm treated timber battens at 600mm ctrs fixed vertically to form drained cavity
- Breathable membrane
- 12mm external quality plywood or other approved
- Stainless steel stop bead forming drip
- Insect proof mesh [non rust]
- 100/150mm x 50mm treated stud at 400mm ctrs
- Thermal insulation as guidance details
- 12.5mm vapour checked plaster board and skim finish
- 100/150mm x 50mm treated sole plates fixed to base
- Construction details as guidance
External timber framed walls with cladding finish (U-value 0.28W/m².k)
Approved timber/upvc weatherboarding/vertical wall tiling fixed with proprietary rust resistant fixings to: 50 X 25mm treated battens/counter battens at 400mm ctrs fixed to:

British Board of Agreement (BBA or other third party accredited) proprietary breathable membrane (suitable for timber framed walls): fixed as manufacturer's details to:

12mm external quality plywood or other approved structural water proof sheathing, (joints covered by dpc and battens) fixed to 100/150 X 50mm timber studs at 400mm ctrs with 100/150 X 50mm timber head and sole plates and 2 rows noggins and diagonal bracing as structural engineers details. Studs exceeding 2.5m high should be designed by structural engineer.

Thermal insulation to be fixed between/over studs in accordance with the insulation guidance table below, with vapour check and plaster board fixed to internal face of studs (increase thickness of plaster board in certain circumstances for increased fire resistance in accordance with Part B of this guidance), finished with 3mm skim coat of plaster. All junctions to have water tight construction, seal all perimeter joints with tape internally and with silicon sealant externally.

Guidance Diagram 21: Typical section through external timber framed walls with Upvc/timber weather board finish (not to scale)
**Guidance Table 18: Examples of insulation for timber frame walls with external tile/render/cladding finishes:**

Tiles/render/cladding on battens as guidance, timber studs at 600 / 400mm centers with insulation fixed between/over studs with vapour checked integral/separate plasterboard as stated below with 3mm plaster finishes.

U-value no worse than 0.28 W/m²K

<table>
<thead>
<tr>
<th>Timber stud (mm)</th>
<th>Insulation type and minimum thickness</th>
<th>Internal insulation/finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 x 50mm</td>
<td>50mm Kingspan Kooltherm K12 Framing Board, K Value 0.20 or Kingspan Thermawall TW55 K value 0.022 fixed between studs</td>
<td>32.5mm Kingspan Kooltherm K18 Insulated Plasterboard. K value 0.023 fixed over studs</td>
</tr>
<tr>
<td>100 x 50mm</td>
<td>60mm Celotex FR4000 K value 0.22 fixed between studs</td>
<td>37.5mm Celotex PL4000 K value 0.22 fixed with integral plaster board with lightweight skim fixed over studs</td>
</tr>
<tr>
<td>125/150 x 50mm</td>
<td>85mm Kingspan Kooltherm K12 Framing Board, K value 0.020 fixed between studs</td>
<td>12.5mm plaster board and 3mm skim finish fixed over studs</td>
</tr>
<tr>
<td>125/150 x 50mm</td>
<td>90mm Celotex FR4000 K value 0.22 fixed between studs</td>
<td>12.5mm plaster board and 3mm skim finish fixed over studs</td>
</tr>
</tbody>
</table>

Notes: 1. Insulation to be installed in accordance with manufacturer's details subject to the suitability of the wall construction and UK zones for exposure to wind-driven rain in accordance with Diagram 12 and Table 4 of ADC.

Detached garage (or similar single storey building) with SINGLE SKIN external walls

External walls to be constructed using: 100mm minimum thickness brick/reconstituted stone, or sand and cement render (render to BS 5262), on 100mm minimum thickness dense concrete blocks with 100 x 400mm minimum sized piers at maximum 3.0m centers, tied or built into walls, with fair face finish internally. Bricks to have a minimum compressive strength of 5N/mm² and dense concrete blocks 2.8N/mm² minimum.

Floor area exceeding 36m² will require structural engineers details and calculations to confirm stability of the structure. Eaves level should not exceed 3.0m in height and ridge height should not exceed 3.6m without structural engineers details and calculations to confirm stability of the structure.

Size and proportion of the garage to comply with paragraph 2C38, and the size and location of openings in building to comply with Diagrams 17, 18 and 19 of ADA, and briefly as follows:

- Major openings to be restricted to one wall only (normally at the front entrance)
- Their aggregate width should not exceed 5.0m and their height should not exceed 2.1m.
- There should be no other openings within 2.0m of a wall containing a major opening.
- The aggregate size of openings in a wall not containing a major opening should not exceed 2.4m²
- There should not be more than one opening between piers.
- Unless there is a corner pier, the distance from a window or a door to a corner should not be less than 390mm.
- Isolated central columns between doorways (where applicable) to be 325 x 325mm min.
- Openings other than those stated above will require structural engineers details and calculations to confirm structural stability.
- Mortar mix to be 1:1:5-6 or as required by the stone/brick/block manufacturer.

Guidance Diagram 22: Design criteria for small detached single storey garages or similar (plan not to scale) See Par 2C38 and diagrams 17/18/19 of ADA for full details
Wall abutments
Vertical junctions of new and old walls to be secured with proprietary profiled stainless steel metal crocodile type system bolted to the existing wall with a dpc inserted into a vertical chase cut into the existing wall above the horizontal dpc and pointed with flexible mastic as manufacturer’s details. Depth of chase and position of dpc to be agreed with building control.

Lintels and weep holes
Proprietary manufactured lintels to current British Standards/Euro codes (including specialist lintels supporting stone facings) are to be provided over all structural openings. The positions, types, sizes, end bearings etc of lintels must be in compliance with the lintel manufacturer’s standard tables suitable for the proposed loadings and clear spans. Stop end and dpc trays etc to be provided above all externally located lintels in compliance with lintel manufacturer’s details. Weep holes are required in porous external walls (i.e. brickwork) at 900mm centers or two per opening.

Structural columns/beams etc
Non proprietary beams/columns (including pad stones) to be fabricated and installed in compliance with details and structural calculations carried out by a suitably qualified and experienced person (i.e. structural engineer), which must be approved by building control before works commence on site. Dpc trays to be provided above all externally located beams. Weep holes are required in porous external walls (i.e. brickwork) at 900mm centers with at least two per opening.

Movement joints
The external leaf of a cavity wall should be provided with adequately spaced and sized vertical movement joints in accordance with the guidance table below to minimize the risk of cracking due to the expansion and contraction of the wall and maintain stability, in accordance with masonry manufacturer’s and structural engineer’s details. Proprietary wall ties to be provided on each side of the joint using stainless steel wall ties, positioned at each block height (225mm max) and joint sealed externally with a proprietary flexible mastic sealant.

Guidance Table 19: Movement joint widths and spacing in walls

<table>
<thead>
<tr>
<th>Construction</th>
<th>Movement joint widths</th>
<th>Spacing of movement joints in walls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay bricks</td>
<td>16mm</td>
<td>12m</td>
</tr>
<tr>
<td>Calcium silicate bricks</td>
<td>10mm</td>
<td>7.5m</td>
</tr>
<tr>
<td>Concrete bricks and blocks</td>
<td>10mm</td>
<td>6m</td>
</tr>
</tbody>
</table>

Key  The first movement joint should be positioned not more than half the above distance from a wall return and should extend the full storey height of the wall

Cavity closers
Proprietary British Board of Agreement (BBA or other third party accredited) acoustic/thermally insulated/fire resistant cavity closers, or similar are to be provided to all cavity openings/closings, tops of walls and junctions with other properties in accordance with manufacturer’s details.

Tops of cavity walls to be closed to prevent the passage of fire using a proprietary British Board of Agreement (BBA or other third party accredited) 30 minutes fire resistant rigid board, fixed in accordance with manufacturer’s details.
Lateral restraint strapping of upper floors to walls
Upper floors should be connected to walls with lateral restraint straps (in accordance with Par 2C32- 2C37 and Diagram 16 of ADA), fixed horizontally to stiffen and stabilize the walls by restraining its movement in a direction at right angles to the wall length by the provision of pre galvanized and edge coated heavy duty horizontal lateral restraint straps, with a minimum cross sectional size of 30 x 5mm with a tensile strength of 8kN in compliance with BS 5268 Part 3 and BS EN 845-1 in the following locations:

(i) Strapping of floor joists parallel to walls
Straps should be spaced at maximum 2m centres with a minimum length of 1200mm carried across and fixed to at least 3 joists by the use of 4 x 4mm x 75mm round nails or screws into noggins (noggins to be at least 38mm wide and 3/4 depth of joist or rafter). Any gap between the wall and the timber member is to be packed with timber folding wedges. The bend length should be 100mm minimum and should be held tight against the masonry wall and positioned at the centre of an uncut brick or block.

Guidance Diagram 23: Strapping of floor joists parallel to walls (not to scale)
(ii) Strapping of floor joists at right angles to walls
Straps should be spaced at maximum 2m centres with a minimum length of 1200mm fixed to joists by the use of 4 x 4mm x 75mm round nails or screws. The bend length should be 100mm minimum and should be held tight against the masonry wall and positioned at the centre of an uncut brick or block. Straps can be omitted in houses with no more than 2 storeys as follows:
- If the joists are not more than 1200mm centres and have at least 90mm bearing on the supported wall or 75mm bearing on a timber wall plate at each end.
- If the joists are supported by joist hangers built into walls at not more than 2m centers.
- Where a concrete floor has at least 90mm bearing on the supported wall
- Where floors are at or about the same level on each side of the wall.

Guidance Diagram 24: Strapping of floor joists at right angles to walls (not to scale)

Lateral restraint strapping of roofs to walls

Strapping of roofs to gable end walls
Roofs should be connected to walls with lateral restraint straps (in accordance with Par 2C32-2C37 and Diagrams 16 of ADA), fixed horizontally to stiffen and stabilize the walls by restraining its movement in a direction at right angles to the wall length by the provision of pre galvanized and edge coated heavy duty horizontal lateral restraint straps. Straps to have a minimum cross sectional size of 30 x 5mm with a tensile strength of 8kN in compliance with BS 5268 Part 3 and BS EN 845-1. Straps should be spaced at maximum 2m centers (strap at highest point must provide a secure connection), with a minimum length of 1200mm carried across and fixed to at least 3 rafters by the use of 4 x 4mm x 75mm round nails or screws into noggins (noggins to be at least 38mm wide and 3/4 depth of joist or rafter). Any gap between the wall and the timber member is to be packed with timber folding wedges. The bend length should be 100mm minimum and should be positioned at the centre of the uncut brick or block.

Where the straps cannot be fixed into a cavity wall (e.g. single skin garage walls), the bend should be fixed to masonry walls using fixings in accordance with manufacturer's details (e.g. proprietary stainless steel expansion bolts fixed to block/brick work as agreed with building control, typically 3 no x M6 expansion fixings per strap bend fixed 75mm into masonry walls).
**Guidance Diagram 25: Strapping of roofs to gable end walls (not to scale)**

Strapping of wall plates and roofs at eaves level
Wall plates to be secured to walls by the provision of pre galvanized and edge coated horizontal lateral restraint straps (in accordance with Par 2C32- 2C37 and Diagram 16 of ADA), with a minimum cross sectional size of 30 x 5mm or light strap in compliance with BS 5268 Part 3 and BS EN 845-1. Straps should be spaced at maximum 2m centers with a minimum length of 1000mm and fixed vertically to masonry walls with mechanical fixings suitable for design requirements in accordance with manufacturer’s details, lowest fixing within 150mm of bottom of strap. Rafters/flat roof joists to be secured to wall plates using proprietary framing anchors/ clips/ skew nails in accordance with manufacturer’s details or direct to walls using lateral restraint straps as detailed above.

Vertical strapping can be omitted if the roof has a pitch of 15° or more, and is tiled or slated, and is of a type known by local experience to be resistant to damage by wind gusts and has main timber members spanning onto the supported wall at not more than 1.2m centers.

**Guidance Diagram 26: Strapping of wall plates and roofs at eaves level (not to scale)**

Wall plates to be secured to walls with galvanized straps spaced at maximum 2m centres with a minimum length of 1000mm and fixed vertically to masonry walls with mechanical fixings suitable for design requirements in accordance with manufacturer’s details, lowest fixing within 150mm of bottom of strap.

Timber wall plate as guidance
Lateral restraint strapping of walls at ceiling level
Where the height of the gable end wall exceeds 16 x thicknesses of the external wall leaves +10mm (excluding cavity width) measured from the top of the floor to centre of the gable end wall above ceiling level, lateral straps to be provided at ceiling joist level (in accordance with Par 2C32- 2C37 and Diagram 16 of ADA) as detailed in this guidance for intermediate floors.

A3: Separating walls and floors

Masonry party walls separating dwellings (U-value 0.2 W/m².K)
Party walls separating dwellings to achieve a minimum 60 minutes fire resistance from both sides and sound insulation value of 45dB value for airborne sound insulation (reduced to 43dB for conversions). Typically constructed using of 2 skins of 100mm minimum thickness dense concrete blocks (density 1990kg/m³) in 225mm coursings with a clear 50mm minimum cavity and tied together with wall ties spaced as external walls with 13mm plaster (min mass 10kg/m²) applied to both faces. Walls to be built up to the underside of the roof coverings and fire stopped with mineral wool or an approved proprietary intumescent product. The party wall to be built off a foundation, bonded/tied to the inner leaf and the junction of cavities are to be fire stopped throughout its length with a proprietary acoustic/insulated fire stop cavity closer and all other vertical and horizontal cavities are to be closed in a similar manner to provide effective edge sealing and a U-value of 0.2 W/m².K. Additional party wall solutions are available in ADE.

Guidance Diagram 27: Section detail of masonry separating wall as Wall type 2.1 of ADE (not to scale)

2 skins of 100mm dense concrete blocks (density 1990kg/m3) in 225mm coursing heights
50mm minimum clear cavity
Each wall leaf tied together with BBA approved wall ties spaced as external walls
13mm plaster (min mass 10kg/m2) applied to both faces.

Double leaf timber frame party walls separating dwellings (U-value 0.2 W/m².K)
Timber framed stud party walls to achieve a minimum 60 minutes fire resistance from both sides and sound insulation value of a minimum 45 dB value (43dB for conversions) for airborne sound insulation and constructed with 2x independent leafs of timber framed walls with 50mm minimum clear cavity, minimum distance between inside lining faces to be 200mm. Timber studs constructed using 100 x 50mm sawn timber studs at 400mm centers with head and sole plates, with 50mm thick layer of ROCKWOOL RWA 45 mineral wool friction (or similar with a minimum density of 10kg/m³) fixed between each studs, and 2x 15mm thick layers of ‘LAFARGE dB check wall board (or similar with a minimum mass of 10kg/m²) fixed to both sides of stud wall (joints staggered) with skim coat of plaster finish- as wall board manufacturer’s details. No electrical fittings to be fixed into/onto party walls and all gaps to be fire sealed and smoke stopped to the full height and width of the party wall and up to the underside of the roof coverings using mineral wool (not glass wool) or an approved proprietary intumescent product to provide effective edge sealing and a U-value of 0.2 W/m².K. Additional party wall solutions are available in ADE.
**Guidance Diagram 28: Plan detail of timber stud separating wall as Wall type 4.1 (new buildings) of ADE (not to scale)**

- Minimum distance between inside lining faces to be 200mm.
- Timber studs 100 x 50mm sawn timber studs at 400mm centers with head & sole plates,
- 50mm minimum clear space between face studs
- 50mm thick layer of ROCKWOOL RWA 45 mineral wool friction (or similar with a minimum density of 10kg/m³) fixed between each studs
- 2x 15mm thick layers of ‘LAFARGE dB check wall board (or similar with a minimum mass of 10kg/m²) fixed to both sides of stud wall (joints staggered) with skim coat of plaster finish.

No electrical fittings to be fixed into/onto party walls

**Upgrading sound insulation of existing party walls separating dwellings**

Existing wall should achieve 60 minutes fire resistance, be at least 100mm thick, of masonry construction and plastered on both faces. With other types of existing wall the independent panels should be built on both sides.

Construct new independent frame fixed at least 10mm from one side of the existing wall using either; 100 x 50mm timber studs at 400mm cts fixed onto head and sole plates or to a proprietary galvanised metal frame, fixed as manufacturer’s details.

Fix 50mm thick Rockwool RWA 45 sound insulation or other approved (min density 16kg/m³) friction fixed between studs

Fix two layers of 15mm thick dB checked wall board with staggered joint and plaster skim finish to the independent frame using mechanical fixings. Note- allow a minimum distance of 35mm between face of existing wall and inner wall board face.

No electrical fittings to be fixed into/onto party walls and all gaps to be fire sealed and smoke stopped to the full height and width of the party wall and up to the underside of the roof coverings using mineral wool (not glass wool) or an approved proprietary intumescent product to provide effective edge sealing and a U-value of 0.2 W/m².K.

Additional upgrading party wall solutions are available in ADE.

**Guidance Diagram 29: Plan of upgrading masonry separating wall as Wall type 4.2 (material change of use) of ADE (not to scale)**

- Existing wall should be at least 100mm thick, of masonry construction and plastered on both faces. With other types of existing wall the independent panels should be built on both sides.
- Construct new independent frame fixed at least 10mm from one side of the existing wall
- 100 x 50mm timber stud at 400mm centers fixed onto head & sole plates
- Fix 50mm thick ROCKWOOL RWA 45 sound insulation or other approved (min density 16kg/m³) friction fixed between studs
- Fix two layers of 15mm thick dB checked wall board with staggered joint and plaster skim finish to the independent frame using mechanical fixings. Note- allow a minimum distance of 35mm between face of existing wall & inner wall board face.
Party floors separating buildings
Outside the scope of this guidance- see relevant sections in ADE

Sound testing requirements
Pre completion sound testing is required for all new party walls/floors which should be carried out by a sound specialist in accordance with ADE, copy of test results sent to building control.

A4: Internal partitions

Internal load bearing masonry partitions
Internal load bearing walls to be 100mm minimum thick dense concrete blocks (actual wall thickness must not be less than the wall it supports above), built off suitable concrete foundations (as guidance details above, typically 450mm wide x 225mm deep), with pre-cast concrete/proprietary steel lintels over openings (in compliance with lintel manufacturer’s span tables) and walls bonded/tied to external or party walls with proprietary ties each course and restrained by floor or ceiling joists/trusses.

Internal load bearing timber stud partitions
Load bearing timber stud partitions and non-proprietary lintels to be in compliance with structural engineers details and calculations which must be built off suitable concrete foundations (as guidance details above, typically 450mm wide x 225mm deep) and approved by building control before works commence on site. Fix a minimum of 25 mm of 10Kg/m³ proprietary sound insulation quilt suspended between the studs and finished with 12.5 mm plasterboard and skim both sides. Sole/head plates to be glued and screwed to floor joists and where necessary fix additional timber members to allow adequate fixing of fittings etc.

Internal masonry non-load bearing partitions
Internal non-load bearing partitions to be constructed of 100mm minimum thick dense concrete blocks built off a thickened floor slab (as agreed with building control) and tied/block bonded to all internal and external walls at maximum 225mm centers with either a plaster or dry lined finish as the external walls.

Internal timber studwork non-load bearing partitions
Non-load bearing stud partitions are to be constructed of 100 x 50mm soft wood framing with head and sole plates and intermediate noggin fixed at 400/600mm centres, built off a thickened floor slab (as agreed with building control) with a minimum thickness of 25 mm of 10Kg/m³ proprietary sound insulation quilt suspended between the studs and finished with 12.5 mm plasterboard and skim both sides. Sole/head plates to be glued and screwed to floor joists and where necessary fix additional timber members to allow adequate fixing of fittings etc.

A5: Intermediate upper floor(s)

Note: Although there are no minimum head room height requirements in the building regulations for habitable rooms (except for stairs and ramps- see Part K of this guidance), a minimum ceiling height of 2.3m is recommended.

Floor Joists
Floor to be constructed of kiln dried, structural grade, timber joists with sizes and spacing suitable for the proposed clear span in compliance with the guidance table below. The maximum span for any floor supported by a wall is 6m, measured to the centre of each bearing in accordance with Paragraphs 2C23-2C24 of ADA.

Joists to have a nominal minimum bearing of 40mm (increased to 80mm where indicated in the guidance table below), supported by heavy-duty, proprietary, galvanized metal restraint joist hangers built into walls or fixed to treated timber wall plates (same sizes as joists) resin bolted 100mm minimum into sound walls at 600-800mm centers using approved 12-16mm diameter...
stainless steel fixings- as agreed with building control. Alternatively, joists can be built into walls using approved proprietary sealed joist caps or sealed with silicon sealant to provide an air tight seal for new dwellings which require air testing, as agreed with building control. Two joists are to be bolted together under baths and non load bearing partitions running parallel with joists, increased to three joists under non load bearing partitions, where indicated in guidance table. Where non load bearing partitions run at right angles to the joists, the spans in the guidance table below should be reduced by 10%.

Floor void between joists to be insulated with a minimum thickness of 100 mm of 10Kg/m³ proprietary sound insulation quilt, ceiling to be a minimum 15mm plasterboard and skim to give the required sound insulation and 30 minutes fire resistance. Floor joists to be provided with 1 row of 38 x ¾ depth solid strutting at ends between joist hangers or proprietary galvanized struts to BS EN 10327 fixed as manufacturer's details, at mid span for 2.5 – 4.5m spans and 2 rows at 1/3 centers for spans over 4.5m.

Fix 22mm thick moisture resistant tongue and groove timber floor boards laid with joints staggered, long edge fixed across the joists and all joints positioned over joists/noggins. All boards to be glued and screwed to floor joists with all joints glued (using water proof glue) and pinned, in accordance with floor board manufacturer's details and current BS EN standards. Allow expansion gap around wall perimeters as manufacturer's details (typically 10-15mm).

**Guidance Table 20: Timber sizes and spans for domestic floor joists (Strength Class C24)**

Supporting domestic floor loads and non load bearing timber stud partitions (imposed load not exceeding 1.5kN/m²; dead load (excluding self weight of joist) not more than 0.5kN/m²)

<table>
<thead>
<tr>
<th>Size of joist</th>
<th>400</th>
<th>450</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breadth (mm)</td>
<td>X Depth (mm)</td>
<td>Maximum clear span (m)</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>97</td>
<td>2.10*</td>
<td>1.99*</td>
</tr>
<tr>
<td>47</td>
<td>120</td>
<td>2.67*</td>
<td>2.56*</td>
</tr>
<tr>
<td>47</td>
<td>145</td>
<td>3.21*</td>
<td>3.09*</td>
</tr>
<tr>
<td>47</td>
<td>170</td>
<td>3.76*</td>
<td>3.61*</td>
</tr>
<tr>
<td>47</td>
<td>195</td>
<td>4.30*</td>
<td>4.13*</td>
</tr>
<tr>
<td>47</td>
<td>220</td>
<td>4.83*</td>
<td>4.65*¹</td>
</tr>
<tr>
<td>75</td>
<td>220</td>
<td>5.61*</td>
<td>5.41*</td>
</tr>
</tbody>
</table>

**Notes:** Where non load bearing partitions run at right angles to the joists, the spans in the guidance table should be reduced by 10%. Two joists are to be bolted together under baths and non load bearing partitions running parallel with joists.

**Key:** *Increased to three joists bolted together under baths and non load bearing partitions running parallel with joists; ¹ 80mm minimum bearing required

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

**Trimming and trimmer joists**

Trimming joists and trimmer joist sizes supporting trimmed joists around openings should be in accordance with the guidance tables below or calculations and details are required from a suitably qualified person (i.e. structural engineer) which should be approved by building control before works commence on site. Minimum bearing 80mm and double joists should be mechanically fixed together using at least two bolted connections at 1/3rd spacing, using 12mm diameter high tensile bolts and 3 x 50mm steel washers at each bolt end. Joists to be supported on heavy duty galvanized joist hangers to current British Standards and fixed in accordance with joist hanger manufacturer's details. Notches / holes/cuts in structural timbers should be carried out in accordance with these guidance details and BS 5268-2002.
### Guidance Table 21: Timber sizes and spans for trimmer joist supporting trimmed joists (Strength Class C24)

Supporting domestic floor loads and non load bearing timber stud partitions (imposed load not exceeding 1.5kN/m²; dead load (excluding self weight of joist) not more than 0.5kNm²)

<table>
<thead>
<tr>
<th>Size of trimmer joist (mm)</th>
<th>Length of trimmed joists (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>2no. x breadth x depth</td>
<td>Clear span of trimmer joist (m) supporting trimmed joists</td>
</tr>
<tr>
<td>2 x 47 x 145</td>
<td>2.68</td>
</tr>
<tr>
<td>2 x 47 x 170</td>
<td>3.21</td>
</tr>
<tr>
<td>2 x 47 x 195</td>
<td>3.69</td>
</tr>
<tr>
<td>2 x 47 x 220</td>
<td>4.17*</td>
</tr>
<tr>
<td>2 x 75 x 220</td>
<td>4.81*</td>
</tr>
</tbody>
</table>

See plan layout below for configuration of trimming, trimmer and trimmed joists.

**Key:** * Increased to three trimmer joists bolted together under non load bearing partitions running parallel with joists.

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

### Guidance Table 22: Timber sizes and spans for trimming joist supporting trimmer joist (Strength Class C24)

Supporting domestic floor loads and non load bearing timber stud partitions (imposed load not exceeding 1.5kN/m²; dead load (excluding self weight of joist) not more than 0.5kNm²)

<table>
<thead>
<tr>
<th>Size of trimming joist (mm)</th>
<th>Length of trimmer joist (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>2no. x breadth x depth</td>
<td>Clear span of trimmer joist (m) supporting trimmer joist</td>
</tr>
<tr>
<td>2 x 47 x 145</td>
<td>2.62</td>
</tr>
<tr>
<td>2 x 47 x 170</td>
<td>3.08</td>
</tr>
<tr>
<td>2 x 47 x 195</td>
<td>3.54</td>
</tr>
<tr>
<td>2 x 47 x 220</td>
<td>3.99</td>
</tr>
<tr>
<td>2 x 75 x 220</td>
<td>4.66</td>
</tr>
</tbody>
</table>

See plan layout below for configuration of trimming, trimmer and trimmed joists.

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop
Notching and drilling of structural timbers
Notches should not be deeper than 0.125 times the depth of the joists and should not be closer to the support than 0.07 times the span and not further away than 0.25 times the span. Holes drilled should have a diameter not greater than 0.25 times the depth of joist and should be drilled at the joist centre line. They should be not less than 3 diameters (centre to centre) apart and should be located between 0.25 and 0.4 times the span from the support. Notches or holes exceeding the above requirements should be checked by a structural engineer.

Sound insulation to floors within the dwelling
Intermediate floors to be provided with sound insulation as described in the relevant floor section in this guidance.

Soil and vent pipe (SVP) boxing internally
SVP pipe boxing to consist of soft wood framing, 2 layers of 15mm plasterboard and skim and void filled with mineral wall quilt for sound insulation and fire/smoke stopping. Boxing to be continuously carried up to roof space for soil and vent pipe and provided with air grills where an air admittance valve is used. Ensure all gaps and all voids are sealed to prevent any air leakage.

Exposed intermediate upper floors
Semi exposed intermediate timber floors over unheated areas such as garages, porches, walkways, and canopy's to be insulated with the following minimum thickness and types of insulations to achieve a U-value 0.22w/m².k in accordance with the insulation guidance table below. Where the construction is open to the environment a vapour barrier and proprietary external mineral fiber or similar 30 minute fire and moisture resistant boarding is to be applied to the underside of the floor.
Guidance Diagram 31: Typical section through an upper floor (not to scale)

Guidance Table 23: Examples of insulation for exposed upper floors

<table>
<thead>
<tr>
<th>Insulation product</th>
<th>K value</th>
<th>Required thickness of insulation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Thermafloor TF70</td>
<td>0.022</td>
<td>110</td>
</tr>
<tr>
<td>Celotex FR5000</td>
<td>0.021</td>
<td>110</td>
</tr>
<tr>
<td>Rockwool Flexi</td>
<td>0.038</td>
<td>200</td>
</tr>
<tr>
<td>Knauf Earthwool loft roll 40</td>
<td>0.040</td>
<td>200</td>
</tr>
</tbody>
</table>

Notes: 1. Insulation to be installed in accordance with manufacturer’s details
A6: Pitched roofs

**Note:** Although there are no minimum head room height requirements in the building regulations for habitable rooms (except for stairs and ramps- see Part K of this guidance), a minimum ceiling height of 2.3m is recommended.

**Pitched roof coverings**

Roof covering to consist of slates/tiles and associated ridge, verge, eaves, hip, valley, abutment and ventilation systems etc fitted in accordance with the tile manufacturer’s details, suitable for the minimum recommended roof pitches and exposure.

Roof tiles/cladding to be fixed in accordance with manufacturer's details to 25 x 50mm treated timber battens (battens to be at least 1.2m long, nailed to each rafter and fixed over at least three rafters and spaced in accordance with tile manufacturer's details), rafters to be overlaid with un-tearable underlay's using either a non breathable/high water vapour resistance underlay to BS EN 13707: 2004 (requires ventilation on opposing sides as detailed in guidance) or a British Board of Agreement (BBA or other third party accredited) vapour permeable breathable/low water resistance type underlay, both types to be fixed, ventilated and lapped in accordance with manufacturer's details.

Where roof coverings cannot be fixed to the tile/slate manufacturer's required pitch, roof coverings can be fixed below manufacturer's minimum recommended roof pitch by using a proprietary British Board of Agreement (BBA or other third party accredited) corrugated roof sheet system below roof coverings to create an independent secondary weatherproof roof, which must be installed to minimum roof pitches and ventilated in accordance with manufacturer's details.  e.g. 'Ondutile' under tile and slate under-sheeting system manufactured by Onduline Building Products Ltd: [www.onduline.net](http://www.onduline.net). (Typical minimum roof pitches: 12.5° for concrete interlocking tiles; 17.5° for clay pan tiles/ natural and fibre cement slates; 22.5° for plain double lap tiles- contact manufacturer for minimum roof pitches achievable)

**Pitched roof structure**

Roof to be constructed using either manufactured roof trusses or a cut roof as follows:

**(i) Roof trusses (including attic and girder trusses)**

Roof to be constructed using specialist designed and manufactured trusses (or Attic trusses where forming room(s) in the roof or used for storage) at 400mm (or 600mm maximum) spacing's to BS 5268:3 or PD 6693-2. Trusses to be fixed and braced strictly in accordance with BS 5268:3 or PD 6693-2 and truss manufacturer's details, mechanically fixed to 100 x 50mm treated soft wood wall plates using proprietary galvanized steel truss clips. Reinforced concrete pad stones are required to support girder trusses to details and calculations by a suitably qualified person.

The person carrying out the building work is to check and confirm the actual roof pitch to the truss manufacturer prior to placing an order. Details of trusses and bracing diagram is to be prepared by the specialist designer/truss manufacturer, which must be submitted and approved by building control prior to commencing roof construction.

**(ii) Cut roof construction**

Roof to be constructed using kiln dried –stress graded timber. Rafters, ceiling joists, purlins, hanger and binder sizes as stated in the independent guidance tables below or see TRADA Technology Span Tables available from: [www.trada.co.uk](http://www.trada.co.uk), suitable for the proposed clear spans and all properly fixed together using approved mechanical fixings. Where the ceiling joists are raised above wall plate level they must be fixed within the bottom third of the rafter using 12mm diameter high tensile bolts and proprietary steel toothed connectors to connect each rafter and ceiling joist to prevent possible roof spread. Joists raised above this level are to be designed by a suitably qualified person and approved by building control before works commence.

Typical minimum sizes of roof timbers: struts and braces to be 100 X 50mm, hip sizes to be the splayed rafter depth + 25mm X 50mm thick(under 30 degree pitch the hips are to be designed by
a suitably qualified person), lay-boards to be the splayed rafter depth + 25mm X 32mm thick, ridges to be splayed rafter depth + 25mm X 38mm thick, all valley beams are to be designed by a suitably qualified person, wall plates to be 100 x 50mm fixed to inner skin of cavity wall using galvanized strapping as detailed below. Angle ties should be used on hipped roof corners to prevent spreading. Hip rafters over 150mm deep to be supported on 100 X 75mm angle ties mechanically connected across wall plates and hip rafter notched to fit over angle tie at corners of roof. Proprietary hip irons to be screwed to base of hip rafters to support ridge tiles.

Soffits, fascias and barge boards etc should be constructed in painted/stained soft/hardwood or Upvc to BS 4576. Allow for all necessary alteration/modification of any existing adjoining roof as required to enable the proper completion of the works and in agreement with building control.

Allow for building in as work proceeds or insertion of proprietary stepped/cavity tray dpc to follow line of new roof 150mm above all roof/wall abutments as necessary using proprietary dpc trays and code 5 lead flashings. Tie the new roof into the existing, alter/modify/renew existing roof coverings and form a weather tight structure. Fix 12.5mm foil backed plasterboard (joints staggered) and 3mm skim coat of finishing plaster to the underside of all ceilings using galvanized plasterboard nails.

Roof pitch to (single storey) single skin buildings with walls 100mm thick should not exceed 40° without structural engineers details and calculations to confirm stability of the structure. Cut roofs over 40° are to be diagonally/laterally braced in accordance with BS 5268.

**Notching and drilling of structural timbers**
Notching and drilling in structural timbers should be in accordance with guidance details above.

**Guidance Diagram 32: Typical section through pitched roof with ceiling joists at wall plate level (not to scale)** U-value no worse than 0.16 W/m²k

- Roof slates/tiles and associated ridge, verge, eaves, hip, valley, abutment and ventilation systems etc fitted in accordance with the tile manufacturer's details, suitable for the minimum recommended roof pitches and exposure.
- 25 x 50mm treated battens at a guage to suit coverings, fixed to:
- Non breathable roofing felt (or breathable roof membrane fixed & ventilated as manufacturers details) fixed to:
- Rafters (see construction details and table in guidance for sizes of rafters suitable for clear spans) fixed to ridge board &:
- Ceiling joists (see construction details and table in guidance for ceiling joist sizes suitable for clear spans fixed to wall plates and rafters
- 25mm minimum air gap
- Rain water gutter & down pipe sizes as guidance
- Facia/soffit boards
- Eaves ventilation - see details below*
- Double glazed windows to bed rooms /inner rooms to be fitted with openings suitable for escape as detailed in guidance

*when using non breathable roofing felt, cross ventilation is to be provided by either proprietary facia ventilation strips or soffit vents to opposing sides of roof at eaves level and fitted with an insect grill with a ventilation area equivalent to a 25mm continuous gap for roof pitches below 15° or a 10mm gap for roof pitches above 15°.

**When using non breathable roofing felt and the roof span is more than 10 metres or when the pitch is more than 35°, provide additional high level ventilated openings equivalent to a continuous 5mm air gap at ridge level to cross ventilate roofs using proprietary dry ridge systems or vent tiles spaced and fixed in accordance with tile manufacturer's details .
Guidance Diagram 33: Typical section through a pitched roof with purlins and high collars (not to scale) U-value no worse than 0.18 W/m².K

- Roof slates/tiles and associated ridge, verge, eaves, hip, valley, abutment and ventilation systems etc fitted in accordance with the tile manufacturer’s details, suitable for the minimum recommended roof pitches and exposure.
- 25 x 50mm treated battens at a guage to suit coverings fixed to:
- Non breathable roofing felt (or breathable roof membrane fixed & ventilated as manufacturers detail) fixed to:
- Rafters birds mouthed over & mechanically fixed to purlins, wall plates & ridges (see construction details and table in guidance for sizes of rafters suitable for clear spans)
- Ceiling joists fixed to wall plates and rafters (see construction details and table in guidance for ceiling joist sizes suitable for clear spans)
- 50mm minimum air gap if using non breathable roofing felt, or 25mm gap if using breathable roofing felt to allow for sag in membrane
- Rain water gutter & down pipe sizes as guidance details
- Facia/soffit boards
- Eaves ventilation equal to a continuous 25mm air gap with insect screen.

Guidance Table 24: Timber sizes and permissible clear spans for single span common jack rafters at 400mm spacing (Strength Class C24)

<table>
<thead>
<tr>
<th>Size of Rafter</th>
<th>Slope of Roof (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 - 22.5°</td>
</tr>
<tr>
<td>Breadth x Depth (mm)</td>
<td>Maximum clear span (m)</td>
</tr>
<tr>
<td>47 x 100</td>
<td>2.08</td>
</tr>
<tr>
<td>47 x 125</td>
<td>2.74</td>
</tr>
<tr>
<td>47 x 150</td>
<td>3.40</td>
</tr>
<tr>
<td>47 x 195</td>
<td>4.59</td>
</tr>
</tbody>
</table>

Minimum rafter bearing 35mm

Imposed load: 1.02 kN/m² (high snow load - altitudes not exceeding 100m)

Dead load: not more than 0.75kN/m² (concentrated load 0.9kN) excluding self weight of rafter

The above values have been independently compiled for guidance table by Geomex Ltd

Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

54
## Guidance Table 25: Timber sizes and permissible clear spans for purlins (Strength Class C24)

<table>
<thead>
<tr>
<th>Size of purlin (mm)</th>
<th>Slope of Roof (degrees)</th>
<th>15 - 22.5°</th>
<th>22.5 - 30°</th>
<th>30 - 45°</th>
</tr>
</thead>
<tbody>
<tr>
<td>B x D</td>
<td>Spacing of Purlins (mm)</td>
<td>1500 1800 2100 2400</td>
<td>1500 1800 2100 2400</td>
<td>1500 1800 2100 2400</td>
</tr>
<tr>
<td>75 x 125</td>
<td>Maximum clear spans (m)</td>
<td>2.01 1.88 1.77 1.65</td>
<td>2.06 1.92 1.82 1.73</td>
<td>2.12 1.99 1.88 1.79</td>
</tr>
<tr>
<td>75 x 150</td>
<td></td>
<td>2.41 2.25 2.13 1.98</td>
<td>2.46 2.31 2.18 2.07</td>
<td>2.54 2.38 2.25 2.15</td>
</tr>
<tr>
<td>75 x 175</td>
<td></td>
<td>2.81 2.63 2.48 2.31</td>
<td>2.87 2.69 2.54 2.42</td>
<td>2.97 2.78 2.63 2.50</td>
</tr>
<tr>
<td>75 x 200</td>
<td></td>
<td>3.20 3.00 2.83 2.63</td>
<td>3.28 3.07 2.90 2.76</td>
<td>3.39 3.17 3.00 2.86</td>
</tr>
<tr>
<td>75 x 225</td>
<td></td>
<td>3.60 3.37 3.19 2.96</td>
<td>3.68 3.45 3.26 3.10</td>
<td>3.81 3.57 3.35 -</td>
</tr>
</tbody>
</table>

Minimum purlin bearing 80mm

Imposed load: 1.02 kN/m² (high snow load - altitudes not exceeding 100m)

Dead load: not more than 0.75kN/m² (concentrated load 0.9kN ) excluding self weight of purlin

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

## Guidance Table 26: Timber size and permissible clear spans for ceiling joists at 400mm spacing (Strength Class C24)

<table>
<thead>
<tr>
<th>Size of Ceiling Joist</th>
<th>Maximum clear span (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breadth x Depth (mm)</td>
<td></td>
</tr>
<tr>
<td>47 x 97</td>
<td>2.00</td>
</tr>
<tr>
<td>47 x 120</td>
<td>2.61</td>
</tr>
<tr>
<td>47 x 145</td>
<td>3.29</td>
</tr>
<tr>
<td>47 x 170</td>
<td>3.69</td>
</tr>
<tr>
<td>47 x 195</td>
<td>4.64</td>
</tr>
<tr>
<td>47 x 220</td>
<td>5.32</td>
</tr>
</tbody>
</table>

Minimum ceiling joist bearing 35mm

Imposed load: 0.25kN/m² (concentrated load 0.9kN )

Dead load: 0.50kN/m² excluding self weight of joist

The above values have been compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

## Guidance Table 27: Timber sizes and permissible clear spans for ceiling binders (Strength Class C24)

<table>
<thead>
<tr>
<th>Size of Binder (mm)</th>
<th>Spacing of Binders (mm)</th>
<th>Maximum clear span or hanger spacing (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breadth x Depth</td>
<td>1200 1500 1800 2100 2400 2700</td>
<td></td>
</tr>
<tr>
<td>47 x 175</td>
<td>2.88 2.69 2.54 2.42 2.32 2.23</td>
<td></td>
</tr>
<tr>
<td>47 x 200</td>
<td>3.33 3.11 2.93 2.89 2.85 2.81</td>
<td></td>
</tr>
<tr>
<td>75 x 175</td>
<td>3.43 3.21 3.04 3.07 3.03 3.02</td>
<td></td>
</tr>
<tr>
<td>75 x 200</td>
<td>3.95 3.70 3.50 3.37 3.31 3.27</td>
<td></td>
</tr>
<tr>
<td>75 x 225</td>
<td>4.47 4.18 3.95 3.76 3.61 3.47</td>
<td></td>
</tr>
</tbody>
</table>

Minimum ceiling binder bearing 60mm

**Key:** 120mm minimum bearing required

Imposed load: 0.25kN/m² (concentrated load 0.9kN )

Dead load: 0.50kN/m² excluding self weight of binder

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

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55
**Roof restraint**

Roof and walls to be provided with lateral restraint straps as guidance details above

**Roof insulation and ventilation gaps**

Insulation to be fixed in accordance with manufacturer’s details and must be continuous with the wall insulation but stopped back at eaves or at junctions with rafters to allow for a continuous 50mm minimum ventilated air gap above the insulation to underside of the roofing felt where a non breathable roofing felt is used or 15- 25mm air space to allow for sag in felt if using a breathable roofing membrane in accordance with the manufacturer’s details. All guidance diagrams and details assume rafters at 400mm centers and 12.5mm vapour checked plaster board ceilings with skim finish.

**Guidance Table 28: Examples of roof insulation fixed between/under rafters.**

(Vented cold roof achieving a U-value of 0.18 W/m².k)

<table>
<thead>
<tr>
<th>Product</th>
<th>K value</th>
<th>Position in roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Kooltherm K7 Pitched Roof Board and Kingspan Kooltherm K18 Insulated Plasterboard</td>
<td>0.020</td>
<td>100mm friction fixed between rafters and 42.5mm fixed under rafters, with integral vapour checked plaster board and skim finish</td>
</tr>
<tr>
<td></td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>Kingspan Kooltherm K7 Pitched Roof Board and Kingspan Kooltherm K18 Insulated Plasterboard</td>
<td>0.020</td>
<td>100mm friction fixed between rafters and 37.5mm fixed under rafters, with integral vapour checked plaster board and skim finish*</td>
</tr>
<tr>
<td></td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>Celotex GA4000</td>
<td>0.022</td>
<td>100mm friction fixed between rafters and 35mm fixed under rafters, with vapour checked plaster board and skim finish*</td>
</tr>
<tr>
<td>Celotex GA4000</td>
<td>0.022</td>
<td>165mm friction fixed between rafters with vapour checked plaster board and skim finish fixed to underside of rafters*</td>
</tr>
</tbody>
</table>

**Multi foils**

<table>
<thead>
<tr>
<th>Product</th>
<th>K value</th>
<th>Position in roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Dynamics TLX Silver FB multi foil and Insulation with a k value of 0.022 or better</td>
<td>R-value 1.69</td>
<td>One layer of multi foil fixed under rafters With vapour checked plaster board fixed to 25mm deep battens to create air space and 75mm Kingspan or Celotex (or other approved foil faced rigid insulation) fixed between rafters allowing a 25mm cavity between the multi foil and rigid insulation*</td>
</tr>
<tr>
<td></td>
<td>0.022</td>
<td></td>
</tr>
<tr>
<td>YBS SuperQuilt multi foil and Insulation with a k value of 0.023 or better</td>
<td>R-value 2.71 (including both air spaces)</td>
<td>One layer of multi foil fixed under rafters With vapour checked plaster board fixed to 25mm deep battens to create air space and 65mm Kingspan or Celotex (or other approved foil faced rigid insulation) fixed between rafters allowing a 25mm cavity between the multi foil and rigid insulation*</td>
</tr>
<tr>
<td></td>
<td>0.023</td>
<td></td>
</tr>
</tbody>
</table>

**Key:** *All unvented roofs using vapour permeable underlay.*

**Notes.** 1. Insulation to be installed in accordance with manufacturer’s details

### Guidance Table 29: Examples of roof insulation laid horizontally between and over ceiling joists
(Vented cold roof achieving a U-value of 0.16 W/m².k)

<table>
<thead>
<tr>
<th>Product</th>
<th>K value</th>
<th>Position in roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthwool Loft Roll 44</td>
<td>0.044</td>
<td>100mm between joists and 170mm laid over joists</td>
</tr>
<tr>
<td>Rockwool Roll</td>
<td>0.044</td>
<td>100mm between joists and 170mm laid over joists</td>
</tr>
<tr>
<td>Earthwool Loft Roll 44 and</td>
<td>0.044</td>
<td>100mm between joists and</td>
</tr>
<tr>
<td>Polyfoam Space Boards</td>
<td>0.029</td>
<td>2 layers 52.5mm Space Boards fixed over joists and over laid with 18mm floor boards</td>
</tr>
</tbody>
</table>

**Notes.** 1. Insulation to be installed in accordance with manufacturer’s details
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### Guidance Table 30: Examples of roof insulation fixed over/between rafters
(Warm roof achieving a U-value of 0.18 W/m².k)

<table>
<thead>
<tr>
<th>Product</th>
<th>K-value</th>
<th>Position in roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Kooltherm K7 Pitched Roof Board</td>
<td>0.020</td>
<td>100mm fixed over rafters with breathable membrane, for example Kingspan Nilvent fixed beneath counter battens* or 90mm fixed over rafters with breathable membrane fixed over counter battens*</td>
</tr>
<tr>
<td>Kingspan Kooltherm K7 Pitched Roof Board</td>
<td>0.020</td>
<td>55mm fixed over rafters and 50mm fixed between rafters with breathable membrane, for example Kingspan Nilvent fixed beneath counter battens* or 50mm fixed over rafters and 50mm fixed between rafters with breathable membrane fixed over counter battens*</td>
</tr>
<tr>
<td>Celotex GA4000</td>
<td>0.022</td>
<td>100mm fixed over rafters with breathable membrane*</td>
</tr>
<tr>
<td>Celotex GA4000</td>
<td>0.022</td>
<td>60mm fixed over rafters and 60mm fixed between rafters with breathable membrane*</td>
</tr>
</tbody>
</table>

**Key:** *All unvented roofs using vapour permeable underlay.

**Notes:** 1. insulation fixed over the roof should be carried out in accordance with insulation manufacturer’s details which may require specialist fixings for the build-up of insulation, battens/counter battens and breathable membrane positions required.
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Guidance Diagram 34: Typical section through a dormer roof (not to scale)

- Roof slates/tiles and associated ridge, verge, eaves, hip, valley, abutment and ventilation systems etc fitted in accordance with the tile manufacturer's details, suitable for the minimum recommended roof pitches and exposure.
- 25 x 50mm treated battens at a guage to suit coverings, fixed to:
  - Non breathable roofing felt (or breathable roof membrane fixed & ventilated as manufacturers details) fixed to:
  - Ridge board as guidance details
  - Rafters (see construction details and table in guidance for sizes of rafters suitable for clear spans)
  - Lintels over openings to s/engineers calculations
  - Ceiling joists (see construction details and table in guidance for ceiling joist sizes suitable for clear spans)
  - Insulation details as tables in guidance
  - Dormer walls constructed with painted renders or cladding on insulated timber frame as guidance
  - Code 5 lead flashing & valleys
  - Dormer roof supported on rafters doubled up & bolted together
  - See main roof for construction details

All cavities closed at eaves level

Guidance Diagram 35: Typical roof valley detail (not to scale)

- Roof coverings & roof structure as guidance details
- Rafters as guidance
- Ceiling joists as guidance (insulation omitted for clarity)
- Breathable roofing membrane lapped over lead & forming drip
- Tiling fillet
- Code 5 lead lined gutter- lead sizes, drips & welted joints etc to the Lead Sheet Association details
- 25mm treated gutter board fixed to:
- 50 x 50mm treated timber gutter bearer
Pitched roof ventilation requirements when using a non breathable roof membrane

(i) Duo pitched roof with horizontal ceilings and insulation at ceiling level
Roof insulation to be continuous with the wall insulation but stopped back at eaves or at junctions with rafters to allow a 50mm minimum air gap. Cross ventilation is to be provided by either proprietary facia ventilation strips or soffit vents to opposing sides of roof at eaves level and fitted with an insect grill with a ventilation area equivalent to a 25mm continuous gap for roof pitches below 15° or a 10mm gap for roof pitches above 15°.

When the roof span is more than 10 metres or when the pitch is more than 35°, provide additional high level ventilated openings equivalent to a continuous 5mm air gap at ridge level to cross ventilate roofs using proprietary dry ridge systems or vent tiles spaced and fixed in accordance with tile manufacturer’s details.

(ii) Mono pitched roofs with horizontal ceilings and insulation at ceiling level
Roof insulation to be continuous with the wall insulation but stopped back at eaves or at junctions with rafters to allow a 50mm minimum air gap. Cross ventilation is to be provided by either proprietary facia ventilation strips or soffit vents at eaves level and fitted with an insect grill with a ventilation area equivalent to a 25mm continuous gap for roof pitches below 15° or a 10mm gap for roof pitches above 15°.

Provide high level ventilated openings fitted with an insect grill equivalent to a continuous 5mm air gap to cross ventilate roofs using proprietary ventilation systems or vent tiles spaced and fixed in accordance with tile manufacturer’s details.

(iii) Duo pitched roof with insulation following slope of rafters (rooms in the roof)
Roof insulation to be continuous with the wall insulation but stopped back at eaves or at junctions with rafters to allow a continuous 50mm air gap between the top of the insulation and underside of the roof membrane. Cross ventilation to be provided by a proprietary eaves ventilation strips equivalent to a 25mm continuous air gap to opposing sides of roof at eaves level, fitted with insect grill and at ridge/high level to provide ventilation equivalent to a 5mm air gap in the form of proprietary dry ridge system or vent tiles spaced and fixed in accordance with tile manufacturer’s details.
Proprietary vapour permeable roof membrane
Ventilation to the roof space may be omitted, only if a proprietary British Board of Agreement (BBA or other third party accredited) vapour permeable breathable roof membrane is used. Vapour permeable breathable roof membranes must always be installed in strict accordance with manufacturer's details (note. some breathable membranes may also require additional roof ventilation in accordance with manufacturer's details).

Valleys and lead work
Lead work, flashing, soakers, valleys and gutters, etc, to be formed from Code 5 lead sheet and fully supported on treated valley boards, etc, and to have a minimum 150mm lap joints, dressed 200mm under tiles, etc, and not to be fixed in lengths exceeding 1.5m and to be fixed in accordance with the roof cladding manufacturer's and the Lead Sheet Association recommendations.

Lofts hatches, doors and Light wells to roof spaces
All hatches, doors and light wells in the roof space to be insulated to the same standard as the roof, draft stripped and positively fixed.
A7: Flat roof construction

4 options as follows:

Option 1. Flat roof with 'cold deck'
The insulation layer is placed at ceiling level with an air space between the top of the insulation and underside of the deck, ventilated to external air on opposing sides and should only be considered for timber structural decks as detailed in the guidance diagram below. (note: due to the technical difficulties in achieving the required levels of insulation between roof timbers and the associated risks of condensation within the 'cold roof' and at thermal bridges, a flat roof with a 'warm deck' is the preferred option).

Waterproof covering to be either:
- 3 layers of high performance felt (hot bonded together with bitumen) to a current BBA Certificate in compliance with BS 8217
- Single layer system with a current BBA or WIMLAS Certificate
- Glass reinforced plastic (GRP) system with a current BBA or other approved accreditation
- Rolled lead sheet fixed in compliance with the Lead Sheet Associations publication 'Rolled Lead Sheet- The Complete Manual' obtainable from: www.leadsheet.co.uk
- Mastic asphalt fixed in accordance with the Mastic Asphalt Councils technical guides and specifications obtainable from: www.masticasphaltcouncil.co.uk

Waterproof covering to be fixed by a flat roofing specialist in accordance with manufacturer's details typically onto a timber deck as follows:
- 22mm external quality plywood decking or similar approved laid to 1:60/80 minimum gradient using firing strips at spacing to match joists, fixed onto:
- Timber flat roof joists constructed of kiln dried structural grade timber with sizes and spacing suitable for the proposed clear span in compliance with independent span table below or see TRADA Span Tables.
- Flat roof covering (excluding lead and areas used for habitable use) to have a surface finish of bitumen bedded stone chippings covering the whole surface to a depth of 12.5mm to achieve a class AA (or B (t4) European class) fire rated designation for surface spread of flame
- Restrain flat roof to external walls by the provision of 30 x 5 x 1000mm lateral restraint straps at maximum 2000mm centers fixed to 100 x 50mm wall plates and internal wall faces.
- Insulation to be fixed between/under joists in compliance with the guidance table below and is to be continuous with the wall insulation. Fix 12.5mm vapour checked plaster board (unless plaster board is integral with the insulation) and 3mm skim to underside of joists
- Eaves ventilation: provide cross ventilation to each and every void of the flat roof by installing eaves ventilation on opposing sides (fitted with insect grills) equivalent to a continuous 25mm gap up to 5m span or 30mm gap for 5-10m span.
- Ventilated air space over roof: provide an unrestricted ventilated air space between the top of the insulation and underside of the complete roof deck at not less than 50mm for up to 5m spans and not less than 60mm for 5-10m spans.

Flat roofs with unlimited access/habitable use
Flat roof with unlimited access to have proprietary non slip finishes/tiles in accordance with manufacturer's details and suitable protection from falling in accordance with guidance details and Approved Document K.
Guidance Table 31: Examples of 'cold roof' insulation fixed between/under flat roof joists (Vented 'cold roof' achieving a U-value of 0.18 W/m².K)

<table>
<thead>
<tr>
<th>Product</th>
<th>K -Value</th>
<th>Position in roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Thermapitch TP10</td>
<td>0.022</td>
<td>185mm (105 + 80mm) friction fixed between joists</td>
</tr>
<tr>
<td>Kingspan Thermapitch TP10 and Kingspan Kooltherm K18 Insulated Plasterboard</td>
<td>0.022, 0.021</td>
<td>120mm friction fixed between joists and 37.5mm fixed under rafters, with integral vapour checked plaster board and skim finish</td>
</tr>
<tr>
<td>Celotex XR4000</td>
<td>0.022</td>
<td>185mm friction fixed between joists or 125mm friction fixed between joists and 25mm fixed under joists, with 12.5mm vapour checked plaster board and 3mm skim finish</td>
</tr>
<tr>
<td>Jablite Premium Board</td>
<td>0.030</td>
<td>220mm friction fixed between joists or 150mm between joists and 50mm fixed under joists with 12.5mm vapour checked plaster board and 3mm skim finish</td>
</tr>
</tbody>
</table>

Notes: 1. The joist depth must be sufficient to maintain a 50mm air gap above the insulation and cross ventilation to be provided on opposing sides by a proprietary ventilation strip equivalent to a 25mm continuous gap at eaves level with insect grill for ventilation of the roof space.
2. All specifications assume 50mm wide joists at 400mm centers with 12.5mm vapour checked plaster board and 3mm skim finish. 3. Insulation to be installed in accordance with manufacturer's details
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Option 2. Flat roof with 'warm deck'

The insulation layer is placed above the roof deck, but below the weatherproof membrane and normally there should be no insulation below the deck unless it is British Board of Agreement (BBA or other third party) accredited. Ventilation of the roof is not required as the insulation is fixed/beded on an approved vapour control layer. Warm roofs can be used above timber structural decks as detailed in the guidance diagram below, and is also suitable for concrete and metal structural decks, in accordance with a flat roof specialists design for the particular project.

Waterproof covering to be either:

- 3 layers of high performance felt (hot bonded together with bitumen) to a current BBA Certificate in compliance with BS 8217
- Single layer system with a current BBA or WIMLAS Certificate
- Glass reinforced plastic (GRP) system with a current BBA or other approved accreditation
- Rolled lead sheet fixed in compliance with the Lead Sheet Associations publication 'Rolled Lead Sheet- The Complete Manual' obtainable from: www.leadsheet.co.uk
- Mastic asphalt fixed in accordance with the Mastic Asphalt Councils technical guides and specifications obtainable from: www.masticasphaltcouncil.co.uk

Waterproof covering to be fixed by a flat roofing specialist in accordance with manufacturer's details typically onto a timber deck as follows:

- Waterproof coverings to be fixed on to a separating layer where necessary and on to:
- Roof insulation layer in compliance with the guidance table below, fixed/beded to an approved vapour control layer (fully supported by the roof deck in accordance with the manufacturer's details) on to:
- 22mm external quality plywood decking or similar approved laid to 1:60/80 minimum gradient using firing strips at spacing to match joists, fixed onto:
- Timber flat roof joists constructed of kiln dried structural grade timber with sizes and spacing suitable for the proposed clear span as annotated on the drawing or in compliance with the independent span table below or see TRADA Span Tables.
- Flat roof covering (excluding lead and areas accessible for habitable use) to have a surface finish of bitumen bedded stone chippings covering the whole surface to a depth of 12.5mm to achieve a class AA (or B (t4) European class) fire rated designation for surface spread of flame
- Restrain flat roof to external walls by the provision of 30 x 5 x 1000mm lateral restraint straps at maximum 2000mm centers fixed to 100 x 50mm wall plates and internal wall faces.
- Fix 12.5mm vapour checked plaster board and 3mm skim to underside of joists

Flat roofs with unlimited access/habitable use

Flat roof with unlimited access to have proprietary non slip finishes/tiles in accordance with manufacturer's details and suitable protection from falling in accordance with guidance details and Approved Document K.
Guidance Table 32: Examples of ‘warm roof’ insulation fixed above flat roof joists
(Non vented ‘warm roof’ achieving a U-value of 0.18 W/m².K)

<table>
<thead>
<tr>
<th>Product</th>
<th>K-Value</th>
<th>Insulation fixed above deck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan Thermaroof TR26 LPC/FM (use with mechanically fixed single ply membranes)</td>
<td>0.022</td>
<td>110mm fixed using telescopic tube fixings</td>
</tr>
<tr>
<td>Kingspan Thermaroof TR27 LPC/FM (use with bonded or mechanically fixed to substrate – finish with 3 layer partially bonded built up felt, mastic asphalt or single ply membrane and approved liquid applied systems)</td>
<td>0.024</td>
<td>120mm</td>
</tr>
<tr>
<td>Celotex TD4000 (use with mechanically fixed single ply membrane or 3 layers built up felt. Note: 12mm additional ply layer required for single ply membranes)</td>
<td>0.022</td>
<td>126mm</td>
</tr>
<tr>
<td>Knauf Polyfoam Roofboard Standard (use with single ply membrane only) with timber deck</td>
<td>0.035</td>
<td>180mm</td>
</tr>
<tr>
<td>Knauf Rocksilk Krimpact Flat Roof Slab (use with bonded fixing over a plywood deck- finished with 3 layer built up felt, mastic asphalt or single ply membrane)</td>
<td>0.038</td>
<td>185mm</td>
</tr>
<tr>
<td>Jablite Jabdec(use with bonded fixing over a plywood deck- finished with 3 layer built up felt, mastic asphalt or single ply membrane)</td>
<td>0.035</td>
<td>183mm (with mechanical fixings) 163mm (without mechanical fixings)</td>
</tr>
</tbody>
</table>

Notes: 1. Where composite deck insulation is to be used with a single ply membrane - ensure the conditions of use of the membrane are met. It may be necessary to use an additional layer of 12mm external quality structural plywood above the insulation to meet the conditions of use. 2. All specifications assume 50mm wide joists at 400mm centers with 12.5mm vapour checked plaster board and 3mm skim finish fixed to underside of joists. 3. Insulation to be installed in accordance with manufacturer’s details.
Option 3. Flat roof with inverted 'warm deck' (insulation on top of waterproof coverings)
Typically constructed as a ballast layer, over a filter layer, over insulation layer, over water proof coverings/ vapour control layer and structural deck, designed and constructed by a flat roofing specialist. Not covered by this guidance.

Option 4. Flat roof with green roof on 'warm deck' (Either intensive or extensive)

Intensive green roof
Typically constructed with vegetation in 1.0m deep soil layer, over filter layer, over drainage/ reservoir layer, over protective layer, over root barrier, over water proof coverings/ vapour control layer and structural deck, designed and constructed by a flat roofing specialist. Not covered by this guidance.

Extensive green roof
Typically constructed with Sedum blanket, over filter layer, over root barrier, over water proof coverings/ vapour control layer and structural deck, designed and constructed by a flat roofing specialist. Not covered by this guidance.

The design, workmanship and selection of materials for flat roofs
The design, workmanship and selection of materials should comply with Model Specification Sheet P.L.1 Built-Up Roofing: Plywood Deck, published by The British Flat Roofing Council. Metallic roof trims to be of non-corrodible material and resistant to sunlight and not fixed through the water proof covering. All timber to be treated using CCA vacuum/pressure or O/S double vacuum to BS 5268:5, including all cut ends of timber etc 300mm of any joint.

All flat roofing works to be carried out by a specialist flat roofing contractor and all materials etc to be fitted in compliance with manufacturer’s details. Work should not be carried out during wet weather or when the deck has not fully dried out. A vapour control barrier is required on the underside of the roof below the insulation level, (typically 500g polythene or foil backed plaster board). Fix 12.5mm plasterboard (joints staggered) and 5mm skim coat of finishing plaster to the underside of all ceilings using galvanized plasterboard nails.

Flat roof to be carried out as detailed on the drawings. Moisture content of timber should not exceed 20% and to be kiln dried and grade C24. Workmanship to comply to BS 8000:4. All fixings to be proprietary stainless steel or galvanized steel.

Cavity closers
Proprietary British Board of Agreement (BBA or other third party accredited) acoustic/thermally insulated/fire resistant cavity closers, or similar are to be provided to all cavity openings/closings, tops of walls and junctions with other properties in accordance with manufacturer's details.

Tops of cavity walls can be closed to prevent the passage of fire using a proprietary British Board of Agreement (BBA or other third party accredited) 30 minutes fire resistant rigid board, fixed in accordance with manufacturer's details.
### Guidance Table 33: Timber sizes and permissible clear spans for joists for flat roofs - with access and use for maintenance and repairs only (Strength Class C24)

<table>
<thead>
<tr>
<th>Size of joist (mm)</th>
<th>Spacing of joist (mm)</th>
<th>Maximum clear span (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400</td>
<td>450</td>
</tr>
<tr>
<td>Breadth x Depth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47 x 97</td>
<td>1.97</td>
<td>1.93</td>
</tr>
<tr>
<td>47 x 120</td>
<td>2.57</td>
<td>2.51</td>
</tr>
<tr>
<td>47 x 145</td>
<td>3.22</td>
<td>3.15</td>
</tr>
<tr>
<td>47 x 170</td>
<td>3.88</td>
<td>3.78</td>
</tr>
<tr>
<td>47 x 195</td>
<td>4.51</td>
<td>4.34</td>
</tr>
</tbody>
</table>

Minimum flat roof joist bearing 40mm

**Key:** 80mm minimum bearing required

- Imposed load: 1.02 kN/m² (high snow load - altitudes not exceeding 100m)
- Dead load: not more than 0.75kN/m² (concentrated load 0.9kN) excluding self weight of joists

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop

### Guidance Table 34: Timber sizes and permissible clear spans for joists for flat roofs - with unlimited access (Strength Class C24)

<table>
<thead>
<tr>
<th>Size of joist (mm)</th>
<th>Spacing of joist (mm)</th>
<th>Maximum clear span (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400</td>
<td>450</td>
</tr>
<tr>
<td>Breadth x Depth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 x 120</td>
<td>2.50</td>
<td>2.46</td>
</tr>
<tr>
<td>75 x 145</td>
<td>3.20</td>
<td>3.15</td>
</tr>
<tr>
<td>75 x 170</td>
<td>3.91</td>
<td>3.85</td>
</tr>
<tr>
<td>75 x 195</td>
<td>4.63</td>
<td>4.55</td>
</tr>
</tbody>
</table>

Minimum flat roof joist bearing 40mm

- Imposed load: 1.5 kN/m² (high snow load - altitudes not exceeding 100m)
- Dead load: not more than 0.75kN/m² (concentrated load 2 kN) excluding self weight of joists

The above values have been independently compiled for guidance table by Geomex Ltd Structural Engineers: www.geomex.co.uk

Span tables for C16 and C24 strength class solid timber members in floors, ceilings and roofs for dwellings are available from TRADA Technology at: www.trada.co.uk/bookshop
A8: Mortars, renders and gypsum plasters

Cement mortars and renders

Guidance Table 35: Cement mortar - general mix ratio

<table>
<thead>
<tr>
<th>Wall construction</th>
<th>Cement: sand with plasticiser (mix ratio by volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard durable materials</td>
<td>1 : 5 - 6</td>
</tr>
<tr>
<td>Moderately hard materials</td>
<td>1 : 7 - 8</td>
</tr>
<tr>
<td>Soft weak materials</td>
<td>See notes 1, 2 and 3</td>
</tr>
</tbody>
</table>

Notes: 1. If sulphates are present in the ground- use sulphate resisting cement. 2. Retaining walls and 3 storey mortar mix to be designed by suitably qualified person i.e. structural engineer. 3. Mortar mix is to be specified by a suitably qualified and experienced specialist- suitable for the type of wall material and degree of exposure.

Guidance Table 36: Cement render - general mix ratio

<table>
<thead>
<tr>
<th>Wall construction</th>
<th>Exposure</th>
<th>Cement: sand with plasticiser (mix ratio by volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard durable materials</td>
<td>Severe</td>
<td>1 : 3 - 4</td>
</tr>
<tr>
<td></td>
<td>Sheltered/mode</td>
<td>1 : 5 - 6</td>
</tr>
<tr>
<td>Moderately hard materials</td>
<td>Severe</td>
<td>1 : 5 - 6</td>
</tr>
<tr>
<td></td>
<td>Sheltered/mode</td>
<td>1 : 7 - 8</td>
</tr>
<tr>
<td>Soft weak materials</td>
<td>Severe</td>
<td>See note 1</td>
</tr>
<tr>
<td></td>
<td>Sheltered/mode</td>
<td>See note 1</td>
</tr>
</tbody>
</table>

Notes: 1. Mortar mix is to be specified by a suitably qualified and experienced specialist, suitable for the type of backing wall material and degree of exposure, in accordance with the manufacturer’s details.

Guidance Table 37: Thickness of render coats

<table>
<thead>
<tr>
<th>Application</th>
<th>type of coat</th>
<th>Thickness</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>External render</td>
<td>Dubbing out</td>
<td>16mm max</td>
<td></td>
</tr>
<tr>
<td>Under coat</td>
<td></td>
<td>10mm</td>
<td>Comb scratched for key</td>
</tr>
<tr>
<td>Top coat</td>
<td></td>
<td>10mm</td>
<td>Smooth float finish</td>
</tr>
</tbody>
</table>

Notes: 1. Thickness of render coats to be specified by a suitably qualified and experienced specialist, in accordance with the manufacturer’s details.

Gypsum plasters

Guidance Table 38: Gypsum plaster for internal finishes - general mix ratio

<table>
<thead>
<tr>
<th>Background</th>
<th>Gypsum plaster</th>
<th>Final coat (smooth finish)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New masonry walls</td>
<td>Bonding coat - 11mm thick</td>
<td>Finish coat - 3mm thick</td>
</tr>
<tr>
<td>Existing masonry walls</td>
<td>Renovation plaster bonding coat - 11mm thick</td>
<td>Renovating plaster finish coat - 3mm thick</td>
</tr>
<tr>
<td>New plaster board</td>
<td>New plaster board</td>
<td>3mm thick board finish plaster</td>
</tr>
</tbody>
</table>

1. Preparation of walls, product suitability, application, and protection of gypsum plaster to be specified by a suitably qualified and experienced specialist, in accordance with the manufacturer's details suitable for the type of backing wall material.
Part B: Fire safety and means of escape
Please refer fully to Approved Document B: Volume 1: Fire safety in dwelling houses (2006 edition with 2010 & 2013 amendments);

Contents

Fire detection and fire alarm systems
   (i) New houses and extensions
   (ii) Large houses
Means of escape
   Ground storey in dwellings
   Two storey dwelling with a floor not more than 4.5m above ground level
   Three storey dwellings with one upper floor more than 4.5m above ground level
   Option 1: Protected stairway
   Option 2: Fire separated 3rd storey with alternative external/internal fire exit
General provisions for means of escape
   Fire doors to protected stairway enclosures
   Protected stairway enclosures
   Limitations on the use of un-insulated glazed elements
   Fire resistance to upper floors and elements of structure
   Means of escape windows and external doors
   Galleries
   Basements
   Passenger lifts
   Replacement windows (excludes repairs)
   Fire separation between an integral garage and dwelling
   Protection of openings, fire stopping and cavity barriers
   Fire resistance of areas adjacent to external fire exit stairs
   Circulation systems in houses with a floor more than 4.5m above ground level.
   Residential sprinkler systems for means of escape
   Guidance Table 39: Internal surface spread of flame: Classification of wall and ceiling linings
Fire resistance to elements of structure
   Guidance Table 40: Fire resistance to common elements of structure etc
External wall construction in relation to a boundary
Compartment walls and floors separating buildings
Permitted building openings in relation to a boundary:
   Openings within 1.0m of a boundary
   Openings more than 1.0m from a boundary
   Guidance Table 41: Permitted unprotected areas in relation to a relevant boundary
Designation of roof covering and minimum distance to boundary
   Guidance Table 42: Limitations on designation of roof coverings and minimum distance to boundary
Typical fire and rescue service vehicle access route specification for dwellings
Part B: Fire safety and means of escape

Fire detection and fire alarm systems
Self contained mains operated smoke alarms with battery backup to BS EN 14604, and fire alarm and fire alarm systems to be installed in accordance with BS 5839 to the following standards:

(i) **New houses and extensions**: Grade D Category to a LD3 standard
Self contained mains operated smoke alarms with battery backup to BS 5446, to be installed in accordance with the relevant recommendations of BS 5839 Part 6: 2004 as follows:
- in all circulation areas at each storey level that form part of the escape route from the dwelling
- within 7.5m of all doors to habitable rooms.
- sited at least 300mm from walls and light fittings
- interconnected together
- Heat alarms to be installed in kitchens if the kitchen is open to the stairway or circulation area (in two storey dwellings).

(ii) **Large houses** - which has more than 1 storey and any of those storeys exceed 200m² as follows:

a. **Large 2 storey house (excluding basement)** - Grade B Category to a LD3 standard
   - Fire detection and alarm system comprising fire detectors (other than smoke/heat alarms), fire alarm sounders and control and indicating equipment to either BS EN 54-2 (and power supply to BS EN 54-4), or to Annex C of BS 5839: Pt.6
   - Detection system to be installed in all circulation areas at each storey level that form part of the escape route from the dwelling

b. **Large 3 storey house (excluding basements)** - Grade A Category to a LD2 standard (smoke/heat alarms sited in accordance with BS 5839-1 for a Category L2 system)
   - Fire detection and alarm system incorporating control and indicating equipment to BS EN 54-2, and power supply to BS EN 54-4, installed to BS 5839: Pt.1 with some minor exceptions
   - Detection system to be installed in all circulation spaces that form part of the escape routes from the dwelling, and in all rooms or areas that present a high risk of fire.

Means of escape

**Ground storey in dwellings**
Except for kitchens, all habitable rooms in the ground storey should either:
(i) open directly onto a hall leading to the entrance or other suitable exit; or
(ii) be provided with a means of escape window (or door) in compliance with the guidance details below.

**Two storey dwelling with a floor not more than 4.5m above ground level**
Habitable rooms in the first floor storey served by only one stairs should either:
(i) be provided with a means of escape windows (or doors) in compliance with the guidance details below; or
(ii) provided with direct access to a protected stairs as described in three storey buildings guidance below.
Three storey dwellings with one upper floor more than 4.5m above ground level
The dwelling house may either have a protected stairs as described in option 1 below or the top floor can be separated and given its own alternative escape route as described in option 2 below. Alternatively, where the fire safety requirements of the building regulations cannot be met, a sprinkler system may be allowed against the requirements of Approved Document B as described in the guidance below. **Important note:** The options below need not be followed if the dwelling house has more than one internal stairway, which affords an effective alternative means of escape in two directions and are physically separated from each other (to be approved by building control).

**Option 1: Protected stairway**
The stairs, landings and hallway from the top storey down to the ground floor must be protected and enclosed in 30-minute fire resisting construction and the doors fitted with FD 20 fire doors (as detailed below), the protected stairs must discharge directly to an external door at ground level or the protected stairs can give access to at least two escape routes and final exits separated by 30 minutes fire resisting construction at ground level. Note: Toilets and bathrooms onto the protected stairs do not require fire doors providing the partitions between the toilet/bathroom and the rooms onto the stairs has 30 minutes fire resistance from both sides and there is no heat producing appliances fitted in the toilet/bathroom. All cupboards onto the stairs will require FD 20 fire doors.

**Option 2: Fire separated 3rd storey with alternative external/internal fire exit**
The top 3rd storey should be separated from the lower storeys by 30 minute fire resisting construction and provided with an alternative escape route leading to its own final exit. Fire resistance of areas adjacent to external stairs are detailed in the guidance below.

**General provisions for means of escape**

**Fire doors to protected stairway enclosures**
Fire doors to protected stairway enclosures to be FD 20 fire resisting doors having 20 minutes fire resistance to BS 476-22:1987, fitted with intumescent strips rebated around sides and top of door or frame, excludes toilets/bathrooms/en-suite-providing the partitions protecting the stairs has 30 minutes fire resistance from both sides. (Note: a self closing FD30 fire door is required between the dwelling/garage in accordance with the guidance details below)

Existing/new solid hardwood/timber doors may achieve 20 minutes fire or doors may be suitable for upgrading to achieve 20 minutes fire resistance (as agreed with building control) with a proprietary intumescent paint/paper system in accordance with manufacturer’s details. More details are available from: www.fireproof.co.uk, who can supply (and apply where required) an intumescent paint/paper system which must be applied in accordance with the manufacturer’s details. A copy of the manufacturer’s certificate of purchase/ application must be provided for building control on completion. Upgraded doors/frames to be fitted with intumescent strips as detailed in the guidance above.

**Protected stairway enclosures**
To have 30 minutes fire resisting construction from both sides, constructed in accordance with partition wall details in Part A of this guidance

**Limitations on the use of un-insulated glazed elements**
Limitations on the use of un-insulated glazed elements on escape routes to be in compliance with Table A4 of Approved Document B: Volume 1 - Dwelling Houses. (un-insulated refers to the fire insulation value of the glazing (normally 30 minutes) and not the thermal insulation value)
Fire resistance to upper floors and elements of structure
Upper floors to have 30 minutes fire resisting construction from the underside, constructed in accordance with upper floor details in Part A of this guidance, other elements of structure to have fire resistance in compliance with the guidance table below.

Means of escape windows and external doors
Means of escape windows to be fitted with proprietary hinges to open the window to the minimum required clear width of 450mm. Escape windows must have minimum clear opening casement dimensions of 0.33m² (typically 450mm wide x 750mm high), with the opening located between 800-1100mm above floor level to all bedrooms and habitable rooms at first floor level and inner habitable rooms on the ground floor level. (roof window openings may be acceptable 600mm above floor level subject to approval by building control).

The means of escape window or door should lead to a place of safety away from the fire. A courtyard or back garden from which there is no exit other than through other buildings would have to be at least as deep as the dwelling house is high to be acceptable as detailed in Par 2.8 (b) and Diagram 4 of ADB V1.

Windows above the ground floor storey and within 800mm of floor level are to be provided with containment/ guarding/ proprietary catches which should be removable (child proof) in the event of a fire. Where an escape window cannot be achieved, direct access to a protected stairs (or protected route to inner rooms) is acceptable in compliance with guidance details above for 3 storey buildings and ADB V1par 2.6 (a) or (b).

Windows should be designed to remain in the open position whilst making an escape

Locks (with or without removable keys) and stays may be fitted to escape windows, subject to the stay being fitted with a release catch which is child resistant.

Galleries
A gallery floor providing a raised area or platform around the sides or at the back of a room (to provide extra space) should be provided with:
  - an alternative exit or,
  - where the gallery floor is not more than 4.5m above ground level, a means of escape window in accordance with guidance details above.

Where a gallery is not provided with an alternative exit or means of escape window, it should comply with the following requirements (see Diagram 5 of ADB V1 for full details):
  - the gallery should overlook at least 50% of the room below;
  - the distance between the foot of the access stairs to the gallery and the door to the room containing the gallery should not exceed 3m;
  - the distance from the head of the access stairs to any point on the gallery should not exceed 7.5m and;
  - any cooking facilities within a room containing a gallery should either:
    (i) be enclosed in fire resisting construction; or
    (ii) be remote from the stair to the gallery and positioned such that they do not prejudice the escape from the gallery

Basements
If the basement storey is served by a single stairway and contains a habitable room, the basement should be either fitted with a means of escape window or door in compliance with this guidance or a protected stairs leading from the basement to the final exit in compliance with guidance details for 3 storey buildings. Fire resistant glazing in protected routes is to be in compliance with Table 4 of ADB V1
Passenger lifts
Lifts installed in dwellings with a floor more than 4.5m above ground level should either be located within the enclosures to the protected stairway or contained in a 30 minute fire resisting lift shaft in accordance with lift manufacturer's details.

Replacement windows (excludes repairs)
The replacement window opening should be sized to provide at least the same potential for means of escape as the window it replaces, or where the original window is larger than necessary for purposes of means of escape, the window opening could be reduced down to the minimum specified in this guidance for means of escape windows. Cavity barriers should be provided around windows where necessary and the window should also comply with the requirements of Parts L and N in this guidance.

Fire separation between an integral garage and dwelling
The wall and any floor between an integral garage and the dwelling house is to be constructed as a compartment wall/floor to give 30 minutes fire resistance from both sides of the wall and taken up to the ceiling/roof level and fire stopped with mineral wool. Any door between the house and garage is to be fitted with; a FD30 fire door in compliance with BS476-22:1987; proprietary mechanical self-closers; intumescent strips and smoke seals. The garage floor should be laid to falls to allow fuel spills to flow away from the fire door to the outside, alternatively, the door opening should be positioned at least 100mm above the garage floor level as detailed in the guidance diagram below. Fire resistant glazing is to be in compliance with Table 4 of ADB V1

Protection of openings, fire stopping and cavity barriers
Upvc pipes passing through compartment walls/floors should not exceed an internal diameter of 110mm and should either be fitted a proprietary intumescent collar at the wall/floor junction or enclosed throughout the pipe length with 30 minutes fire resisting construction (typically soft wood framing fixed around pipe work, packed with acoustic quilt with 12.5mm plaster board and skim finish or 2x layers plaster board with staggered joists). Other pipe materials and pipe sizes to be in compliance with Table 3 of ADB V1.

30 minute fire resisting ceiling should be provided between a protected stairway and roof void in a dwelling house with a floor more than 4.5m above ground level. Alternatively if the stairway extends through the roof void up to the roof level, a 30 minute fire resisting cavity barrier or wall should separate the stairway from the roof space.

Fire resistance of areas adjacent to external fire exit stairs
The external stairs must not be within 1.8m of any unprotected opening at the side of the stairs, and no openings are permitted below the stairs- unless the opening is fitted with 30 minute fire resisting glass and proprietary bead system and is permanently sealed shut (subject to adequate ventilation requirements for the room) as detailed in the guidance diagram below.

Circulation systems in houses with a floor more than 4.5m above ground level.
Where ventilation ducts pass through compartment walls into another building, follow the guidance in ADB2.

Air circulation systems which circulate air within an individual dwelling house should be designed to prevent smoke and fire spread into a protected stairs as follows:

- No air transfer grills to be fitted in any walls, floors or ceilings to the protected stairs
- Ducts passing through protected stairs or entrance hall to be constructed of rigid steel and all joints between the duct work and the enclosure fire stopped
- Ventilation ducts serving protected stairs should not serve other areas
- Ventilation systems serving protected stairs and other areas should be designed to shut down on detection of smoke within the system
- A room thermostat for a ducted warm air system should be mounted in a living room 1370-1830mm above floor and set at 27degrees maximum.
Residential sprinkler systems for means of escape
Where fire safety requirements of the building regulations cannot be met, the proposals for fire engineered solutions which may incorporate a sprinkler suppression system as part of the solution can be allowed against the requirements of ADB where a risk assessment has been carried out by a suitably qualified and experienced fire engineer and approved by building control before works commence on site. The residential sprinkler system is to be designed and installed to BS 9251:2005 (incorporating BAFSA technical guidance note No.1 June 2008 by a suitably qualified specialist) and DD 252:2002 Components for residential sprinkler systems- which must be approved by Building Control before works commence on site.

In three storey dwellings where the stairs discharges into a habitable open plan area, a partial sprinkler installation to the whole of all connected open plan areas may be used. Fire separation of the route will be required from the upper floor from this open plan area with a 30 minute fire resisting partition and FD20 fire door fitted with intumescent strips. Instead of the separation it may be possible to fully sprinkler the whole dwelling and retain the open plan arrangement with the agreement of building control.

(An alternative solution to the open plan arrangement effecting the means of escape as detailed above is to link an automatic opening vent (AOV) designed to be opened by an electronic sprinkler control panel). With the agreement of the building control, it should be possible to reduce fire protection throughout the dwelling by 30 minutes with the introduction of a full sprinkler installation. Where dwellings are unable to meet the requirements for access and facilities for the fire service under Section 5 of ADB V1, it should be possible to install a full sprinkler installation as a compensatory measure with the agreement of the building control.


Surface spread of flame: internal wall and ceiling linings including roof lights
Surface spread of flame over internal wall or ceiling finishes to be in compliance with product manufacturer's details in compliance with BS 476 -7:1997 (as amended). Please refer to Section 3: Wall and ceiling linings of ADB V1 for full details.

Guidance Table 39: Internal surface spread of flame: Classification of wall and ceiling linings See Table 1 of ADB V1 for full details.

<table>
<thead>
<tr>
<th>Location</th>
<th>National class</th>
<th>European class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small rooms upto 4m² and Domestic garages upto 40m²</td>
<td>3</td>
<td>D-s3,d2</td>
</tr>
<tr>
<td>Other rooms over 4m² inc Garages over 40m² and Circulation spaces within Dwellings (e.g. hall, stairs and landings)</td>
<td>1</td>
<td>C-s3,d2</td>
</tr>
</tbody>
</table>

**Note:** Plaster on masonry walls and plaster board and skim linings in this guidance will achieve class 1. Exposed timber linings should be treated with a proprietary treatment to achieve the above classifications.
Fire resistance to elements of structure

Load bearing elements of structure to have the minimum standard of fire resistance for buildings up to three storeys as stated in the guidance table below to prevent premature failure of the structure and minimize the risk to occupants, also reduce the risk to fire fighters and reduce the danger to people in the vicinity of the building should failure of the building occur. See Table A1: Appendix A of ADB V1 for full details.

Guidance Table 40: Fire resistance to common elements of structure etc

<table>
<thead>
<tr>
<th>Building element</th>
<th>Fire resistance in minutes</th>
<th>Method of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Load bearing capacity</td>
<td>Integrity</td>
</tr>
<tr>
<td>Structural beam, column or frame</td>
<td>30</td>
<td>Na</td>
</tr>
<tr>
<td>Load bearing wall (which is not also a wall described in any of the following items)</td>
<td>30</td>
<td>Na</td>
</tr>
<tr>
<td>Upper floors (not above a garage or basement)</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Roof (only if forming part of an escape route)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>External walls: 2 and 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Less than 1.0m to relevant boundary</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>(ii) More than 1.0m to relevant boundary (max 3 storey building)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Walls and upper floors separating an integral garage from the dwelling</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Compartment walls separating dwellings</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Compartment floors separating dwellings</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Protected stairs and lift shaft (not forming part of a compartment wall)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Cavity barriers etc (i.e. junctions between roof and compartment/separating walls or in cavities between separating walls and floors)</td>
<td>Na</td>
<td>30</td>
</tr>
<tr>
<td>Ceiling above protected stairs (3 storey)</td>
<td>Na</td>
<td>30</td>
</tr>
<tr>
<td>Ducts in cavity barriers</td>
<td>Na</td>
<td>30</td>
</tr>
<tr>
<td>Casing around soil pipes etc</td>
<td>Na</td>
<td>30</td>
</tr>
</tbody>
</table>

Notes: 1. 12.5mm plasterboard with a plaster skim finish applied to 100 x 50mm timber stud partitions/ceiling/floor joists as detailed in this guidance will achieve 30 minutes fire resistance, two layers of 12.5mm plaster board (joints staggered) with a plaster skim finish will achieve 60 minutes fire resistance. Masonry walls detailed in this specification will achieve 60 minutes minimum fire resistance.
2. External walls within 1.0m of a boundary should achieve class 0 surface spread of flame.
3. Combustible materials used on external surfaces should comply with Diagram 10 of ADB V1

External wall construction in relation to a boundary

External walls less than 1.0m to a relevant should have 30 minutes fire resistance from each side separately, and external walls more than 1.0m to a relevant boundary should have 30 minutes fire resistance from inside the building. Typical construction details are detailed in part A of this guidance. External walls within 1.0m of a boundary should achieve class 0 external surface spread of flame. Please refer to Section 8 of ADB V1 for full details. Combustible materials used on external surfaces should comply with Diagram 19 of ADB V1.

Compartment walls and floors separating buildings

Compartment walls (party walls) and compartment floors (party floors) separating buildings should have 60 minutes fire resistance, (including; load bearing capacity, integrity and insulation) from each side separately. Typical construction details for party walls are detailed in part A of this guidance. Party floors are out of the scope of this guidance and reference should be made to ADE.
Permitted building openings in relation to a boundary:

Openings within 1.0m of a boundary
An unprotected opening of 1m² (e.g. window) is permitted every 4.0m on the same building face. This unprotected opening can consist of two or more smaller openings within an area of 1m² (openings less than 0.1m² is permitted every 1500mm on the same building face). There are no restrictions on dimensions between openings separated by compartment walls and floors. Please refer to Diagram 20 of ADB V1 for full details.

Openings more than 1.0m from a boundary
Permitted unprotected openings to be in compliance with table below for buildings not exceeding 3 storeys high (excludes basements) or more than 24m long.

Guidance Table 41: Permitted unprotected areas in relation to a relevant boundary

<table>
<thead>
<tr>
<th>Minimum distance between side of building and relevant boundary</th>
<th>Maximum total area of unprotected openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0m</td>
<td>5.6m²</td>
</tr>
<tr>
<td>2.0m</td>
<td>12m²</td>
</tr>
<tr>
<td>3.0m</td>
<td>18m²</td>
</tr>
<tr>
<td>4.0m</td>
<td>24m²</td>
</tr>
<tr>
<td>5.0m</td>
<td>30m²</td>
</tr>
<tr>
<td>6.0m</td>
<td>no limit</td>
</tr>
</tbody>
</table>

Notes: 1. Refer to Section 9 of ADB V1 for full details relating to space separation and other methods of calculating unprotected areas.
2. If sprinklers are fitted throughout the building to BS 9251, the above distances can be reduced by 50% (min 1.0m) or the unprotected opening area doubled.

Designation of roof covering and minimum distance to boundary
Roof coverings (not roof structure) near a boundary should give adequate protection against the spread of fire when exposed to fire from outside in accordance with the guidance table below. Please refer to Section 10 of ADB V1 for full details.

Guidance Table 42: Limitations on designation of roof coverings* and minimum distance to boundary

<table>
<thead>
<tr>
<th>Designation of coverings of a roof or part of a roof</th>
<th>Minimum distance from any point on relevant boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Class</td>
<td>Less than 6m</td>
</tr>
<tr>
<td>AA,AB or AC</td>
<td>Broof(4)</td>
</tr>
<tr>
<td>BA,BB or BC</td>
<td>Croof(4)</td>
</tr>
<tr>
<td>CA.CB or CC</td>
<td>Droof(4)</td>
</tr>
<tr>
<td>AD,BD or CD</td>
<td>Eroof(4)</td>
</tr>
<tr>
<td>DA,DB, DC or DD</td>
<td>Froof(4)</td>
</tr>
</tbody>
</table>

Notes: *See table 5 of ADB V1 for limitations on glass, thatch, wood shingles and plastic roof lights
#For explanation of the designation of external roof surfaces and separation distances see table 5 of ADB V1. Separation distances do not apply to the boundary between roofs of a pair of semi detached houses or enclosed/covered walkways, but it does cover the top of a compartment walls- see Diagram 11 of ADB V1
1) Not acceptable in any of the following buildings:
   a. Houses in terraces of three or more houses
   b. Any other building with a cubic capacity of more than 1500m³
2) Acceptable on buildings not listed in Note 1), providing that part of the roof is no more than 3m² in area and is at least 1500mm from any similar part, with the roof between the parts covered with a material of limited combustibility.

Typical fire and rescue service vehicle access route specification for dwellings see Section 11 of ADB V1 for full details.
Part C: Site preparation and resistance to contaminants and moisture

Please refer fully to Approved Document C: Site preparation and resistance to contaminants and moisture (2004 edition with 2010 amendments);

Contents

C1: Resistance to contaminants
   Radon gas
   Protective measures
   Basic radon protection
   Full radon protection
      Number and position of sumps
      Sump construction
      (i) Site constructed sumps
      (ii) Proprietary prefabricated sumps
      (iii) Depressurisation pipes
      (iv) Geo-textile drainage matting (as an alternative to sumps)
      (v) Edge-located sumps (mainly used for retrospective fitting or conversion work)
      Radon fan locations
      Stepped foundations and retaining walls
   Methane and other gas protection in sub structure
   Landfill gas and radon

C2: Resistance to moisture
   Horizontal damp proof courses (dpc’s)
   Vertical damp proof courses and damp proof course trays etc (dpc’s)
   External cavity walls
   Tanking systems
   Flood risk
   Condensation risks

C1: Resistance to contaminants

The site should be prepared and building constructed in accordance Approved Document C of the Building Regulations and the details in this guidance to prevent and resist contaminants (and moisture) from causing damage to the building and effecting the health of its occupants.

Radon gas

Protective measures

Where required, protective measures against radon gas to be in incorporated in the building in compliance with the following guidance details and approved by building control before works commence:

Note: The level of radon protection required can be determined at a cost from: the British Research Establishment website at: www.bre.co.uk/radon or British Geological Society at: www.bgs.ac.uk or contact building control for more information.

Basic radon protection

Ground supported concrete floors are only acceptable for basic radon protection.

Ground supported floors with a 1200g (300 micrometer) polythene damp proof membrane (DPM) is acceptable as a radon barrier subject to building control approval (recycled products may not be suitable and proprietary radon membranes are available which must also be suitable for use as a damp proof membrane, positioned and fixed in accordance with manufacturer’s details) laid within the floor as illustrated in the guidance diagrams in Part A of the guidance above.
To prevent damage of the radon barrier, it should be installed at a later stage of construction - and sealed with gas proof tape to strips of membrane already built into the walls, or use a proprietary reinforced radon barrier/damp proof membrane. Any damaged areas to be repaired with radon membrane and sealed with two strips of gas proof tape with 150mm minimum laps.

**Full radon protection**

Full radon protection is to be achieved by the provision of a continuous radon proof barrier (which must also be suitable as a damp proof membrane as detailed in the guidance diagrams in Part A of the guidance above) over the foot print of the building, continuing through the external/cavity walls, together with suspended beam and block floors or cast in-situ reinforced concrete slabs with sumps and sub floor depressurisation pipes as illustrated in the ground floor diagrams below. In areas requiring full radon protection the floor needs to be suspended and supported on the cavity wall to prevent settlement of the ground floor and rupture of the radon proof barrier at the external wall junction. Also see guidance details above for prevention of damage and repair of radon membranes.

**Number and position of sumps**

Clean permeable fill to be used in the sub floor make up, with a single radon sump suitable for a single dwelling over an area of approximately 250m² or for a distance of 15m from the sump. Sumps to be connected together in multi compartmented sub floor areas using a pipe work manifold and connected to an external or internal fan, or vent openings/ducts formed through sub walls.

**Sump construction**

(i) **Site constructed sumps**

Site constructed sumps are typically 600mm x 600mm square x 400mm deep, constructed using bricks laid in a honeycomb bond so as to form a box around the end of the pipe, the top of the box is covered with a paving slab. To avoid subsequent collapse when compacting fill around the sump, mortar should be used for horizontal joints. However, it is essential that all vertical joints are left open. Further details are available on the BRE website at: [www.bre.co.uk/radon](http://www.bre.co.uk/radon)

(ii) **Proprietary prefabricated sumps**

Prefabricated sumps used as an alternative to brick construction should be installed in accordance with manufacturer's details.

(iii) **Depressurisation pipes**

The pipe from the sump needs to be 110mm diameter Upvc with joints using standard couplings which are sealed and airtight. The pipe needs to leave the building so that it could be coupled to a fan mounted on the external wall. The pipe should terminate about 100mm from the external wall, and located at the rear of the house or at a re-entrant corner where subsequent installation of a boxed-in fan and vertical stack will be least obtrusive. until such time as a fan is installed, the pipe should be capped off 300mm above ground level to prevent vermin and rain penetration and capped off with an access plug and sign identifying radon pipe work fixed to wall above capping.

(iv) **Geo-textile drainage matting (as an alternative to sumps)**

Geo-textile drainage matting to be laid beneath the slab and connected to an extract pipe to provide a sump in accordance with manufacturer's details.

(v) **Edge-located sumps (mainly used for retrospective fitting or conversion work)**

Edge-located mini-sumps can be used instead of centrally located sump in accordance with details available on the BRE web site at: [www.bre.co.uk/radon](http://www.bre.co.uk/radon) which must be agreed with building control before works commence on site. Edge-located sumps are typically constructed by excavating a hole 400 x 400 x 400mm in the hardcore or fill beneath the dwelling alongside the perimeter wall to form an open area around the end of the extract pipe. fix 600 x 600mm paving slab or similar over sump to provide permanent formwork to support the floor slab (or make good existing cast in-situ floor slabs where sumps are fitted retrospectively). Seal
the pipe where it passes through the wall. Prefabricated sumps or site constructed sumps
detailed above can also be used as edge-located sumps. (Concrete floor slabs to be reinforced
over sumps if required by building control)

**Radon fan locations**
When required, the fan should be positioned with the outlet well away from windows, doors and
ventilation grilles and discharging just above eaves level. Low-level discharge is permitted if
there are no openings or vents close by. To avoid penetrating the radon-proof floor membrane,
the pipe should be taken through the wall, not up through the floor. The pipe work can be
installed in ducts inside the house and connected as close as possible to the roof space fan and
outlet terminating out through the roof using proprietary roof vent and flashing system- 900mm
above any roof opening or vent that is within 3.0m of the terminal.

**Stepped foundations and retaining walls**
Where possible, stepped foundations should be avoided, as they complicate the achievement of
radon protection using only sealing techniques. It may prove less expensive to excavate around
the house to provide a ventilated space, than to try to build into the hillside and seal all the faces
of the building which are below ground level.

**Further details**
Guidance on protective measures against Radon gas are available on the BRE web site at:
www.bre.co.uk/radon

**Methane and other gas protection in sub structure**
Protection is to be provided in the sub structure in compliance with a specialists design and in the
following circumstances:

- If within 250m of a landfill site. (The Environment Agency's policy on building
development on or near landfill sites should be followed).
- On a site containing biodegradable substances (including made up ground or fill); or
  subject to use that could have petrol oil or solvent spillages; or naturally occurring
  methane, carbon dioxide and other hazardous gases (e.g. hydrogen sulfide).
- Further information on protective measures for methane and other ground gases is
  available in the BRE publication 'Protective measures for housing on gas contaminated
  land 2001' which is available at a cost from: www.brebookshop.com

Risk assessments, ground investigations and any necessary remedial works should be carried
out by a specialist in accordance with ADC which should be approved by Building
Control/Environmental Health Department before works commence on

**Landfill gas and radon**
Building works located on or adjacent to a landfill site or old coalfield may require additional
precautions to a specialists design to deal with methane which exceed those required for radon,
so where both methane and radon are present, methane-protective measures should be applied,
and only intrinsically safe (non-sparking) fans and switchgear should be used.

**C2: Resistance to moisture**
The walls, floor, and roof of the building should be constructed in accordance with ADC and the
details/diagrams in this guidance to prevent and resist the passage of moisture into the building.

**Horizontal damp proof courses (dpc's)**
Horizontal damp proof course (dpc) and dpc trays with weep holes at 900mm ctrs to be provided
150mm above external ground level continuous with and sealed to the floor damp proof
membrane (dpm) and radon/ dpc tray to prevent the ingress of moisture into the building.
Vertical damp proof courses and damp proof course trays etc (dpc's)
Stepped and horizontal dpc/cavity trays are to be provided over all openings, roof abutments/projections and over existing walls with different construction or materials. Install vertical dpc or proprietary insulated cavity closers at all closings, returns, abutments to cavity work and openings etc to prevent the ingress of moisture into the building.

External cavity walls
50mm minimum wide clear continuous cavity should extend the full height and width between the internal and external wall leaves bridged only by wall ties, cavity trays, cavity barriers, fire stops and cavity closures. (where a cavity is to be partially filled, the residual cavity should not be less than 50mm wide- unless the product has a British Board of Agreement (BBA or other approved third party accreditation) for use and approved by building control). The cavity should be carried down at least 225mm below damp course level at ground floor level to protect the inner wall leaf and damp proof (cavity) trays should be at least 150mm deep as diagrams/details in this guidance.

Tanking systems providing either barrier, structural or drained protection to the building must be assessed, designed and installed for the particular project in compliance with BS 8102: 2009 Code of Practice for Protection of Below Ground Structures Against Water from The Ground. Tanking systems can be installed internally or externally in accordance with a tanking specialist's details.

The illustrated tanking section details in this guidance are suggested details only and actual details must be approved by building control before works commence on site. Forms of tanking include: bonded sheet materials; liquid applied membranes; mastic asphalt, drained cavity membranes and cementitious crystallization and cementitious multi coat renders.

Suitable tanking systems to have British Board of Agreement (BBA or other approved third party) accreditation and individually assessed by a tanking specialist as suitable for the proposed situation. Tanking systems above ground should be vapour permeable to prevent condensation problems within the building and prevent mould growth.

Tanking systems must be designed/installed/applied by a tanking specialist for the particular project in compliance with tanking manufacturer's details and where necessary additional measures taken to prevent radon gas and other such ground gases and contaminates from entering the building.

Tanking systems to be properly connected to and made continuous with wall damp proof courses/radon dpc trays. Perforation of the tanking system by service entry pipes etc should be avoided or carried out strictly in accordance with the tanking manufacturer's details.

Flood risk
Flood risk should be assessed and precautions carried out in compliance with paragraph 0.8 of ADC

Condensation risks
The technical details and diagrams in this guidance document should be read in conjunction with the BRE publication 'Thermal Insulation Avoiding Risks', which explains the technical risks and condensation risks which may be associated with meeting the building regulation requirements for thermal insulation for the major elements of the building. A copy of the publication can be obtained from: www.brebookshop.com
Part D: Toxic substances
Please refer fully to Approved Document D: Toxic substances (1992 with 2002 and 2010 amendments)

If insulating material is inserted into a cavity in a cavity wall - precautions must be taken to prevent the subsequent permeation of any toxic fumes from that material into any part of the building occupied by people.

The suitability of the cavity wall for filling must be assessed before the works is carried out by an insulation specialist in accordance with BS 8208: Part 1: 1985 and the insulation system must be British Board of Agreement (BBA or other third party) accredited.

The insulation specialist carrying out the work must hold or operate under a current BSI Certificate of Registration of Assessed Capability for the work being carried out.

The insulation material must be in accordance with BS 5617: 1985 and the installation must be in accordance with BS 5618: 1985

The Installation of urea-formaldehyde (UF) in cavity walls is to be carried out in compliance with paragraphs 1.1 — 1.2 of ADD1
Part E: Resistance to passage of sound
Please refer fully to Approved Document E: Resistance to the passage of sound (2003 with 2004 and 2010 amendments):

**New party walls and floors in new extension**
Sound insulation details for new party walls to be carried out in accordance with the relevant details in ADE Section 2 and floors to be carried out in accordance with the relevant details contained within Section 2 of this guidance and ADE Section 3.

Please note that the Party Wall Act may be applicable to works to party walls (see guidance in general information above)

**New Internal walls and floors in new extension**
Sound insulation details between internal walls and floors separating bedrooms or a room containing a WC and other rooms to be carried out in accordance with the relevant details contained within Section 2 of this guidance and ADE Section 5.

**Pre completion sound testing**
Where new party walls or party floors are constructed, pre-completion sound testing is to be carried out to demonstrate compliance with ADE Section 1 and as follows:

Pre completion sound testing is to be carried out by a suitably qualified person or specialist with appropriate third party accreditation (UKAS or ANC registration) to demonstrate compliance with ADE1, and copy of test results sent to building control.

**Remedial works and re-testing**
Remedial works and re-testing will be required where the test has failed, in compliance with Section 1 of ADE

**Exemptions and relaxations**
If the requirements of the building regulations will unacceptably alter the character or appearance of a historic/listed building/ancient monument or building within a conservation area, then the requirements may be exempt or relaxed to what is reasonably practical or acceptable, ensuring that any exemption or relaxation would not increase the risk of deterioration of the building fabric or fittings in consultation with the local planning authorities conservation officer (before works commence) For further information see ADE and contact your local authority planning department
Part F: Ventilation

Please refer fully to Approved Document F: Ventilation (2010 edition with further 2010 amendments)

Contents
Purge (natural) ventilation
Mechanical extract ventilation and fresh air inlets for rooms without purge ventilation
Background ventilation
Mechanical extract ventilation rates
Ventilation systems for basements
Ventilation of a habitable room through another room or conservatory
General requirements for mechanical extract ventilation

Part F: Ventilation

Purge (natural) ventilation
Purge (natural) ventilation to be provided to all habitable rooms equal to 1/20th (5%) floor area. The 1/20th applies where the external windows/doors open more than 30 degrees and is increased to 1/10th (10%) of the floor area where the windows open between 15 - 30 degrees. Window openings which open less than 15 degrees is not suitable for purge ventilation and alternative ventilation details are required as detailed below (in compliance section 5 and Appendix B of ADF1). Purge ventilation openings to habitable rooms to be typically located 1.75m above floor level. The area of external windows, roof windows and doors should not exceed 25% of the usable internal floor area otherwise SAP calculations may be required from a suitably qualified person to confirm design flexibility.

Unprotected openings (glazed window and door openings) should not exceed the permitted areas in relation to a boundary in compliance with Part B of this guidance.

Means of escape windows to be fitted with proprietary hinges to open to the minimum required clear width of 450mm. Escape windows must have minimum clear opening casement dimensions of 0.33m² and 450mm (typically 450mm wide x 750mm high), located within 800-1100mm above floor level to all bedrooms and habitable rooms at 1st floor level and inner habitable rooms on the ground floor. Windows above the ground floor storey and within 800mm of floor level are to be provided with containment/guarding/proprietary catches which should be removable (child proof) in the event of a fire. Where escape windows cannot be achieved, direct access to a protected stairs (or protected route to inner rooms) is acceptable in compliance with ADB V1- par 2.6 (a) or (b).

Mechanical extract ventilation and fresh air inlets for rooms without purge ventilation
Mechanical extract ventilation and fresh air inlet are required for habitable rooms without purge (natural) ventilation which must designed by a ventilation specialist having a minimum of 4 air changes per hour and manually controlled in compliance section 5 of ADF1. This system can incorporate heat recovery if required. Note: means of escape windows are required to all bedrooms and habitable rooms at 1st floor level and inner habitable rooms on the ground floor in accordance with the guidance details above.

Background ventilation
Background ventilation to be provided equivalent to 8000mm² to habitable rooms and 2500mm² to wet rooms via operable hit and miss vents into frames (or two stage security catches fitted to operable windows if agreed with building control). Fans and background vents fitted in the same room should be a minimum of 0.5m apart.
Mechanical extract ventilation rates
Mechanical ventilation is to be provided to the rooms listed below directly ducted to the outside air equivalent to the following rates.

- **Kitchen**: 30 litres per second over hob or 60 litres elsewhere
- **Utility room**: 30 litres per second
- **Bathroom**: 15 litres per second (including shower rooms and en-suites)
- **Toilet**: 6 litres per second W/C (with or without a window)

Ventilation systems for basements
To be carried out in compliance with Paragraphs 5.11- 5.13 of ADF1

Ventilation of a habitable room through another room or conservatory
To be carried out in compliance with Paragraphs 5.14- 5.16 of ADF1

General requirements for mechanical extract ventilation
Mechanical ventilation to rooms without operable windows to be linked to light operation, independent switch or PIR and have 15 minutes overrun and a 10mm gap under the door for air supply. Fans must not be installed in rooms containing open flue appliances unless the interaction of mechanical ventilation and open flue heating appliances is checked and certified by an approved method and suitably qualified person as contained in ADJ.

Mechanical ventilation to be ducted in proprietary insulated ducts to outside through walls to proprietary vent or through roof space to proprietary a tile or soffit vent.
Part G: Sanitation, hot water safety and water efficiency

Please refer fully to Approved Document G: Sanitation, hot water safety and water efficiency (2010 edition with further 2010 amendments)

Contents
- Wholesome hot and cold water supply
- Scale of provisions
- Wash basins and separation of w/c from any food preparation areas
- Water tanks/cisterns base
- Pumped small bore foul water drainage
- Vented and unvented hot water storage systems
- Safety valves, prevention of scalding and energy cut outs (see new dwellings)
- Discharge pipes from safety devices
- Solar water heating
- Electrical water heating
- Supply (Water Fittings) Regulations 1999
- Insulation of pipe work to prevent freezing
- Commissioning certificates

Part G: Sanitation, hot water safety and water efficiency

Wholesome hot and cold water supply
Sinks with wholesome hot and cold running water are to be provided in all food preparation areas, bathrooms to be fitted with either a bath or shower. Hot and cold water supplies to wash basins, baths, showers and sinks including external taps to have water from a wholesome water supply.

Hot taps should be located on left hand side (traditionally as most people are left handed it prevents people from unwittingly running the hot tap and burning themselves).

Softened wholesome cold water should not be provided where drinking water is drawn off or to any sink where food is prepared.

Wholesome water supply to comply with The Water Supply (Water Quality) Regulations 2000 (SI2000/3148) and in Wales; The Water Supply (Water Quality) Regulations 2001 (SI2001/3911) and Annex1 of AD. Private water supplies to comply with The Private Water Supplies Regulations 2009 (SI 2090/3101) and in Wales; The Private Water Supplies (Wales) Regulations (SI 2010/66)

Scale of provisions
Any dwelling house or flat must have at least one bathroom, with a fixed bath or shower, wash basin and wc in compliance with BS 6465. Hot taps should be located on left hand side. In new dwellings, wc should be located in the principle entrance storey.

Wash basins and separation of w/c from any food preparation areas
Wash hand basins to be provided in all rooms containing a w/c (or in an adjacent room providing the room is not used to prepare food) and a door must separate the w/c and wash basin from any food preparation area in a dwelling.

Water tanks/cisterns base
Water tanks/cisterns must have an adequate designed flat platform base to support the proposed loads.

Pumped small bore foul water drainage
Pumped small bore foul water drainage from a toilet is only permitted if there is also access to a gravity draining toilet in the same dwelling. Proprietary pumped foul water macerator systems must have BBA or other approved accreditation and fitted in compliance with manufacturer's details to a suitable foul water drainage system.
**Vented and unvented hot water storage systems**

Vented and unvented hot water storage systems to be designed, installed, commissioned and tested by a suitably qualified heating engineer/specialists (unvented systems to be indelibly marked with information contained in paragraph 3.23 of ADG), in compliance with paragraphs 3.10-3.27 of ADG. Copy of commissioning certificates to be issued to Building Control on completion of the works.

**Safety valves, prevention of scalding and energy cut outs (see new dwellings)**

**Discharge pipes from safety devices**

Discharge pipes from safety devices should be 600mm max length, constructed of metal (or other material suitable for proposed temperatures to BS 7291-1:2006) and connect to a Tundish fitted with a suitable air gap in compliance with the current Water Supply (Water Fittings) Regulations. Any discharge into the Tundish must be visible (and where the dwelling is occupied by visibly or physically impaired- the devise must be electronically operated able to warn of discharge).

Discharge pipes from Tundish should be at least 300mm in length and fixed vertically below Tundish-before connection to any bend or elbow and at a continuous fall of 1:200 thereafter until point of termination. Pipes from Tundish should be at least one pipe size larger than the outlet of the safety devise upto 9m in length (2x larger 9-18m and 3x larger 18-27m) and constructed of metal (or other material suitable for proposed temperatures to BS 7291-1:2006).

Point of termination from discharge pipes can be either:
(i) To a trapped gully - below grating - but above the water seal
(ii) Downward discharges at low level- upto 100mm above external surfaces (car parks, hard standings, grassed areas etc) and fitted with proprietary wire guard to prevent contact.
(iii)Discharges at high level into metal hopper and metal down pipes at least 3m from plastic guttering collecting the discharge.

Note: visibility of discharge must be maintained at all times and discharges of hot water and steam should not come into contact with materials that could be damaged by such discharges.

**Solar water heating**

Solar water heating roof/wall panel systems to be factory made to BS EN 12976-1:2006, fitted with safety devices and an additional heating source to maintain an adequate water temperature and fitted in compliance with manufacturer’s details. Solar water heating systems should comply with current European/ British/ Standards.

**Electrical water heating**

Fixed electrical immersion heaters to BS EN 60335-2-73:2003, electrical instantaneous water heaters to BS EN 60335-2-35:2002, electrical storage water heaters to BS EN 60335-2-21:2003 and safety devices to be manufactured and installed in accordance with ADG, manufacturer’s details and current European/ British/ Standards.

**Supply (Water Fittings) Regulations 1999**

All new water installations must be in compliance with the ‘Supply (Water Fittings) Regulations 1999’ for England and Wales, for the protection against frost and freezing, prevention of waste, misuse, undue consumption, contamination and erroneous measurement of a water supplier’s mains water supply. A free copy of regulations can be downloaded from the HMSO website, or alternatively a hard copy of the new Regulations can be purchased directly from your local HMSO stationary office. The Regulations are Statutory Instrument No 1148 and the amendments are Statutory Instrument No 1506 both dated 1999.
**Insulation of pipe work to prevent freezing**

All hot and cold water service pipe work, tanks and cisterns should be located within the warm envelope of the building to prevent freezing.

Where hot and cold water service pipe work, tanks and cisterns are located in unheated spaces they should be insulated to prevent freezing in compliance with BS 6700 and BS 8558, and typically as follows:

(i) All tanks and cisterns should be thermally insulated to prevent freezing with proprietary insulated systems in compliance with manufacturer's systems (insulation normally omitted from below tank where it benefits from heat in the heated area below).

(ii) Pipe work should be insulated with proprietary insulated sleeves of phenolic/polyisocyanurate/polyurethane foam having a minimum wall thickness of 30mm for 15mm diameter pipes and 12mm for pipes 22mm diameter pipes, (or other approved) and fixed in accordance with manufacturer's details.

Incoming cold water supply service pipes should be at least 750mm below the ground level and other precautions should be carried out to prevent freezing and protect the pipe in accordance with the relevant Water Authorities requirements, which will require consent from the Water Authority before works commence.

**Commissioning certificates**

Commissioning certificates for fixed building services are required on completion with copy sent to building control.
Part H: Drainage and waste disposal

Please refer fully to Approved Document H: Drainage and waste disposal (2002 edition with 2010 amendments)

Contents

H1: Foul and storm water drainage
Foul, rain and storm water drainage systems (single dwellings)
Bedding and backfilling requirements for rigid and flexible pipes
Guidance Diagram 39: Typical bedding detail for flexible pipes
Guidance Diagram 40: Typical protection detail for pipes laid at shallow depths
Pipes penetrating though walls
Drain trenches near buildings
Inspection chambers and gullies
Guidance Table 43: Minimum dimensions for access fittings and inspection chambers
Guidance Table 44: Minimum dimensions for manholes
Guidance Table 45: Maximum spacing of access points in metres
Foul water disposal
Waste pipes
Guidance Table 46: Waste pipe and trap design limits
Soil and vent pipes (discharge stack)
Guidance Table 47: Minimum diameters for discharge stacks
Waste pipe connections to soil and vent pipes (discharge stack) - to prevent cross flow
(i) Waste pipes up-to 65mm diameter
(ii) Waste pipes over 65mm diameter
(iii) Lowest waste pipe connection to soil and vent pipe
Stub stacks
Air admittance valves
Air tightness and testing
Pipes, fittings and joints should be capable of withstanding an air test of positive pressure of at
Pumping installations

H2: Septic tanks, sewage treatment systems and cesspools
Existing septic tank and effluent drainage
Non mains foul drainage waste water treatment systems
Septic tanks
Sewage treatment systems
Disposal of sewage from septic tanks and sewage treatment systems
Drainage fields
Drainage mounds
Wetlands/reed beds
Percolation tests
Ground conditions
Percolation test method
Guidance Diagram 41: Typical section through a septic tank/sewage treatment system drainage field
Guidance Diagram 42: Typical drainage field plan layout
Cesspools

H3: Rainwater drainage and harvesting
Rainwater gutters and down pipes
Rainwater gutters and down pipe sizes and number to be suitable for roof area to be drained in
Guidance Table 48: Gutter sizes and pipe outlet sizes for drainage of roof areas
Rainwater/ grey water harvesting storage tanks and systems
Surface water drainage around the building
Rain/surface water disposal
Existing soak-away
New soak-away
Guidance Diagram 43: New soakaway design
Oil/fuel separators

H4: Building over or close to and connections to public sewers
Building over or close to a Public Sewer
Locating a public sewer
The Build Over Process
H1: Foul and storm water drainage

Foul, rain and storm water drainage systems (single dwellings)
An adequate system of foul water drainage shall be provided to carry foul water from appliances within the building to one of the following, listed in order of priority: public sewer, private sewer, sewage treatment system, septic tank or cesspool as detailed in this guidance.

An adequate system of rainwater drainage shall be provided to carry rainwater from roofs of the building and paved areas around the building to one of the following, listed in order of priority: Adequate soak away as detailed in this guidance (or similar approved filtration system) or where that is not practicable, water course or where that is not practicable, a sewer (note: discharge to a water course or sewer is subject to the relevant Water Authority's written approval).

Both storm and foul drainage to consist of proprietary underground drainage system with BBA certification (or other approved accreditation), with 100mm minimum diameter pipes laid at a minimum gradient of 1:40 where serves up to one wc or 1:80 where serves two or more wc's.

Upvc pipes should be surrounded in a single size aggregate (size 5-10mm) at a minimum/maximum depth of 0.6/7.0m in fields, 0.9/7.0m in drives and roads in compliance with the guidance diagram below. If minimum depths cannot be achieved, pipes can be protected with a 100mm reinforced concrete slab with compressible material under and 300mm minimum bearing on original ground in compliance with the guidance diagram below.

Drainage/services to incorporate adequate precautions to prevent excessive movement due to possible ground movement in shrinkable clay sub soils in accordance with design details from a suitably qualified specialist.

Bedding and backfilling requirements for rigid and flexible pipes
See Diagram 10 of ADH1 for full details

Guidance Diagram 39: Typical bedding detail for flexible pipes (not to scale)
Pipes penetrating though walls
Pipes penetrating though walls should have joints formed within 150mm of either wall face, with 600mm maximum length adjacent rocker pipes fitted both sides with flexible joints, or alternatively lintels provided above openings though walls to give 50mm clear space around pipes and openings in-filled with inert sheet material and sealed to prevent ingress of fill, vermin and radon gas.

Drain trenches near buildings
Trench excavations for pipe runs located within 1.0m of buildings which extend below the level of the existing foundations should have trenches backfilled with concrete up to the underside of the existing foundations. Trench excavations for pipe runs located more than 1.0m from buildings which extend below the level of the existing foundations should have trenches backfilled with concrete up to the underside of the existing foundations less 150mm.

Inspection chambers and gullies
Proprietary Upvc 450mm diameter inspection chambers to be provided at all changes of level and or direction and at 45m maximum spacing in straight runs up to 1.2m in depth. Other access fittings and rodding eyes to be in accordance with the guidance table below. All gullies to be trapped and have rodding access where serving branches. Inspection chamber covers to be mechanically fixed and suitable for vehicular loads in drives and roads and double sealed air tight bolt down covers and frames in buildings in accordance with manufacturer's details.

Guidance Table 43: Minimum dimensions for access fittings and inspection chambers
(See Table 11 of ADH1 for full details)

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth to invert from cover level (m)</th>
<th>Internal sizes</th>
<th>Cover sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Length x Width (mm)</td>
<td>Circular (mm)</td>
</tr>
<tr>
<td>Rodding eye</td>
<td>n/a</td>
<td>As drain but min 100</td>
<td>n/a</td>
</tr>
<tr>
<td>Access fitting</td>
<td></td>
<td>150 x 100</td>
<td>150</td>
</tr>
<tr>
<td>Small : 150 diam 150 x 100</td>
<td>0.6 or less except where situated in a chamber</td>
<td>225 x 100</td>
<td>225</td>
</tr>
<tr>
<td>Large: 225 x 100</td>
<td>0.6 or less except where situated in a chamber</td>
<td>225 x 100</td>
<td>225</td>
</tr>
<tr>
<td>Inspection chamber</td>
<td></td>
<td>225 x 100</td>
<td>190²</td>
</tr>
<tr>
<td>Shallow</td>
<td>0.6 or less 1.2 or less</td>
<td>450 x 450</td>
<td>450</td>
</tr>
<tr>
<td>Deep</td>
<td>Greater than 1.2</td>
<td>450 x 450</td>
<td>450</td>
</tr>
</tbody>
</table>

Notes: ¹ The clear opening may be reduced by 20mm in order to provide proper support for the cover and Frame ²Drains up to 150mm diameter ³ A larger clear opening cover may be used in conjunction with a restricted access. The size is restricted for health and safety reasons to deter entry
Guidance Table 44: Minimum dimensions for manholes
(See Table 12 of ADH1 for full details)

<table>
<thead>
<tr>
<th>Type</th>
<th>Size of largest pipe (DN) (mm)</th>
<th>Min internal dimensions 1</th>
<th>Min clear opening size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rectangular length and width (mm)</td>
<td>Circular diameter (mm)</td>
</tr>
<tr>
<td>Manhole</td>
<td>Equal to or less than 150</td>
<td>750 x 675 1200 x 675 1200 x 750 1800 x (DN+450)</td>
<td>1000 1200 1200</td>
</tr>
<tr>
<td>Less than 1.5m deep to soffit</td>
<td>225 300</td>
<td>Greater than 300</td>
<td></td>
</tr>
<tr>
<td>Greater than 1.5m deep to soffit</td>
<td>Equal to or less than 225 300 375-400 Greater than 450</td>
<td>1200 x 1000 1200 x 1075 1350 x 1225 1800 x (DN+775)</td>
<td>1200 1200 1200</td>
</tr>
<tr>
<td>Manhole shaft</td>
<td>Steps 6</td>
<td>1050 x 800</td>
<td>1050</td>
</tr>
<tr>
<td>Greater than 3.0m deep to soffit pipe</td>
<td>Ladder 6</td>
<td>1200 x 800</td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td>Winch 6</td>
<td>900 x 800</td>
<td>900</td>
</tr>
</tbody>
</table>

Notes:
1. Larger sizes may be required for manholes on bends or where there are junctions
2. May be reduced to 600 x 600 where required by highway loading considerations, subject to a safe system of work being specified.
3. Not applicable due to working space needed
4. Minimum height of chamber in shafted manhole 2m from benching to underside of reducing slab
5. Min clear space between ladder or steps and the opposite face of the shaft should be approximately 900mm
6. Winch only - no steps or ladders, permanent or removable
7. The minimum size of any manhole serving a sewer (i.e. any drain serving more than one property) should be 1200mm x 675mm rectangular or 1200mm diameter

Guidance Table 45: Maximum spacing of access points in metres
(See Table 13 of ADH1 for full details)

<table>
<thead>
<tr>
<th>From</th>
<th>To access fitting</th>
<th>Small</th>
<th>Large</th>
<th>Junction</th>
<th>Inspection chamber</th>
<th>Manhole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of external drain 1</td>
<td>12</td>
<td>12</td>
<td>-</td>
<td>22</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Rodding eye</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>45</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Access fitting: Small 150 diam and 150 x 100</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>45</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Large 225 x100</td>
<td>-</td>
<td>-</td>
<td>22</td>
<td>22</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Inspection chamber shallow</td>
<td>22</td>
<td>45</td>
<td>22</td>
<td>45</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Manhole and inspection chamber deep</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>45</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Stack or ground floor appliance
2. May be up to 200 for man-entry size drains and sewers

Foul water disposal
Foul water should be discharged in to new or existing foul water drainage facilities using existing or new inspection chamber connection as shown on plans/specification, or as agreed with building control on site.

Foul drainage systems to low lying buildings or basements which carry storm water or other vulnerable drainage systems should be provided with anti flood protection such as one way valves, etc, to prevent flooding and sewage entering the building.
Waste pipes
All W/Cs to have trapped outlet connected to 100mm diameter pipes. Sanitary appliances such as wash hand basins, baths, showers, sinks etc, to be provided with waste pipes laid to falls and fitted with traps sizes as stated in the guidance table below. Where waste pipe runs exceed 4m British Board of Agreement (BBA or other third party accredited) air admittance valves are to be fitted above appliance spill over level. Waste pipes to either discharge below trapped gully grating or into soil and vent pipes via proprietary waste manifolds or bossed junctions. Internally all waste and drainage pipes to have rodding access/eyes at changes of direction and be adequately clipped/supported and provided with 30 minutes fire protection where passing through floors.

Guidance Table 46: Waste pipe and trap design limits
See Tables 1 and 2 of ADH1 for full details

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Minimum diameter of pipe and trap (mm)</th>
<th>Depth of trap Seal (mm)</th>
<th>Slope of pipe (mm/m)</th>
<th>Maximum length of Pipe to stack (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sink</td>
<td>40</td>
<td>75</td>
<td>18 to 90</td>
<td>3 (increased to 4 for 50mm diam pipe)</td>
</tr>
<tr>
<td>Bath</td>
<td>40</td>
<td>50</td>
<td>18 to 90</td>
<td>3 (increased to 4 for 50mm diam pipe)</td>
</tr>
<tr>
<td>WC</td>
<td>100</td>
<td>50</td>
<td>18</td>
<td>6-8 for single wc</td>
</tr>
<tr>
<td>Washbasin</td>
<td>32</td>
<td>75²</td>
<td>120/0.5 80/0.75 50/1.0 35/1.25 25/1.5 20/1.75</td>
<td>1.7 (increased to 3 for 40mm diam pipe)</td>
</tr>
</tbody>
</table>

Notes:
1. Trap sizes should not be increased-only the pipe sizes- commencing 50mm beyond tail of trap
2. Depth of seal may be reduced to 50mm only with flush grated wastes without plugs on spray tap basins

Soil and vent pipes (discharge stack)
To consist of Upvc proprietary above ground drainage system, sized in accordance with the table below. Discharge stack is normally installed internally through the building in sound insulated boxing as guidance details and fitted with proprietary flashing system through the roof or vent tile, or alternatively soil and vent pipe fixed externally in accordance with manufacturer's details. A ventilated stack should terminate 900mm minimum above any opening into the building that is within 3.0m of the stack and fitted with a proprietary grilled vent cap. An open soil and vent pipe should always be fitted wherever possible at the head of the drainage system, particularly where a septic tank or sewage treatment system is installed.

Guidance Table 47: Minimum diameters for discharge stacks
See Table 3 of ADH1 for full details

<table>
<thead>
<tr>
<th>Stack size (mm)</th>
<th>Maximum capacity (liters/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50*</td>
<td>1.2</td>
</tr>
<tr>
<td>65*</td>
<td>2.1</td>
</tr>
<tr>
<td>76**</td>
<td>3.4</td>
</tr>
<tr>
<td>90</td>
<td>5.3</td>
</tr>
<tr>
<td>100</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Key:
*No wc's
**Not more than 1 wc with outlet size < 80mm
Waste pipe connections to soil and vent pipes (discharge stack) - to prevent cross flow

(i) Waste pipes up-to 65mm diameter- opposed pipe connections (without swept entries) should be offset at least 110mm on a 100mm diameter stack and 250mm on a 150mm diameter stack, at a radius of 25mm or angle of 45 degrees- or alternatively a proprietary manifold fitted in accordance with manufacturer's details.

(ii) Waste pipes over 65mm diameter- opposed pipe connections (with swept entries) should be offset at least 200mm irrespective of stack diameter (no connections are allowed within this 200mm zone), at a radius of 50mm or angle of 45 degrees. Unopposed connections may be at any position.

(iii) Lowest waste pipe connection to soil and vent pipe- 450mm minimum distance is required between centre line of waste pipe connection to soil and vent pipe and invert level of below ground drain, ensuring a 200mm minimum radius bend connects the soil and vent pipe to the drain.

Stub stacks
To consist of 100mm diameter Upvc proprietary above ground drainage system, with wash basins/sinks connected to the sub stack within 2.0m of the invert level of the drain and the wc floor level is to be within 1.3m of the invert level of the drain.

Air admittance valves
Proprietary air admittance valves fitted to sub stacks or soil and vent pipes should comply with BS EN 12380 and be installed in accordance with manufacturer's details, and valve is to be located above the spillover level of the highest appliance i.e. wash basin or sink. Valves installed internally should be located in sound insulated boxing, accessible for maintenance and clearance of blockages etc. and fitted with 225 x 75mm louvered vent. Valves should not be installed in dusty environments. An open vent should always be fitted wherever possible at the head of the drainage system, particularly where a septic tank or sewage treatment system is installed.

Air tightness and testing
Pipes, fittings and joints should be capable of withstanding an air test of positive pressure of at least 38mm water gauge for at least 3 minutes. Every trap should maintain a water seal of at least 25mm. Smoke testing should be used to identify defects where water test has failed. Note: smoke testing is not recommended for Upvc pipes.

Pumping installations
Where gravity drainage is impractical, or protection is required against flooding due to surcharging in downstream sewers, pumped drainage solutions may be required - subject to building control approval.

Proprietary packaged pumping systems to consist of a watertight GRP/polyethylene chamber, lockable pedestrian/vehicle covers, pumps, high level alarm, preset automatic level control, float switch, non-return valve, discharge pipe and connections etc. Domestic sewage pump sets located within buildings should conform to BS EN 12050, designed in accordance with BS EN 12056-4 and installed in accordance with manufacturer's details. Domestic sewage pump sets located outside buildings should be designed in accordance with BS EN 752-6 and installed in accordance with manufacturer's details. Pumped installations must contain 24 hours inflow storage. The minimum daily discharge of foul drainage should be taken as 150 litres per person per day for domestic use. Auto-changeover duty/standby duplex (twin pumps) pump stations may be accepted as an alternative to 24 hours storage subject to approval by building control.
H2: Septic tanks, sewage treatment systems and cesspools

Existing septic tank and effluent drainage
Where additional drainage effluent is to be connected to the existing septic tank/treatment system, it should be checked by specialist and sizes/condition of tank/system to be confirmed as suitable for treatment of additional effluent.

Non mains foul drainage waste water treatment systems
Non mains drainage systems are to be used only where connection to the mains drainage system is not possible. Either a septic tank or sewage treatment system is to be installed as to suit specific ground conditions as agreed with Building Control. No septic tank/ sewage treatment system and associated tertiary (secondary) treatment is permitted by the Environment Agency in prescribed Zone 1 ground water source protection zones. Where no other option is feasible, the installation of a cesspool is to be agreed with Building Control and the Environment Agency.

Septic tanks
Septic tanks to consist of a watertight chamber (watertight from both sides to prevent the ingress of water and contain the effluent). The sewage is liquefied by anaerobic bacteria action in the absence of oxygen assisted by the natural formation of a surface scum or crust. Sludge settlement at the base of the tank must be removed annually (or more frequently if required). Discharge from tanks is to be taken to drainage fields, drainage mounds or wetlands/reef beds for secondary treatment as detailed in the guidance below.

Proprietary factory made septic tanks to be designed and constructed to BS EN 12566 and installed in accordance with manufacturer’s details, or

Non proprietary septic tanks constructed in situ to be designed and constructed to a drainage specialist’s design and approved by Building Control before the works commence on site. Typically, the tank consists of two chambers (the first being twice as large as the second) constructed using 150mm minimum thick reinforced concrete base C25P mix to BS 5328, 220mm thick engineering quality brickwork walls (or concrete), mortar mix 1:3 cement/sand ratio with water proof rendering or suitable proprietary tanking system applied to both sides and designed heavy concrete roof structure. 100mm diameter Inlet and outlet ‘dip pipes’ is required and designed to prevent disturbance of the surface scum, inlet pipe laid at a flatter gradient for at least 12 meters before it enters the tank.

Septic tanks to be fitted with durable lockable lids or covers for emptying and cleaning, and inspection chamber fitted on the discharge side of tank for sampling of the effluent.

Septic tanks to be sited at least 7m from any habitable part of any building, preferably down slopes, within 30m of a suitable vehicle access for emptying and cleaning sludge which must not be taken through a dwelling or place of work and must not be a hazard to the building occupants. If the tank invert is more than 3.0m the 30m distance should be reduced.

Septic tank should have a minimum capacity of 2,700 litres for up to 4 users and increased by 180 litres for each additional user. (Recommended minimum size of septic tank to be 3,800 litres to accommodate discharges from washing machines/dishwashers etc). A notice plate must be fixed within the building and include the following information: Address of the property; location of the treatment system; description of the septic tank and effluent drainage installed; necessary maintenance to be carried out (including monthly checks of the apparatus and emptying of the tank every 12 months by a licensed contractor) and a statement that the owner is legally responsible to ensure that the system does not cause pollution, health hazard or nuisance.
Consultations are to be carried out with Building Control and The Environment Agency before any works commence on site. It is the Occupier’s responsibility to register the effluent discharge as an exempt facility with the Environment Agency for discharges of 2m³ or less per day to the ground from a septic tank, or obtain an Environmental Permit from the Environment Agency. Septic tanks must not discharge to a water course. For more information contact the Environment Agency at: www.environment-agency.gov.uk

**Sewage treatment systems**

Proprietary sewage treatment systems treat sewage by an accelerated (aerobic) process to higher standards than that of septic tanks, and are to be factory made, designed and constructed to BS EN 12566 (if less than 50 persons otherwise to BS 6297:2007 Code of Practice for design and installations of small sewage treatment works and cesspools and BBA certification (or other approved accreditation), be installed and maintained in accordance with the manufacturer’s details and fitted with an uninterruptible power supply (or 6 hours power back up). Note: only treatment systems suitable for intermittent use should be used for holiday lets or similar uses where the system is unused for periods of time.

Sewage treatment system to be sited at least 7m from any habitable part of any building, preferably down slopes, within 30m of a suitable vehicle access for emptying and cleaning sludge which must not be taken through a dwelling or place of work and must not be a hazard to the building occupants. If the tank invert is more than 3.0m the 30m distance should be reduced.

Sewage treatment system should be designed to British Water design criteria based on the maximum occupancy of the property, and the final effluent quality requirements of the Environment Agency.

Discharges from sewage treatment systems can be taken to a water course or alternatively a designed drainage field, drainage mound, wetlands or reed beds as detailed below.

A notice plate must be fixed within the building and include the following information: Address of the property; location of the treatment system; description of the sewage treatment system and effluent drainage installed; necessary maintenance to be carried out in accordance with the manufacturer’s details and a statement that the owner is legally responsible to ensure that the system does not cause pollution, health hazard or nuisance.

Consultations should be carried out with Building Control and The Environment Agency before any works commence on site. It is the Occupier’s responsibility to register the effluent discharge as an exempt facility with the Environment Agency for discharges of 5m³ or less per day to a surface water course or 2m³ or less per day to the ground from a sewage treatment system, or to obtain an Environmental Permit from the Environment Agency. For more information contact the Environment Agency at: www.environment-agency.gov.uk

**Disposal of sewage from septic tanks and sewage treatment systems**

**Drainage fields**

Drainage fields consist of irrigation pipes laid below ground allowing partially treated effluent to percolate into the ground and further biological treatment to take place in the aerated soil layers. Construction of drainage fields to be carried out as tank/system manufacturer’s details and BS6297:2007 + A1:2008. See typical guidance section detail and drainage field layout below. The drainage field area is calculated from the percolation test results which should have a suggested minimum area of 30m x 0.6m wide subject to percolation test results and number of users and approved by Building Control before works commence on site. See below for percolation test procedure.
Drainage fields to be located 10m from any water course, 50m from any point of water abstraction, 15m from any building, 2m from any boundary and sufficiently far from any other drainage areas so the overall soakage capacity of the ground is not exceeded. Water supply pipes, access roads, drives or paved areas etc must not be located within the drainage areas. See diagram 1 of ADH2 for typical drainage field construction details.

**Drainage mounds**
Drainage mounds consist of drainage fields constructed above the ground allowing further biological treatment of the partially treated effluent in the aerated soil layers. Drainage mounds to be used where there is a high water table level, impervious or semi water logged ground. Drainage mounds and drainage mound areas should be designed by a drainage specialist for particular ground problems and approved by Building Control before works commence on site. See diagram 2 of ADH2 for typical drainage mound construction details.

Drainage fields to be located 10m from any water course, 50m from any point of water abstraction, 15m from any building, 2m from any boundary and sufficiently far from any other drainage areas so the overall soakage capacity of the ground is not exceeded. Water supply pipes, access roads, drives or paved areas etc must not be located within the drainage areas. See diagram 1 of ADH2 for typical drainage field construction details.

**Wetlands/reed beds**
In situations where additional treatment is required, wetland treatment systems consisting of manmade reed beds can be constructed as either vertical or horizontal flow reed bed systems (see Diagrams 3 and 4 of ADH2 for full details) for the purification of the partially treated effluent by filtration, biological oxidation, sedimentation and chemical precipitation as the partially treated effluent passes through gravel beds and root systems of wetland plants. Wetlands should not be constructed in shaded, windblown or severe winter areas. Vertical or horizontal flow wetland treatment systems should be designed by a drainage specialist for particular ground problems and approved by Building Control before works commence on site.

A notice plate must be fixed within the building and include the following information: Address of the property; location of the treatment system; description of the sewage treatment system and effluent drainage installed; necessary maintenance to be carried out in accordance with the drainage specialist’s details and a statement that the owner is legally responsible to ensure that the system does not cause pollution, health hazard or nuisance.

**Percolation tests**
A percolation test is required to calculate the area of a drainage field for a septic tanks or sewage treatment system. A preliminary assessment of the site should be carried out including consultation with the Environment Agency and building control to determine the suitability of the site.

**Ground conditions**
Ground conditions should be assessed to determine the suitability of sub soils. Examples of suitable sub soils with good percolation include sand, gravel, chalk, sandy loam and clay loam. Examples of poor sub soils are sandy clay, silty clay and clay. It is important that percolation characteristics are suitable in both summer and winter conditions and that the sub soil is well drained and not saturated with water. A trial hole should be excavated 1.5m below the invert of the proposed effluent drainage pipe work to determine the position of the standing ground water table. The ground water level in summer and winter should be at least 1.0m below the invert of the effluent drainage pipe work.
Percolation test method

Percolation tests should not be carried out in abnormal weather conditions such as heavy rain, severe frost or drought.

**Step 1:** Excavate a test hole 300mm square x 300mm deep below proposed invert level of the drainage field trench bottom

**Step 2:** Fill the test hole with water and allow to drain away over night

**Step 3:** Refill to a depth of 300mm and note time taken in seconds to drain away from 75% full to 25% full (i.e. 150mm drop in level from 225mm to 75mm)

**Step 4:** Carry out the procedure a second and third time (can be in the same day if the hole empties completely and quickly enough)

**Step 5:** Repeat the procedure in two more test holes and calculate the average of the three results as follows: \( \text{test 1} + \text{test 2} + \text{test 3} = \text{average time taken for each test hole} \)

\[
\text{Step 6: } \text{Find the average of these results as follows: } \frac{\text{Hole 1} + \text{Hole 2} + \text{Hole 3}}{3} = \text{average time taken for all test holes}
\]

**Step 7:** Calculate the Vp (average time in seconds for the water to drop 1mm) as follows:

(i) Divide 2100 seconds by 150mm depth of water
(ii) \( \frac{2100}{150} = 14 \text{ Vp}^* \) (see note below*)

(iii) Area of trench = number of persons to use property \( \times \) Vp \( \times \) 0.25 (0.25 figure is used for septic tanks and can be reduced to 0.20 for treatment systems)

Therefore: 5 persons \( \times \) 14 \( \times \) 0.25 = 17.5\( \text{m}^2 \) of effluent drainage field is required.

(iv) To calculate actual length of drainage trench required divide 17.5\( \text{m}^2 \) by width of the trench

Required, therefore: \( \frac{17.5\text{m}^2}{0.6\text{m}} = 29.16 \) (Suggested minimum area 30m long x 0.6m wide)

* Vp should range between 12 and 100 to be successful; otherwise the system should be designed by a drainage specialist.

**Guidance Diagram 41:** Typical section through a septic tank/sewage treatment system drainage field (not to scale) See Diagram 1 of ADH2 for full details
Guidance Diagram 42: Typical drainage field plan layout (not to scale)
See Diagram 1 of ADH2 for full details

Effluent distribution pipes laid in a loop at maximum gradient of 1:200 (can be stepped if necessary), pipes can be laid at a shallower gradient if required.

Distribution chamber with a 150mm cascade fall for sampling.

2m minimum separation between trenches.

100mm diam perforated effluent distribution pipes 1 (perforations laid down) and 30m minimum length of rigid upvc pipes.

300-900mm wide trenches as guidance details.

Effluent drainage to be at least 15m from any building and at least 10m from a water course (see guidance on sewage treatment systems and disposal to a water course).

Septic tank/sewage treatment plant as guidance details, located at least 7m from buildings.

Foul water drainage inlet pipe.
Cesspools
Cesspools are sealed watertight tanks used for the containment of domestic sewage and must be emptied regularly by a licensed contractor. Cesspools are used in locations without main drainage in locations acceptable to the Environment Agency, where the discharge of treated effluent is not permissible due to unsuitable ground conditions, or where infrequent use or seasonal use would prevent the functioning of a septic tank or sewage treatment system.

Proprietary factory made cesspools to be designed and constructed to BS EN 12566-1 and installed in compliance with manufacturer’s details, or

Non proprietary cesspool can be constructed in situ to a drainage specialist’s design and approved by Building Control before the works commence on site. Cesspools to be watertight to prevent leakage of the contents and ingress of sub soil water, Typically the tank consists of one chamber constructed using 150mm minimum thick reinforced concrete base designed by a suitably qualified specialist suitable for storing aggressive effluents, 215mm thick engineering quality brickwork walls (or dense concrete bricks), bond to be agreed with building control, mortar mix 1:3 cement/sand ratio with water proof render or suitable proprietary tanking system applied to both sides and designed heavy concrete roof structure.

Cesspools to be ventilated and fitted with durable lockable lids or covers for emptying and cleaning, and the inlet side of tank should be fitted with a lockable access for inspection. No other openings are permitted. A high level alarm should be fitted for monitoring the cesspool for optimum usage.

Cesspools to be sited:
- At least 7m from any habitable part of any building, preferably down slopes and lower than any existing building and
- Within 30m of a vehicle access suitable for emptying and cleaning the effluent, and the contents should not be taken through a dwelling or place of work and must not be a hazard to the building occupants.

Cesspools should have a minimum capacity of 18,000 litres (18.0m³) for up to 2 users and increased by 6800 litres (6.8m³) for each additional user.

A notice plate must be fixed within the building describing the necessary maintenance and the following is an example of such wording:
- 'The foul drainage system from this property is served by a cesspool'
- 'The system should be emptied approximately every (insert frequency) by a licensed contractor and inspected fortnightly for overflow'
- 'The owner is legally responsible to ensure that the system does not cause pollution, a health hazard or a nuisance'

Consultations are to be carried out with Building Control and The Environment Agency before any works commence on site. Cesspools normally do not need registration with the Environment Agency as they are sealed systems with no discharge to the environment. For more information contact the Environment Agency at: www.environment-agency.gov.uk
H3: Rainwater drainage and harvesting

Rainwater gutters and down pipes
Rainwater gutters and down pipe sizes and number to be suitable for roof area to be drained in compliance with the guidance table below, and fixed in compliance with manufacturer’s details. See H3 of ADH for further information

Guidance Table 48: Gutter sizes and pipe outlet sizes for drainage of roof areas
See Table 2 of ADH3 for full details

<table>
<thead>
<tr>
<th>Maximum effective roof area m²</th>
<th>Gutter sizes (mm diam)</th>
<th>Outlet sizes (mm diam)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>37.0</td>
<td>100</td>
<td>63</td>
</tr>
<tr>
<td>53.0</td>
<td>115</td>
<td>63</td>
</tr>
<tr>
<td>65.0</td>
<td>125</td>
<td>75</td>
</tr>
<tr>
<td>103.0</td>
<td>150</td>
<td>89</td>
</tr>
</tbody>
</table>

Note: The sizes above refer to half round gutters and round rain water pipes

Rainwater/ grey water harvesting storage tanks and systems
Rainwater harvesting system to be designed, installed, and commissioned by a specialist to supply rainwater to sanitary appliances. Below drainage pipe work is to be carried out in accordance with the foul water pipe guidance details above. Overflow from the rain water storage tank is to discharge to a designed soakaway system constructed at least 5m from any building.

Grey water (consisting of recycled bath, shower and basin waste water) systems designed for use within the building to be designed, manufactured, installed and commissioned by a suitably qualified and experienced specialist. Grey water to be treated prior to use in toilets etc by an approved method and overflow to discharge to the foul water drainage system.

Grey water and rainwater tanks and systems should:
- Prevent leakage of the contents, ingress of subsoil water and should be ventilated
- Have an anti backflow device on any overflow connected to a drain or sewer
- Have a corrosion proof locked access cover for emptying and cleaning
- Supply pipes from the grey water or rain water collector tanks to the dwelling must be clearly marked as either ‘GREY WATER’ or ‘RAIN WATER’.

Surface water drainage around the building
Paths and paved areas around the building to have a non slip finish and provided with a surface cross fall of 1:40 – 1:60 to dispose of rain/surface water and a reverse gradient of at least 500mm away from walls of building (unless the paved/path area is a proprietary system designed to be porous and installed in accordance with manufacturer’s details). Surface water to be disposed of by an adequately sized and roddable drainage system via soakaways, or other approved means.

Rain/surface water disposal
Rain/surface water to be piped away from buildings as detailed in guidance above and discharged in to new or existing surface water soakaway, storm water or combined storm/foul water drainage facilities using existing or new inspection chamber connection as shown on plans/ specification, or as agreed with building control on site. New connections to existing storm or combined storm/foul water systems may require consent from the relevant Water Authority before works commence on site. Rain/surface water should only connect into a combined system with the consent of the relevant Water Authority, and only into a foul system under exceptional circumstances and subject to written approval from the Water Authority.
Rain/surface water disposed of in a separate surface water sewer or combined sewer should be connected via trapped gullies, with inspection chamber positions as detailed in guidance for foul water drainage. Drainage systems to low lying buildings or basements which carry storm water or other vulnerable drainage systems should be provided with anti flood protection such as one way valves, etc, to prevent flooding and sewerage entering the building.

**Existing soakaways**
Where additional rain/surface water systems are to be connected to the existing soakaway system, it should be checked by a specialist and sizes of the soakaway should be confirmed and agreed with building control as adequate for percolation into the surrounding ground.

**New soakaways**
New surface water soakaway(s) to be designed, sited and constructed to provide adequate short term storage for rain/surface water and adequate percolation into the ground. Soakaways should be sited at least 5m from any buildings and constructed on land lower than or sloping away from the foundations of the buildings.

Soakaway to have a minimum capacity of 1-2m³ (in free draining granular type sub soils), per rain water pipe serving a roof area up to 30m² as agreed with building control, constructed of clean stone/rubble with particle sizes ranging in size from 20 to 150mm and covered with polythene and top soil or to other methods as shown on the drawing/specification. Soakaways in clay sub soils or serving roof areas exceeding 30m² per rwp to be designed in accordance with BRE Digest 365 or by a drainage specialist (i.e. Hydrologist).

**Guide Diagram 43: New soakaway design (section detail not to scale)**

**Oil/fuel separators**
Under the requirements of the Water Industries Act, it is an offence to discharge fuels into water courses, coastal water or underground water. Oil separators are required where fuel is stored or in other high risk areas or car parks and the Environment Agency has issued guidance on the provision of oil separators. For paved areas around buildings or car parks a bypass separator is required with a nominal size of 0.0018 times the contributing area and silt storage area (in litres) equal to 100 times the nominal size.

In fuel storage areas and other high risk areas full retention separators are required with a nominal size equal to 0.018 times the contributing area and silt storage area (in litres) equal to 100 times the nominal size. Separators discharging to infiltration devices or surface water sewers should be class 1 (and capable of accommodating the whole content volume of one compartment of a delivery tanker)
Proprietary oil separators should be factory made, water proof, designed and constructed to the requirements of the Environment Agency, licensing authorities requirements (where the Petroleum Act applies), prEN858 and BBA certification or other approved accreditation. Separators must be installed and maintained in compliance with the manufacturer's details and inlet arrangements should not be direct to the water surface, adequate ventilation must be provided. The separator must be cleaned out and emptied regularly by a licensed contractor. See Appendix H3 -A of ADH3 for further information

H4: Building over or close to and connections to public sewers

Building over or close to a Public Sewer
The Water Authority (WA) being the sewerage undertaker is responsible for maintaining public sewers and the owner/developer of a building being constructed, extended or underpinned within 3m of a public sewer as indicated on the relevant WA sewer maps are required to consult with the WA to ensure:
(i) No damage occurs to the sewer. The extra weight of building being constructed, extended or underpinned a new building above a sewer could cause the sewer to collapse, resulting in structural damage to the new building, interrupted drainage from other properties and wastewater flooding. In these instances the sewer will need to be repaired quickly and this may involve taking down the building.
(ii) Suitable access is available to carry out any maintenance, repair or replacement works to the public sewer.
(iii) Consent is obtained and an agreement is entered into to build close to or over the public sewer before works commence on site

Locating a public sewer
Copies of the sewer record maps are held by the WA and Local Authority for the location of public sewers, and checks should be carried out at an early stage to ensure that the proposed works do not affect a public sewer.

Options
If you find that your plans could affect a public sewer, you should consult the relevant WA and discuss with them the following options:
• Avoiding the sewer through modifications of plans so that the building is at least 3 metres away from the sewer. This is often the easiest and cheapest option.
• Diverting the sewer. If the plans cannot be modified, the WA will usually require the sewer to be diverted. In most cases the diversion works is carried out at the property owners expense, normally by contractors approved by the WA.

The WA will not normally allowed construction directly over a manhole or pressurized pumping main.

The Build Over Process
If the only option is to apply to build over a public sewer, the building owner should make an application to the WA who may allow to build over a sewer, subject to the sewer being in satisfactory condition and their written Agreement before works commence.

Typical procedure:
• A Closed Circuit Television (CCTV) survey is carried out by WA before works commence to ascertain whether any repair work is required
• Another survey is required when the building is completed, to check that the sewer has not been damaged.
• In certain circumstances, if the building owner does not obtain the WA agreement, the WA have the right to discontinue the works, and the take down the building erected over the public sewer.
Consultations should be carried out early on in the design process to avoid any abortive costs, delays or other problems.

The WA make a charge for applications.

**Private Sewer Transfer Regulations**

Since the implementation of the Private Sewer Transfer Regulations on 1st October 2011, all lateral drains and sewers, i.e. those serving two or more properties that connect to the public sewer network, will be adopted by the relevant Water Authority/sewerage provider and the above requirements for building over/ close to and/or making new connections to public sewers will apply. As these lateral drains and sewers may not yet show up on the sewer maps it is important that consultations with the WA are carried out at an early stage.

**Protection**

Protection of the sewer pipes and systems are to be carried out in compliance with the WA requirements.

**Further information**

Is available from the relevant Water Authority or

[www.defra.gov.uk/environment/quality/water/sewage/sewers](http://www.defra.gov.uk/environment/quality/water/sewage/sewers) or

[www.water.org.uk/home/policy/private-sewer-transfer](http://www.water.org.uk/home/policy/private-sewer-transfer)

**Connections to public sewers**

Owners/developers of a building with new drainage connections or indirect drainage connections being made to a public sewer as indicated on the relevant Water Authorities sewer maps are required to consult with the WA and where necessary obtain consent before works commence on site.

**H5: Separate systems of drainage**

The building owner/agent must carry out all necessary consultations with the relevant Water Authority before works commence on site. Rain/surface water systems cannot be connected to foul water drains without the written permission of the relevant Water Authority. See H5 of ADH for further information.

**H6: Solid waste storage**

Only applies to new dwellings and conversion to create a new dwelling. See H6 of ADH and new dwellings in this guidance for further information.
Part J: Combustion appliances and fuel storage systems

Please refer fully to Approved Document J: Combustion appliances and fuel storage systems (2010 edition with further 2010 amendments);

Contents

Space and hot water heat producing appliances in general
Guidance Table 49: Typical minimum design guide temperatures for rooms
Solid fuel appliances up to 50kW rated output
Construction of open fire recessed and hearth
Guidance Diagram 44: Non combustible hearth details for recessed open fire
Construction of solid fuel masonry chimneys
Guidance Diagram 45: Solid fuel masonry chimney construction
Guidance Diagram 46: Lead flashing detail to solid fuel masonry chimney
Guidance Diagram 47: Solid fuel chimney construction with bends
Guidance Diagram 48: Minimum separation distances from combustible material in or near to a solid fuel chimney
Free standing solid fuel stove and hearth
Guidance Diagram 49: Non combustible hearth detail under free standing solid fuel stove
Flue pipe connections to free standing stove and chimneys
Construction of factory made insulated twin walled metal chimneys
Guidance Diagram 50: Free standing stove and metal chimney detail through a building
Guidance Diagram 51: Separation of twin walled insulated flue from combustible materials
Guidance Table 50: Sizes of flues in chimneys
Carbon monoxide alarms
Air supply (ventilation) to solid fuel appliances
Guidance Table 51: Air supply (permanent ventilation) to solid fuel appliances
Construction of factory made flue block chimneys
Configuration of flues serving open flue appliances
Inspection and cleaning openings in chimneys and flues
Interaction of mechanical extract vents and opened flue combustion appliances
Chimney /flue heights
Repair/relining of existing flues
Notice plates for hearths and flues

Appliances other than solid fuel
Gas heating appliances up to 70kw
Interaction of mechanical extract vents and opened flue gas combustion appliances
Oil heating appliances up to 45kW
Interaction of mechanical extract vents and opened flue oil combustion appliances
Fuel storage tanks
LPG tanks and cylinders up to 1.1 tonnes
Oil tanks up to 3500 litres

Renewable energy/micro regeneration Installations
Provision of information- commissioning certificates (testing)

Part J: Combustion appliances and fuel storage systems

Space and hot water heat producing appliances in general
All space and hot water systems must be in accordance with BS 5449, BS 5410 and BS 8303, installed, commissioned, calibrated and certified by a suitably qualified person or installer registered with an appropriate competent persons scheme and details supplied to Building Control and the owner along with the operating manuals, etc before the building is completed/occupied.
**Guidance Table 49: Typical minimum design guide temperatures for rooms**

<table>
<thead>
<tr>
<th>Room</th>
<th>Design room temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room (including study or similar room)</td>
<td>21</td>
</tr>
<tr>
<td>Dining/breakfast room</td>
<td>21</td>
</tr>
<tr>
<td>Bed-sitting room/open plan flat</td>
<td>21</td>
</tr>
<tr>
<td>Bedroom</td>
<td>18</td>
</tr>
<tr>
<td>Hall and landing</td>
<td>18</td>
</tr>
<tr>
<td>Kitchen</td>
<td>18</td>
</tr>
<tr>
<td>Bathroom/shower room/en-suite</td>
<td>22</td>
</tr>
<tr>
<td>Toilet/cloakroom</td>
<td>18</td>
</tr>
</tbody>
</table>

Note: design room temperatures above are based on external temperature of -3°C

Boilers to have a SEDBUK efficiency above 90% to comply with Building Regulations as amended in October 2010 for gas/ LPG/oil and must be provided with separate controls for heating and hot water with a boiler interlock and timer. Separate temperature control of zones within the dwelling should be provided as follows; room thermostat or programmable room thermostats in all zones, and individual radiator control such as thermostatic radiator valves (TRV’s) on all radiators other than in reference rooms (with a thermostat) and bathrooms. Un-vented hot water systems require safety devices including non self setting energy cut out and temperature release valve and thermostat. Safety valves from vented hot water systems must discharge safely.

Hot water vessels to be insulated with 35mm minimum thickness of PU foam and both heating and water pipes to be insulated with proprietary foam covers equal to their outside diameter within 1m of the vessel and in unheated areas.

**Solid fuel appliances up to 50kW rated output**

**Construction of open fire recessed and hearth**

Fire place walls to consist of non combustible material of at least 200mm in thickness to the side and at least 100mm thick in the back wall recess, lined with suitable fire bricks or proprietary fire back. The constructional hearth to be at least 125mm thickness (or 25mm minimum thickness decorative non combustible superimposed hearth with changes in levels to mark safe perimeter, fixed over 100mm minimum concrete floor slab). Hearth to project at least 150mm from the sides jambs and 500mm in front of the jambs as detailed in the guidance diagram below.

**Guidance Diagram 44: Non combustible hearth details for recessed open fire (plan not to scale)** See Diagrams 28 and 29 of ADJ for full details.
Construction of solid fuel masonry chimneys

Chimneys to be constructed as detailed in guidance diagram below, in external quality frost resistant materials 100mm minimum thickness (increased to 200mm where separates another fire compartment or another dwelling), using brick, dense blocks or reconstituted/natural stone to match the existing, with suitable mortar joints for the masonry as the masonry manufacturer's details with any combustible material kept at least 200mm away from the flue and 40mm away from the walls containing flues in compliance with diagram 21 of ADJ. Line chimney with manufactured flue liners installed in compliance with manufacturer's details as follows:

(i) Clay flue liners to BS EN 1457:2009: Class A1 N1 or Class A1 N2, to be laid vertically and continuously with socket up (jointed with fire proof mortar) from appliance with a minimum diameter in compliance with the guidance table below.

(ii) Concrete flue liners to BS EN 1857:2003: Type A1, A2, B1 or B2 to be laid vertically and continuously socket up (jointed with fire proof mortar) from appliance with a minimum diameter in compliance with guidance table below.

(iii) Liners whose performance complies to BS EN 1443:2003: designation: T400 N2 D 3 G with a minimum diameter in compliance with guidance table below.

Guidance Diagram 45: Solid fuel masonry chimney construction (not to scale)

- Flue outlet must extend above roof surfaces in compliance with guidance details
- Maximum chimney height (H) must not exceed 4.5 x smallest chimney width (W) from the level of the highest point of intersection (Ht)
- 100mm wide throat +/- 10mm
- Minimum flue height: flues should not be less than 4.5m in height to ensure sufficient draught to clear the products of combustion, measured vertically from the highest point at which air enters the fire place (or canopy) to the exit point at the terminal (E)
- 300mm high traditional Cannon head pot 250mm int diam base & 200mm int diam top suitable for 225mm int diam circular flue
- Cement/land bedding and capping (1:2:3)
- Code S Lead drop proof course trims & Code S lead apron & side flashings (not shown) as the Lead Sheet Association details
- 2 x trimmers joints bolted together trimming roof around chimney
- 25mm treated gutter board fixed 50 x 50mm treated timber gutter bearers
- 40mm min space between chimney & combustible timbers
- Clay type A1 flue liner internal sizes as guidance table (typically 225mm internal diameter), supported by surrounding masonry walls.
- For bends in flue see separate detail
- Liners to be jointed together with proprietary fire proof mortar and fitted with rebates uppermost to prevent condensation running out
- Rebeate uppermost
- Allow 25mm min void between liner and masonry wall, back filled with weak cement/vermiculite insulation mix as works proceed.
- 100mm min load bearing masonry walls supporting flue liners (see additional requirements for building against timber frame in guidance)
- Proprietary flue starter block
- 1:3 cement/land smooth benching
- Proprietary scored flue back - opening size 550mm high x 600/45/400:400mm wide, back filled with weak mix cement/vermiculite insulation (layer of corrugated card board to be built against fire back to burn away & leave expansion gap)
- Non combustible back hearth

Provide permanent combustion air supply in same room as fire, in accordance with guidance details, typically for 400mm wide opening provide 18.009m² of free air space using 2 x 215 x 215mm rectangular hole in brick through external wall to outside air - each providing 10.259m² of free air space, fitted with proprietary cavity wall ducts and dpc trays over.
Guidance Diagram 46: Lead flashing detail to solid fuel masonry chimney
(elevation detail not to scale)

- Brick or stone faced chimney
- Code 5 cover flashing & integral dpc tray* fixed over back gutter flashing
- Code 5 lead lined back gutter flashing returned around side stepped flashings
- Code 5 lead stepped side flashings (held in mortar joints with lead wedges on brick & stone facings) to both sides of chimney & returned around front of apron flashing
- Code 5 lead soakers beneath each tile overlapping flashing
- Roof underlay turned up at abutments
- Code 5 dpc tray* turned down over front apron
- Code 5 lead front apron flashing returned behind stepped side flashings

Notes:
* damp proof course (dpc) trays to be coated with bituminous emulsion on both sides & sandwiched between mortar beds

Code 4 lead suitable for moderate exposure & code 5 for severe exposure

All lead work detailing, lead code, sizes, dips & welted joints, upstands, laps, gutter width to be in accordance with the Lead Sheet Association details obtainable from: www.leadstreet.co.uk

Guidance Diagram 47: Solid fuel chimney construction with bends
(section detail not to scale) See Diagram 15 of ADJ for full details

Flues to be constructed straight & vertical with no more than two 45 degree bends (to the vertical) in the flue configuration, in compliance with paragraph 4.48 - 4.49 of ADJ, using proprietary flue bends to match flue liners
The Building Regulations 2010

Monmouthshire C.C. Guidance for domestic extensions

Guidance Diagram 48: Minimum separation distances from combustible material in or near to a solid fuel chimney (plan detail not to scale) See Diagram 21 of ADJ for full details

Free standing solid fuel stove and hearth
Free standing solid fuel stoves to be installed in accordance with manufacturer’s details, fixed to a non combustible hearth, sizes at least 840 x 840mm, positioned 150mm minimum away from enclosing non combustible walls (walls at least 100mm thick). The constructional hearth to be at least 125mm thickness (or can be a decorative non combustible superimposed hearth 25mm minimum thickness fixed over 100mm minimum concrete floor slab with changes in levels to mark a safe perimeter). Hearth should project at least 150mm to the sides and rear of the appliance and 300mm in front of the operable appliance door as detailed in the guidance diagram below.

Guidance Diagram 49: Non combustible hearth detail under free standing solid fuel stove (plan detail not to scale) See Diagrams 26, 27 and 30 of ADJ for full details
Flue pipe connections to free standing stove and chimneys

Single flue pipes connecting the appliance to a chimney should not extend beyond the room in which the appliance is located, and should not pass through any roof space, partition, internal wall or floor (unless it connects to the chimney at that point). The maximum recommended length is 1-1.5m to prevent heat transfer and improve flue efficiency. Minimum flue length 0.6m.

Single flue pipes should be guarded if they could be at risk of damage, or if the burn hazard is not immediately apparent to people. Single flue pipes must be located to avoid igniting combustible materials and must be at least 3 times its internal diameter from any combustible materials (3 x 150mm = 450mm); or

The combustible material can be heat shielded, the flue must be at least or 1.5 times its diameter from the heat shield. The heat shield (typically 12mm thick proprietary fire resistant board) must extend at least 1.5 times the flues internal diameter to each side of the flue and there must be an air gap of at least 12mm (formed with strips of fire board) between the shield material and the combustible material; or

The connecting flue pipe is factory made in compliance with T 400 N2 D3 G according to BS EN 1856-2:2004, and installed to BS EN 15827-1

Construction of factory made insulated twin walled metal chimneys

Construction of factory made metal chimneys are to be carried out in compliance with paragraphs 1.42 – 1.46 of ADJ, and appliance manufacturer’s details. The separation of combustible materials from a factory-made twin walled metal chimney is to be carried out in compliance with Diagram 13 of ADJ. Where a metal chimney passes through a cupboard, storage space or roof space it must be fully separated with at least 50mm from combustible materials with a non combustible steel mesh guard. Factory made metal chimneys concealed in the building are to be accessible for inspection in compliance with paragraph 1.47 and diagrams 13 and 14 of ADJ. Chimneys passing through combustible floors and roofs should be fitted with proprietary fire stop shields. Chimneys passing through fire compartment walls or floors-contact building control for further advice.
**Guidance Diagram 50: Free standing stove and metal chimney detail through a building (section detail not to scale)** See Diagrams 14,15,16, 17, 18 and 19 of ADJ for full details

Where a metal chimney passes through a cupboard, storage space or roof space it must be fully separated with at least 50mm* from combustible materials with an approved non combustible steel mesh guard.

Ceiling joists

Where a metal chimney passes through a room it must be boxed in (or guarded), the flue must be separated with at least 50mm* from combustible materials & must be accessible for inspection

Floor joists

Single flue pipe connection appliance to twin walled chimney should not extend beyond the room in which appliance is located. Recommended maximum length 1–1.5m. Minimum length 0.6m

Single flue pipe must be at least 3 times its internal diameter from combustible materials, or 1.5 times its diameter from a suitable heat shield in compliance with guidance details

Permanent combustion air to be in compliance with guidance details

* Actual distance should be calculated in compliance with BS EN 1856 & BS 4543-1

**Guidance Diagram 51: Separation of twin walled insulated flue from combustible materials (plan detail not to scale)** See Diagram 13 of ADJ for full details

Non combustible wall options as guidance details:

- (i) External cavity wall
- (ii) Cavity or solid party wall
- (iii) Internal partition wall

Timber frame

12.5mm plasterboard

Where a metal chimney passes through a room it must be boxed in (or guarded)

Twin walled insulated stainless steel multi-fuel chimney/flue system, installed in compliance with flue & combustible materials in compliance with flue manifold details (Actual distance should be calculated in compliance with BS EN 1856 & BS 4543-1)

Proprietary fire stop shield installed through ceiling to provide 50mm* minimum air gap clearance between flue & combustible materials in compliance with flue manifold details

150mm minimum internal flue sizes as guidance details

Free standing stoves installed to manifold details, & positioned on non combustible hearths in compliance with guidance details, typically 25mm min thick decorative non combustible hearth on 100mm min thick concrete ground bearing floor slab

Flues to be constructed straight & vertical with no more than a 90 degree bend with cleaning access where the flue connects to the appliance & no more than two 45 degree bends (to the vertical) in the flue configuration in compliance with paragraph 1.48–1.49 of ADJ.

Note: Proprietary fire stop shield to be installed through upper timber floor(s) to provide 50mm minimum air gap clearance between flue & combustible materials in compliance with flue manifold details (Actual distance should be calculated in compliance with BS EN 1856 & BS 4543-1)
Guidance Table 50: Sizes of flues in chimneys
(see Table 2 of ADJ for full details)

<table>
<thead>
<tr>
<th>Installation</th>
<th>Minimum internal flue sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire place with opening up to 500 x 500mm</td>
<td>200mm (diameter, rectangular or square)</td>
</tr>
<tr>
<td>Fire place with opening more than 500 x 500mm or exposed on both sides</td>
<td>Area equal to 15% of the total face area of the fireplace opening. (note: total face areas more than 15% or 0.12m² to be designed by heating specialist)</td>
</tr>
<tr>
<td>Closed appliances (stove, cooker, room heater and boiler) up to: 30kW rated output</td>
<td>(diameter, rectangular or square)</td>
</tr>
<tr>
<td>30-50kW rated output</td>
<td>150mm</td>
</tr>
<tr>
<td>175mm</td>
<td></td>
</tr>
<tr>
<td>Closed appliances up to 20kW rated output which burns smokeless/low-volatile fuel, or complies to the Clean Air Act</td>
<td>See table 2 of Approved Document J</td>
</tr>
<tr>
<td>Pellet burner which complies to the Clean Air Act</td>
<td>See table 2 of Approved Document J</td>
</tr>
</tbody>
</table>

Carbon monoxide alarms
A mains operated carbon monoxide alarm is required at ceiling level in the same room as the solid fuel appliance, which must be either battery operated in compliance with BS EN 5029: 2001: or mains operated with sensor failure warning device in compliance with BS EN 5029: Type A. Carbon monoxide alarm to be positioned on the ceiling at least 300mm from walls, or if located on the wall as high up as possible (above any doors or windows) but not within 150mm of the ceiling, and between 1m and 3m horizontally from the appliance.

Air supply (ventilation) to solid fuel appliances
Permanently open combustion air vents ducted to outside are to be provided in the same room as the solid fuel appliance with a total free area in compliance with the guidance table below (see Table 1 of ADJ for further information)

Guidance Table 51: Air supply (permanent ventilation) to solid fuel appliances
See Table 1 of ADJ for full details

<table>
<thead>
<tr>
<th>Type of appliance</th>
<th>Minimum amount of ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open fire place with no throat (i.e. under a Canopy)</td>
<td>50% of the cross section area of the flue</td>
</tr>
<tr>
<td>Open fire place with throat</td>
<td>50% of the cross section area of the Throat opening area</td>
</tr>
<tr>
<td>or for fire openings sizes:</td>
<td></td>
</tr>
<tr>
<td>500mm wide</td>
<td>20,500mm²</td>
</tr>
<tr>
<td>450mm wide</td>
<td>18,500mm²</td>
</tr>
<tr>
<td>400mm wide</td>
<td>16,500mm²</td>
</tr>
<tr>
<td>350mm wide</td>
<td>14,500mm²</td>
</tr>
<tr>
<td>Enclosed stove with flue draught stabilizer*:</td>
<td></td>
</tr>
<tr>
<td>(i) In new building/extension (good air tightness)</td>
<td>850mm²/kW of appliance rated out put</td>
</tr>
<tr>
<td>(ii) In existing older building (if air tightness improved-use figure for new extension)</td>
<td>300mm²/kW for first 5kW and 850mm²/kW of balance of appliance rated out put</td>
</tr>
<tr>
<td>Enclosed stove with no flue draught stabilizer:</td>
<td></td>
</tr>
<tr>
<td>(i) In new building/extension (good air tightness)</td>
<td>550mm²/kW of appliance rated out put</td>
</tr>
<tr>
<td>(ii) In existing building (if air tightness improved-use figure for new extension)</td>
<td>550mm²/kW for appliance rated out put above 5kW</td>
</tr>
</tbody>
</table>

Note: *Draught stabilizer is a factory made counter-balance flap devise admitting air to the flue, from the same space as the combustion air, to prevent excessive variations in the draught. It is usual for these to be in the flue pipe or chimney, but they may be located in the appliance. (see diagram 3 of ADJ)
Construction of factory made flue block chimneys
Construction of factory made flue block chimneys are to be carried out in compliance with paragraphs 1.29 – 1.30 of ADJ, and appliance manufacturer's details.

Configuration of flues serving open flue appliances
Flues to be constructed straight and vertical with no more than a 90 degree bend with cleaning access where the flue connects to the appliance and no more than two 45 degree bends (to the vertical) in the flue configuration in compliance with paragraph 1.48-1.49 of ADJ.

Inspection and cleaning openings in chimneys and flues
Where a chimney/flue cannot be cleaned through the appliance, an air tight accessible inspection and cleaning opening should be fitted using proprietary factory made components compatible with the flue system, fitted and located to allow sweeping of the flue in compliance with appliance manufacturer's details.

Interaction of mechanical extract vents and opened flue combustion appliances
Where a kitchen etc contains an opened flue solid fuel appliance and a mechanical extract vent, the appliance should be tested and certified by a suitable qualified and registered HETAS engineer that the combustion appliance operates safely whether or not the fans are running. Alternatively, the ventilation from the passive stack effect of an open flue appliance may negate the need for a mechanical extract fan to be fitted in the same room subject to approval by building control.

Chimney /flue heights
Chimney height not to exceed 4.5 times its narrowest thickness above highest point of intersection (density of masonry to be greater than 1500kg/m³). Chimney/terminal to discharge at a minimum height in compliance with Diagram 17 of ADJ as follows:
- 1.0m above flat roofs
- 1.0m above opening windows or roof lights in the roof surface
- 0.6m above the ridge
- Outside of a zone measured 2.3m horizontally from the roof slope
- 0.6m above an adjoining or adjacent building that is within 2.3m measured horizontally (whether or not beyond the boundary)

Please refer to Diagram 18 of ADJ for flue positions on easily ignited roofs (i.e. thatch)

Repair/relining of existing flues
Repair /relining of existing flues to be carried out by a suitably qualified and experienced specialist. Re-use of existing flues to be inspected, tested and certified by a suitably qualified and experienced specialist prior to use as suitable for solid fuel appliances.

Relining of existing flues to be carried out in compliance with BS EN 1443:2003: designation: T400 N2 D 3 G with minimum diameters in compliance with guidance table above using lining systems suitable for solid fuel appliances as follows:
(i) Factory made flue lining systems in compliance with BSEN1856-1:2003 or BSEN1856-2:2004

Notice plates for hearths and flues
Notice plates for hearths and flues must be permanently displayed next to the flue (or electricity consumer unit or water stop tap) detailing the property address; location of installation (room); type of installation the flue is suitable for; size and construction of flue, if suitable for condensing appliance, installation date, and any other information (optional).
Appliances other than solid fuel

Gas heating appliances up to 70kw
Gas burning appliances up to 70kW are out of the scope of this guidance and to be installed, commissioned and tested in compliance with Section 3 of ADJ, and BS 5440, BS 5546, BS 5864, BS 5871, BS 6172, BS 6173, BS 6798, and the Gas Safety (installation and use) Regulations. All works to be to be carried out by an installer registered with Gas Safe. Copy of commissioning certificates are to be issued to Building Control on completion of the works.

Interaction of mechanical extract vents and opened flue gas combustion appliances Where a kitchen etc contains an opened flue gas appliance and a mechanical extract vent, the rate of the extract fan should not exceed 20l/s (73m³/hour) and the appliance should be tested and certificated by a suitable qualified and registered gas engineer that the combustion appliance operates safely whether or not the fans are running.

Oil heating appliances up to 45kW
Oil burning appliances up to 45kW are out of the scope of this guidance and to be installed, commissioned and tested in compliance with Section 4 of ADJ and BS 5410, BS 799. All works should be carried out by an installer registered with OFTEC. Copies of commissioning certificates are to be issued to Building Control on completion of the works.

Interaction of mechanical extract vents and opened flue oil combustion appliances Where a kitchen etc contains an opened flue oil appliance and a mechanical extract vent, the rate of the extract fan should not exceed 40 l/s for an appliance with a pressure jet burner and 20l/s for an appliance with a vaporising burner and the appliance should be tested and certificated by a suitable qualified and registered OFTEC engineer that the combustion appliance operates safely whether or not the fans are running.

Fuel storage tanks

LPG tanks and cylinders up to 1.1 tonnes
LPG tanks up to 0.25 tonne capacity s to be positioned in the open air at least 2.5m from buildings or boundaries and 1.1 tonne tanks positioned 3m from buildings or boundaries . Cylinders to be positioned in the open air on a minimum 50mm thick concrete base, securely chained to the wall and positioned at least 250mm below and 1m from any openings horizontally into the building such as windows, combustion vents or flue terminals and 2m from un-trapped drains or cellar entrances. See Section Diagram 43 and 44 and Section 5 of ADJ for full details.

Oil tanks up to 3500 litres
Oil tanks up to 3500 litres to be positioned in the open air on a concrete base with a minimum thickness of 50mm extending a minimum of 300mm beyond the tank base and be positioned a minimum of 1.8m from buildings or flues and 760mm from boundaries. They should also be provided with a proprietary fire resistant pipe and valve system. Where there is a risk of pollution to water courses, open drains including inspection chambers with loose covers, the tank should be either internally bunded or be provided with an impervious masonry bund equal to capacity of 110% of its volume. Where any of the above requirements cannot be met- please contact Building Control for further guidance. See Section 5 of ADJ for full details.
Renewable energy/micro regeneration Installations

Renewable energy systems must be installed, commissioned, calibrated and certified by a suitably qualified person or specialist installer registered with an appropriate competent persons scheme (where applicable) and details supplied to building control and the owner along with the operating manuals, etc for the following installations:

- Solar photovoltaic (pv) roof/wall panels for producing electricity
- Biomass boiler for space heating and hot water systems
- Wind energy turbines for producing electricity
- Hydro-power systems for producing electricity
- Solar thermal water heating roof/wall panel systems, fitted with an additional heating source to maintain an adequate water temperature
- Ground/air source heat pumps for space heating and hot water systems
- Micro - combined heat and power(CHP) systems (low carbon technology that is similar to conventional gas boilers but also produce electricity)

All roof / wall structures must be adequate to support the above installations in compliance with manufacturer’s details, additional calculations/details may also be required from a suitably qualified person if requested by building control, which must be approved before works commence on site. Installations must be installed in accordance with manufacturer’s details to prevent ingress of water/moisture into the building. Electrical works should comply with Approved Document P

Further information on renewable energy/micro regeneration Installations are available from the following sources:

- BS EN 12975-2:2006: Thermal solar systems and components
- ER G59/2: Recommendations For The Connection of Generating Plant To The Distribution Systems of Licensed Distribution Network Operators
- ER G83/1: Recommendations for the connection of small scale embedded generators (up to 16 A per phase) in parallel with public low voltage distribution networks
- BRE Digest 489: Wind loads on roof based photovoltaic systems
- BRE Digest 495: Mechanical installation of roof mounted photovoltaic systems
- The HVCA guide to Good Practice Installation of Biofuel Heating (TR/38)
- The HVCA guide to Good Practice Installation of Heat pumps (TR/30)
- British Wind Energy Association: Small Wind Turbine Performance and Safety Standard
- Photovoltaics in buildings: Guide to the installation of PV systems. 2nd Edition (DTI publication 06/1972)
- CE72: Energy Efficiency Best Practice in Housing- Installing small wind powered electricity generating systems
- CE131: Energy Efficiency Best Practice in Housing- Solar water heating systems

Provision of information- commissioning certificates (testing)

Copy of installers commissioning certificate to be sent to building control on completion of the work.
Part K: Protection from falling, collision and impact (including glazing)

Please refer fully to Approved Document K: Protection from falling, collision and impact (including safety glazing which replaces Approved Document N) (2013 edition)

Contents

Internal stairs, guarding and landings for changes in level of 600mm or more
  Stair pitch
  Headroom
  Rise and going
  Guidance Diagram 52: Measuring rise and goings (not to scale)
  Landings
  Stair width
  Handrails
  Internal guarding (external guarding details below)
  Length of flights
  Guidance Diagram 53: Typical internal stair case and guarding construction details
  Guidance Diagram 54: Typical internal tapered tread stair case
  Typical internal staircase construction details

External stairs, guarding and landings for changes in level of 600mm or more
  External stairs and landings
  External guarding

Guarding to upper storey window openings/other openings within 800mm of floor level

Lift conversion stairs
  Reduced headroom to stairs in loft conversions
  Guidance Diagram 55: Reduced headroom to stairs in loft conversions
  Alternating tread stairs for loft conversions
  Guidance Diagram 56: Alternating tread stairs for loft conversions
  Fixed Ladders for loft conversions

Ramps

Protection against impact with glazing
  Glazing in critical locations
  Guidance Diagram 57: Critical locations for use of safety glass in doors/side screens and windows
  Marking of safety glass

Part K: Protection from falling, collision and impact (including glazing)

Internal stairs, guarding and landings for changes in level of 600mm or more

Private stairs (used for only one dwelling) to be constructed in accordance with BS 5395 and BS 585 as detailed in the following guidance details and diagrams below:-
(Spiral and helical stairs to be designed to BS 5395: Part 2)

Stair pitch
Stair pitch must not exceed 42°

Headroom
Stair to have a minimum headroom of 2m above the pitch line of the stairs

Rise and going
Rise and going to be level and equal to all steps and to fall within the following separate classes:
  • Any rise between 155mm-220mm used with any going between 245mm- 260mm, or
  • Any rise between 165mm-200mm used with any going between 223mm- 300mm.
(The sum of twice the rise plus the going must be between 550 and 700mm)
Landings
Landings to be provided at the top and bottom of the stair equal in length to the width of the stairs and clear of any door opening onto it. If a door open across the bottom of a landing (or cupboard doors open in a similar at the top and bottom of a flight) a clear 400mm space must be maintained across the width of the flight. in compliance with Diagrams 1.7 and 1.8 of ADK

Stair width
There is no minimum stair width for new extensions or replacement stairs in existing dwellings but should be safe and practicable. Treads should be slip resistant where open to the weather or in wet areas.

Handrails
Handrails must be provided on one side of the stairs if they are less than 1m wide and they should have one on each side if they are wider. Handrails to provide a firm handhold with a minimum clearance of 25 - 50mm between the handrail and wall to prevent trapping of hands and securely fixed at a height 900-1000mm above floor/nosing levels and must be continuous throughout their length.

Internal guarding (external guarding details below)
Stair flights, landings, ramps and edges of internal floors to be guarded at a minimum height of 900mm, measured from the floor/pitch line of the stairs (across the nosings) to the top of the handrail and be continuous throughout their length, fitted with non climbable vertical balustrading, with no gaps to exceeding 100mm (in which a 100mm diameter sphere cannot pass through) and all constructed to resist a horizontal force of 0.36kN/m. All open treads, gaps etc should not exceed 100mm. See Diagram 3.1 of ADK for full details and BS6180 for protective barrier details.

Length of flights
Stairs having more than 36 risers in consecutive flights should have a landing between flights which should be equal in length to the width of the stairs and make a change of direction of at least 30° in compliance with Diagram 1.6 of ADK
Guidance Diagram 53: Typical internal stair case and guarding construction details (not to scale) See diagram 1.3 of ADK for full details

Guidance Diagram 54: Typical internal tapered tread stair case (not to scale)
The rise of tapered treads should be uniform and equal to the rise of the straight flight.
The going on the tapered treads should be uniform and equal to the going of the straight flights as measured on the centre line of the stairs as detailed in the guidance diagram below. (See Diagram 1.9 of ADK for full details)
The Building Regulations 2010

Monmouthshire C.C. Guidance for domestic extensions

Typical internal staircase construction details
Typical staircase construction details: side strings ex. 230 X 35mm, capping ex. 32 X 63mm, treads 25mm thick, risers in 12.5mm thick plywood, newel posts ex. 75 X 75mm, handrails ex. 75 X 63mm, balustrades ex. 32 X 32mm at 125mm ctrs fixed into proprietary timber head and base rebated capping.

External stairs, guarding and landings for changes in level of 600mm or more

External stairs and landings
As internal stair guidance details above

External guarding
Stair flights, landings, ramps and edges of external floors to be guarded at a minimum height of 1100mm, measured from the floor/pitch line of the stairs (across the nosings) to the top of the handrail and be continuous throughout their length, fitted with non climbable vertical balustrading, with no gaps to exceeding 100mm (in which a 100mm diameter sphere cannot pass through) and all constructed to resist a horizontal force of 0.74kN/m. All open treads, gaps etc should not exceed 100mm. See Diagram 3.1 of ADK for full details and BS6180 for protective barrier details

Guarding to upper storey window openings/other openings within 800mm of floor level
Opening windows located above the ground floor storey with openings within 800mm of floor level must be provided with non climbable containment/guarding or proprietary catches which should be removable (but child proof) to means of escape windows in the event of a fire. All gaps etc to containment/guarding should not exceed 100mm.

Loft conversion stairs

Reduced headroom to stairs in loft conversions
Where there is not enough space to achieve a 2.0m clear head room it can be reduced to 1.9m at the centre of the stairs and 1.8m at the side in loft conversions as detailed in the guidance diagram below.

Guidance Diagram 55: Reduced headroom to stairs in loft conversions (not to scale)
See Diagram 1.4 of ADK for full details
**Alternating tread stairs for loft conversions**

Alternating tread stairs are only suitable for loft conversions and should only be installed in one or more straight flights and then only where there is not enough space to accommodate a stairs in accordance with guidance diagrams above. It should only be used to access one habitable room together with a bath/shower room or wc, providing it is not the only wc in the dwelling. The user relies on familiarity and regular use for reasonable safety. The alternating tread stairs should be constructed as follows and in accordance with the guidance diagram below: (See diagram 1.10 of ADK for full details).

- Steps should be uniform with parallel nosings
- Treads should be slip resistant
- Tread sizes over the wider part of the step should be in accordance with the dimensions in the guidance above with a maximum rise of 220mm and a minimum going of 220mm.
- Handrails to be fitted to both sides and guarded in accordance with the above guidance details for internal stairs

**Guidance Diagram 56: Alternating tread stairs for loft conversions (not to scale)**

See Diagram 1.10 of ADK for full details

**Fixed Ladders for loft conversions**

Fixed ladders should only be used in certain circumstances in accordance with paragraphs 1.31 - 1.32 of ADK, subject to building control approval.

**Ramps**

See section 2 of ADK for full details. See ramp requirements for new dwellings in part M of this guidance and ADM.
Protection against impact with glazing  Please refer fully to K4 of ADK

Glazing in critical locations
Doors and adjacent sidelights/windows in critical locations i.e. within 1500mm of floor/ground level and 300mm of doors and windows within 800mm of floor/ground as detailed in the guidance diagram below to comply with one of the following:
1. Safety glass in accordance with BS EN 12600 and BS 6206 (to ensure it breaks safely)
2. Annealed glass in accordance with Diagram 5.2 of ADK (or polycarbonate or glass blocks fixed in accordance with manufacturer's details suitable for size of openings)
3. Small panes of glass should not exceed 0.5m² in area and should have one dimension smaller than 250mm measured between glazing beads. Glass should be annealed and not less than 6mm thick. See Diagram 5.3 of ADK for full details

Guidance Diagram 57: Critical locations for use of safety glass in doors/side screens and windows. See Diagram 5.1 of ADK for full details

Diagram notes: 1. Where safety glazing is required in part of an opening as indicated by hatched lines in the above guidance diagram- that complete pane must be in safety glass. 2. Glass thickness must be suitable for dimension limits and opening sizes in accordance with glass manufacturer's details. 3. Glazing to be installed in accordance with manufacturer’s details.

Marking of safety glass
Safety glazing to have clear and indelible markings on each piece of safety glazing within critical locations with the following information: name or trade mark of the manufacturer/ merchant/ installer, The standard the glass complies to and the classification in accordance with BS EN 12600
Part L1B: Conservation of fuel and power (Existing dwellings)

Please refer fully to Approved Document L1B: Conservation of fuel and power in existing dwellings (2010 edition with further 2010 amendments)

Contents
Listed buildings, conservation areas and ancient monuments
Areas of external windows, roof windows and doors
New thermal elements
External glazing
Guidance Table 52: U-value requirements for external windows and doors including roof windows
Guidance Table 53: U-values for double glazing
Guidance Table 54: U-values for triple glazing- Pilkington EnergiKare glazing system
Closing around window and door openings
Sealing and draught proofing measures
Energy efficient lighting
Fixed internal lighting
Fixed external lighting
Insulation of pipe work to prevent freezing
External walls, roofs, floors and swimming pool basin
Guidance Table 55: U-values for external walls, roofs, floors and swimming pool basin
Renovation/upgrading of existing thermal elements
Guidance Table 56: Renovation/upgrading of existing thermal elements
Consequential improvements (applies to existing buildings with a total useful floor area exceeding 1,000m²)
Commissioning of fixed building services
Providing information -building log book

Part L1B: Conservation of fuel and power (Existing dwellings)

Listed buildings, conservation areas and ancient monuments
If the proposed energy efficiency requirements will unacceptably alter the character or appearance of a historic/listed building/ancient monument or building within a conservation area, then the energy efficiency standards may be exempt or improved to what is reasonably practical or acceptable and would not increase the risk of deterioration of the building fabric or fittings in consultation with the local planning authorities conservation officer in compliance with paragraphs 3.6- 3.14 of AD L1B.

Areas of external windows, roof windows and doors
Area of external windows, roof windows and doors should not exceed the sum of:
(i) 25% of the floor area of the extension, plus
(ii) the total area of any windows or doors which as a result of the extension works, no longer exists or are no longer exposed.

Notes:
1. Area of glazing less than 20% of the total floor area, may result in poor levels of daylight in the extension and dwelling.
2. Areas of glazing greater than 25% may be acceptable in certain circumstances, i.e. to make the extension consistent with the external appearance of the host building, in such cases the U-value of the window should be improved in accordance with Par 4.1b of ADL1B or other compensation measure as Par 4.4 -4.7 of ADL1B.
3. Where necessary, SAP calculations can be submitted to building control to confirm how compensating measures can provide flexibility where area of external windows, roof windows and doors exceed 25% of the floor area of the extension.
New thermal elements

External glazing
External glazing insulation details to comply with U-values for external windows, doors and roof lights in compliance with paragraphs 4.19-4.22 and Table 1 of ADL1B and guidance tables as follows: (Note: All external doors, windows, roof lights etc to be factory draft stripped)

Guidance Table 52: U-value requirements for external windows and doors including roof windows. See Table 1 of ADL1B for full details

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Insulation standard U-value not worse than:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows, roof window or roof light</td>
<td>1.6 (or Window energy rating (WER) as Band C of par 4.22 of ADL1B)</td>
</tr>
<tr>
<td>Doors with more than 50% glazing</td>
<td>1.8</td>
</tr>
<tr>
<td>Other doors</td>
<td>1.8</td>
</tr>
<tr>
<td>Replacement windows/doors</td>
<td>As above or 1.2 centre pane- if external appearance of facade or character of the building is to be maintained</td>
</tr>
</tbody>
</table>

Guidance Table 53: U-values for double glazing

<table>
<thead>
<tr>
<th>Pilkington Glass</th>
<th>Outer pane</th>
<th>Cavity/spacer/gas</th>
<th>Inner pane</th>
<th>U-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGU</td>
<td>Optifloat</td>
<td>16mm air filled</td>
<td>K-Glass</td>
<td>1.7</td>
</tr>
<tr>
<td>EnergiKare</td>
<td>Optiwhite</td>
<td>16mm argon filled with aluminium spacer bar</td>
<td>K-Glass</td>
<td>1.5</td>
</tr>
<tr>
<td>Classic</td>
<td>Optiwhite</td>
<td>16mm argon filled with warm edge spacer bar</td>
<td>K-Glass OW</td>
<td></td>
</tr>
<tr>
<td>EnergiKare</td>
<td>Optiwhite</td>
<td>16mm argon filled with warm edge spacer bar</td>
<td>K-Glass</td>
<td>1.5</td>
</tr>
<tr>
<td>Classic</td>
<td></td>
<td></td>
<td>K-Glass OW</td>
<td></td>
</tr>
</tbody>
</table>

Guidance Table 54: U-values for triple glazing- Pilkington EnergiKare glazing system

<table>
<thead>
<tr>
<th>Cavity</th>
<th>Middle pane</th>
<th>Cavity</th>
<th>Inner pane</th>
<th>U-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optiwhite</td>
<td>12mm argon</td>
<td>K Glass T</td>
<td>12mm Argon</td>
<td>K-Glass</td>
</tr>
<tr>
<td>Optiwhite</td>
<td>16mm argon</td>
<td>K Glass T</td>
<td>16mm Argon</td>
<td>K-Glass</td>
</tr>
<tr>
<td>Optiwhite</td>
<td>12mm argon</td>
<td>K Glass OWT</td>
<td>12mm Argon</td>
<td>K-Glass OW</td>
</tr>
<tr>
<td>Optiwhite</td>
<td>16mm argon</td>
<td>K Glass OWT</td>
<td>16mm Argon</td>
<td>K-Glass OW</td>
</tr>
<tr>
<td>Optiwhite</td>
<td>12mm Krypton</td>
<td>K Glass OWT</td>
<td>12mm Krypton</td>
<td>K-Glass OW</td>
</tr>
</tbody>
</table>

Closing around window and door openings
Checked rebates should be constructed to window/door reveals or alternatively a proprietary finned insulated closers should be used. Checked rebates are where the outer skin masonry/skin projects across the inner skin by at least 25mm, the cavity is closed by an insulated closer and the window or door is fully sealed with mastic or similar externally.

Sealing and draught proofing measures
All external door and window frames, service penetrations to walls, floors and ceilings, etc, should be sealed both internally and externally with proprietary sealing products such as proprietary waterproof mastic, expanding foam or mineral wool or tape to ensure air tightness.

Energy efficient lighting

Fixed internal lighting
Fixed internal energy efficient lighting in new extensions must not be less than 75% of all the fixed low energy light fittings (fixed lights or lighting units) in the main dwelling spaces (excluding cupboards and storage areas), fitted with lamps which must have a luminous efficiency greater than 45 lumens per circuit-watt and a total output greater than 400 lamp lumens. Light fittings to be either dedicated fittings which only take low energy lamps or standard fittings which take low energy lamps. (Note: light fittings with supplied power less than 5 circuit-watts are excluded from the overall count of the total number of light fittings)
**Fixed external lighting**

Fixed external energy efficient lighting in new extensions must consisting of either:
(i) Lamp capacity not greater than 100 lamp-watts per light fitting and fitted with automatic switch off between dawn and dusk and when lit area becomes unoccupied; or
(ii) Lamp efficacy greater than 45 lumens per circuit-watt; and fitted with automatic switch off between dawn and fitted with manual controls.

**Insulation of pipe work to prevent freezing**

All hot and cold water service pipe work, tanks and cisterns should be located within the warm envelope of the building to prevent freezing.

Where hot and cold water service pipe work, tanks and cisterns are located in unheated spaces they should be insulated to prevent freezing in compliance with BS 6700 and BS 8558, and typically as follows:
(i) All tanks and cisterns should be thermally insulated to prevent freezing with proprietary insulated systems in compliance with manufacturer's systems (insulation normally omitted from below tank where it benefits from heat in the heated area below).
(ii) Pipe work should be insulated with proprietary insulated sleeves of phenolic/polyosocyanurate/polyurethane foam having a minimum wall thickness of 30mm for 15mm diameter pipes and 12mm for pipes 22mm diameter pipes, (or other approved) and fixed in accordance with manufacturer's details.

**External walls, roofs, floors and swimming pool basin**

External Walls, roofs, floors and swimming pool basin to comply with new thermal element requirements in compliance with paragraphs 5.1- 5.6 and Table 2 of ADL1B as follows:

**Guidance Table 55: U-values for external walls, roofs, floors and swimming pool basin**

See Table 2 of ADL1B for full details

<table>
<thead>
<tr>
<th>Element <em>(see construction details in part A)</em></th>
<th>Insulation standard U-value: W/m².K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls (exposed and semi exposed)</td>
<td>0.28</td>
</tr>
<tr>
<td>Pitched roof and dormer windows with insulation at ceiling level</td>
<td>0.16</td>
</tr>
<tr>
<td>Pitched roof and dormer windows with insulation at rafter level</td>
<td>0.18</td>
</tr>
<tr>
<td>Flat roof or roof with integral insulation</td>
<td>0.18</td>
</tr>
<tr>
<td>Floors³</td>
<td>0.22⁴</td>
</tr>
<tr>
<td>Swimming pool basin (walls and floor)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

**Notes:**
1. Roof includes the roof parts of dormer windows, and wall includes the wall parts (cheeks) of dormer windows.
2. Area-weighted average values
3. A lesser provision may be appropriate where meeting such a standard would reduce the floor area by 5% in the room bounded by the wall.
4. A lesser provision may be appropriate where meeting such a standard would cause significant problems in relation to adjoining floor levels. The U-value of the floor of the extension can be calculated using the exposed perimeter and the floor area of the whole enlarged dwelling.

**Renovation/upgrading of existing thermal elements**

Where the existing walls, roof or floor is to be retained and become part of the thermal envelope or renovated or subject to a material change of use and are insulated below the threshold values in column (a) of table below then the thermal elements should be thermally renovated/upgraded to the U-values in column (b) in table below. (Note: renovation of existing thermal elements only applies where the area to be renovated is more than 50% of the surface area of the individual element and 25% of the total building envelope, and renovation/upgrading of the existing thermal elements only applies where it is technically and functionally feasible with a simple payback of 15 years +). See Section 5 of ADL1B for full details.
## Guidance Table 56: Renovation/upgrading of existing thermal elements

See Table 3 of ADL1B for full details

<table>
<thead>
<tr>
<th>Element</th>
<th>(a) Threshold U-value W/m².K</th>
<th>(b) Upgraded U-value W/m².K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cavity walls (where suitable for filling with insulation)</td>
<td>0.7</td>
<td>0.55</td>
</tr>
<tr>
<td>Solid walls (external or internal insulation)³</td>
<td>0.7</td>
<td>0.30</td>
</tr>
<tr>
<td>Floors ³,⁴</td>
<td>0.7</td>
<td>0.25</td>
</tr>
<tr>
<td>Pitched roof- insulation at ceiling level</td>
<td>0.35</td>
<td>0.16</td>
</tr>
<tr>
<td>Pitched roof- insulation between rafters⁶</td>
<td>0.35</td>
<td>0.18</td>
</tr>
<tr>
<td>Flat roof or roof with integral insulation⁷</td>
<td>0.35</td>
<td>0.18</td>
</tr>
</tbody>
</table>

**Notes:**
1. Roof includes the roof parts of dormer windows, and wall includes the wall parts (cheeks) of dormer windows.
2. This only applies if the cavity wall is suitable for the installation of cavity wall fill as ADD, otherwise, insulation should be fixed internally or externally.
3. A lesser provision may be appropriate where meeting such a standard would reduce the floor area by 5% in the room bounded by the wall.
4. The U-value of the floor of the extension can be calculated using the exposed perimeter and the floor area of the whole enlarged dwelling.
5. A lesser provision may be appropriate where meeting such a standard would cause significant problems in relation to adjoining floor levels.
6. A lesser provision may be appropriate where meeting such a standard would create limitations on headroom. In such cases the depth of insulation and required air gap should be at least to the depth of the rafter, using insulation to achieve the best practical U-value.
7. A lesser provision may be appropriate if there are problems associated with the load bearing capacity of the frame or up-stand height.

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### Consequential improvements (applies to existing buildings with a total useful floor area exceeding 1,000m²)

Consequential improvements (additional works) are required to make an existing building more energy efficient which has a total useful floor area exceeding 1,000m² and is subject to an extension or provision of fixed building service in compliance with paragraphs 6.1- 6.5 of ADL1B and section 6 of ADL2B.

### Commissioning of fixed building services

Copy of commissioning certificate for fixed building services is to be sent to Building control within 5 days of completion of the commissioning work being carried out (or within 30 days for works commissioned by a person registered with a competent persons scheme).

### Providing information - building log book

Log book containing the following information is to be provided in the dwelling on completion:
- Operating and maintenance instructions for fixed building services
- Instructions how to make adjustments to timing and temperature control settings etc
- Instructions on routine maintenance requirements for fixed building services in compliance with manufacturer's details

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### Part M: Access and use of buildings (For disabled Persons)


ADM of the building regulations do not apply to extensions to existing buildings, unless it is an extension of a dwelling where ADM of the building regulations would have applied and the proposed extension will make things worse, for example removal of an access ramp or a down stairs wc- unless it is to be reinstated as part of the proposed works in compliance with ADM. Please contact your building control department for their specific requirements.

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123
Part P: Electrical safety (Dwellings)

Please refer fully to Approved Document P: Electrical safety in dwellings (2013);

Electrical Installations
All fixed electrical wiring installed in dwellings must comply with Part P of the Building Regulations. All work performed on new or existing electrical circuits or systems must be designed, installed, inspected, tested and certified by a competent person in accordance with the current version of the IEE Regulations as documented in BS 7671.

For notifiable works, an installer who is not a registered competent person may use a registered third party to certify notifiable electrical installation work as an alternative to using a building control body.

The competent electrician must provide signed copies of an electrical installation certificate conforming to BS 7671 for the owner of the property and for notifiable works a copy of the completion certificate must be forwarded to the Building Control surveyor for approval at completion, so the Building Control completion certificate can be issued.

Guidance Table 57: Notifiable work for electrical installations that need to be notified to building control (See Regulations 12(6A & 9 and contained within Par 25 of ADP for full details)

<table>
<thead>
<tr>
<th>Notifiable work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where the electrical works consist of:</td>
</tr>
<tr>
<td>• Installation of a new circuit</td>
</tr>
<tr>
<td>• replacement of a consumer unit¹</td>
</tr>
<tr>
<td>• any addition or alteration to existing circuits in a special location*</td>
</tr>
<tr>
<td>*Special location meaning:</td>
</tr>
<tr>
<td>• within a room containing a bath or shower, the space surrounding a bath tap or shower head, where the space extends² (see diagram 2 of ADP):</td>
</tr>
<tr>
<td>- vertically from the finished floor level to:</td>
</tr>
<tr>
<td>- a height of 2.25m or</td>
</tr>
<tr>
<td>- the position of the shower head where it is attached to a wall or ceiling at a point higher than 2.25m from that level; and</td>
</tr>
<tr>
<td>- horizontally:</td>
</tr>
<tr>
<td>- where there is a bath tub or shower tray, from the edge of the bath tub or shower tray to a distance of 0.6m; or</td>
</tr>
<tr>
<td>- where there is no bath tub or shower tray, from the centre point of the shower head where it is attached to the wall or ceiling to a distance of 1.2m</td>
</tr>
<tr>
<td>• a room containing a swimming pool or sauna heater</td>
</tr>
<tr>
<td>Notes: 1. Consumer units must be fixed above any flood level and must be generally accessible for use by responsible persons in the house hold and they should not be installed where young children might interfere with them. 2. Socket outlets should not be located within 3m of a bath tub or shower tray</td>
</tr>
</tbody>
</table>

Guidance Table 58: Non- notifiable work for electrical installations that is not notified to building control

<table>
<thead>
<tr>
<th>Non- notifiable work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where the electrical works consist of:</td>
</tr>
<tr>
<td>• Additions and alterations to existing installations outside special locations.</td>
</tr>
<tr>
<td>• Replacements, repairs and maintenance anywhere</td>
</tr>
<tr>
<td>• Installing a built in cooker unless a new cooker circuit is required</td>
</tr>
<tr>
<td>• Connecting an electric gate or garage door to an existing isolator switch unless a new circuit from the consumer unit to the isolator switch is required</td>
</tr>
<tr>
<td>• Installing prefabricated modular wiring (i.e. kitchen lighting systems) linked by a plug and socket connectors</td>
</tr>
</tbody>
</table>
Materials and workmanship
Please refer fully to Approved Document: Regulation 7: Materials and workmanship (2013)

Materials and workmanship
All materials used for a specific purpose should be assessed for suitability using the following aids: (See Approved Document: Regulation 7: Materials and Workmanship for full details)
- British Standards or European Standards (or other acceptable national and international technical specifications and technical approvals)
- Product Certification Schemes (Kite marks)
- Quality Assurance Schemes
- British Board of Agreement Certificates (BBA)
- CE marking under the Construction Products Regulations
- CE marking under other EU Directives and Regulations
- Local Authority National Type Approvals (System Approval Certification)
- In certain circumstances, materials (and workmanship) can be assessed by past experience, for example a building already in use - providing it is capable of performing a function for which it was intended - subject to building control approval.

All materials must be fixed in strict accordance with manufacturer’s printed details. Workmanship should be in strict accordance with Regulation 7 and BS 8000: Workmanship on Building Sites: should be in compliance with Parts: 1 to 16. Where materials, products and workmanship are not fully specified or described, they are to be ‘fit for purpose’ stated or inferred and in accordance with recognized best practice. Testing to be carried out if required by building control to ensure workmanship is appropriate.

External works

External works - paths, private drives, patios and gardens
The guidance below for external surface finishes do not form part of the building regulations and are for domestic guidance use only, associated commercial uses should be designed by a suitably qualified specialist.

Concrete areas and paths etc
- 100mm thick concrete, shuttered with temporary or permanent edge restraint or kerbs. Mix type PAV 1, max bay size 6m with bitumen impregnated fiber board isolated Joints to BS 8110/5328, laid over;
- 100-150mm minimum thick course of Type 1 sub base, sand blinded and mechanically compacted to refusal in 150mm thick layers with a geotechnical membrane underneath, laid over firm sub soils

Tarmac areas:
- 20mm thick mechanically rolled wearing course of 100-150 pen grade bituminous coated macadam using 0-6mm aggregate sizes (to BS 4987), with permanent edge restraint or kerbs, laid over;
- 60mm thick mechanically rolled base course of 100-150 pen grade bituminous coated macadam using 0-20mm aggregate sizes (to BS 4987), laid over;
- 100-150mm minimum thick course of Type 1 sub base, sand blinded and mechanically compacted to refusal in 150mm thick layers with a geotechnical membrane underneath, laid over firm sub soils
Block pavers:
- 60mm pre-cast self draining concrete block paving to clients choice, laid in compliance with manufacturer's details, to BS 6717 with permanent edge restraint or kerbs, laid over;
- 100-150mm minimum thick course of Type 1 sub base, sand blinded and mechanically compacted to refusal in 150mm thick layers with a geotechnical membrane underneath, laid over firm sub soils

Precast concrete or natural stone slabs
- 50mm precast concrete/natural stone slabs laid in compliance with manufacturer's details to BS 7263:1, (Typically fully bedded and pointed in 25mm thick sand/cement mortar 1:4 mix or other approved in accordance with manufacturer's details)
- 100-150mm minimum thick course of Type 1 sub base, sand blinded and mechanically compacted to refusal in 150mm thick layers with a geotechnical membrane underneath, laid over firm sub soils

Gravel
- 100mm gravel, laid in compliance with manufacturer's details to BS 7263:1
- 100-150mm minimum thick course of Type 1 sub base, sand blinded and mechanically compacted to refusal in 150mm thick layers with a geotechnical membrane underneath, laid over firm sub soils

Drainage of paved areas:
To be carried out in accordance with BS 6367:1983 A1 84, ADH and Part H of this guidance. Paths and paved areas to have a non slip finish with a fall of 1:80 and a reverse gradient of at least 500mm away from walls of building unless using proprietary porous self draining systems. Surface water to be disposed of by an adequately sized and roddable drainage system via soakaways, or other approved means. Paved areas are normally set 5mm above drainage channels or gullies etc. The Local Authority Planning Department may have additional requirements for the drainage of paved areas and should be consulted before works commence.

Acknowledgements for contributions to the guidance document

<table>
<thead>
<tr>
<th>Name</th>
<th>Contribution</th>
<th>Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovereign Chemicals (Bostik)</td>
<td>Guidance on tanking systems</td>
<td>Mark Gillen [<a href="http://www.sovchem.co.uk">www.sovchem.co.uk</a>]</td>
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<tr>
<td>Ty -Mawr ecological building products</td>
<td>Breathable buildings &amp; product</td>
<td>Joyce &amp; Nigel Gervis [<a href="http://www.lime.org.uk">www.lime.org.uk</a>]</td>
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<tr>
<td>Kingspan Insulation</td>
<td>Insulation values, &amp; calculations</td>
<td>Peter Morgan [<a href="http://www.kingspaninsulation.co.uk">www.kingspaninsulation.co.uk</a>]</td>
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<tr>
<td>Celotex Insulation</td>
<td>Insulation values, &amp; calculations</td>
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<tr>
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</tr>
<tr>
<td>Nationwide Fire Sprinklers</td>
<td>Guidance for domestic sprinklers and fire consultant</td>
<td>Keith Rhodes [<a href="http://www.nationwidefiresprinklers.co.uk">www.nationwidefiresprinklers.co.uk</a>]</td>
</tr>
<tr>
<td>Geomex</td>
<td>Span tables for solid timber members and structural consultant</td>
<td>Paul Smith Eur. Ing., DipFI, BEng, MSc, C.Eng, MICE, MCM1, MIHT, MCIOB. [<a href="http://www.geomex.co.uk">www.geomex.co.uk</a>]</td>
</tr>
<tr>
<td>Rockwool</td>
<td>Insulation values, &amp; calculation</td>
<td>James Rees [<a href="mailto:technical.solutions@rockwool.co.uk">technical.solutions@rockwool.co.uk</a>]</td>
</tr>
<tr>
<td>Lifetime Homes</td>
<td>Lifetime Homes guidance</td>
<td>Chris Goodman [<a href="http://www.habinteg.org.uk">www.habinteg.org.uk</a>]</td>
</tr>
</tbody>
</table>
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| Liddell Associates (Architects) | Plans | Chris Mcgonagle  
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| Apex Architecture | Front cover diagram | Richard Jones  
www.apexarchitecture.com |
| Neil J Dransfield  
PPCIAT MCIAT  
MCArb FCIJOB  
Chartered Architectural Technologist | Guidance on The Party Wall Act | Neil J Dransfield  
www.dransfield.org.uk |
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01792 390309 |
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**About the author**

Anthony Gwynne MRICS; MIFireE, is a Chartered Surveyor and Fire Engineer and has 35 years experience in the construction industry. He co-manages a building control section and has been in building control for over 19 years. He has been responsible for overseeing the building control function of major developments including commercial, industrial, healthcare, residential, housing developments, bespoke dwellings, extensions, conversions and works to heritage buildings. 1986- 1993; was a Building Surveyor with a local authority, dealing with the repair and planned maintenance of buildings including contract procurement and contract administration. 1977- 1986; apprenticed as a banker mason and was responsible for conservation projects with CADW (Welsh historic monuments and buildings) and following further academic study was later with English Heritage as a professional and technical officer, responsible for historic monuments in the South of England. 1976-1977 Worked in Canada on construction projects

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**Building control guidance book available**


There are clear explanations of how the technical design and construction requirements of the Building Regulations can be met with sufficient information to draw up an effective specification and design to be developed.