

Chapter 6.2

External timber framed walls



6.2

External timber framed walls

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SCOPE

This Chapter gives guidance on meeting the Technical Requirements and recommendations for external walls of timber framed dwellings, substantially timber framed dwellings and wall panels (including relevant certification procedures). This Chapter applies to timber framed walls up to seven storeys high.

DESIGN STANDARDS

6.2 - D1 Design shall meet the Technical Requirements

Dwellings with a timber frame superstructure require certification indicating that the design has been checked by an NHBC timber frame certifier. See Appendix 6.2-A.

Design that follows the guidance below will be acceptable for external walls of timber framed dwellings, substantially timber framed dwellings and wall panels. This Chapter applies to timber framed walls up to seven storeys high.

For guidance on the prevention of fire during construction see 'Fire Prevention on Construction Sites' jointly published by the Construction Federation and the Fire Protection Association (www.thefpa.co.uk) and guidance from the UKTFA under the 'Site Safety Strategy' that presents fire risk management publications such as the '16 Steps to Fire Safety' and the 'Design Guide to Separation Distances' (www.uktfa.com).

STATUTORY REQUIREMENTS

6.2 - D2 Design shall comply with all relevant statutory requirements

Design should be in accordance with relevant Building Regulations and other statutory requirements.

LOADBEARING WALLS

6.2 - D3 Loadbearing timber framed walls shall be designed to support and transfer loads to foundations safely and without undue movement

Structural design of loadbearing timber framed walls should be in accordance with BS EN 1995-1-1. The design should take into account:

- wind loads
- roof loads
- floor loads.

Items to be taken into account include:

(a) structural elements

All structural timber should be:

- of a suitable grade in accordance with BS EN 338 and BS EN 14081-1
- dry graded and marked in accordance with BS 4978.

Sheathing and its associated fixings should be structurally adequate to resist racking due to wind and other forces.

Individual studs should be not less than 37mm wide, at maximum 600mm centres, unless other adequate support is provided for wall boards and fixings.

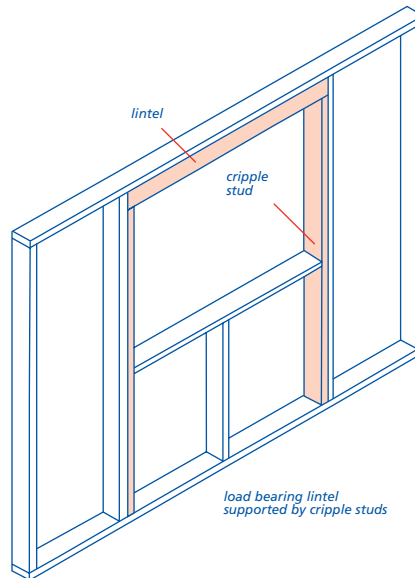
A lintel and cripple studs should be provided to any opening in load-bearing panels except when the opening does

not affect the stud spacing or where the supported loads are carried by a rim beam or perimeter joist.

Additional studs may be required at openings for fixing wall ties where masonry cladding is used.

Multiple studs should be included to support multiple joists and other point loads unless otherwise specified by the designer.

The design should avoid narrow, inaccessible gaps between studs which are difficult to insulate.



(b) anchoring the frame

Wall panels should be adequately fixed to the sole plate which in turn should be anchored to the substructure to resist all the lateral and vertical forces acting at these junctions. Typical details are shown in Clause S2.

Where frames are fixed to masonry or beam and block floors by shotfiring, the blocks should be concrete blocks to BS EN 771 with a minimum crushing strength of 7.3N/mm². Blocks in beam and block floors should be grouted.

(c) joints between panels and other elements

Wall panels should be securely fixed together and fixed to floor and roof framing where appropriate. Appropriate measures should be taken to prevent buckling.

If head binders are not provided joists and roof trusses, including girder trusses and other similar loads, should bear directly over studs.

At joints between wall panels, sole plates and head binders should be provided to bind panels together. Joints in sole plates and head binder should not coincide with those between panels. Joints in head binders should occur over a stud.

MOISTURE CONTROL AND INSULATION

6.2 - D4 The design shall ensure that the structure is adequately protected from the effects of moisture

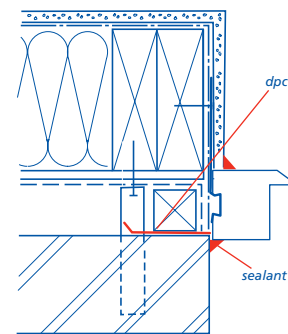
Items to be taken into account include:

(a) provision of dpcs and dpms

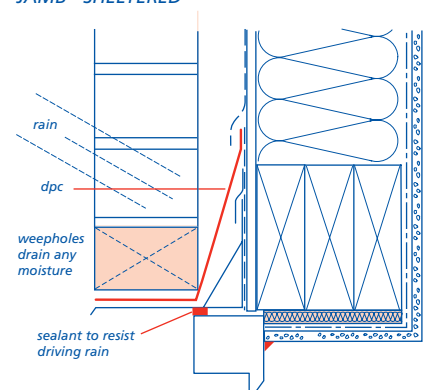
Dpcs should be installed below the sole plates of all ground floor walls, including internal partitions, to protect timber from rising damp and residual construction moisture.

Dpcs and trays should be fitted at openings where needed to prevent rain penetration.

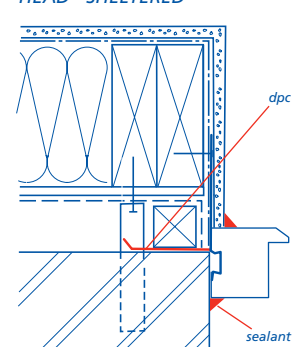
In Scotland, Northern Ireland, the Isle of Man and other places where the exposure to driving rain is Severe or Very Severe, masonry should form a rebate at the reveals of openings to avoid a straight through joint where the frame abuts the masonry.



JAMB - SHELTERED



HEAD - SHELTERED

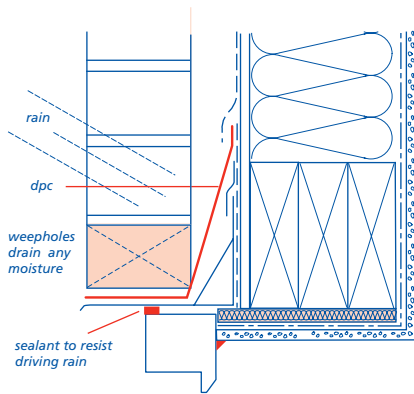


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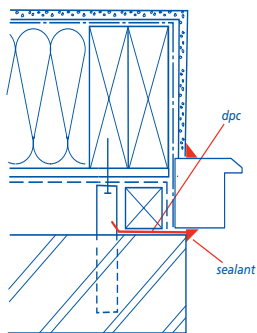
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HEAD - SHELTERED



JAMB - EXPOSED

(b) membranes

Breather membranes should be lapped so that each joint is protected and moisture drains outwards and downwards as shown in Clause S3.

In areas of Very Severe exposure to wind driven rain (as defined in Appendix 6.1-A) a high performance breather membrane should be used (unless the alternatives given in Clause D4(c) below are adopted).

(c) cavities in external walls

A drained and vented cavity should be provided to reduce the risk of rain penetrating to the frame. The following minimum cavity widths, measured between the cladding and sheathing, should be provided:

Cladding	Minimum cavity width
Masonry	50mm nominal
Renderon backed lathing	25mm nominal
Verticaltile hanging without underlay	No vertical cavity required when a breather membrane is fitted to the sheathing
Othercladding*	15mm

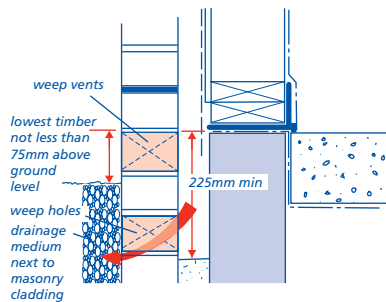
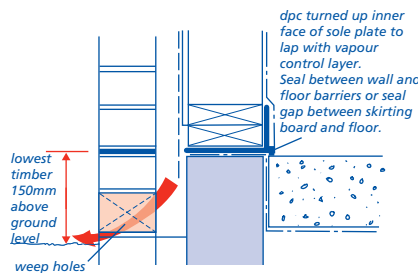
* See Chapter 6.9 'Curtain walling and cladding'.

In areas of *Very Severe* exposure to wind driven rain (as defined in Appendix 6.1-A) the wall construction should include a 50mm cavity between the sheathing and the cladding and:

- a high performance breather membrane, or

- a masonry cladding which is rendered or clad with an impervious material.

The cavity should be extended at least 150mm below dpc, to allow drainage of the cavity and should be kept clear. Open brick perpend should be provided where necessary to prevent water build up in the cavity. These openings can also provide cavity venting.



Note: This detail is only acceptable in situations where the site is not subject to a high water table or where the cavity will not have standing water.

The cavity should be vented to allow some limited, but not necessarily through, movement of air. Where wall areas are divided by horizontal cavity barriers and openings should be provided to each section (see Clause 6.2 - D7).

The openings should be:

- equivalent to open brick perpends every 1.2m
- located to prevent the ingress of rain, or
- below the lowest timber.

Proprietary perpend ventilators are available.

These openings can also provide drainage of the cavity.

(d) insulation

The BRE Report 'Thermal insulation: avoiding risks' discusses aspects of insulation relevant to external timber framed walls. In England and Wales account should be taken of Accredited Details.

Insulation should normally be placed within the stud void. Partial fill cavity insulation, with a 50mm residual cavity, between it and any cladding may be needed but should be assessed in accordance with Technical Requirement R3 as an integral part of the wall system and installed in accordance with the assessment.

Insulated sheathing boards should be assessed in accordance with Technical Requirement R3 and installed in accordance with the assessment.

Wall insulation should be of a type which 'breathes' eg, mineral wool (rock or glass). Other insulation materials should be assessed in accordance with Technical Requirement R3 for use in timber frame wall panels and installed in accordance with the assessment.

Water and heating services within walls should be on the warm side of the insulation.

(e) vapour control layers for walls

A vapour control layer should be fixed on the warm side of the wall insulation.

The vapour control layer should cover the external wall including bottom rails, head rails, studs, lintels and window reveals.

Vapour control layers should be of 500 gauge (120 micron) polyethylene or vapour control plasterboard.

All joints in sheet vapour control layers should have at least 100mm laps and be located on studs or noggings and be adequately fixed to the frame.

PRESERVATIVE TREATMENT

6.2 - D5 Timber and timber products shall either be naturally durable or where necessary be treated with preservative to give adequate resistance against decay and insect attack

Items to be taken into account include:

(a) timber framing

Timber framing should be treated in accordance with the guidance in Chapter 2.3 'Timber preservation (natural solid timber)', to which reference should be made.

I-studs manufactured from timber of durability class 'moderately durable' or lower should be preservative treated in accordance with Chapter 2.3 'Timber preservation (natural solid timber)'.

(b) timber cladding

Timber cladding should be treated in accordance with the guidance in Chapter 2.3 'Timber preservation (natural solid timber)'.

EXTERIOR CLADDING

6.2 - D6 Exterior cladding shall be compatible with the timber frame

Items to be taken into account include:

(a) cavity

A drained and vented cavity between exterior cladding and the sheathing should be specified as detailed in Clause D4. This cavity should not contain electricity cables other than meter tails.

(b) wall ties

Wall ties should be:

- of a type which complies with BS EN 845 and fully permits differential movement between the timber frame and the cladding - see Clause D6(c) below
- fixed to studs, not sheathing
- spaced at a maximum of 600mm horizontally and 450mm vertically
- spaced at jambs of openings and at movement joints in masonry a maximum of 300mm vertically within 225mm of the masonry reveal or movement joint. In this case additional studs may be needed
- spaced within 225mm of the top of a masonry wall
- inclined away from the sheathing so that the slope is maintained following differential movement.

(c) movement between the timber frame wall and other elements.**DIFFERENTIAL MOVEMENT**

During the first two years after erection, the timber frame will reduce in overall height as it dries out. The anticipated amount of shrinkage of the timber frame is given in Appendix 6.2-C.

Movement between the timber frame and other parts of the construction will occur at:

- door and window openings
- eaves and verges
- balconies (including Juliet balconies)
- openings for drive-throughs
- staircases and lift shaft enclosures (where they are not timber framed)
- service entries
- the interface of the timber frame with any other construction.

Appendix 6.2-C provides guidance on the anticipated amount of shrinkage of the timber frame and where it will occur between other parts of the structure. The extent of the differential movement increases with the number of storeys. Movement gaps should be filled with suitable materials to take up the expected movement. The manufacturer of the material should be consulted on the suitability for the extent of the movement expected.

Where the movement gap is expected to be more than 35mm it should be protected by a cover strip.

All claddings that are fixed direct to the timber frame, should have a horizontal movement joint at each floor level. See Appendix 6.2-C

Masonry claddings should not be supported by the timber frame.

(d) prefabricated chimneys

Prefabricated chimneys should either be supported by:

- the masonry cladding, or
- the timber frame, including any roof construction supported by the timber frame.

(e) services

Differential movement should be allowed for services both within the timber frame envelope or where they pass through it. Additional guidance is given in Appendix 6.2-C or in the case of gas services publications from the Institution of Gas Engineers and Managers (www.igem.org.uk).

CONTROL OF FIRE**6.2 - D7 Walls and panels shall resist the spread of fire**

For guidance on the prevention of fire during construction see 'Fire Prevention on Construction Sites' jointly published by the Construction Federation and the Fire Protection Association (www.thefpa.co.uk) and guidance from the UKTFA under the 'Site Safety Strategy' that presents fire risk management publications such as the '16 Steps to Fire Safety' and the 'Design Guide to Separation Distances' (www.uktfa.com).

All elements should have adequate fire resistance.

Service mains should not pass through separating wall cavities.

In Scotland services are not permitted within a timber framed separating wall.

Service outlets should not impair the fire resistance of floors and walls.

Items to be taken into account include:

(a) cavity barriers

The design should detail the position and materials for cavity barriers in accordance with relevant Building Regulations.

Horizontal cavity barriers (except under eaves) should be protected with a dpc tray. The tray should have a minimum upstand of 100mm. Alternatively polyethylene encased cavity barriers providing a minimum upstand of 100mm should be used.

Dpcs should be used to cover horizontal and vertical cavity barriers and to shed moisture away from the sheathing. Typical details are shown in Clause S8.

Vertical timber cavity barriers should be protected from penetrating moisture by a dpc.

(b) fire-stops

The design should detail the position and type of fire-stops in accordance with relevant Building Regulations.

A typical fire-stop detail is shown in Clause S8.

PROVISION OF INFORMATION**6.2 - D8 All relevant information shall be distributed to appropriate personnel**

Ensure that design and specification information is issued to site supervisors

and relevant specialist subcontractors and/or suppliers.

Where proprietary products are to be used, manufacturers usually have specific requirements for fixing and/or assembly of their products. This information should also be made available for reference on site so that work can be carried out satisfactorily in accordance with the design and specification.

The fixing schedule should allow for every structural connection made on site including fixing details for framing, wall ties, breather membrane, sheathing and vapour control layers, and should show as appropriate:

- number and spacing of nails and staples
- size and type of nail including material and corrosion protection
- method of nailing (eg skew, end, etc.).

Where the wall design relies on plasterboard to take racking forces those walls should be clearly defined and the type and centres of the fixings stated.

Copies of the fixing schedule should be given to the person doing the job.

6.2 - D9 Design of the superstructure shall be checked by an NHBC timber frame certifier

The superstructure design should be placed with an NHBC approved timber frame certifier so that a certificate can be issued in accordance with Appendix 6.2-A.

MATERIALS STANDARDS**6.2 - M1 All materials shall:**

- (a) meet the Technical Requirements**
- (b) take account of the design**

Materials that comply with the design and the guidance below will be acceptable for external timber framed walls including wall panels and dwellings which are substantially timber framed.

Materials should comply with all relevant standards, including those listed below. Where no standard exists, Technical Requirement R3 applies (see Chapter 1.1 'Introduction to the Standards and Technical Requirements').

References to British Standards and Codes of Practice include those made under the Construction Products Directive (89/106/EEC) and, in particular, appropriate European Technical Specifications approved by a European Committee for Standardisation (CEN).

TIMBER**6.2 - M2 All timber shall be of a grade suitable for the design**

All structural timber should be:

- of a suitable grade in accordance with BS EN 338 and BS EN 14081-1

- dry graded and marked in accordance with BS 4978.

I-studs should be assessed in accordance with Technical Requirement R3.

TIMBER PRESERVATION

6.2 - M3 Timber shall be either naturally durable or preservative treated to provide adequate protection against rot and insect attack

Timber preservation should be in accordance with Chapter 2.3 'Timber preservation (natural solid timber)'.

I-studs manufactured from timber of durability class 'moderately durable' or lower should be preservative treated in accordance with Chapter 2.3 'Timber preservation (natural solid timber)'.

SHEATHING

6.2 - M4 Sheathing shall be durable and capable of providing structural resistance to racking

The following materials are acceptable:

- plywood in accordance with BS EN 636 and BS EN 13986 table 7
- oriented strand board in accordance with BS EN 300 type OSB/3 or 4
- moisture-resistant chipboard in accordance with BS EN 312 type P5 or P7.
- medium board in accordance with BS EN 622-3 type MBH.HLS1 or MBH.HLS2.
- impregnated soft board in accordance with BS EN 622-4 type SB.HLS.

Proprietary sheathing materials should be assessed in accordance with Technical Requirement R3 and used in accordance with the assessment.

BREATHER MEMBRANES

6.2 - M5 Breather membranes shall be capable of allowing water vapour from within the frame to pass out into the cavity and protect the sheathing and frame from external moisture

Breather membranes should be:

- vapour resistant to less than 0.6MN/g when calculated from the results of tests carried out in accordance with BS 3177 at 25 °C and relative humidity of 75%
- capable of resisting water penetration
- self extinguishing
- durable
- adequately strong when wet to resist site damage
- Type 1 to BS 4016 in areas of Very Severe exposure (unless the alternatives given in Design Clause D4(c) are adopted).

CAVITY BARRIERS AND FIRE-STOPS

6.2 - M6 Materials used for cavity barriers and fire-stops shall be capable

of providing adequate resistance to fire and smoke

Materials specified in statutory requirements are acceptable.

Other materials may be used if satisfactorily assessed in accordance with Technical Requirement R3.

HOLDING DOWN DEVICES

6.2 - M7 Holding down devices shall be of durable material

Holding down devices should be manufactured from:

- austenitic stainless steel to BS EN 10088-1, minimum grade 1.4301
- galvanised mild steel with zinc coating to BS EN ISO 1461, minimum coating 940 g/m² on each side.

Sole plate anchors within the internal envelope should be galvanised mild steel, minimum coating Z275.

All holding down devices should be as detailed in the design.

NAILS AND STAPLES

6.2 - M8 Nails and staples shall be durable and of the correct type to provide adequate mechanical fixing

Staples for fixing breather membranes should be austenitic stainless steel or other material of similar strength and corrosion resistance.

Nails for fixing sheathing or timber should be galvanised, sheradized or austenitic stainless steel.

VAPOUR CONTROL LAYERS

6.2 - M9 Vapour control layers shall restrict the passage of water from within the dwelling to the timber frame

Vapour control layers should be 500 gauge (120 micron) polyethylene sheet or vapour control plasterboard.

Vapour control products manufactured from recycled materials should be assessed in accordance with Technical Requirement R3.

WALL TIES AND FIXINGS

6.2 - M10 Wall ties and fixings shall be capable of properly connecting the cladding to the timber frame in accordance with the design

Wall ties and their fixings should be of austenitic stainless steel, comply with BS EN 845 and be capable of accommodating the anticipated differential movement given in Appendix 6.2-C.

INSULATION

6.2 - M11 Insulation materials shall provide the degree of insulation to comply with the design and statutory requirements

Wall insulation should be of a type that 'breathes', eg mineral wool (rock or glass). Other insulation used in walls should be assessed in accordance with Technical Requirement R3 for use in timber frame wall panels.

SITWORK STANDARDS

6.2 - S1 All sitework shall:

- (a) meet the Technical Requirements**
- (b) take account of the design**
- (c) follow established good practice and workmanship**

All relevant information in a form suitable for the use of site operatives should be available on site before construction starts including:

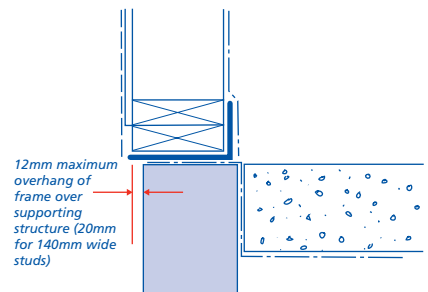
- full set of drawings
- materials specification
- fixing schedules
- nailing details
- manufacturers' recommendations relating to proprietary items.

CONSTRUCTION

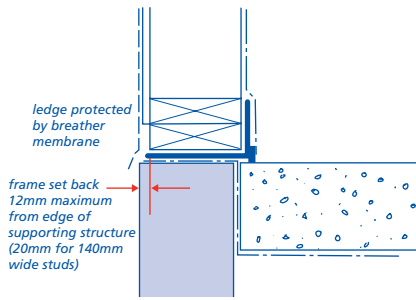
6.2 - S2 Construction shall ensure that the building is structurally adequate

(a) setting out

The substructure should be correctly set out to receive the timber frame which will be manufactured to close tolerances. The timber frame should be checked to ensure that it is erected accurately both on plan and vertically. The load from the frame should be supported as intended in the design. Where packing under sole plates is necessary it should be in accordance with Appendix 6.2-B.



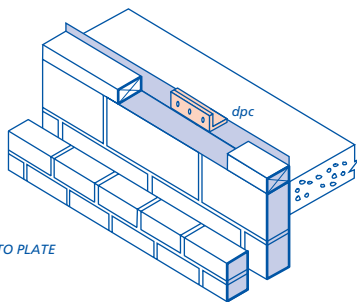
Ledges can form moisture traps. Where these occur protection should be provided.



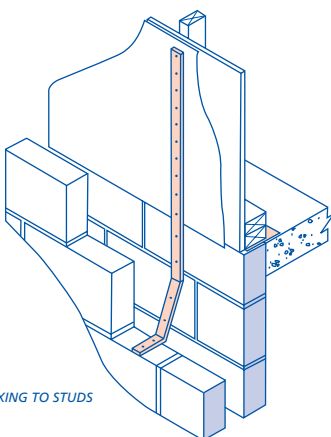
(b) anchoring the frame

The frame should be anchored to resist both lateral movement and uplift. Care should be taken to avoid splitting timber plates or damaging the substructure.

When shotfiring, care should be taken not to spall edges of masonry or slabs. When shotfiring into masonry, solid concrete blocks with a minimum crushing strength of 7.3N/mm² should be used, positioned to receive fixings.



FIXING TO PLATE



FIXING TO STUDS

(c) fixing panels

All fixings, including nailed joints and sheathing, should be as scheduled in the design.

Wall panels should be securely fixed together and to floor and roof framing.

Sole plates and head binders should be provided to bind the panels together. Joints in sole plates and head binders should not coincide with those between panels. Joints in head binders should occur over a stud.

If head binders are not provided, joists and roof trusses, including girder trusses and other similar loads, should bear directly over studs. Individual studs should be not less than 37mm wide, at maximum 600mm centres, unless other adequate support is provided for wall boards and fixings.

A lintel and cripple studs should be provided to any opening in loadbearing panels except when the opening does not affect the stud spacing or where the supported loads are carried by a rim beam or perimeter joist.

Unless otherwise clearly specified by the designer, multiple studs should be included to support multiple joists.

(d) supporting claddings

Wall ties should be in accordance with the design and fixed to studs.

Battens supporting lightweight cladding should be fixed to studs.

(e) fixing plasterboard

Plasterboard should be fixed in accordance with Chapter 8.2 'Wall and ceiling finishes' (Sitework) unless the design specifies closer fixing centres

Particular care should be taken at the junction between walls and roofs. Reference should be made to Chapter 8.2 'Wall and ceiling finishes' (Sitework).

(f) movement between timber frame wall and other elements

The timber frame will reduce in overall height as it dries out. The anticipated amount of shrinkage of the timber frame and where it will occur between other parts of the structure is given in Appendix 6.2-C.

Movement will occur at:

- door and window openings
- eaves and verges
- balconies (including Juliet balconies)
- openings for drive-throughs
- staircases and lift enclosures (where they are not timber framed)
- service entries
- the interface of the timber frame with any other construction.

The extent of the differential movement increases with the number of storeys. Movement gaps should be filled with suitable materials to take up the expected movement. The manufacturer of the material should be consulted on the suitability for the extent of the movement expected.

Where the movement gap is expected to be more than 35mm it should be protected by a cover strip.

All claddings that are fixed directly to the timber frame, should have a horizontal movement joint at each floor level. See Appendix 6.2-C.

Masonry claddings should not be supported by the timber frame.

(g) prefabricated chimneys

Prefabricated chimneys should either be supported by:

- the masonry cladding, or
- the timber frame, including any roof construction supported by the timber frame.

(h) cavities

A cavity should be provided to reduce the risk of rain penetrating to the frame. The following minimum cavity widths, measured between the cladding and sheathing, should be provided:

Cladding	Minimum cavity width
Masonry	50mm nominal
Render on backed lathing	25mm nominal
Vertical tile hanging without underlay	No vertical cavity required when a breather membrane is fitted to the sheathing
Other cladding*	15mm

*See Chapter 6.9 'Curtain walling and cladding'.

A clear cavity for at least 150mm below dpc should be maintained. Weep holes (eg open perpend) should be provided where necessary to prevent water build up in the cavity.

BREATHER MEMBRANES

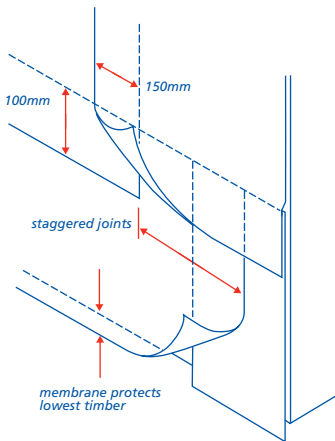
6.2 - S3 Breather membranes shall where required protect the sheathing from dampness

Special attention should be given to the following details:

- laps, which should be at least 100mm on horizontal joints and 150mm on vertical joints as shown in the following diagram
- direction of laps - upper layers should be fixed over lower layers to ensure rain runs away from the sheathing. Vertical joints should be staggered wherever possible
- fixing should be at regular intervals to prevent damage by wind and should be not more than 600mm centres horizontally, 300mm centres vertically and 150mm centres around openings
- marking the stud positions for wall tie fixing
- shedding water away from the lowest timber
- use of self extinguishing grade membrane
- use of high performance breather membrane in areas of Very Severe exposure to wind driven rain (as defined in Appendix 6.1-A) (unless the alternatives given in Design Clause D4(c) are adopted)
- use of fixings described in Chapter 6.2 (Materials).

6.2

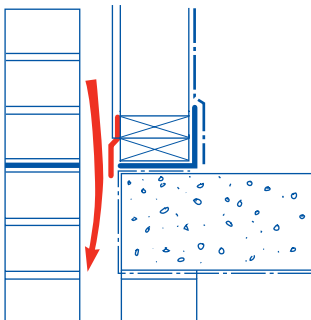
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Damaged membranes should be repaired or replaced before proceeding with the cladding.

When bitumen impregnated fibre building board is used and a breather membrane is not specified the joints of the boards should be closely butted and horizontal joints sealed to prevent water ingress.

When a breather membrane is not required the bottom frame members should be protected from water in the cavity.



WALL TIES

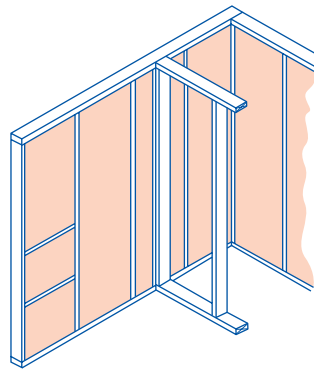
6.2 - S4 Wall ties shall be correctly installed

- of the type specified in the design
- fixed to the studs not the sheathing
- be sufficiently flexible or of a type that fully permits differential movement
- be kept clean and free from mortar droppings
- spaced at a maximum of 600mm horizontally and 450mm vertically
- spaced at jambs of openings and at movement joints in masonry a maximum of 300mm vertically within 225mm of the masonry reveal or movement joint
- spaced within 225mm of the top of a masonry wall
- inclined away from the sheathing so that the slope is maintained following differential movement.

INSULATION

6.2 - S5 Insulation shall be correctly installed

Insulation should cover the whole wall area between studs. No gaps should be left:



- against studs or rails
- at corners
- against noggings
- at junctions with partitions
- behind service panels.

VAPOUR CONTROL LAYERS

6.2 - S6 Vapour control layers shall be correctly installed

Before fixing a vapour control layer the framing timbers should have a moisture content of 20% or less.

The vapour control layer should be fixed on the warm side of the insulation and frame.

The vapour control layer should be the material specified in the design. 500 gauge (120 microns) polyethylene sheet or vapour control plasterboard should be used. Where vapour control plasterboard is used joints between sheets should be positioned on studs or noggings and the joints should be filled, taped and finished.

Where polyethylene is used all joints in the vapour control layer should have at least 100mm laps and be located on studs or noggings.

Vapour control layers should be fixed at 250mm centres to the top and bottom of the frame, at laps and around openings.

When cutting vapour control plasterboard care should be taken not to displace the vapour control material.

Any holes made in a vapour control layer should be made good.

The vapour control layer should cover the external framed wall area including rails, studs, reveals, lintels and sills.

The vapour control layer should lap with the dpc.

CLADDING

6.2 - S7 Cladding and its fixings shall not obstruct the cavity and shall allow for differential movement

Horizontal battens, which obstruct the drained and vented cavity, should not be used to support cladding except tile hanging.

The cavity should be vented to allow some limited, but not necessarily through, movement of air. Where wall areas are divided by horizontal cavity barriers and openings should be provided to each section (see Design clause 6.2 - D7).

The ventilation openings should be:

- equivalent to open brick perpend every 1.2m.
- placed to prevent the ingress of rain or should be below the lowest timber.

Proprietary perpend ventilators are available.

These openings can also provide drainage.

The cavity should be kept clean, free of obstructions and be capable of draining freely.

All proprietary cladding should be fixed in accordance with the manufacturer's recommendations.

Masonry cladding should be constructed in accordance with Chapter 6.1 'External masonry walls'.

CONTROL OF FIRE

6.2 - S8 Fire spread shall be controlled as detailed in the design

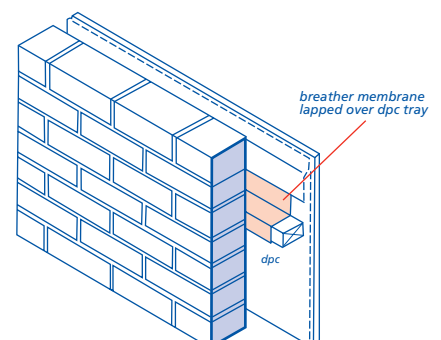
For guidance on the prevention of fire during construction see 'Fire Prevention on Construction Sites' jointly published by the Construction Federation and the Fire Protection Association (www.thefpa.co.uk) and guidance from the UKTFA under the 'Site Safety Strategy' that presents fire risk management publications such as the '16 Steps to Fire Safety' and the 'Design Guide to Separation Distances' (www.uktfa.com).

CAVITY BARRIERS

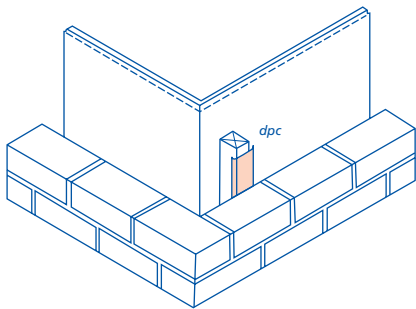
Cavity barriers should be installed in positions detailed by the design and relevant Building Regulations.

Cavity barriers should be formed of materials specified in the design. If no specification is available the advice of the designer should be obtained.

Horizontal cavity barriers (except under eaves) should be protected with a dpc tray. The tray should have a minimum upstand of 100mm. Alternatively polyethylene encased cavity barriers providing a minimum upstand of 100mm should be used.



Vertical timber cavity barriers should be protected from moisture by a dpc.

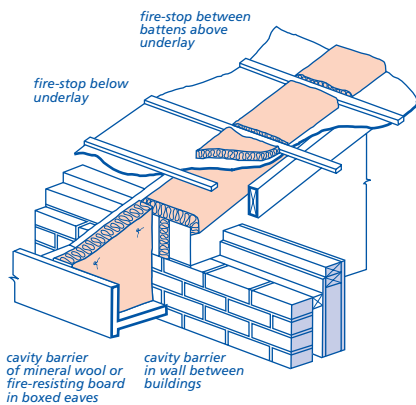


FIRE-STOPPING

Fire-stops should be installed in positions detailed in the design and relevant Building Regulations.

Only those materials specified in the design should be used for fire-stopping.

If details of fire-stop design, location and materials are not available they should be verified with the designer before construction commences.



SERVICES

6.2 - S9 Services shall not reduce the fire resistance or stability of the dwelling

Service outlets should not impair the fire resistance of floors and walls.

Only those services shown in the design should be installed in separating walls.

Notching or drilling of structural timber members should be carried out as detailed in the design. If these details are not available the designer should be consulted before such operations are started.

See Appendix 6.2 - C.

APPENDIX 6.2-A

Certification

Certifiers

The timber frame certifier is required to complete and sign a certificate

confirming that he has assessed the structural adequacy of the timber frame superstructure for a specific project.

The completed and signed certificate must be given to the registered builder.

Certifiers must be suitably qualified civil or structural engineers with at least three years' experience in timber frame construction and Chapter 6.2 'External timber framed walls'. The certifier must not be the designer of the timber frame.

Where the design is four storeys or more and the floor joists are solid timber the design is to be submitted to NHBC.

Applications to become a timber frame certifier should be made to NHBC Standards and Technical.

Registered builders

Registered builders should ensure that the completed timber frame certificate is available on site for inspection by NHBC.

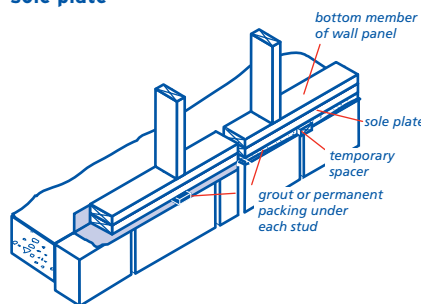
APPENDIX 6.2-B

Packing under sole plates

The finished surface of the substructure supporting the timber frame should be reasonably level. However, where packing is required to ensure the timber frame or sole plate is level, the following three alternative options are acceptable.

The options given are for packing up to 20mm. Packing exceeding 20mm should be agreed between the timber frame manufacturer's engineer and NHBC.

1 Permanent structural packing under sole plate

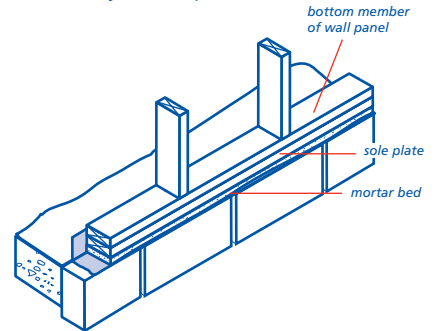


The sole plate is levelled on temporary spacers. Once the first lift construction - wall panel and first floor floor structure (or roof structure in a single storey building) - has been erected, permanent packing is placed under the sole plate.

This permanent packing can be:

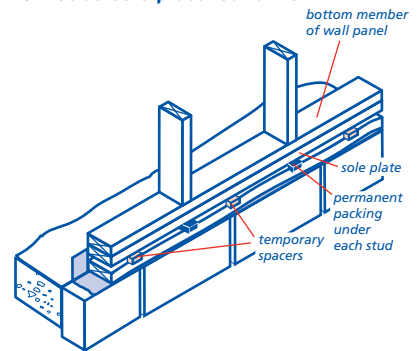
- free flowing non-shrinkable grout for the full length and width of the sole plate, or
- individual packers placed under each load point (e.g. stud or post).

2 Bedding of sole plate



The sole plate is laid and levelled on a continuous bed of mortar, prior to the erection of the wall panels. The bedding should extend the full width of the sole plate. Care is needed to ensure that the bedding is not disturbed during the fixing of the sole plate.

3 Double sole plate 'sandwich'



The lower sole plate is fixed to follow the contours of the supporting structure. The upper sole plate is fixed on top and levelled with temporary spacers inserted between the sole plates. Once the first lift construction has been erected permanent packing is inserted under each load point (e.g. stud or post).

Because this method introduces an additional sole plate the extra shrinkage should be taken into account. See Appendix 6.2-C.

Notes

- 1 Permanent packing should be designed and approved by the timber frame designer to suit the horizontal and vertical loads on the sole plate and should be at least the same plan area as the load points (e.g. studs or posts). Hollow plastic packing with reduced bearing surfaces is not acceptable.
- 2 Temporary spacers can remain in place providing they are durable and non-degradable.
- 3 Grout and mortar are both unsuitable for gaps less than 5mm and in such cases permanent packing should be used.

APPENDIX 6.2-C

DIFFERENTIAL MOVEMENT

INTRODUCTION

During the first two years after erection the timber frame will reduce in overall height as it dries out. Movement will occur between the timber frame and other parts of the structure.

This Appendix contains:

- guidance on differential movement of the timber frame, and
- common details for timber frame construction where differential movement will take place.

The sketches show examples of typical interfaces and illustrate general design principles.

In the absence of project specific calculations the gaps shown in the following table, are required:

Table of differential movement

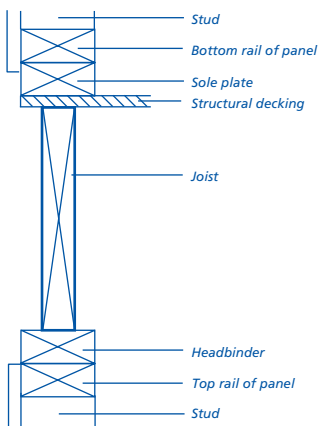
Gap location	Opening and Closing gaps(mm)	
	Solid timber (mm)	Engineered I-joist (mm)
Floor joists		
Eaves/verge	Add 5mm to gap dimension at level below	
Sixth storey	Specialist calculations to be submitted to NHBC	61
Fifth storey		53
Fourth storey		45
Third storey	45	35
Second storey	35	25
First storey	20	15
Ground storey*	5	5

*Ground storey or lowest level of timber frame.

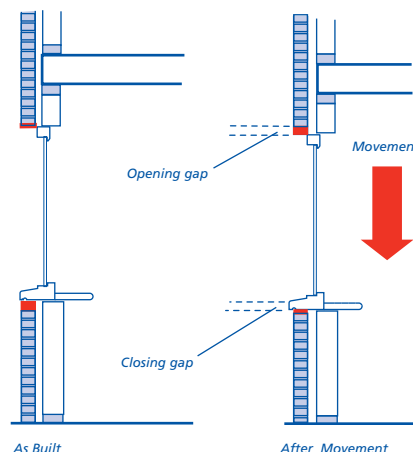
Notes

The gap sizes are based on the following :

- timber joist and rim beam/header joist maximum depth 240mm
- timber frame floor cross section is as shown below with maximum 45mm deep timber plates/binders
- single head binder at the eaves. Maximum double sole plates
- calculations, where required, to be based on BS EN 1995-1-1
- timber components are not saturated and normal moisture contents at the time of construction (e.g. less than 20%) and tight jointed construction
- movement gaps in excess of 35mm should be protected by cover strips
- the table allows for a 2mm thickness of compressible material in closing gaps. Check the manufacturer's product details
- outer leaf brickwork with expansion rates no greater than 2.5mm per storey
- brickwork up to 5 storeys with lightweight cladding above 5 storeys
- lightweight cladding - floor level joints to be 15mm for solid timber and 10mm for engineered I-joists.
- the ground floor is concrete. For ground floors of timber joists add 15mm for solid timber and 10mm for engineered I-joists



Timber frame construction on which the table of differential movement above is based.



Location of opening and closing gaps at windows.

COMMON DETAILS

The following sketches show examples of typical construction details and illustrate general principles relating to differential movement.

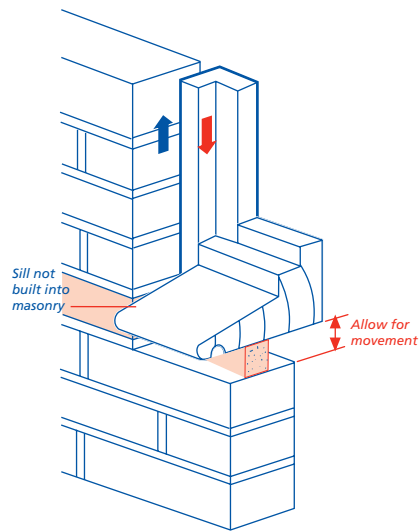
Further information is available from the UKTFA document 'Guidance on detailing to accommodate differential movement in timber frame buildings'. This UKTFA publication includes guidance on:

- the interface between a lift shaft and the timber frame
- the interface between lightweight cladding to the timber frame and balconies
- the support of roofs above lift shafts etc. constructed from masonry or concrete
- staircases within the timber frame
- services within the timber frame
- additional chimney details.

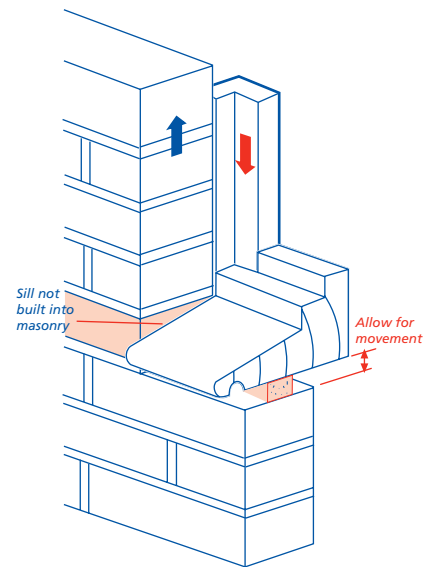
In the following sketches:-

- ↓ = downward movement of the timber frame
- ↑ = upward brick expansion (taken as 2.5mm per storey of clay masonry).

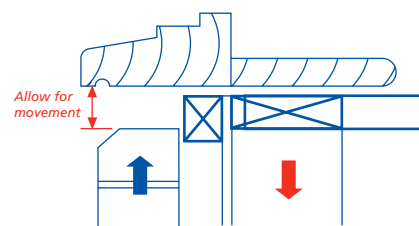
The design should ensure that the material used in movement joints will safely accommodate the amount of expansion or compression expected and, where required, provide a weather resistant and durable joint. See Clauses 6.2-D6 and S2.



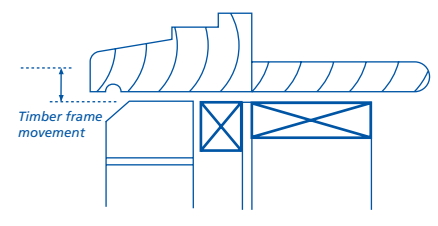
Normal reveal



Check reveal



As built



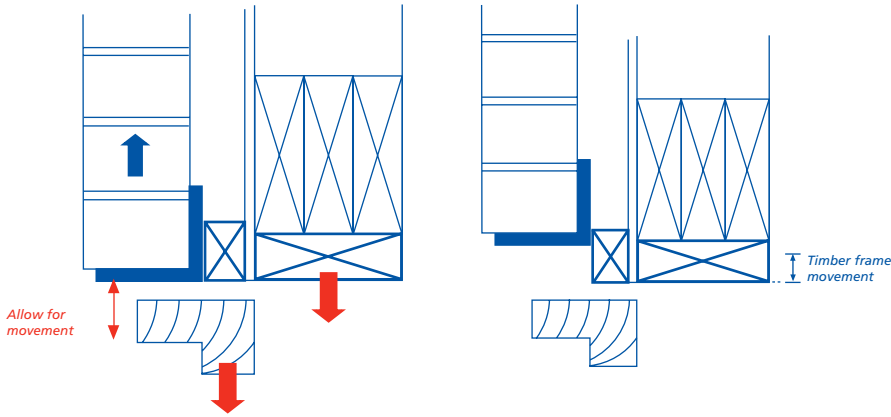
After movement

6.2

External timber framed walls

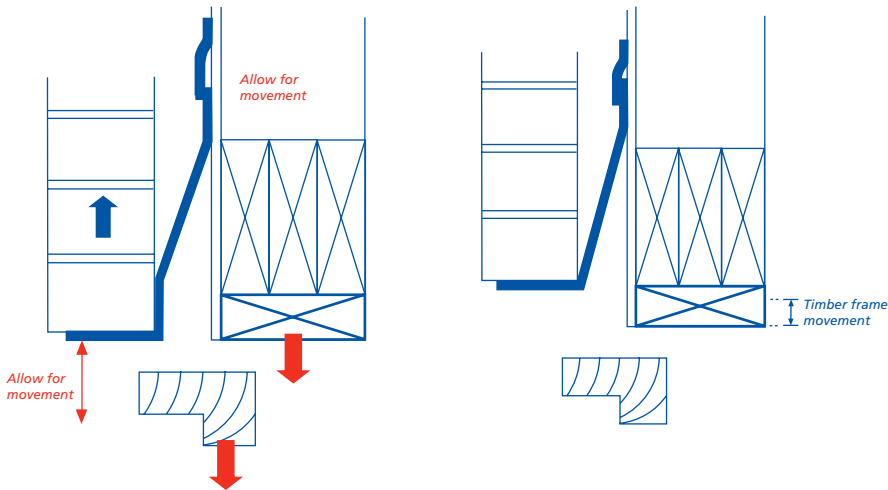
WINDOW HEADS WITH MASONRY CLADDING

(movement gaps in excess of 35mm should be protected by cover strips) (cavity trays omitted for clarity)



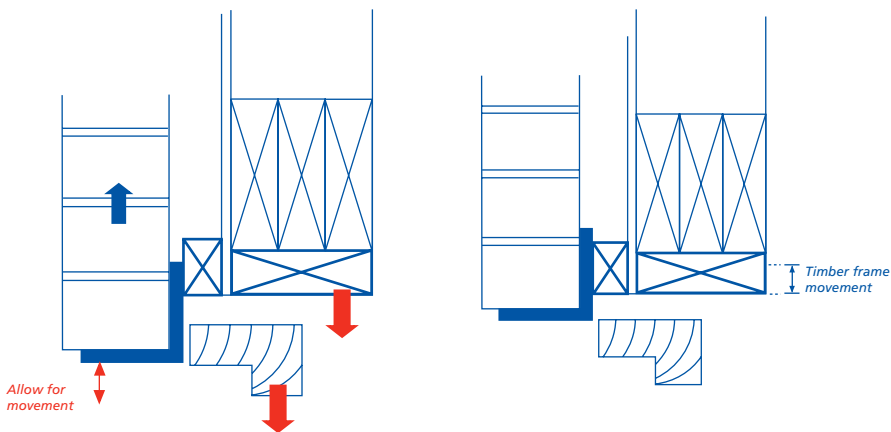
As Built

After movement



As Built

After movement



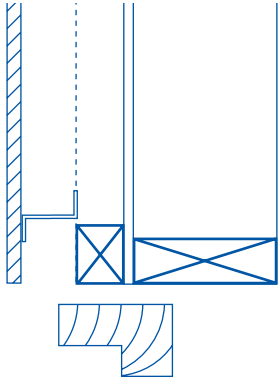
As Built

After movement

6.2

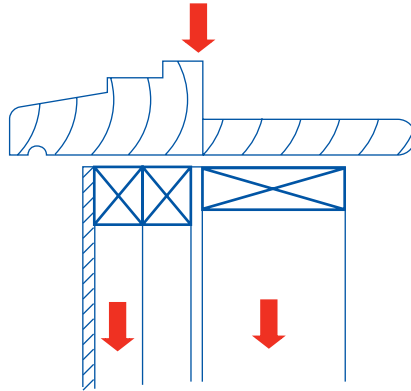
WINDOW HEAD AND SILL WITH LIGHTWEIGHT CLADDING

(movement gaps in excess of 35mm should be protected by cover strips)



No differential movement

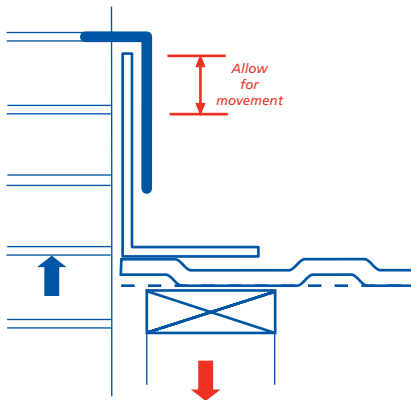
Head with lightweight cladding



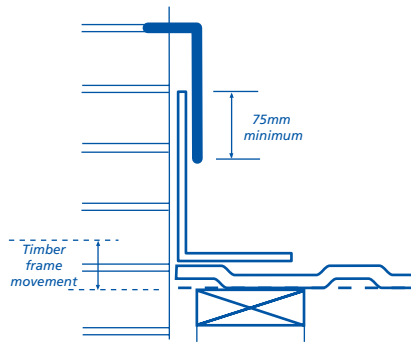
No differential movement

Sill with lightweight cladding

ROOF TO CHIMNEY ABUTMENT

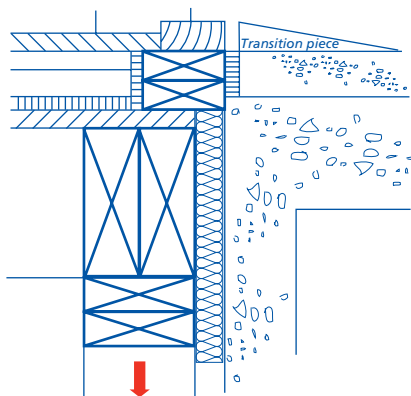


As Built

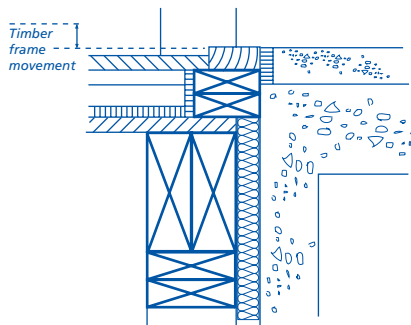


After movement

TIMBER FRAME INTERFACE WITH CONCRETE OR MASONRY STAIRS AND COMMON AREAS



As built



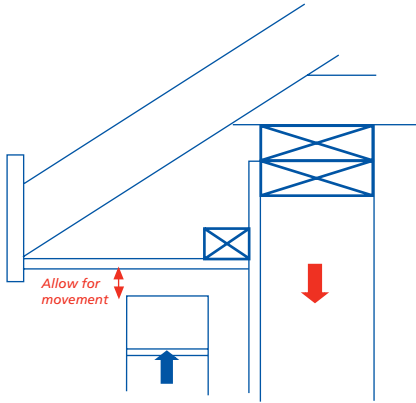
After movement (transition piece removed)

6.2

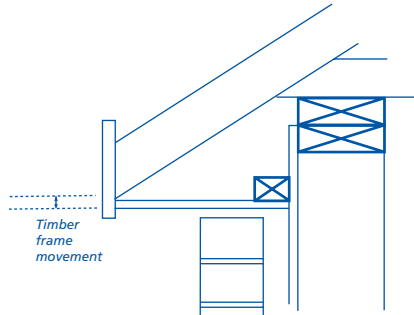
External timber framed walls

EAVES

(movement gaps in excess of 35mm should be protected by cover strips)

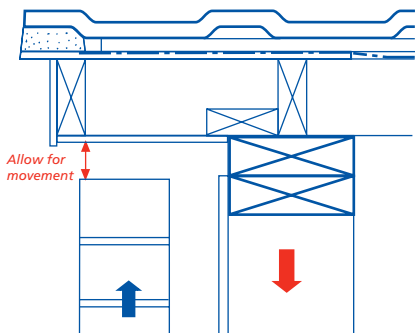


As Built

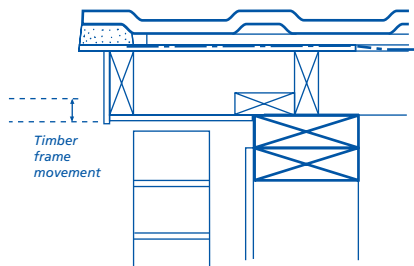


After movement

VERGE

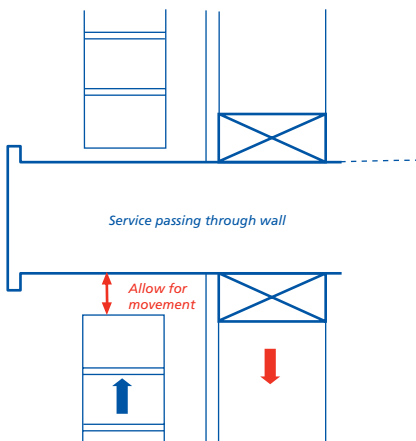


As Built

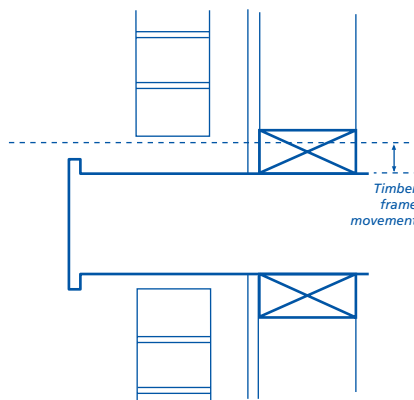


After movement

SERVICES



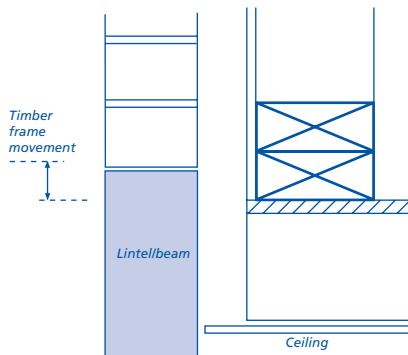
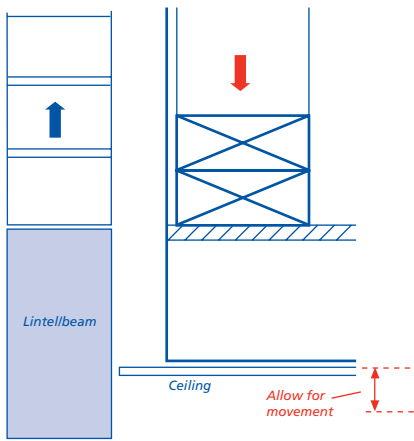
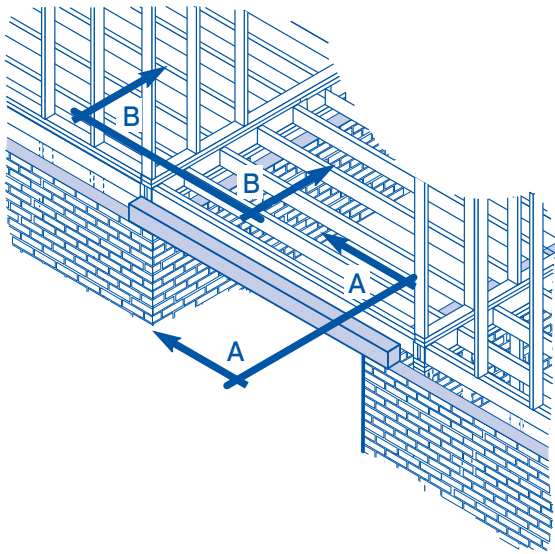
As built



After movement

6.2

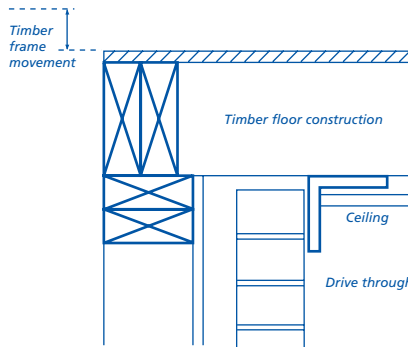
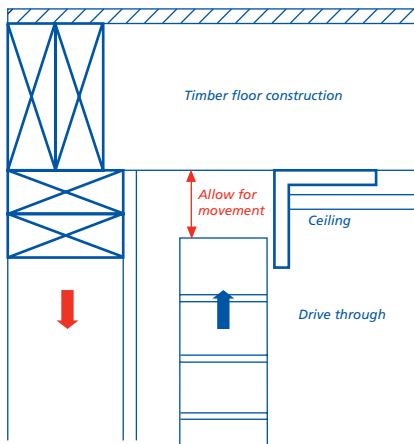
DRIVE THROUGH



As built

After movement

Section A - A



As Built

After movement

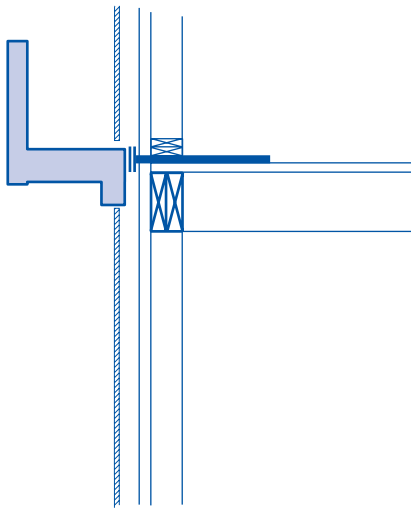
Section B - B

6.2

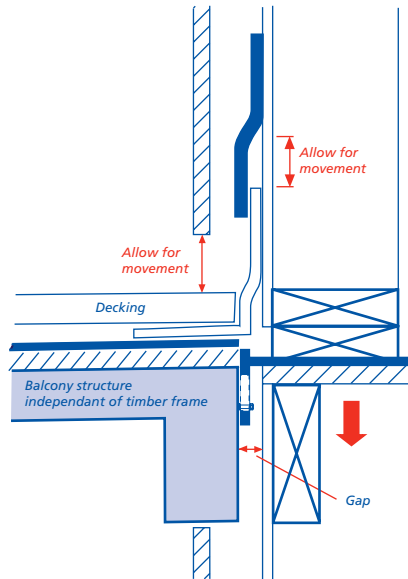
External timber framed walls

BALCONY ABUTMENTS

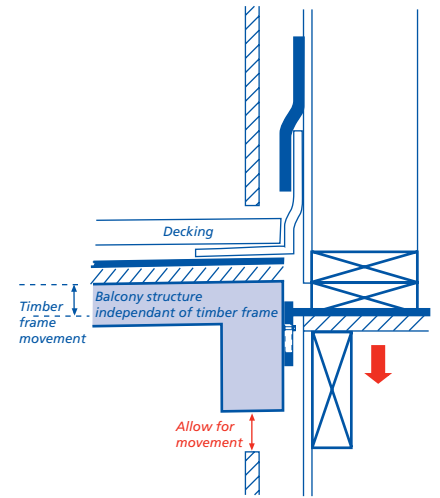
(movement gaps in excess of 35mm should be protected by cover strips)



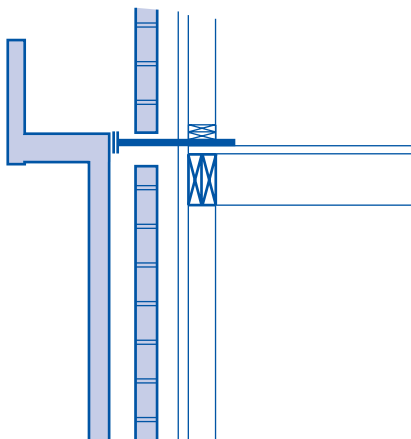
Balcony - lightweight cladding



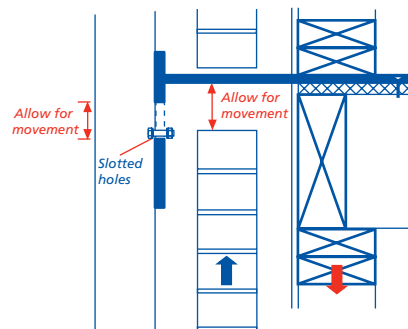
As built



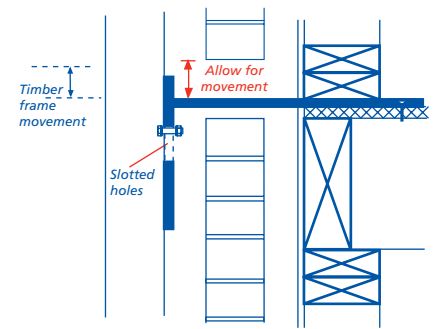
After movement



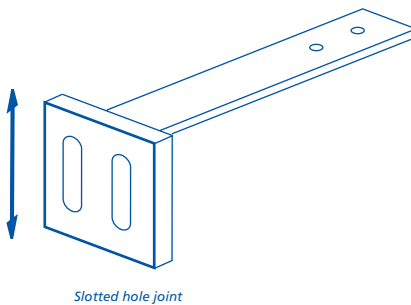
Balcony - masonry cladding



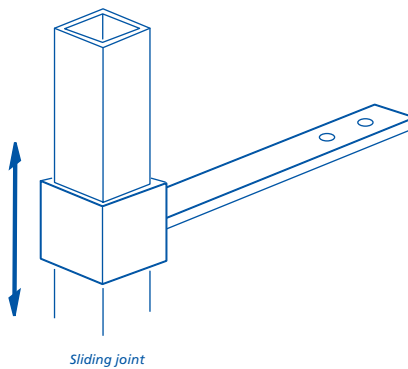
As built



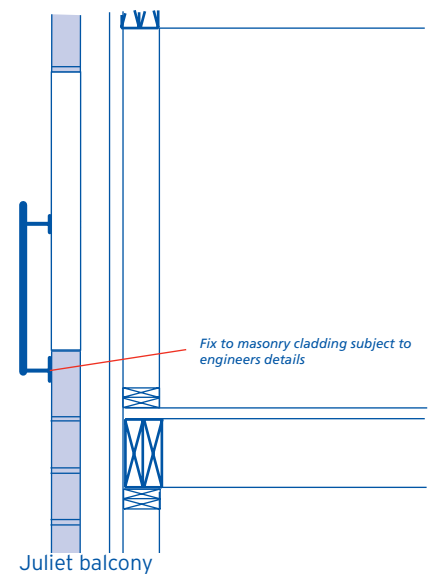
After movement



Slotted hole joint



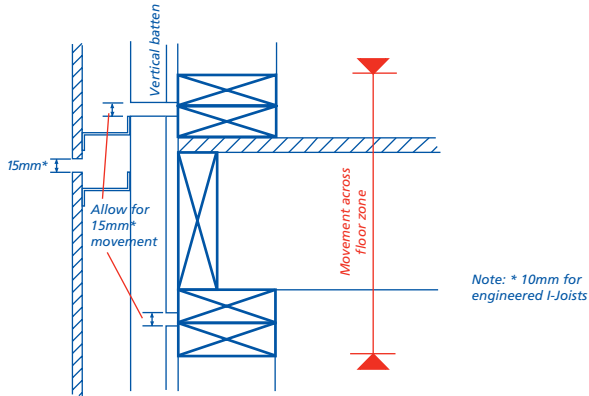
Sliding joint



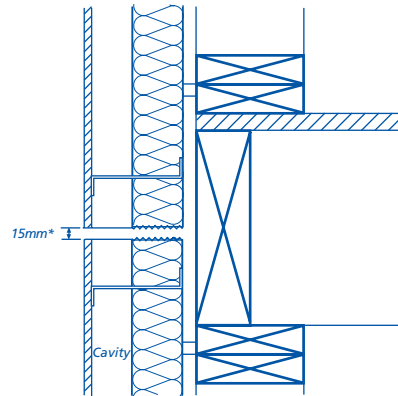
Juliet balcony

LIGHTWEIGHT WALL CLADDING - JOINT AT EACH FLOOR LEVEL

(with and without insulation in cavity)

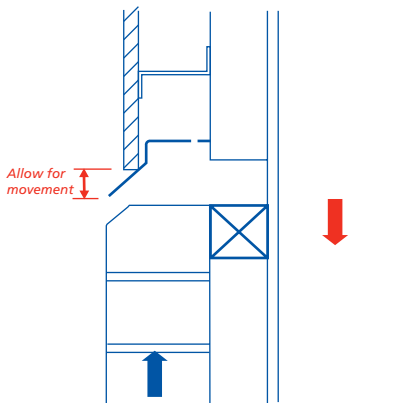


As built

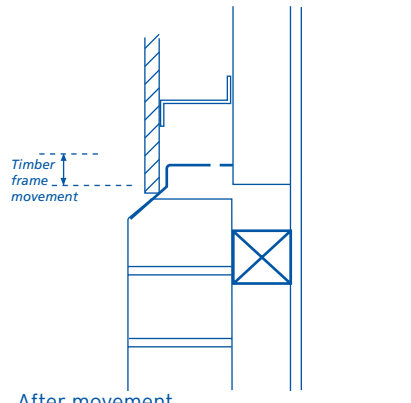


After movement

LIGHTWEIGHT CLADDING AND MASONRY PLINTH

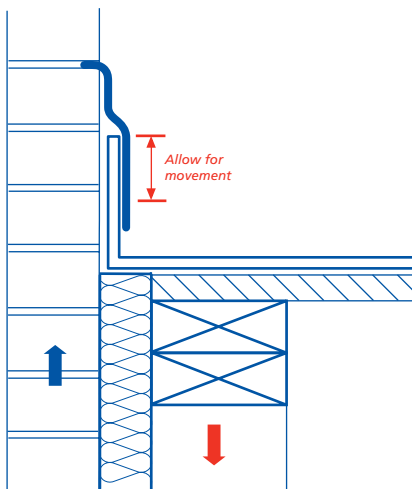


As built

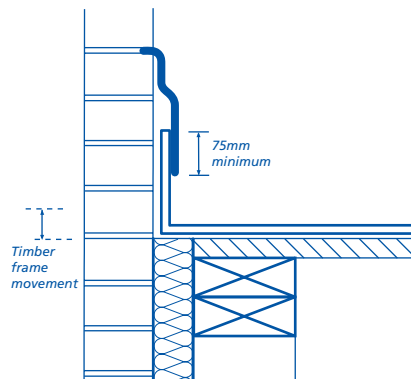


After movement

WALLS TO FLAT ROOF ABUTMENT



As built



After movement

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