



# TECHNICAL MANUAL

VERSION 11

**10: UPPER FLOORS**

# 10. Upper Floors

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## Limitations of Functional Requirements

1. These Functional Requirements do not and will not apply to create any policy liability for any remedial works carried out by the contractor or otherwise, nor to any materials used in those remedial works.
2. The guidance provided in this Section, is guidance that provides a suggested solution to meeting the Functional Requirements. If an alternative solution is selected, then this must still meet the Functional Requirements.
3. Means of escape, passive and active systems are not covered by the Warranty unless specifically identified in the appropriate 'Building Part' section.

## Workmanship

1. Any multiple occupancy building (which includes flats /apartment accommodation) must have fire stopping and cavity barriers completed by a third-party approved contractor, or have a suitable quality assurance process provided to evidence the installation of the fire stopping and cavity barriers. This is applicable to all floor levels of a building that has a floor 4.5m above the lowest external ground level.
2. All workmanship must be within the tolerance requirements set out in this Technical Manual.
3. All work is to be carried out by a technically competent person in a workmanlike manner.
4. Concreting shall not take place during cold weather periods where the working temperature is below 2°C or where ground conditions are frozen.

## Materials

1. All materials should be stored, installed and protected correctly in a manner that will not cause damage or deterioration of the product.
2. All materials, products and building systems shall be appropriately tested and approved for their intended purpose.
3. All load bearing structural elements providing support to the Home will have a service life of not less than 60 years, unless specifically agreed otherwise with us. All other parts of the Home will have a lesser durability and need planned maintenance, repair or replacement during that reduced period.
4. Timber should be adequately treated or finished to resist insect attacks and be suitable for the position used within the structure. All timber treatment should be in accordance with relevant British standards and Codes of Practice.
5. Timber used in the building to provide support to the structure must be appropriately seasoned to prevent excessive shrinkage and movement.
6. All materials should be suitable for the relative exposure of the building in accordance with the relevant British Standards.

## Design

1. Evidence must be provided to demonstrate the Party floors between buildings achieve satisfactory levels of sound insulation to meet the relevant requirements of the Building Regulations.
2. Upper floors - (including separating floors) shall be designed and constructed so that they:
  - a. Are structurally sound;
  - b. Are durable and resistant to moisture;
  - c. Have adequate resistance to the effects of fire and surface spread of flame;
3. The design and specifications shall provide a clear indication of the design intent and demonstrate a satisfactory level of performance.
4. The following additional elements shall be supported by structural calculations designed by an Engineer:
  - a. Structural elements outside the parameters of Building Regulations.
  - b. Specialist structural works.
  - c. Reinforced concrete elements.
  - d. Precast structural elements.
  - e. Any engineered beams/posts manufactured off-site.
5. Damp proofing works should prevent any external moisture passing into the internal environment of the building.
6. Projects consisting of Non-standard/Modern methods of construction must be supported with evidence of valid independent third party product conformity certification before an offer of Warranty is provided. These types of constructions must be declared before commencement.

# 10.

## Upper Floors

### 10.1

#### Suspended Timber

### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Details of proposed floor joists to be used including floor joist layouts.
2. Details of proposed services to be constructed within the floor void.
3. Details of any proposed underfloor heating systems to be incorporated.
4. Details of insulation to be used within the floor construction.
5. An Engineer's full set of structural calculations for the floor construction.

The Warranty surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Floor joists

For advice on sizing of certain timber members of floors, the Designer should refer to the following sources:

- Span tables for solid timber members in floors, ceilings and roofs (excluding trussed rafter roofs) for dwellings. Published by BM TRADA. Note: Reference should be made to the version of the BM TRADA document current at the time of construction of the floor/ceiling or roof.
- BS 8103-3, Structure design of low rise buildings, Code of Practice for timber floors and roofs for dwellings.
- BS EN 1995, Eurocode 5 design of timber structures. General. Common rules and rules for buildings.

It is essential that joists are not overloaded during construction. Joints in joists should only be in place over a load-bearing support, or the joint be designed by an Engineer.

The floor joists must be laid reasonably level and onto suitable solid and level bearings.

Please refer to the 'Tolerances' section for guidance on levelness and deflection limits of floor joists. There may be an instance where a joist might be designed to meet permissible deflections within a relevant British Standard; however, our tolerance requirements will take precedence.

Joists should be restrained at supports using tightly fitted strutting.

Joists should have a minimum end bearing of 90mm, unless joist hangers are used, where a 35mm bearing is acceptable (subject to the manufacturer's details).

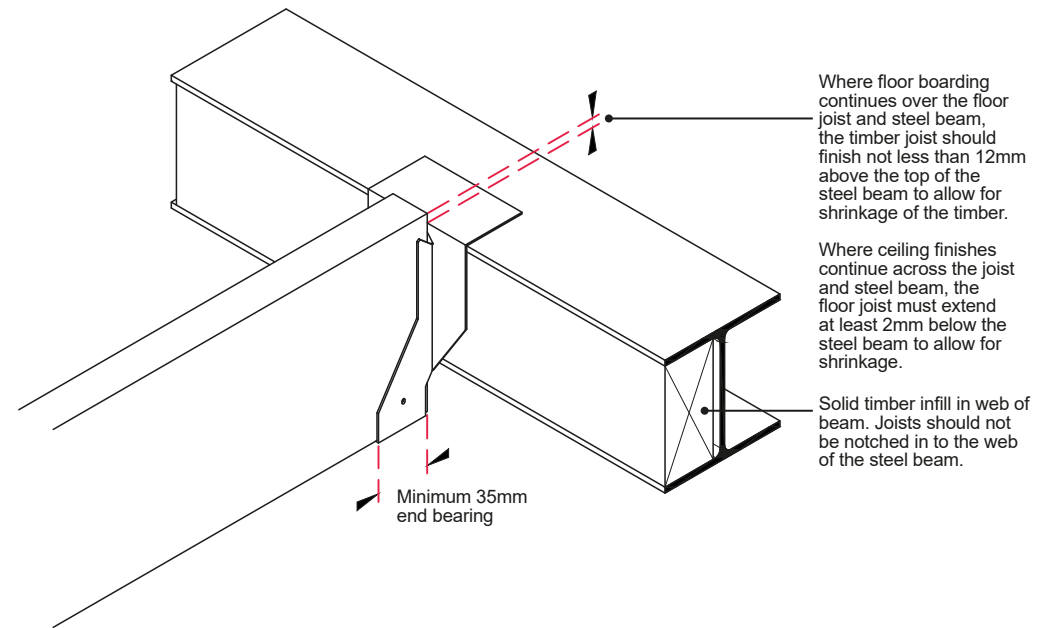
### Steel beams

Steel beams should be designed by the Engineer and should have appropriate fire resistance to meet the requirements of the relevant Building Regulations.

Where steel beams and columns are used to support the upper floor construction on a project in a coastal location, and maybe exposed to an aggressive external environment (e.g. undercroft) please follow the requirements for additional corrosion protection in the 'Appendix B - Coastal Locations' and 'Appendix C - Materials, Products, and Building Systems' section.

To prevent the distortion of finishes, joists should be stopped from twisting over supports and provision provided to accommodate up to 12mm of drying shrinkage in floor joists supported by steel beams.

### Steel beam bearing



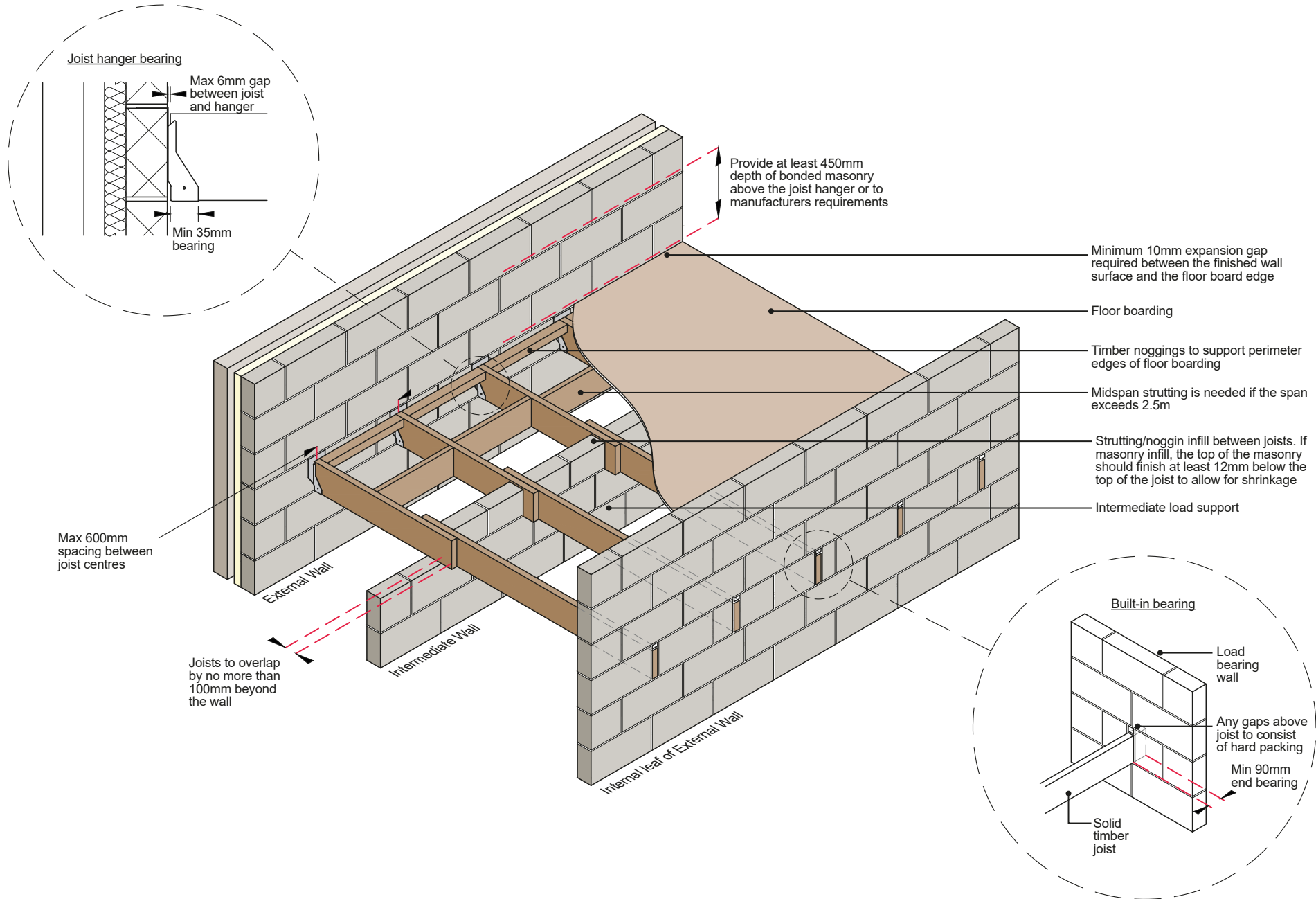
### Restraint of walls

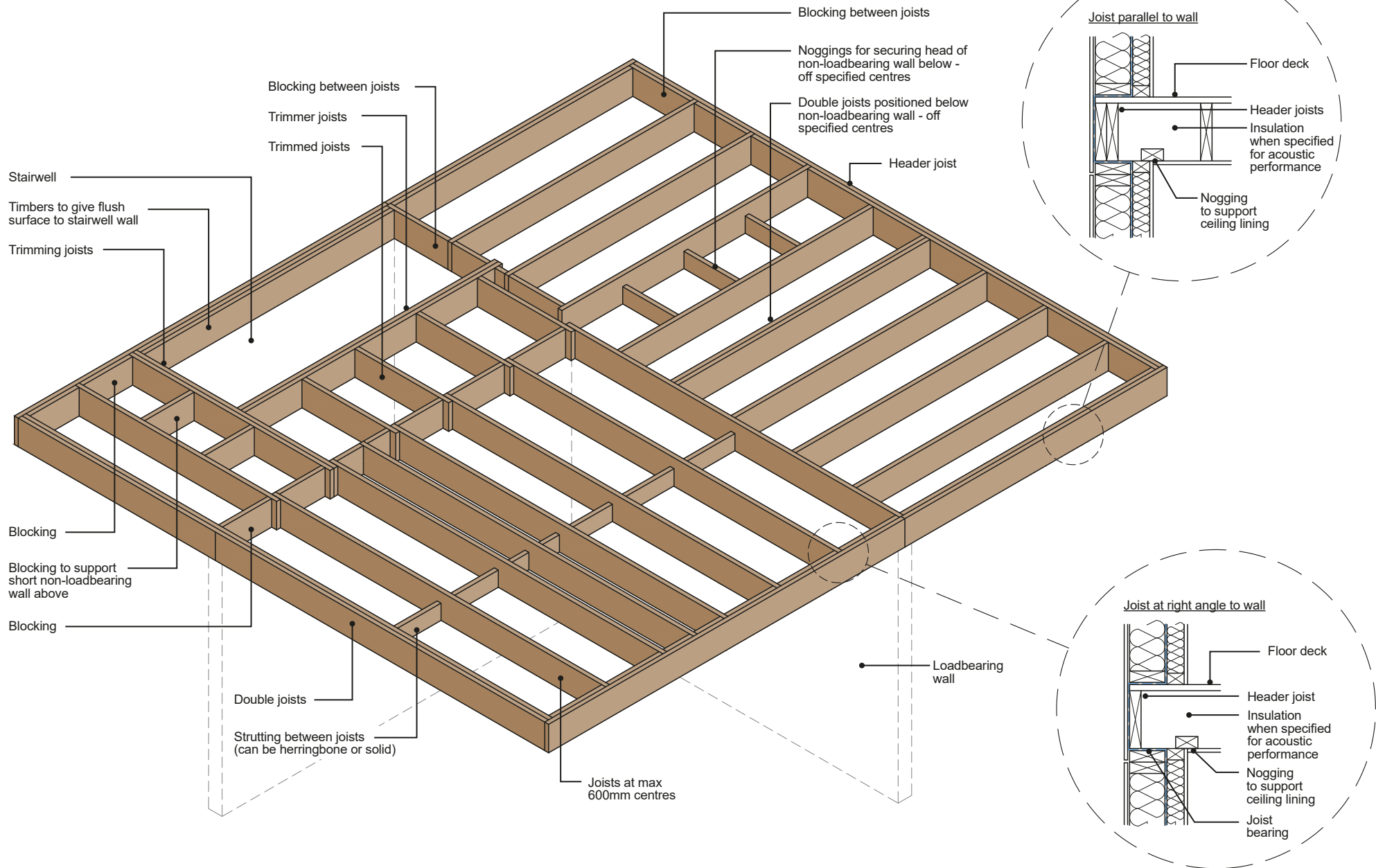
Walls should be adequately restrained at floors, ceilings and verges in accordance with the relevant Building Regulations.

Restraint can be provided by:

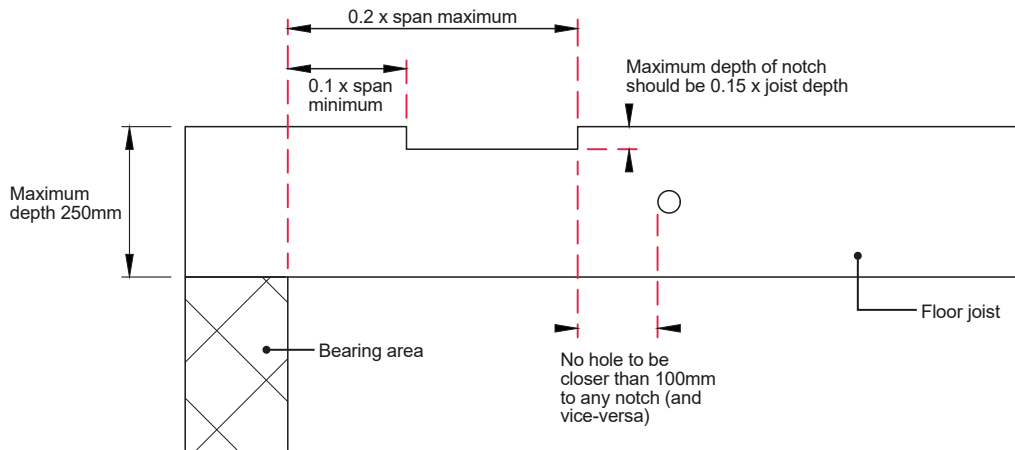
- Lateral restraint straps.
- Restraint type joist hangers.
- Other forms of restraint proven by the Engineer.

Please refer to the 'External Walls' section for further guidance.

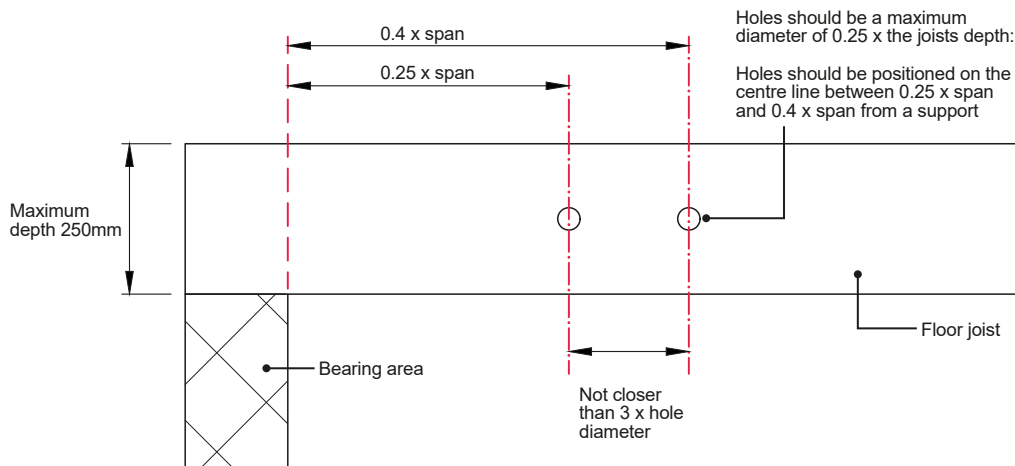




**Permissible areas for the notching of joists**



**Permissible areas for the drilling of joists**



**Notching and drilling in solid timber joists**

Requirements for notching and drilling of solid timber joists (further guidance can be found in BS 8103, TRADA span tables, BS EN 1996 and PD 6693 - 1).

This guidance is for joists up to 250mm deep, notching and drilling for joists exceeding this depth should be designed by the Engineer.

Notches: Notches should be made in between 0.1 and 0.2 x span. Notches should be no deeper than 0.15 x depth of the joists in this area e.g. For a 250mm deep joist, the maximum notch depth should not exceed 35mm.

Holes: Holes should be drilled on the centre line of the joist. Holes should be between 0.25 and 0.4 x the span. Holes should be a maximum diameter of 0.25 x the joists depth and kept apart by at least 3x the diameter. The maximum hole diameter should not exceed 65mm.

Note: Notches and holes should be a minimum of 100mm apart.

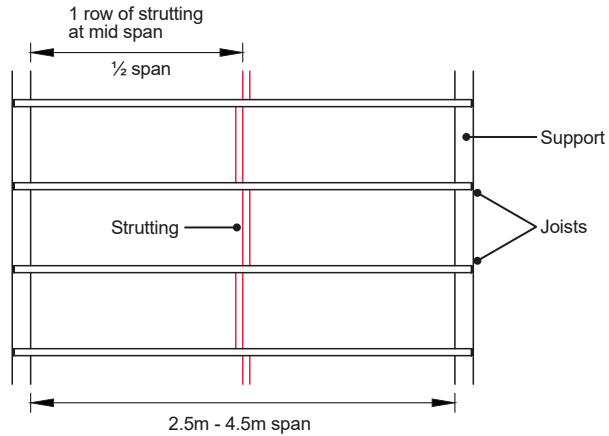
The table below gives an indication of the areas in a joist which are suitable for notching and drilling.

**Typical permissible zones for notching and drilling of solid timber joists**

Span (m)	Notches to be taken out only within these zones (m)		Holes only to be drilled within these zones (m)	
1.5	0.15	0.30	0.375	0.6
2	0.2	0.4	0.5	0.8
2.5	0.25	0.5	0.625	1
3.0	0.3	0.6	0.75	1.2
3.5	0.35	0.7	0.875	1.4
4	0.4	0.8	1	1.6
4.5	0.45	0.9	1.125	1.8
5	0.5	1	1.25	2

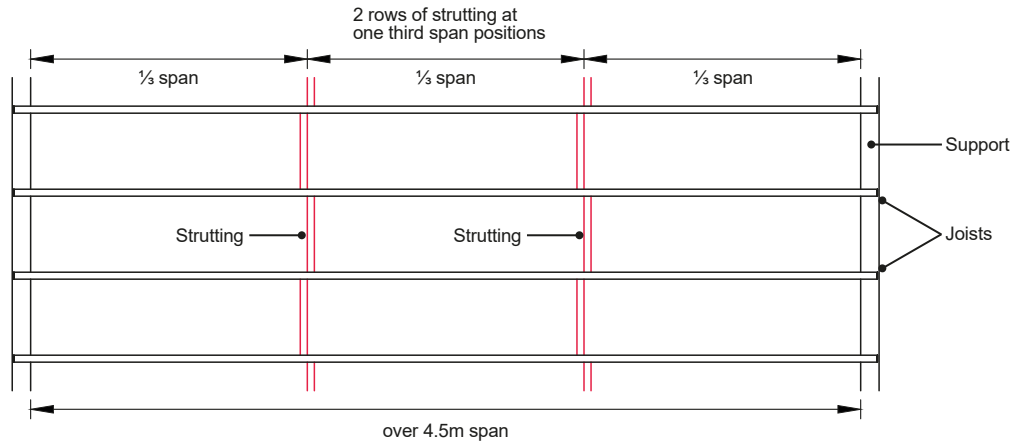


### Strutting of joists with a span between 2.5m and 4.5m



Where the span of a floor joist is more than 2.5m, strutting is necessary. This should be provided either by timber bridging or strutting in accordance with Figure 3 of BS 8103-3:2009 or by a proprietary system.

### Strutting of joists with a span over 4.5m



Where the span of a floor joist or flat roof joist is more than 4.5m, two rows of strutting at  $\frac{1}{3}$  the span position will be necessary.

### Strutting or bridging of solid timber floor joists

Where the span of a floor joist is more than 2.5m, strutting is necessary. This should be provided either by timber bridging or strutting in accordance with Figure 3 of BS 8103-3: 2009 or by a proprietary system.

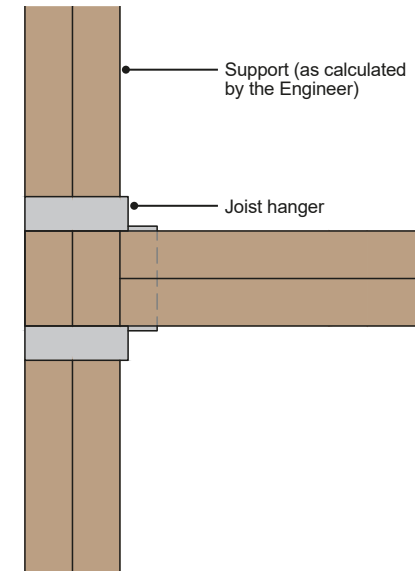
Timber strutting can be in the form of solid bridging of at least 38mm basic thickness and with a depth equal to at least three-quarters of the depth of the joists; or it can consist of herringbone strutting with members of at least 38mm by 38mm basic size. Herringbone strutting should not be used where the distance between the joists is more than approximately three times the depth of the joists.

### Deflection of floors

For upper floors (intermediate floors), designers and Engineers must observe our tolerance requirements for levelness of floors. Please refer to the 'Tolerances' section for further guidance.

There may be an instance where a joist might be designed to meet permissible deflections with a relevant British Standard; however, our tolerance requirements will take precedence.

### Typical trimming detail (plan)



Double joists should be bolted together at 600mm centres using minimum 10mm diameter bolts with large washers that will prevent the bolt head and nut from penetrating the joist. It is recommended that the bolting of double joists is along the centre line of joists. Suitably sized trimmer joists shall be provided around floor openings.

Trimmed openings may be needed around staircase openings and chimneys. Solid trimmed joists may be supported using either joist hangers or a structurally designed connection; timber trimmers around openings should consist of at least two members and be designed by the Engineer.

# 10.

## Upper Floors

10.2  
I-joists

### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Manufacturer's joist layout drawings and calculations.
2. Details of the manufacturer relevant accreditation (TRADA, STA, etc.). The accreditation must confirm the manufacturers has been assessed for the design of joists.
3. Details of proposed services to be constructed within the floor void.
4. Details of any proposed underfloor heating systems to be incorporated.
5. Details of insulation to be used within the floor construction.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### I-joists

I-joists must be laid reasonably level and onto suitable solid and level bearings.

Engineered timber I-joists include a timber flange (usually solid timber or laminated veneer lumber (LVL)) and a panel product web (usually OSB). They are manufactured in an assortment of depths and flange widths under controlled factory conditions to low and uniform moisture contents.

I-joists should be designed in accordance with BS EN 1995, Eurocode 5 design of Timber Structures. General: Common rules and rules for buildings. I-joists should be appropriately UKCA / CE marked and comply with ETAG 011 or hold independent third party certification.

It is essential that joists are not overloaded during construction. Joints in joists should only be in place over a load-bearing support, or the joint be designed by the Engineer.

Joists should be restrained at supports using tightly fitted strutting.

Joists should have a minimum end bearing of 90mm, unless joist hangers are used, where the minimum bearing should be not less than 45mm.

Joist hangers should be detailed in the design, including confirmation that the joist hangers have the equivalent to restraint straps at 2m centres where required to provide restraint.

### Deflection

For upper floors (intermediate floors), designers and Engineers must observe our tolerance requirements for levelness of floors. Please refer to the 'Tolerances' section.

There may be an instance where a joist might be designed to meet permissible deflections within a relevant British Standard; however, our tolerance requirements will take precedence.

### Storage of i-joists

I-joists should be protected from the elements and supported on suitable bearers over a free draining surface. Levels of exposure, which are more severe than those encountered during a normal uninterrupted build programme should be addressed by the provision of suitable protection.

### Bracing

Large areas of floor joists can be assembled with these products due to their lightweight and availability in long lengths. It is of great importance that adequate safety bracing is provided to ensure that the joists remain stable through the construction phase. Joist manufacturers provide simple guide recommendations that allow an installer to facilitate this process with ease and speed.

- Unbraced joist layouts are not to be walked on by workers.
- Floors should not become overloaded during construction.
- Under no circumstances should the flanges of the I-joist be cut, notched or drilled.

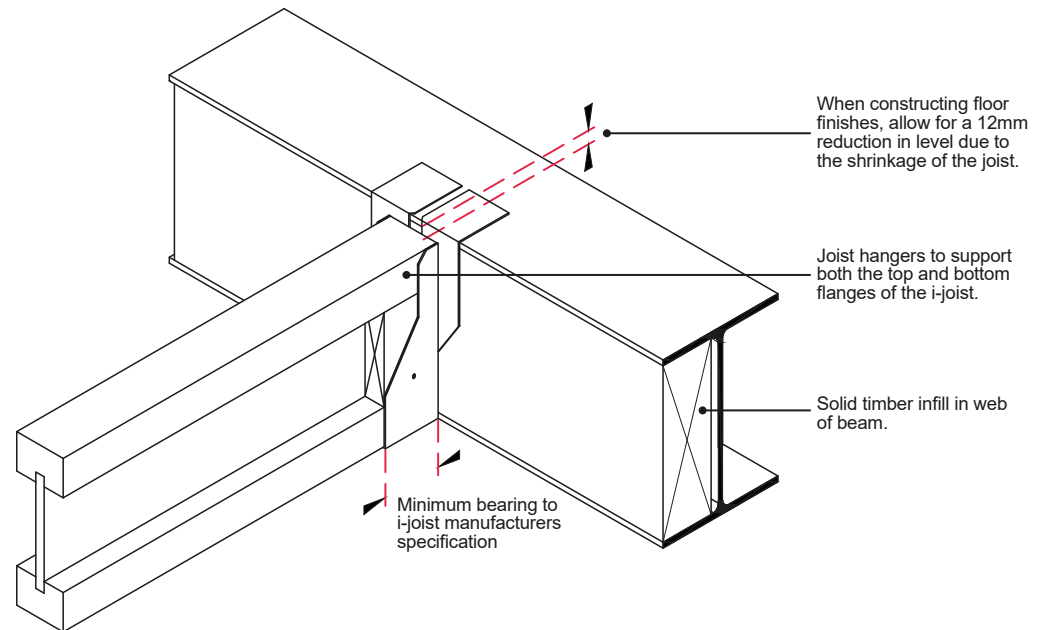
### Steel beams

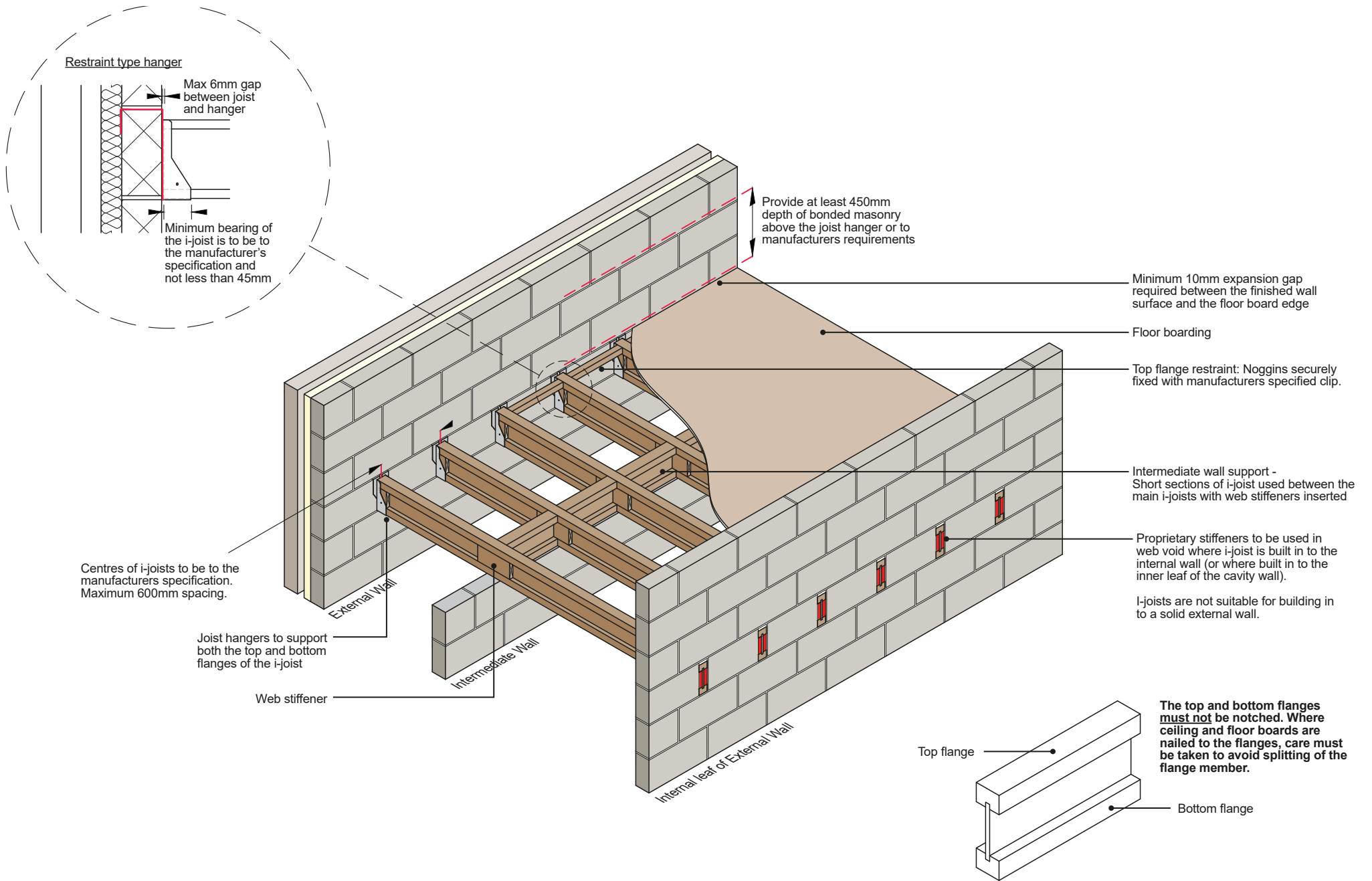
Steel beams should be designed by the Engineer and should have appropriate fire resistance to meet the requirements of the relevant Building Regulations.

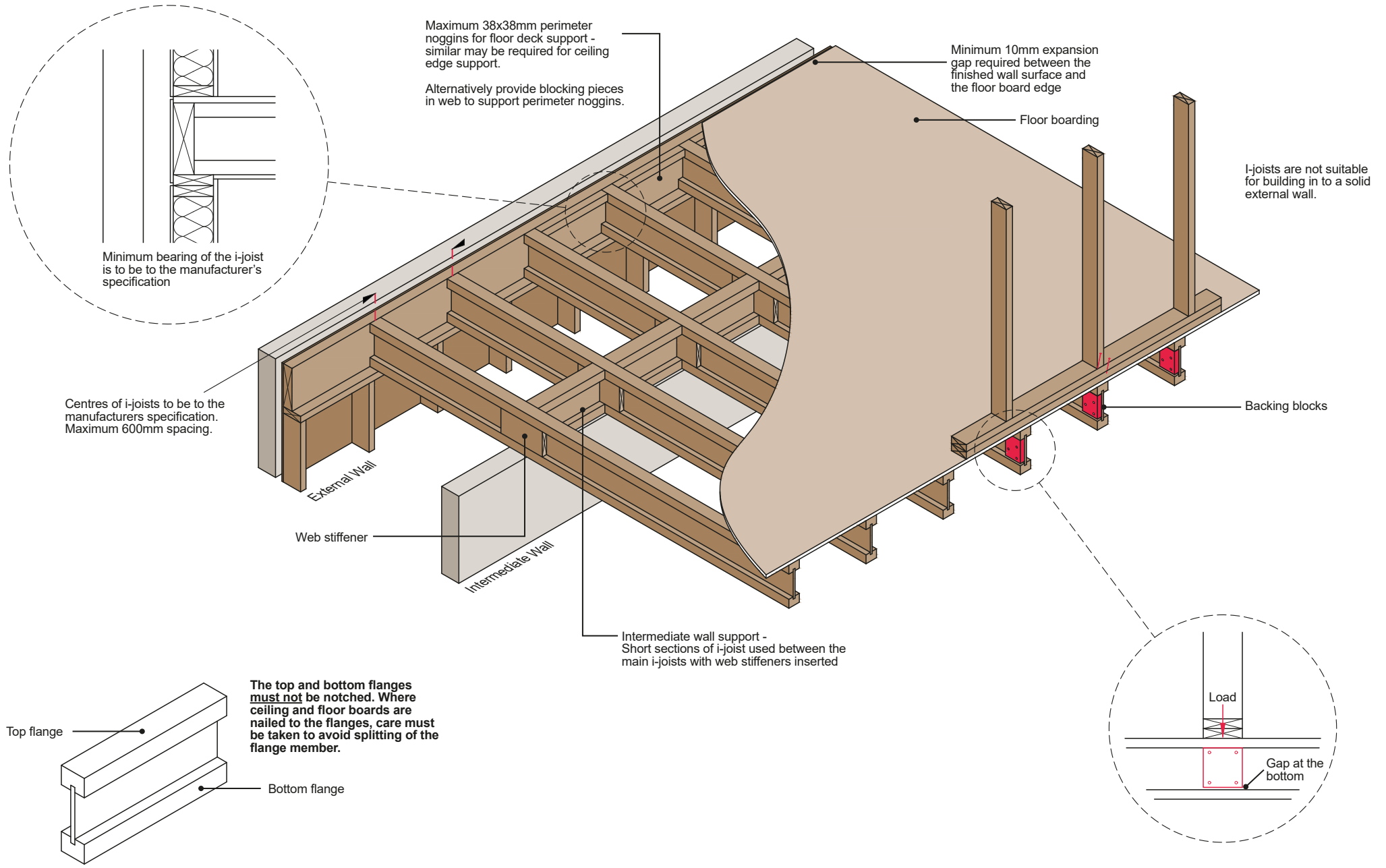
Where steel beams and columns are used to support the upper floor construction on a project in a coastal location, and maybe exposed to an aggressive external environment (e.g. undercroft) please follow the requirements for additional corrosion protection in 'Appendix B - Coastal Locations' and 'Appendix C - Materials, Products, and Building Systems'.

To prevent the distortion of finishes, joists should be stopped from twisting over supports and provision provided to accommodate up to 12mm of drying shrinkage in floor joists supported by steel beams.

### Steel beam bearing







**I-joist installation**

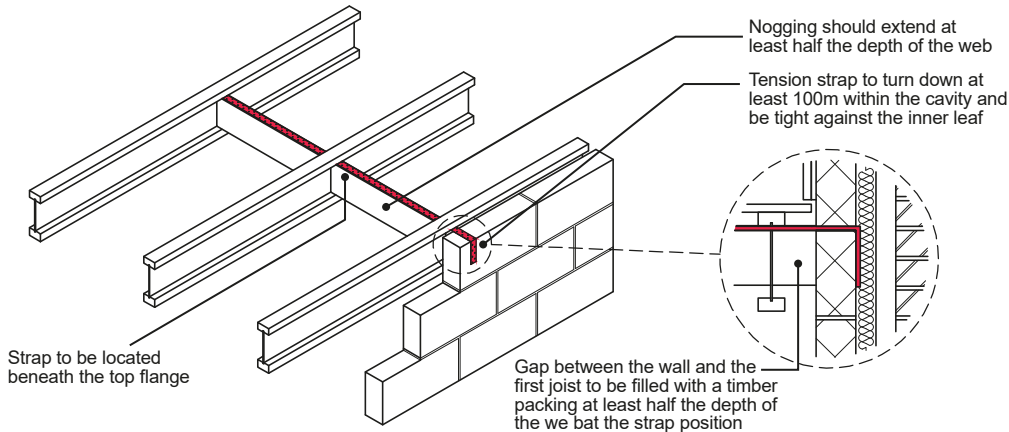
The installation of I-joists must follow the manufacturer's guidance and specification for the project.

**Lateral restraint**

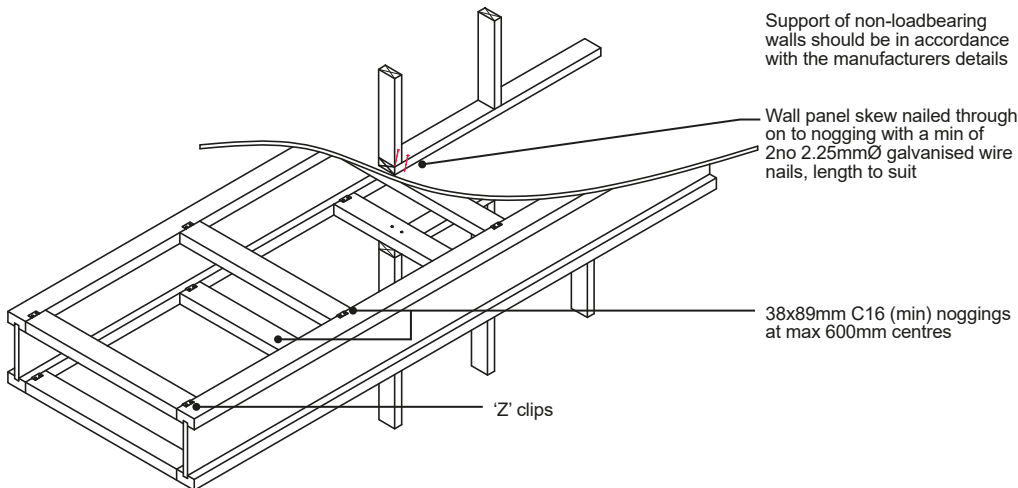
Floors should provide lateral restraint to all walls running parallel to them by means of 30mm x 5mm galvanized or stainless steel restraint straps at 2m centres.

Straps need not be provided to floors at, or about, the same level on each side of a supported wall and at the following locations:

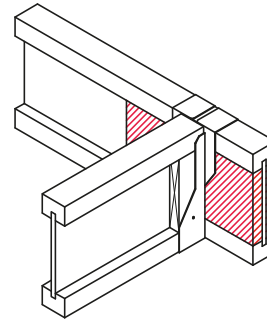
- Timber floors in two storey dwellings where:
  - Joists are at maximum 1.2m centres and have at least 90mm bearing on supported walls or 75mm bearing on to a timber wall plate.
  - Carried by the supported wall by restraint type joist hangers as described in BS 5268: 7.1.



**Support of light-weight non load bearing partitions**

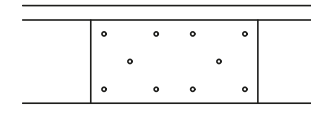


**Backer blocks**



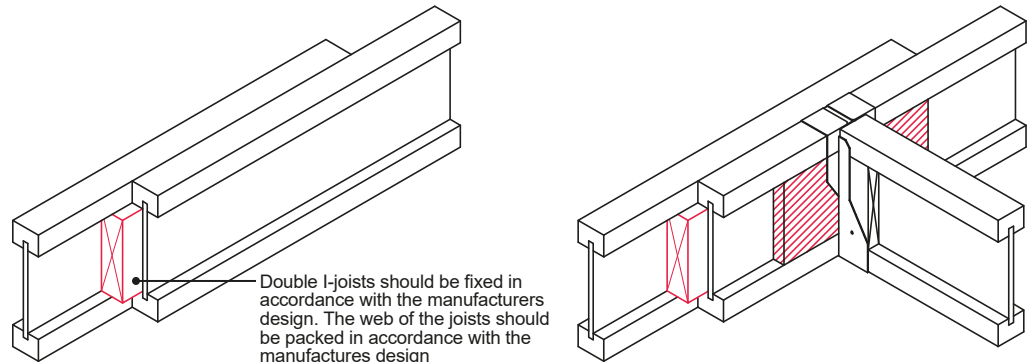
Trimmed openings may be needed around staircase openings and chimneys. Solid trimmed joists may be supported using joist hangers. Timber trimmers around openings should consist of at least two members and be designed and installed in accordance with the manufacturers instructions. Where an I-joist is faced fixed to another I-joists backer blocks should be provided on both sides of the web of the trimmer.

Fixing of I-joists should be in accordance with the engineers design and specification. A timber filler block should be installed between I-joists.

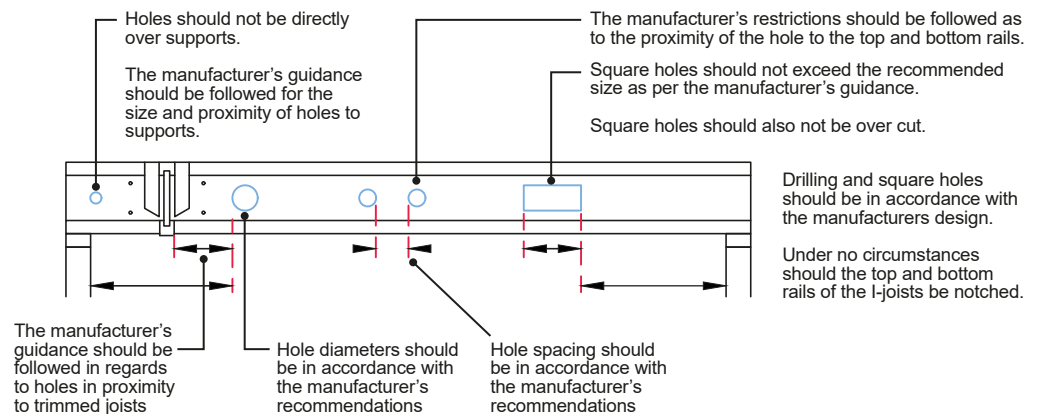


Backer blocks should be fixed in accordance with the manufacturer's design.

**Fixing of multiple i-joists**

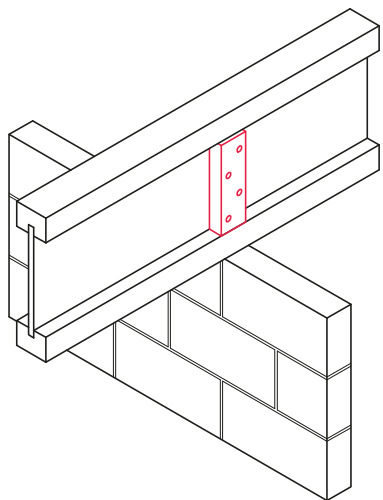


**Notching and drilling of i-joists**



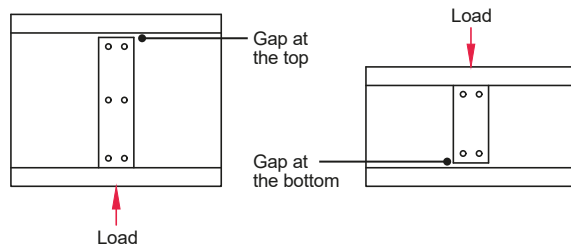
**Building in of I-joists over internal walls**

To reduce shrinkage, all mortar should be adequately dry and solidly packed in, but it should not be packed up tight to the underside of the top flange. Before the floor decking is fixed, all continuous joists must be packed down to the intermediate bearing wall.



Additional blocking should be installed in accordance with the manufacturers instructions.

Generally a gap is required at the top or bottom of the packing, dependent on the direction of the load. Generally if the load comes from the bottom e.g. bearing on an internal wall the gap should be at the top. If the load is from the top the gap should be provided at the bottom.

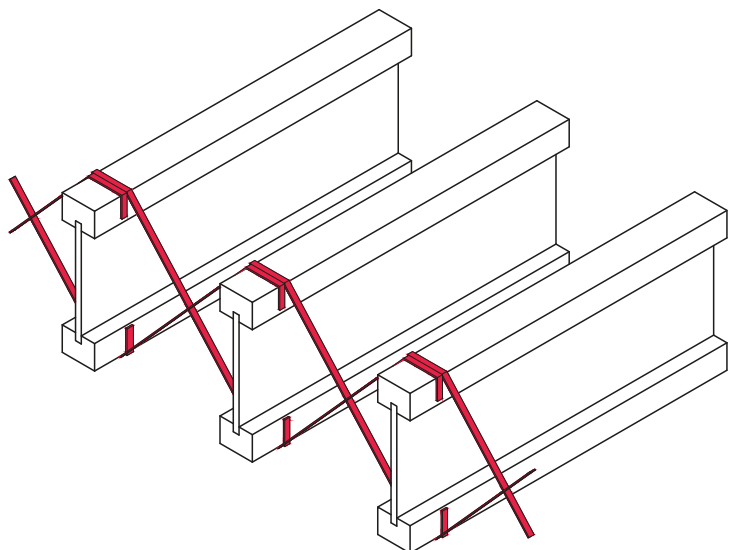


The backing blocks should be fixed in accordance with the manufacturers design. Generally, backing blocks on deeper joists require a higher number of fixings.

**Proprietary strutting devices**

Solid strutting is difficult to install between I-joists and propriety strutting maybe used as an alternative.

An alternative to solid strutting is Steel herringbone strutting systems, which are generally pressed lengths of galvanized mild steel, usually 1mm thickness and are produced in a variety of lengths to suit differing joist depths and spacing's.



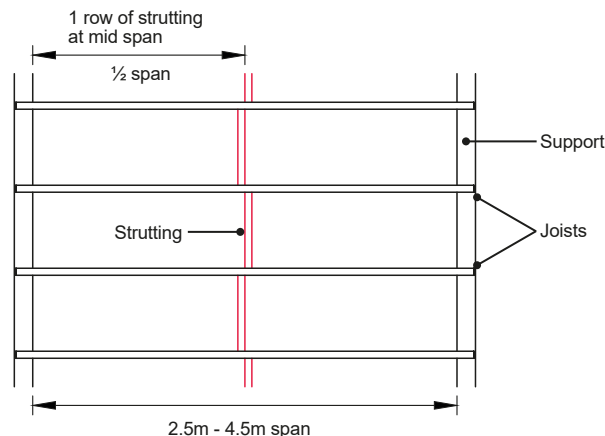
**Strutting or bridging**

Strutting or bridging of I-joists should be installed as per the below table.

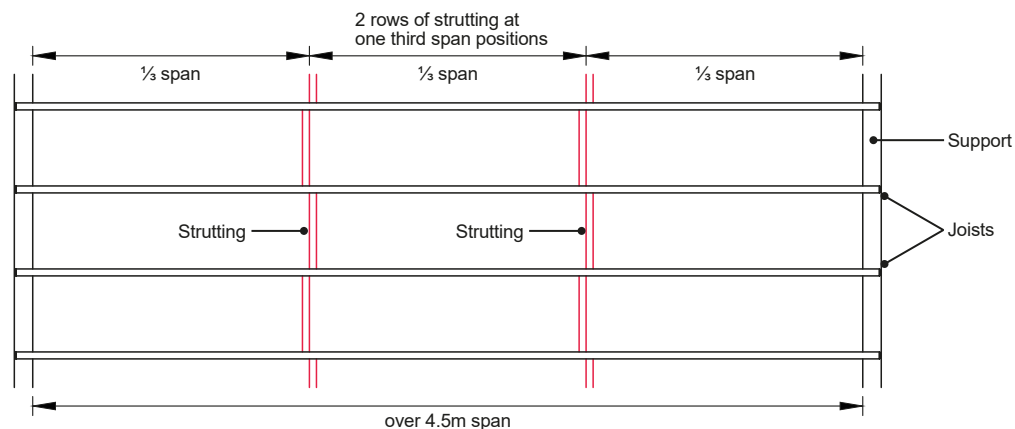
Joist span (m)	Rows of strutting
up to 2.5	None
2.5 - 4.5	1 at mid-span
over 4.5	2 at 1/3 points

**Strutting of joists with a span between 2.5m and 4.5m**

Strutting or bridging of I-joists should be installed as per the below table.



**Strutting of joists with a span over 4.5m**



Where the span of a floor joist or flat roof joist is more than 4.5m, two rows of strutting at 1/3 the span position will be necessary.

# 10.

## Upper Floors

### 10.3

#### Metal Web



### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Manufacturer's joist layout drawings and calculations.
2. Details of the manufacturer relevant accreditation (TRADA, STA, etc.). The accreditation must confirm the manufacturers has been assessed for the design of joists.
3. Details of proposed services to be constructed within the floor void.
4. Details of any proposed underfloor heating systems to be incorporated.
5. Details of insulation to be used within the floor construction.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Metal web joists

Consists of parallel stress graded timber flanges joined together with V-shaped galvanised steel webs. The webs are fixed to the flanges via nail plates. The open web design gives great flexibility in running through services.

Metal web joists should be designed in accordance with BS EN 1995, Eurocode 5 design of Timber Structures. General: Common rules and rules for buildings.

Metal web joists should be appropriately UKCA / CE marked comply with ETAG 011 or hold independent third party certification.

Metal web joists must be laid reasonably level and onto suitable solid and level bearings.

It is essential that joists are not overloaded during construction. Joints in joists should only be in place over a load-bearing support, or be designed by the Engineer.

Joists should be restrained at supports using tightly fitted strutting.

The minimum end bearing of the joists should be in accordance with the manufacturers instruction and the site specific design. Generally the minimum end bearing should be no less than 90mm, unless joist hangers are used, where the minimum bearing should be to the manufacturers specifications.

### Deflection

For upper floors (intermediate floors), designers and engineers must observe our tolerance requirements for levelness of floors. Please refer to the 'Tolerances' section.

There may be an instance where a joist might be designed to meet permissible deflections with a relevant British Standard; however, our tolerance requirements will take precedence.

### Storage of metal web joists

Metal web joists should be protected from the elements and supported on suitable bearers over a free draining surface. Levels of exposure which are more severe than those encountered during a normal uninterrupted build programme should be addressed by the provision of suitable protection.

### Bracing

Large areas of floor joists can be assembled with these products due to their light weight and availability in long lengths. It is of great importance that adequate safety bracing is provided to ensure that the joists remain stable through the construction phase. Joist manufacturers provide simple guide recommendations that allow an installer to facilitate this process with ease and speed.

- Unbraced joist layouts are not to be walked on by workers.
- Floors should not become overloaded during construction.
- Under no circumstances should the metal web joist be cut, notched or drilled.

### Steel beams

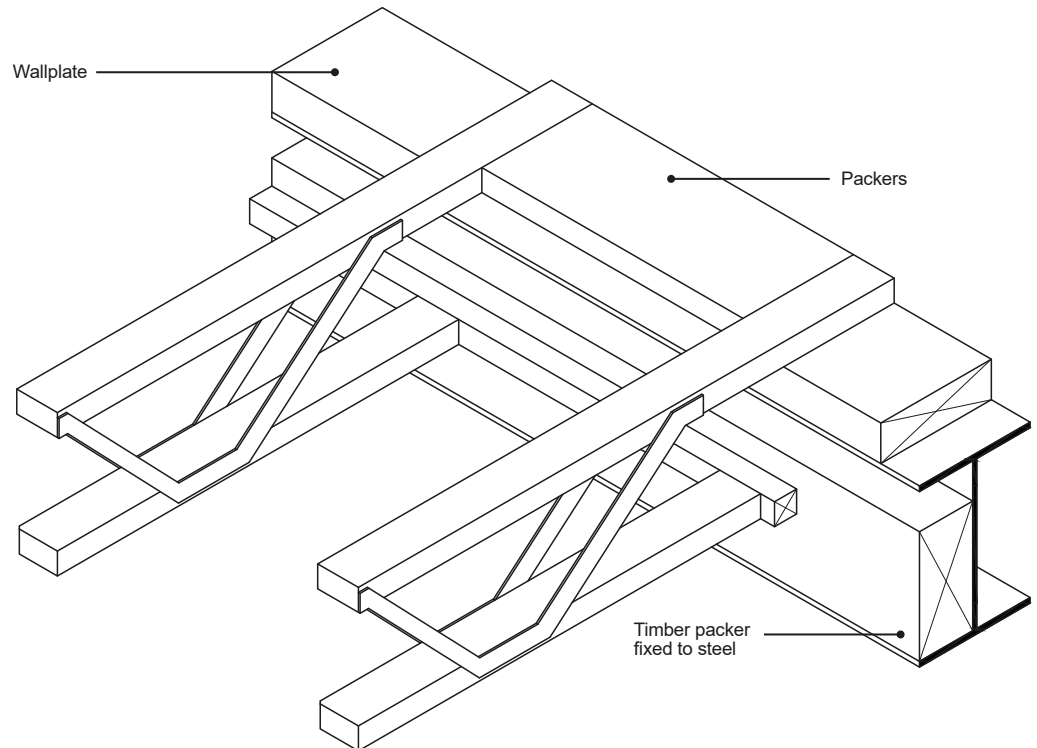
Steel beams should be designed by a suitably qualified Structural Engineer and should have appropriate fire resistance to meet the requirements of the relevant Building Regulations.

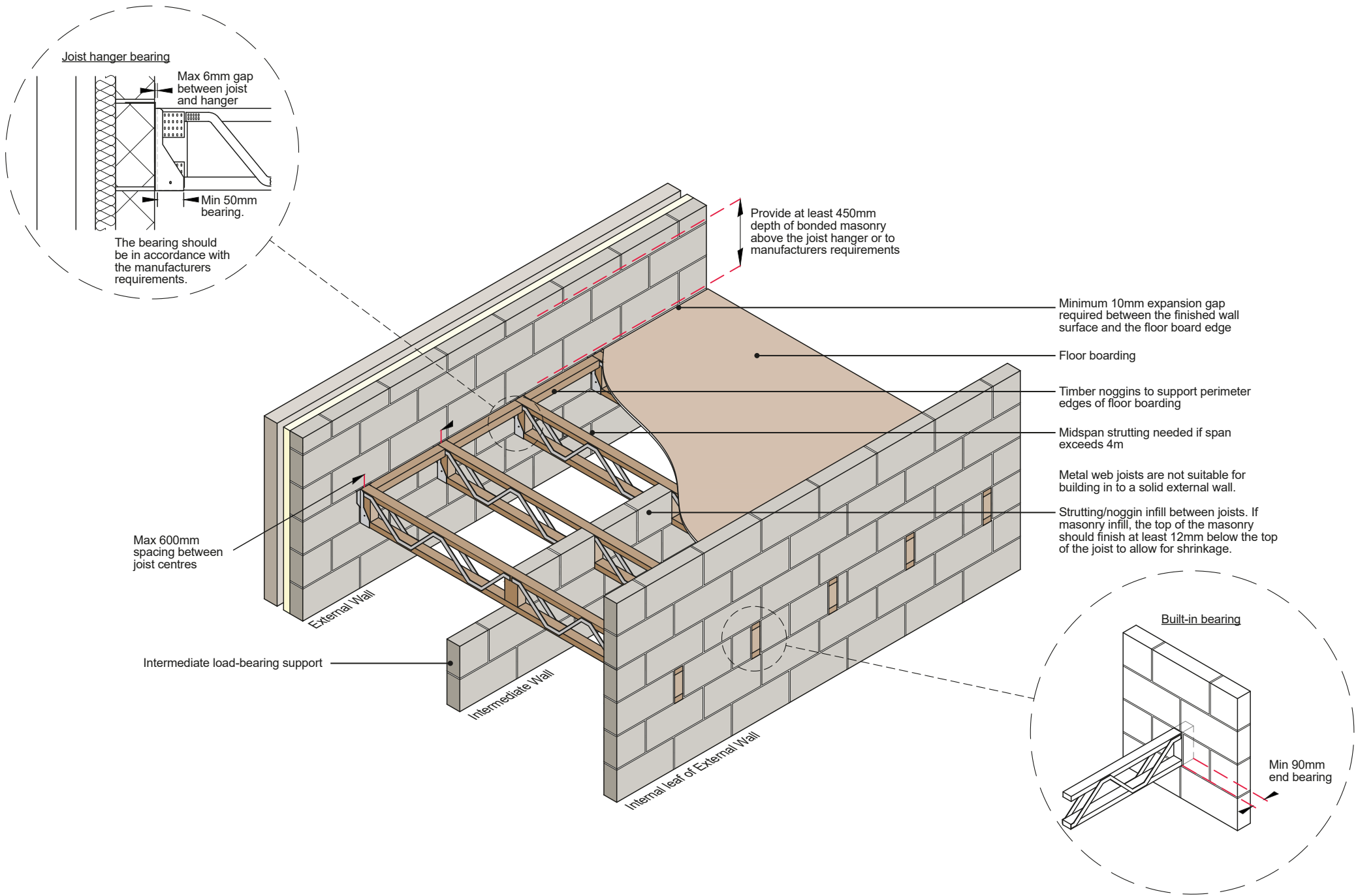
Where steel beams and columns are used to support the upper floor construction on a project in a coastal location, and maybe exposed to an aggressive external environment (e.g. undercroft) please follow the requirements for additional corrosion protection in 'Appendix B - Coastal Locations' and 'Appendix C - Materials, Products, and Building Systems'.

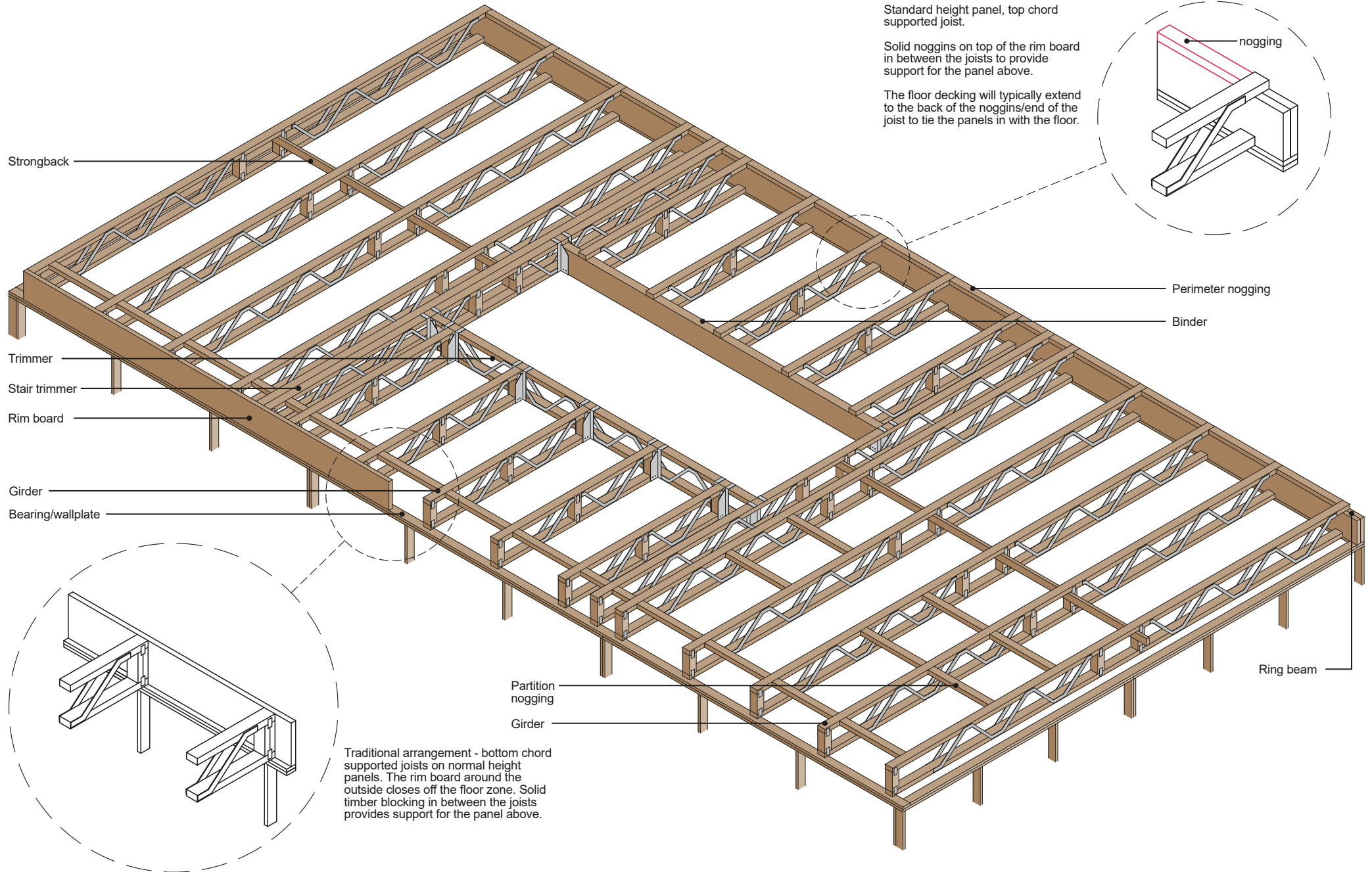
To prevent the distortion of finishes, joists should be stopped from twisting over supports and provision provided to accommodate up to 12mm of drying shrinkage in floor joists supported by steel beams.

### Steel beam bearing

Metal web joists may be top hung subject to the manufacturers site specific design.



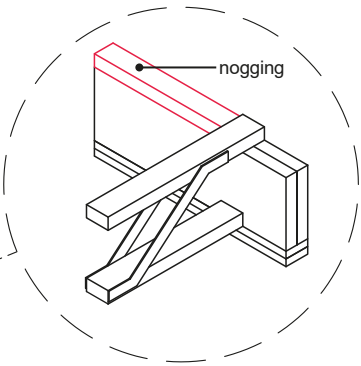




Standard height panel, top chord supported joist.

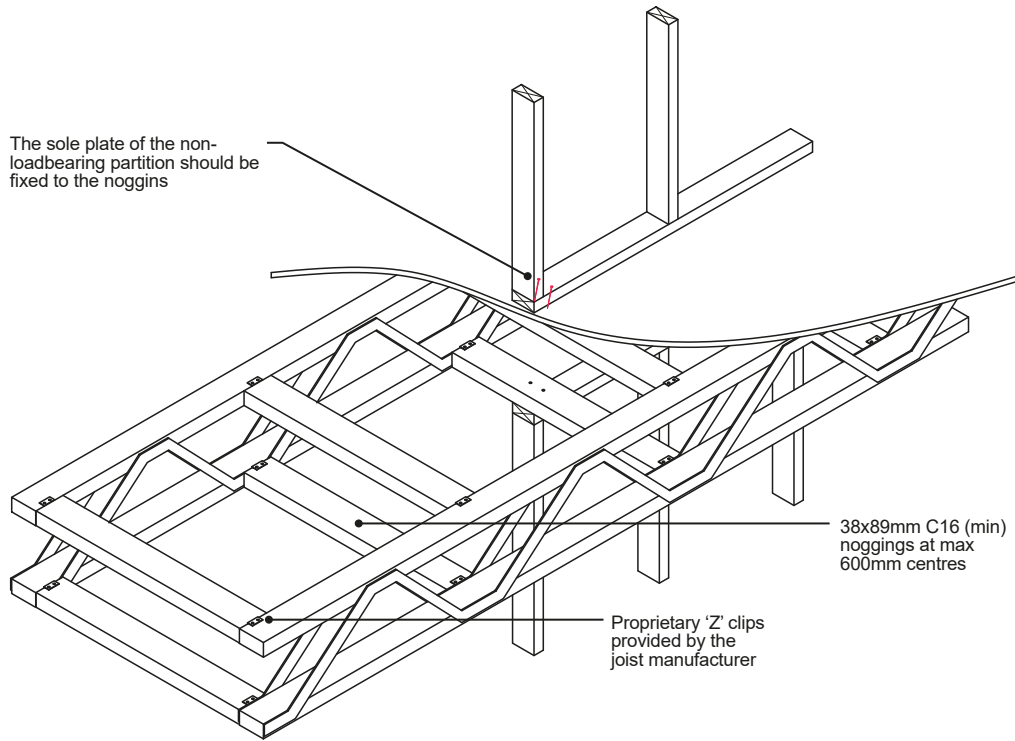
Solid noggins on top of the rim board in between the joists to provide support for the panel above.

The floor decking will typically extend to the back of the noggins/end of the joist to tie the panels in with the floor.



Traditional arrangement - bottom chord supported joists on normal height panels. The rim board around the outside closes off the floor zone. Solid timber blocking in between the joists provides support for the panel above.

**Support of light-weight non load bearing partitions**



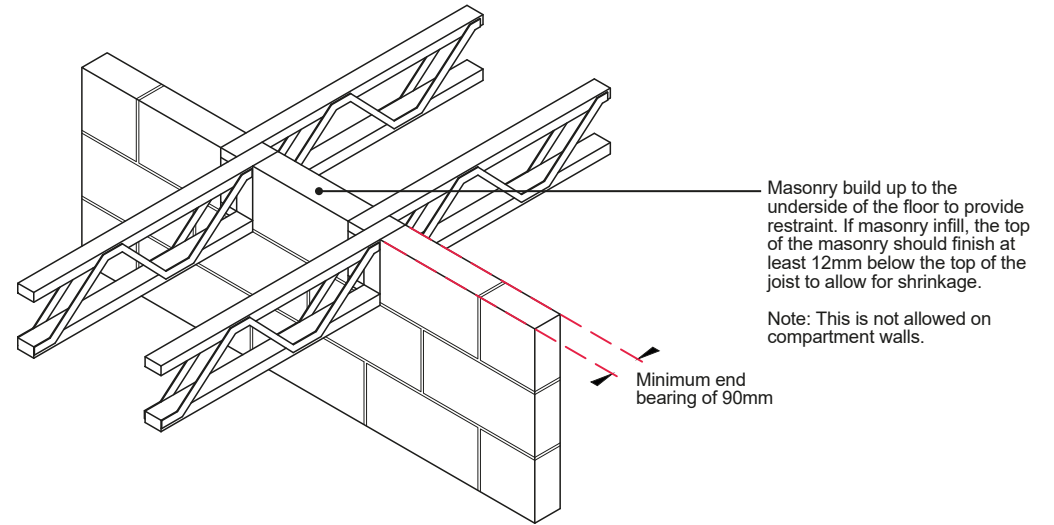
Where light weight non load bearing partition are parallel to the joists, they should be suitably supported in accordance with the manufacturers design.

Where metal web joists are used they should be:

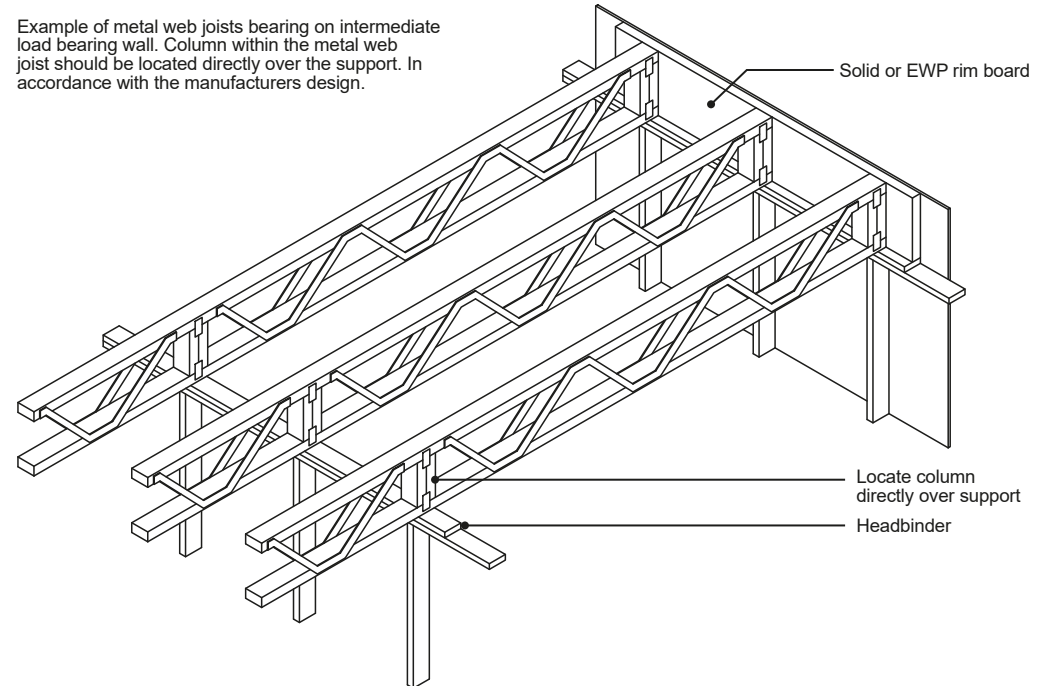
- Positioned centrally below a non load bearing partition. Double or triple joists should be provided in accordance with the manufacturers details and fixed with propitiatory fixings in accordance with the manufactures design.
- Or the weight of the partition should be supported by noggings or bearers fixed to joists with the floor systems propitiatory fixings on either side. The noggings should be at a maximum of 600mm centres and should be 38mm x 90mm unless designed otherwise.

Sole plates should be fixed to the noggings or joists.

**Metal web joists supported on load bearing masonry internal wall**



**Metal web joists supported on load bearing timber internal wall**



Example of metal web joists bearing on intermediate load bearing wall. Column within the metal web joist should be located directly over the support. In accordance with the manufacturers design.

### Restraint of walls

Walls should be adequately restrained at floors, ceilings and verges in accordance with the relevant Building Regulations.

Restraint can be provided by:

- Restraint type joist hangers.
- Other forms of restraint proven by an Engineer.
- Lateral restraint floor straps, provided at no more than 2m centres.

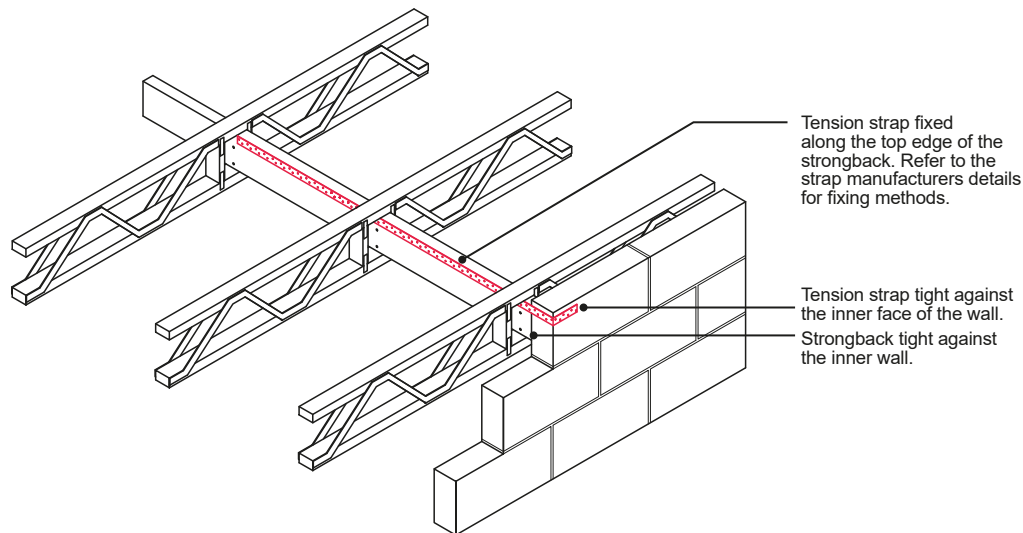
### Lateral restraint straps

Floors should provide lateral restraint to all walls running parallel to them by means of 30mm x 5mm galvanised or stainless steel restraint straps at 2m centres. Straps need not be provided to floors at, or about, the same level on each side of a supported wall and at the following locations:

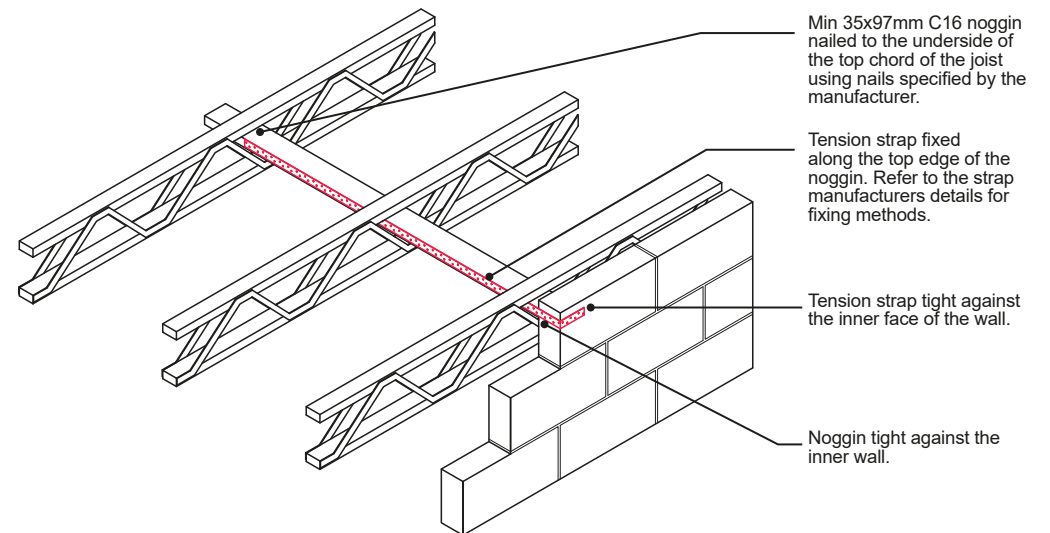
Timber floors in two storey dwellings where:

- Joists are at maximum 1.2m centres and have at least 90mm bearing on supported walls or 75mm bearing on to a timber wall plate.
- Carried by the supported wall by restraint type joist hangers as described in BS 5268: 7.1.

### Horizontal restraint strap fixed to strongback

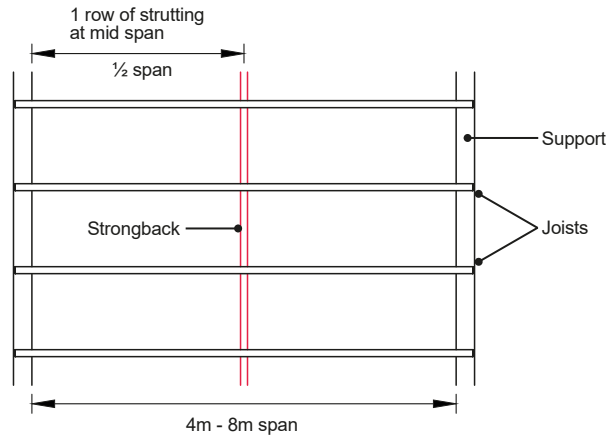


### Horizontal restraint strap fixed to noggin



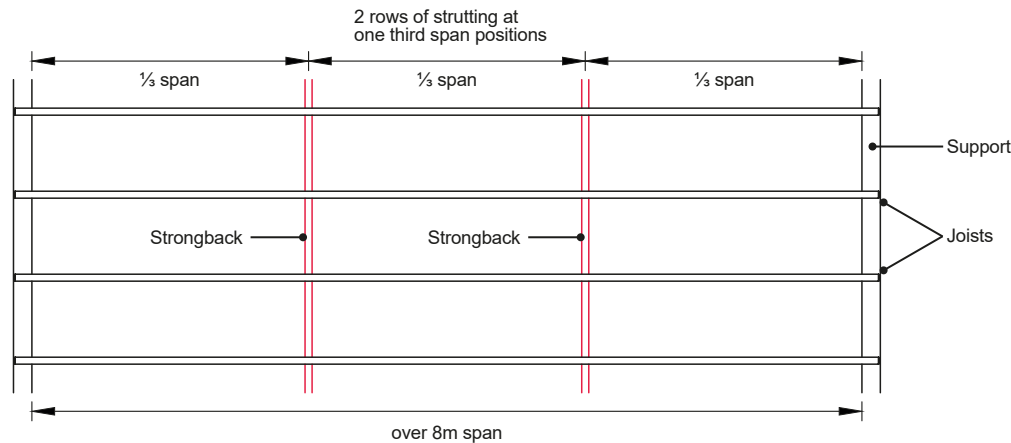


**Strutting of joists with a span between 4m and 8m**



Where the span of a floor joist or flat roof joist is more than 4m, strutting is necessary. This should be provided by timber strong backs in accordance with the manufacturers design

**Strutting of joists with a span over 8m**



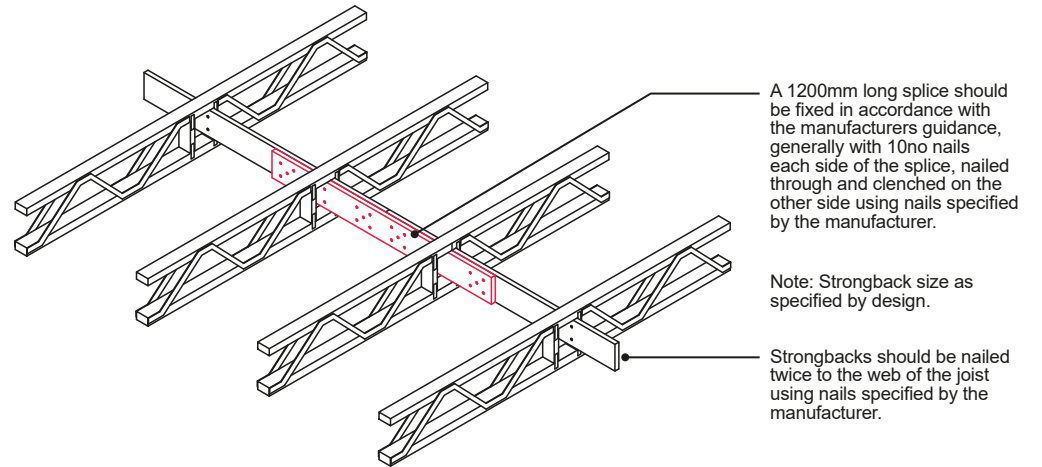
A minimum of two rows of strutting are required for spans over 8m. This should be provided by strongbacks in accordance with the manufacturers design.

**Strutting of joists**

Strutting to metal web joists should be provided in accordance with the manufacturers guidance and the table below.

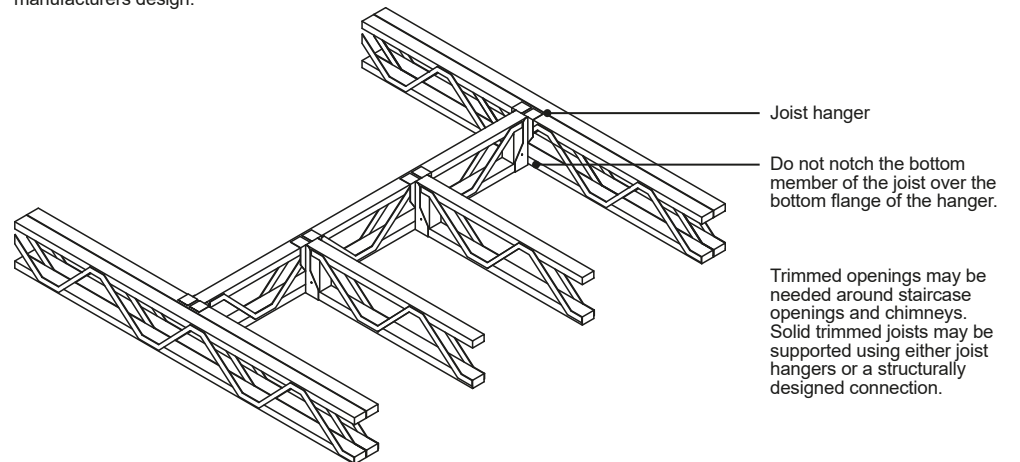
Joist span (m)	Rows of strutting
4 - 8	1 at centre of span
over 8	2 at equal spacing

**Strongback splice**



**Typical trimming detail**

Double joists should be fixed as per the manufactures design, this can be with a propriety clip or fixed at specified centres with fixings provided by the manufacturer. It is important to ensure that the work on site is in accordance with the manufacturers design.



# 10.

## Upper Floors

### 10.4

#### Structural Floor Boarding for Timber Upper Floors

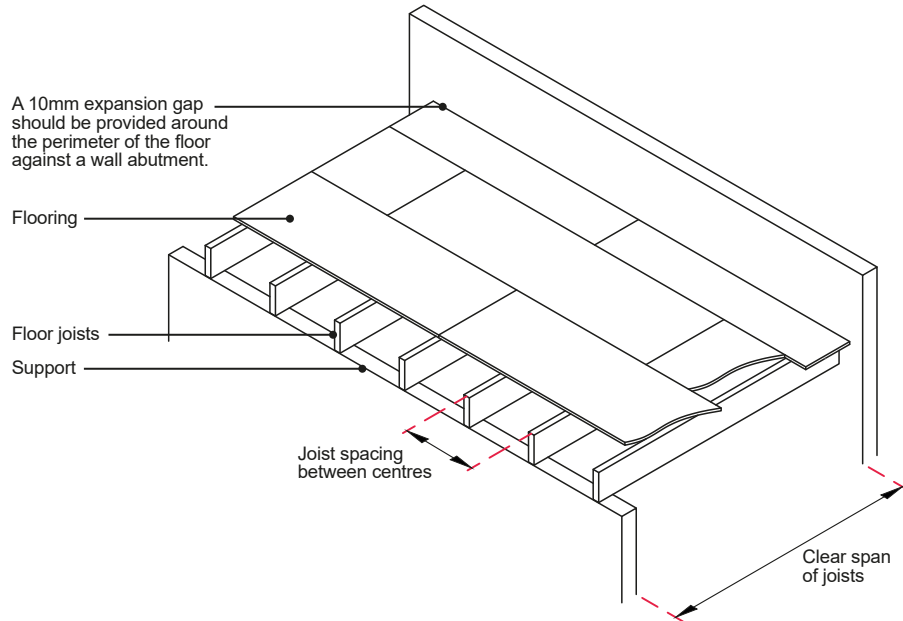
### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Details of proposed decking boards to be used including third party product approval certificate.
2. Details of type, size, spacing and method of fixing.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Floor joists arrangement



### Structural floor boarding

Suitable floor boards include tongue and grooved softwood flooring with a minimum moisture content at the time of fixing of between 16%-20% and in accordance with BS 1297. All boards must be double nailed or secret nailed to each joist using nails that are at least three times the depth of the board. Floor coverings should be fixed in accordance with BS 8103-3. Boards must have a minimum thickness, as indicated in this section.

### Softwood floor boarding: Minimum thickness and centres of support

Finished board thickness (mm)	Maximum centres of joist (mm)	Typical nail fixings (mm)
15	Max 450	45mm lost head nail
18	Max 600	60mm lost head nail

### Particle boarding

Acceptable particle boards consist of Oriented Strand Board (OSB) or chipboard. Chipboard should be tongue and grooved and all joints glued. The boards should be laid so that the shortest length is laid parallel to the span. OSB boards should be type 3 or 4 to BS EN 300, and should be laid with the major axis at right angles to the joists (the major axis is indicated on the OSB board by a series of arrows). Boards must have a minimum thickness, as indicated in the table below.

Particle boards should be either screwed or nailed to the joists at 250mm centres. Nails should be annular ring shanks that are at least three times the depth of the board.

A 10mm expansion gap should be provided around the perimeter of the floor against a wall abutment.

### Particle floor boarding: Minimum thickness and centres of support

Thickness (mm) (chipboard)	Thickness (mm) (OSB)	Maximum span (mm)	Typical nail fixing (mm)
18 and 19	15	450	60mm annular ring shank
22	18 and 19	600	65mm annular ring shank

### Floor boarding

Plywood flooring should be laid so that the grain within the face is at right angles to the supporting elements. The ends of joints should occur over joists or noggins. Fixings should be spaced at a maximum of 150mm around the outer perimeter of the boards, with fixings a maximum of 300mm apart at intermediate supports. An expansion gap a minimum of 2mm should be allowed between each panel.

### Plywood boarding: Minimum fixing nails

	Plain wire nails	Annular ring shank nails
Minimum diameter	3.35mm	3mm
Minimum length	65mm	50mm
Minimum penetration	40mm	32mm

### Sound resistance

Internal separating floors shall, where necessary, have adequate resistance to the transmission of sound.

All separating floors in England and Wales may be built in accordance with Robust Details and meet the requirements for resistance to the passage of sound in the relevant Building Regulations. Compliance with the relevant Building Regulations can be demonstrated by either:

Pre-completion testing (PCT) is required in the following situations:

- To all new build properties (including rooms for residential purposes), other than when the Developer has registered and built in accordance with Robust Details.
- Where the sound insulation construction is in accordance with the guidance given in the relevant Building Regulations for resistance to the passage of sound.
- Where the building is not built in accordance with the relevant Building Regulations.
- Where the requirements of the Robust Details system have not been met.

or

Robust details:

The use of robust details as a means of providing adequate sound insulation applies only to party walls and floors between different dwellings or flats. It is approved by Robust Details Ltd.

- The resilient insulation layers where required should be fitted as per manufacturer's instructions.
- The resilient layer and subsequent floor makeup should be suitable to support the design loads. Any point loads or additional loading may have special requirements.
- Floor makeup laid above a resilient layer must be isolated from the walls and skirtings by the insertion of a resilient layer to meet the requirements of the sound resistance design.

### Protection against damage and weather

Structural floor boards that are built in as the work proceeds and left exposed to the elements will be subjected to various issues, especially during prolonged periods of precipitation. As such, we require these floor boards for timber joists (both engineered and traditional) to have a third party approval certificate from a UKAS accredited body which covers weather resistance for the period of time the boards are to be left exposed on site. Any boards that are left exposed beyond the period stated in the third party approval certificate should be replaced. A third party product approval certificate for structural floor boarding for timber joists is required regardless of if the floor boards are to be left exposed.



# 10.

## Upper Floors

10.5  
Plaster Boarding for Timber  
Upper Floors

### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Details of proposed plasterboards to be used; type of board, thickness, number of boards to create the layer.
2. Details of mechanical fixings of plasterboards.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Plastered finishes

Workmanship of plastered finishes to ceilings should be applied to a certain standard to receive a suitable decorative finish. It should be durable enough to prevent surface cracking and, if applicable as part of the whole element, meet the required levels of fire and sound insulation in accordance with current Building Regulations.

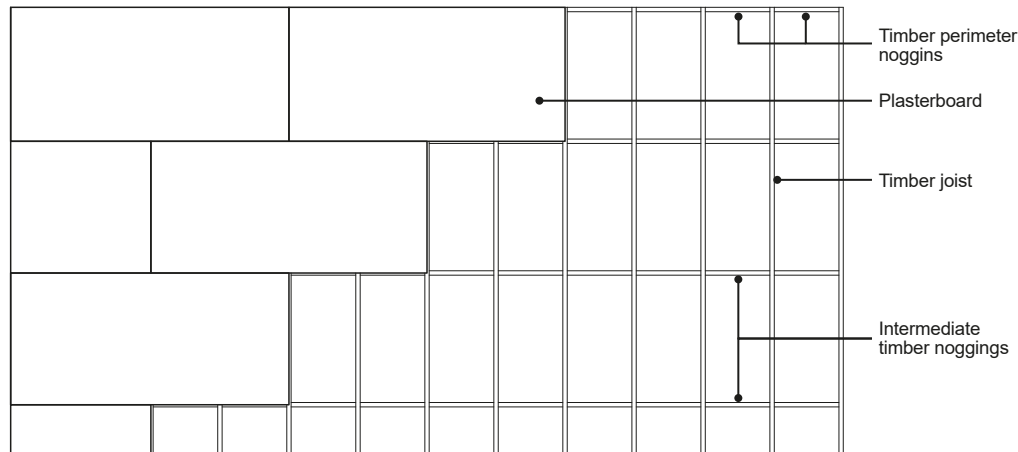
### Substrate and background

Plasterwork should be applied to suitable substrates. The substrate may also require additional sealing or bonding agents, in accordance with the requirements set out in BS 8481.

### Plaster mixes

Plaster mix ratios should be in accordance with manufacturer's recommendations and be appropriate for the intended use.

### Ceiling plan - plasterboard fixed to timber joists



### Minimum plaster thicknesses

The thickness of plaster will vary depending on the evenness of the substrate. The finished element must meet the tolerances identified in this Technical Manual, and be of a suitable quality so that a decorative finish can be applied. Minimum thickness should be in accordance with the table below.

Element	Minimum number of coats	Typical thickness
Ceiling - plasterboard	1	Skim to provide suitable and durable finish

### Support of plasterboard

Supports for plasterboard should be designed so that the following span limits are not exceeded:

Board thickness (mm)	Timber support centres (mm)	Intermediate noggings required	Perimeter noggings required*
9.5	400	No	Yes
	450	Yes	Yes
12.5	400	No	Yes
	450	No	Yes
	600	Yes	Yes
15	600	No	Yes

\* Fire resisting plasterboard should be fully supported at edges by noggings if the floor joist are not against the wall.

When fixing plaster boarding:

- Fix boards with decorative side out to receive joint treatment or a skim plaster finish.
- Lightly butt boards together and never force boards into position.
- Install fixings no closer than 13mm from cut edges and 10mm from bound edges.
- Position cut edges to internal angles whenever possible, removing paper burrs with fine sandpaper.
- Stagger horizontal and vertical board joints between layers by a minimum of 600mm.
- Locate boards to the centre line of framing where this supports board edges or ends.
- Fix to timber joists using dry-wall screws.

Gaps between boards should not exceed 3mm and consideration should be given to sealing all gaps to improve building air tightness.

# 10.

## Upper Floors

### 10.6

#### Suspended Beam and Block

### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Manufacturer's floor layout drawings and calculations.
2. Plan details showing dimensions, levels and locations of incoming service penetrations.
3. Details indicating the locations of all load and non-load bearing walls.
4. Manufacturer's third party certification for the proposed insulation to be used within the floor.
5. Details of underfloor heating systems where being used.
6. Third party certification for non-standard beam & block flooring.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Pre cast concrete floor units

Precast beams are proprietary products, which the design and construction are specific to the manufacturer of the product. Projects incorporating precast beams must be provided with full manufacturers design, structural calculations and specifications including fixings specific for the project.

Precast concrete units and infill blocks are to be carefully stored and handled on-site, preventing damage occurring before, during and after incorporation into the structure. Units should be lifted as near as possible to their ends.

The installation of pre cast concrete floor beams and blocks must follow the manufacturer's guidance and specification for the project.

The bearing surface of walls, beams and other supports to receive precast units are to be smooth and level.

Infill blocks and slabs should fully bear onto supporting beams and walls.

### Precast suspended beam and block floors

Ensure that precast concrete beam and block floors are fully supported by load-bearing walls.

Similar beams of the same size may have differing strength properties because of their varying reinforcement size, so it is important to check beam reference numbers and their layout. It is also essential sometimes to provide two or more beams adjacent to each other where spans are excessive or in heavily loaded areas. Suitable infill bricks or blocks are to be properly bedded on mortar and provided between pre cast (PC) beams where bearing onto supporting walls.

Beams and blocks are to be grouted together with a 1:6 cement to sand mix in accordance with the manufacturer's instructions.

Load-bearing walls are to continue through the beam and block floor.

Holes for service pipes are properly filled by laying non-timber formwork between PC joists and filling with good quality concrete (ST2 mix) prior to screeding.

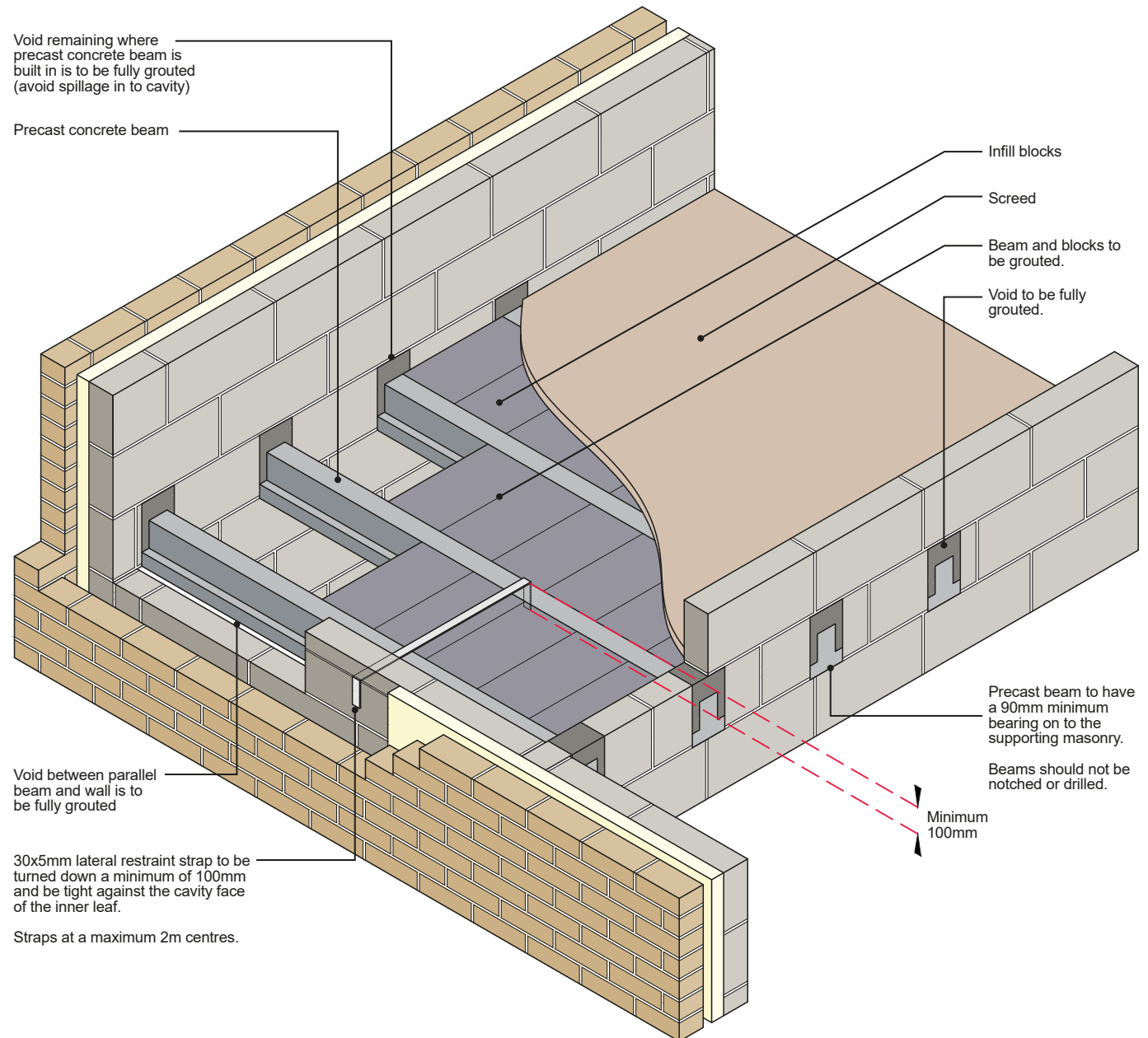
Beams should bear onto masonry with a minimum 90mm bearing, and steelwork with a minimum 70mm bearing.

Provide restraint straps to walls where the beams run parallel.

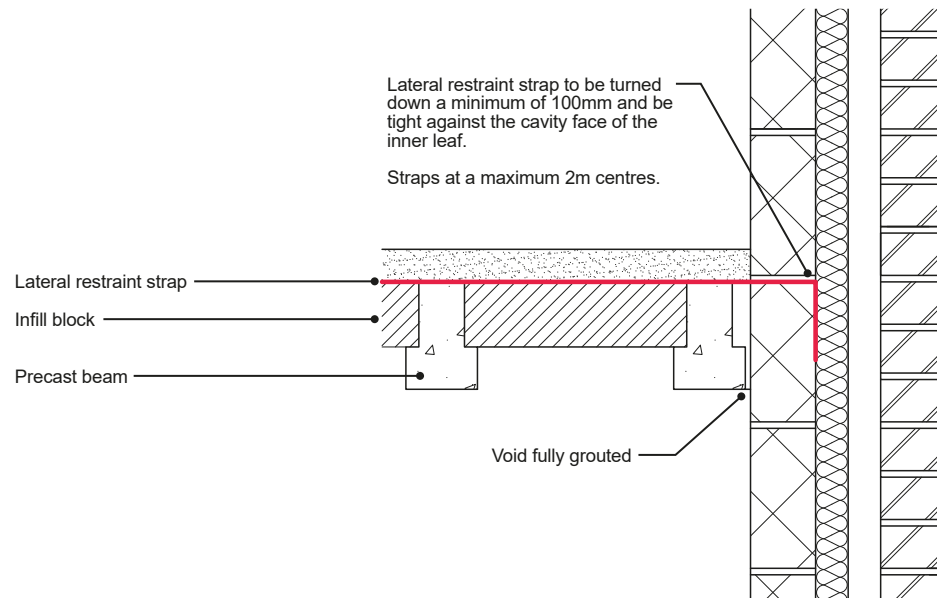
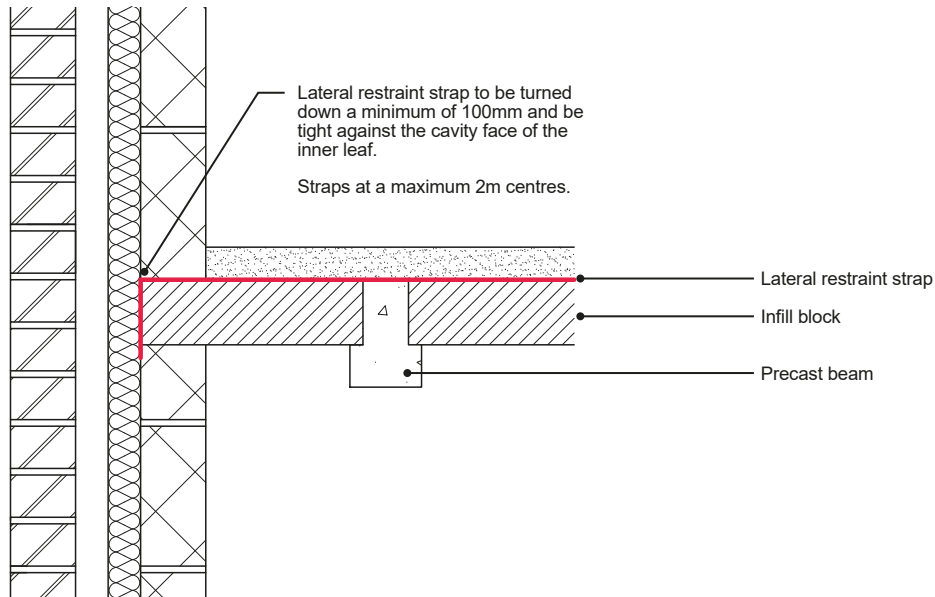
Ensure that the blockwork carrying the beam and block flooring has sufficient compressive strength.

### Levels

Precast beams or beam and block floor constructions must be laid reasonably level and onto suitable solid and level bearings.



### Lateral restraint of walls



### Restraint of walls

Walls should be adequately restrained at floors, ceilings and verges in accordance with the relevant Building Regulations.

Restraint can be provided by:

- Lateral restraint straps.
- Other forms of restraint proven by an Engineer.

### Lateral restraint straps

Beam and block floors should provide lateral restraint to all walls running parallel to them by means of 30mm x 5mm galvanised or stainless steel restraint straps at 2m maximum centres.

Straps need not be provided to floors at, or about, the same level on each side of a supported wall and in two storey dwellings where concrete floors have a minimum 90mm bearing on supported wall.

### Deflection of floors

For upper floors (intermediate floors), designers and engineers must observe our Tolerance requirements, for levelness of floors. Please refer to the 'Tolerances' section for further guidance.

There may be an instance where a joist might be designed to meet permissible deflections with a relevant British Standard; however, our Tolerances requirements will take precedence.

### Sound resistance

Internal separating floors shall, where necessary, have adequate resistance to the transmission of sound.

All separating floors in England and Wales may be built in accordance with Robust Details and meet the requirements for resistance to the passage of sound in the relevant Building Regulations. Compliance with the relevant Building Regulations can be demonstrated by either:

Pre-completion testing (PCT) is required in the following situations:

- To all new build properties (including rooms for residential purposes), other than when the Developer has registered and built in accordance with Robust Details.
- Where the sound insulation construction is in accordance with the guidance given in the relevant Building Regulations for resistance to the passage of sound.
- Where the building is not built in accordance with the relevant Building Regulations.
- Where the requirements of the Robust Details system have not been met.

or

Robust details:

The use of robust details as a means of providing adequate sound insulation applies only to party walls and floors between different dwellings or flats. It is approved by Robust Details Ltd.

- The resilient insulation layers where required should be fitted as per manufacturer's instructions.
- The resilient layer and subsequent floor makeup should be suitable to support the design loads. Any point loads or additional loading may have special requirements.
- Floor makeup laid above a resilient layer must be isolated from the walls and skirtings by the insertion of a resilient layer to meet the requirements of the sound resistance design.

### Plastered finishes

Workmanship of plastered finishes to ceilings should be applied to a certain standard to receive a suitable decorative finish. It should be durable enough to prevent surface cracking and, if applicable as part of the whole element, meet the required levels of fire and sound insulation in accordance with current Building Regulations.

### Substrate and background

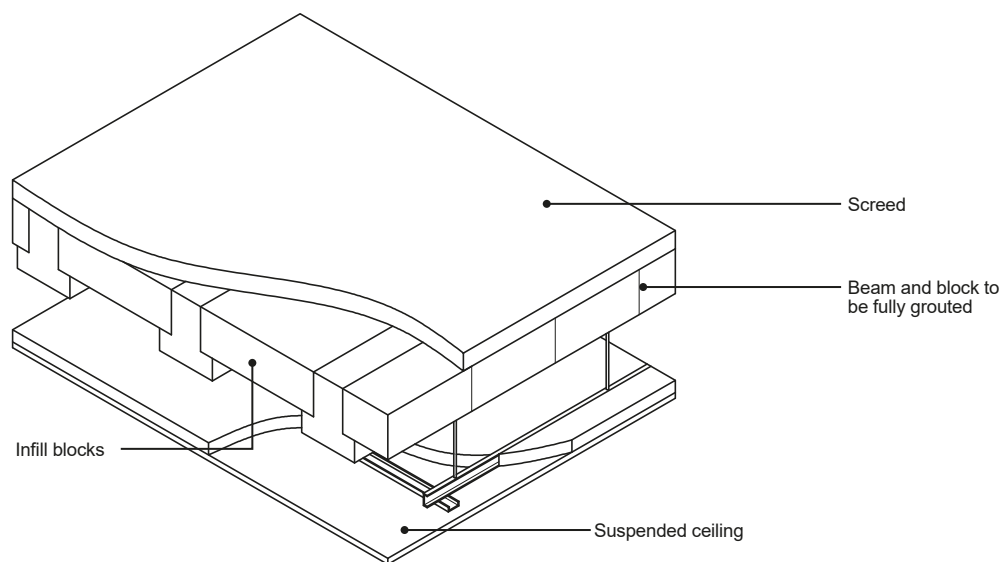
Plasterwork should be applied to suitable substrates. The substrate may also require additional sealing or bonding agents, in accordance with the requirements set out in BS 8481.

### Plaster mixes

Plaster mix ratios should be in accordance with manufacturer's recommendations and be appropriate for the intended use.

### Suspended ceilings

Suspended ceilings should be designed and constructed in accordance with BS EN 13964.



### Fixing requirements

Fixings should be appropriate for the site conditions and the loads to be supported. They must also be installed in accordance with the manufacturer's specifications. Fixings to suspended beam and blocks should be at the correct designated centres using the correct wires/brackets that are compatible with the suspended ceiling (and the intended environmental conditions). Pull tests should be carried out on ceilings with an area exceeding 100m<sup>2</sup> and a factor of safety of 2 is applicable.

Ceiling grid layouts and fixing schedule and method of fixing to soffit, should be provided.

Confirmation that the weight of the ceiling construction and any additional fire/sound insulation loads has been taken account of in the supporting structure design calculations.

Where there is any doubt regarding the adequacy or installation or variation from the initial design a manufacturer's inspection and certification will be required.

### High humidity or external environment or specialised conditions

Where the ceiling is above a high humidity area or is an external suspended ceiling; third party certification should be provided to demonstrate the product is suitable for the specified environment.

### Fire resistance

Where suspended ceilings are designed to give a minimum period of fire resistance, fire test certification will be required to confirm the periods of fire resistance given. This should also take into account any recessed light fittings which may bypass the fire resistant layer. Consideration should also be given to the quality of workmanship in these installations, and a manufacturer approved installer be used.

The additional weight of materials used to achieve fire resistant specifications or where sound insulation requirements occur must also be taken account of in the structural design of the supporting structure and the fixings of the ceiling construction.

### Minimum plaster thicknesses

The thickness of plaster will vary depending on the evenness of the substrate. The finished element must meet the tolerances identified in this Technical Manual, and be of a suitable quality so that a decorative finish can be applied. Minimum thickness should be in accordance with the table below.

Element	Minimum number of coats	Typical thickness
Ceiling - plasterboard	1	Skim to provide suitable and durable finish

### Support of plasterboard

Supports for plasterboard should be designed so that the following span limits are not exceeded:

Board thickness (mm)	Support centres (mm)	Intermediate support required	Perimeter support required
9.5	400	No	Yes
	450	Yes	Yes
12.5	400	No	Yes
	450	No	Yes
	600	Yes	Yes
15	600	No	No

When fixing plaster boarding:

- Fix boards with decorative side out to receive joint treatment or a skim plaster finish.
- Lightly butt boards together and never force boards into position.
- Install fixings no closer than 13mm from cut edges and 10mm from bound edges.
- Position cut edges to internal angles whenever possible, removing paper burrs with fine sandpaper.
- Stagger horizontal and vertical board joints between layers by a minimum of 600mm.
- Locate boards to the centre line of framing where this supports board edges or ends.

Gaps between boards should not exceed 3mm and consideration should be given to sealing all gaps to improve building air tightness.

# 10.

## Upper Floors

10.7  
Concrete Plank

### Provision of information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

1. Manufacturer's floor layout drawings and calculations.
2. Plan details showing dimensions, levels and locations of incoming service penetrations.
3. Details indicating the locations of all load and non-load bearing walls.
4. Manufacturer's third party certification for the proposed insulation to be used within the floor.
5. Details of underfloor heating systems where being used.
6. Third party certification for non-standard beam & block flooring.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Pre cast concrete floor units

Precast concrete floor units are proprietary products, which the design and construction are specific to the manufacturer of the product. Projects incorporating precast concrete planks must be provided with full manufacturers design, structural calculations and specifications including fixings specific for the project.

Precast concrete units are to be carefully stored and handled on-site, preventing damage occurring before, during and after incorporation into the structure. Units should be lifted as near as possible to their ends.

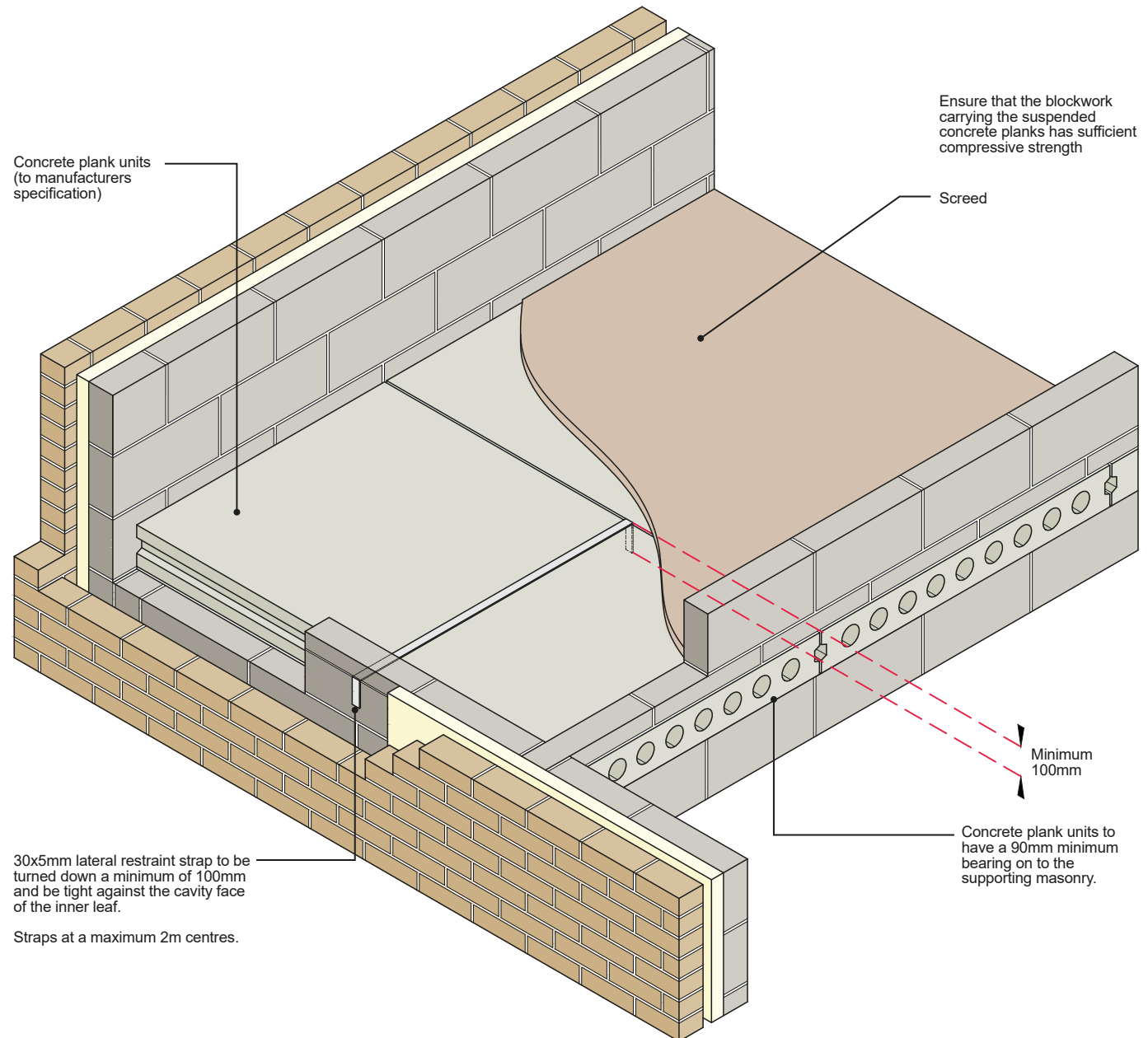
The installation of precast concrete floor units must follow the manufacturer's guidance and specification for the project.

The bearing surface of walls, beams and other supports to receive precast units should be smooth and level.

Infill blocks and slabs should fully bear onto supporting beams and walls. Ensure that precast suspended concrete plank floors are fully supported by load-bearing walls.

It is important to check the plank reference numbers and their layout. Similar units of the same size may have differing strength properties because of their varying reinforcement size, so it is important to check unit reference numbers and their layout. Suspended concrete planks should be grouted in accordance with the manufacturer's instructions ensuring the correct strength and aggregate size is used.

Holes for service pipes are to be properly filled by laying non-timber formwork between PC joists and filling with good quality concrete (ST2 mix) prior to screeding.

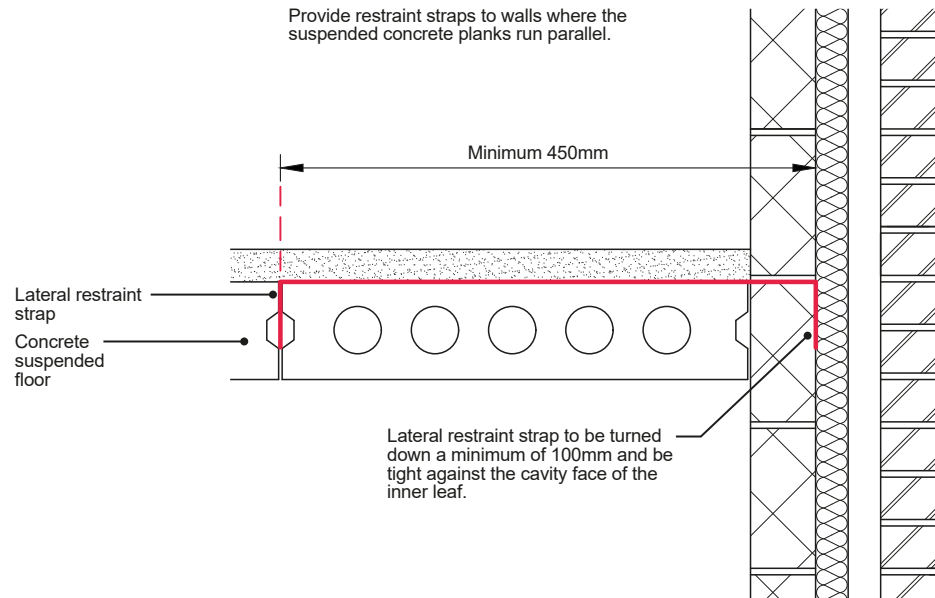
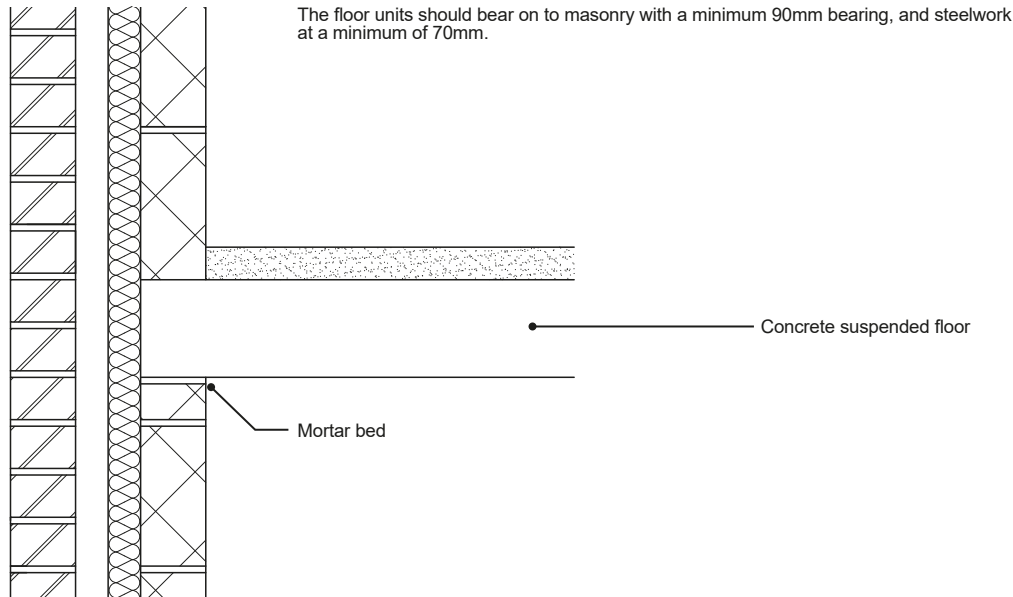


30x5mm lateral restraint strap to be turned down a minimum of 100mm and be tight against the cavity face of the inner leaf.

Straps at a maximum 2m centres.



### Lateral restraint of walls



### Restraint of walls

Walls should be adequately restrained at floors, ceilings and verges in accordance with the relevant Building Regulations.

Restraint can be provided by:

- Lateral restraint straps.
- Other forms of restraint proven by an Engineer.

### Lateral restraint straps

Concrete plank floors should provide lateral restraint to all walls running parallel to them by means of 30mm x 5mm galvanised or stainless steel restraint straps at maximum 2m centres.

Straps need not be provided to floors at, or about, the same level on each side of a supported wall and in two storey dwellings where concrete floors have a minimum 90mm bearing on supported wall.

### Deflection of floors

For upper floors (intermediate floors), designers and engineers must observe our Tolerance requirements, for levelness of floors. Please refer to the 'Tolerances' section for further guidance.

There may be an instance where a joist might be designed to meet permissible deflections with a relevant British Standard; however, our Tolerance requirements will take precedence.

### Sound resistance

Internal separating floors shall, where necessary, have adequate resistance to the transmission of sound.

All separating floors in England and Wales may be built in accordance with Robust Details and meet the requirements for resistance to the passage of sound in the relevant Building Regulations. Compliance with the relevant Building Regulations can be demonstrated by either:

Pre-completion testing (PCT) is required in the following situations:

- To all new build properties (including rooms for residential purposes), other than when the Developer has registered and built in accordance with Robust Details.
- Where the sound insulation construction is in accordance with the guidance given in the relevant Building Regulations for resistance to the passage of sound.
- Where the building is not built in accordance with the relevant Building Regulations.
- Where the requirements of the Robust Details system have not been met.

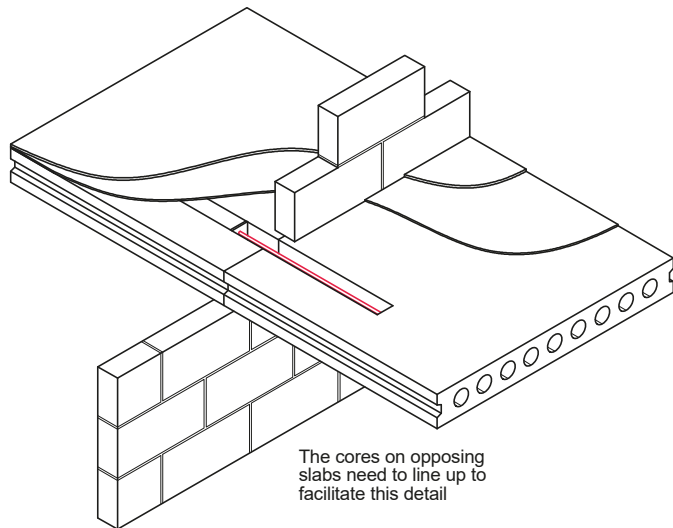
or

Robust details:

The use of robust details as a means of providing adequate sound insulation applies only to party walls and floors between different dwellings or flats. It is approved by Robust Details Ltd.

- The resilient insulation layers where required should be fitted as per manufacturer's instructions.
- The resilient layer and subsequent floor makeup should be suitable to support the design loads. Any point loads or additional loading may have special requirements.
- Floor makeup laid above a resilient layer must be isolated from the walls and skirtings by the insertion of a resilient layer to meet the requirements of the sound resistance design.

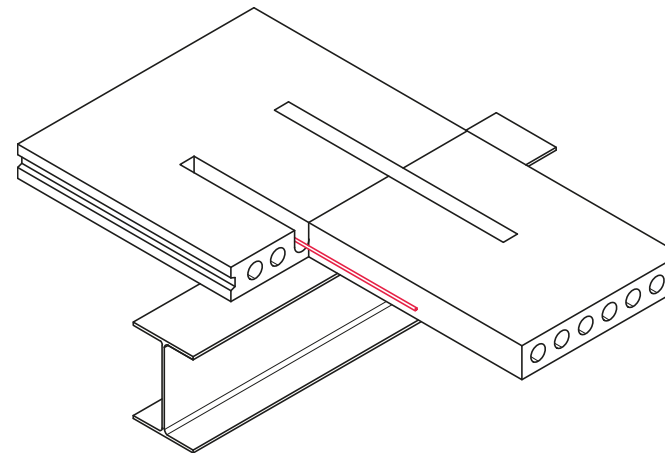
## Narrow wall bearing



Generally for walls narrower than 190mm the slabs should be tied together in accordance with the manufacturer's instructions.

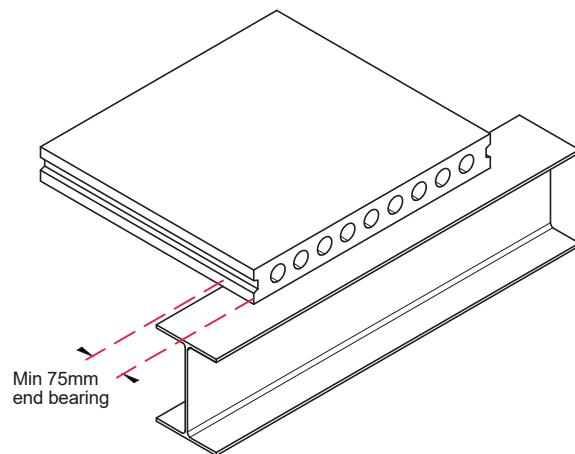
Typically this is achieved by two cores per 1200mm wide slab are formed open so that a reinforcement bar can be inserted across to form the tie detail, however this should be constructed in accordance with the manufacturer's site specific design.

## Continuity over steelwork



When continuing over steel work the slabs may also require tying together in accordance with the manufacturers recommendations.

## Bearing on top of steelwork

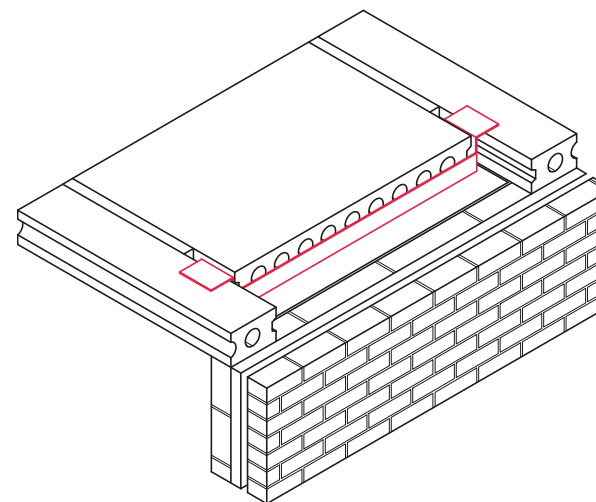


A minimum of 75mm bearing should be provided on steel beams. Planks may require mechanical restraint to the steel beam in accordance with the manufactures specification.

Steel beams should be designed by a suitably qualified structural engineer and should have appropriate fire resistance to meet the requirements of the relevant Building Regulations.

Where steel beams and columns are used to support the upper floor construction on a project in a coastal location, and maybe exposed to an aggressive external environment (e.g. undercroft), please follow the requirements for additional corrosion protection in 'Appendix B - Coastal Locations' and 'Appendix C - Materials, Products, and Building Systems'.

## Holes and notches



Openings to accommodate service voids and column notches should be preformed. Large openings may require steel trimming supports. Holes of less than 100mm can be formed on site in accordance with the manufactures design.

All holes/openings should be in accordance with the manufacturers design.

### Plastered finishes

Workmanship of plastered finishes to ceilings should be applied to a certain standard to receive a suitable decorative finish. It should be durable enough to prevent surface cracking and, if applicable as part of the whole element, meet the required levels of fire and sound insulation in accordance with current Building Regulations.

### Substrate and background

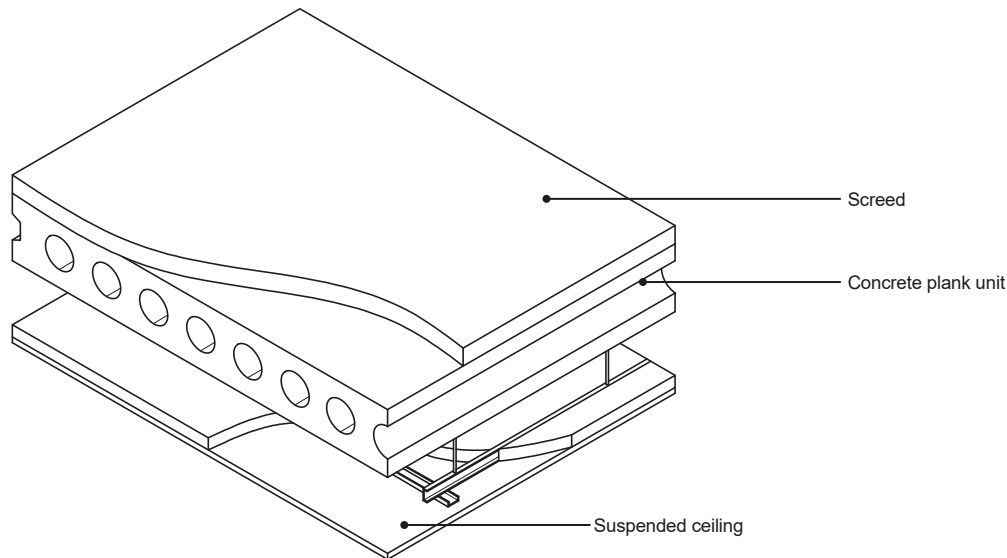
Plasterwork should be applied to suitable substrates. The substrate may also require additional sealing or bonding agents, in accordance with the requirements set out in BS 8481.

### Plaster mixes

Plaster mix ratios should be in accordance with manufacturer's recommendations and be appropriate for the intended use.

### Suspended ceilings

Suspended ceilings should be designed and constructed in accordance with BS EN 13964.



### Fixing requirements

Fixings should be appropriate for the site conditions and the loads to be supported. They must also be installed in accordance with the manufacturer's specifications. Fixings to the concrete plank should be at the correct designated centres using the correct wires/brackets that are compatible with the suspended ceiling (and the intended environmental conditions - see below). Pull tests should be carried out on ceilings with an area exceeding 100m<sup>2</sup> and a factor of safety of 2 is applicable.

Ceiling grid layouts and fixing schedule and method of fixing to soffit, should be provided.

Confirmation that the weight of the ceiling construction and any additional fire/sound insulation loads has been taken account of in the supporting structure design calculations.

Where there is any doubt regarding the adequacy or installation or variation from the initial design a manufacturer's inspection and certification will be required.

### High humidity or external environment or specialised conditions

Where the ceiling is above a high humidity area or is an external suspended ceiling; third party certification should be provided to demonstrate the product is suitable for the specified environment.

### Fire resistance

Where suspended ceilings are designed to give a minimum period of fire resistance, fire test certification will be required to confirm the periods of fire resistance given. This should also take into account any recessed light fittings which may bypass the fire resistant layer. Consideration should also be given to the quality of workmanship in these installations and a manufacturer approved installer be used.

The additional weight of materials used to achieve fire resistant specifications or where sound insulation requirements occur must also be taken account of in the structural design of the supporting structure and the fixings of the ceiling construction.

### Minimum plaster thicknesses

The thickness of plaster will vary depending on the evenness of the substrate. The finished element must meet the tolerances identified in this Technical Manual, and be of a suitable quality so that a decorative finish can be applied. Minimum thickness should be in accordance with the table below.

Element	Minimum number of coats	Typical thickness
Ceiling - plasterboard	1	Skim to provide suitable and durable finish

### Support of plasterboard

Supports for plasterboard should be designed so that the following span limits are not exceeded:

Board thickness (mm)	Support centres (mm)	Intermediate support required	Perimeter support required
9.5	400	No	Yes
	450	Yes	Yes
12.5	400	No	Yes
	450	No	Yes
	600	Yes	Yes
15	600	No	No

When fixing plaster boarding:

- Fix boards with decorative side out to receive joint treatment or a skim plaster finish.
- Lightly butt boards together and never force boards into position.
- Install fixings no closer than 13mm from cut edges and 10mm from bound edges.
- Position cut edges to internal angles whenever possible, removing paper burrs with fine sandpaper.
- Stagger horizontal and vertical board joints between layers by a minimum of 600mm.
- Locate boards to the centre line of framing where this supports board edges or ends.
- Fix using dry-wall screws.

Gaps between boards should not exceed 3mm and consideration should be given to sealing all gaps to improve building air tightness.

# 10.

## Upper Floors

### 10.8

#### General Requirements for Concrete Upper Floors

### Provision of Information

A full set of design drawings and specifications shall be made available to the Warranty Provider and all other interested parties prior to the associated works starting on site. This may include:

- Details of proposed floor screeds including thickness and mix.
- Details of substrates to which the screeds will be laid upon.
- Details of proposed curing times and environmental constraints.
- Details of services within the floor, including underfloor-heating.

The Warranty Surveyor, at their discretion, may also request supporting information that demonstrates suitability for use of any materials or systems contained within the above.

### Floor screeds

Traditional floor screeds consist of sand and cement. If the ratios and properties of these screeds are not correctly controlled; cracking, peeling or collapse of the screed will occur (due to being too strong/weak).

Proprietary screeds typically are pre-blended to achieve greater consistency and strength and more suitable over larger areas. As such where the floor area exceeds 50m<sup>2</sup> only a proprietary screed installed by the screed manufacturers trained installers will be accepted.

Screeds should be fit for purpose, have a suitable finish and be of an appropriate thickness.

### Curing

Screeds should be cured naturally and should not be covered for at least three weeks.

### Background surfaces

Background surfaces where screeds are being supported should meet the following requirements:

- **Bond**  
Background surfaces for bonded screeds should provide an adequate mechanical key. If necessary, cement grouting or a bonding agent should be specified to provide adequate adhesion. Where bonded screeds are used, mechanical means of preparing the concrete should be used to create an adequate bond between the substrate and the screed.
- **Moisture protection**  
The floor design should ensure that moisture from the ground does not enter the dwelling.
- **Adequate support**  
Substrate structures must be adequately constructed to provide adequate support to the screed. (Note: Timber floor constructions are not suitable to support screeded finishes.)
- **Screed mix**  
Cement and sand screeds should have a mix ratio of between 1:3 and 1:4½.

Proprietary additives should have been assessed and have third-party certification.

### Screed thickness requirements

The minimum thicknesses of screeds are as follows:

Surface	Minimum thickness at any point (mm)
Laid monolithically with base	12
Laid and bonded to a set and hardened base	20
Laid on a separating membrane (e.g. 1000g polyethylene)	50
Laid on resilient slabs or quilts (screed reinforced with galvanised wire mesh)	65

Where service pipes are bedded in the screed, the screed should be deep enough to provide at least 25mm of screed cover over service pipes, insulation and reinforcing.

### Maximum areas of screed

Screeds should be laid room by room. Unreinforced screeds should have a maximum area of 40m<sup>2</sup>. Expansion joints should be provided and consistent with joints in the floor slab below.

### Finishing of screeds

Screed should provide an even surface as appropriate, as defined in the 'Tolerances' section. Concrete floor slabs may be suitably finished to serve directly as a wearing surface without the need for an additional topping, in accordance with the recommendations of BS 8204. If required, surface sealers or hardeners should only be used in accordance with the manufacturer's instructions.

### Anhydrite screeds

If an anhydrite screed is used, it must be sealed before the application of any cement based floor finish adhesive is proposed. Anhydrite screeds can be difficult to identify once laid, if the screed type cannot be identified the screed should be fully sealed as a precaution to prevent the possibility of the floor finish adhesive de-bonding from the screed.

The floor screed should be fully dry before the sealant is applied. The screed drying time will depend on the thickness and type of screed.

A decoupling membrane is also recommended as this can reduce the stress on the fixed floor finish layer.

### Insulation

Insulation below screeds should have enough compressive strength to support the screed. DPM's should be installed in the correct positions, as indicated by the insulation manufacturer's instructions. Sound insulation should be installed in accordance with the manufacturer's instructions.

Constructing screeds over all substrates:

- Substrates must be level with no pockets or high spots to ensure the thickness of the screed remains even.
- Where screeds are laid over insulation; the insulation must be tightly butted together and level.
- Screeds must be correctly mixed.
- Screeds must not be walked on during the drying period.
- Screeds must not be constructed during cold periods (below 5 degrees).
- Movement joints will be required across door thresholds.
- Movement joints are required if bay sizes exceed 40m<sup>2</sup> with a maximum of 8m on any one side.
- Movement joints are also required where joints exist or a change of span occurs e.g. beam and block floors.
- The screed must be ready to accept any floor finishes (see guidance below for over insulated substrates).

### Drying times

- With cementitious levelling screeds, one day should be allowed for each millimetre of thickness for the first 50 mm, followed by an increasing time for each millimetre above this thickness (BS 8204).
- Polymer modified screeds: strictly follow the manufacturer's specifications and recommendations.
- The developer should keep an accurate record of the screed drying times elapsed before any fixed floor finish is constructed on top is laid and the Warranty Surveyor may ask for this information.

Note: The moisture contents of levelling screeds onto which particular floorings are to be laid and methods for measuring moisture content are given in BS 5325, BS 8201, BS 8203 and BS 8425.

### Building services

Where building services pass through the screed e.g. underfloor heating, allowance should be made for thermal movement between the screed and the service (so that service pipes can resist chemical attack from the screed).

### Additional steps where constructing screeds over concrete substrates

Where a concrete slab is insulated from below and a finishing screed is required to the top surface:

- The concrete substrate slab must be of the correct thickness and not less than 100mm thick.
- Concrete substrate must be adequately dried out and not wet. See drying time guidance.
- Surfaces of hardened in situ concrete bases for bonded screeds should be roughened (Scrabbled) and cleaned to remove laitance and to expose cleanly, but not loosen, the coarse aggregate particles.
- Brushing to remove laitance from a fresh concrete base is inadequate preparation before laying a bonded screed and is not recommended.
- Remove all loose debris, dirt and dust by appropriate means, preferably with vacuum equipment.
- Carry out the preparation of the surface with as little delay as is practicable before the screed is laid so as to reduce the risk of contamination.
- The surface of the prepared slab must be reasonably level to avoid deviations in thickness's of the screed.

### Constructing screeds over insulated substrates with under floor heating (UFH) system

#### 1. Provision and construction of movement joints

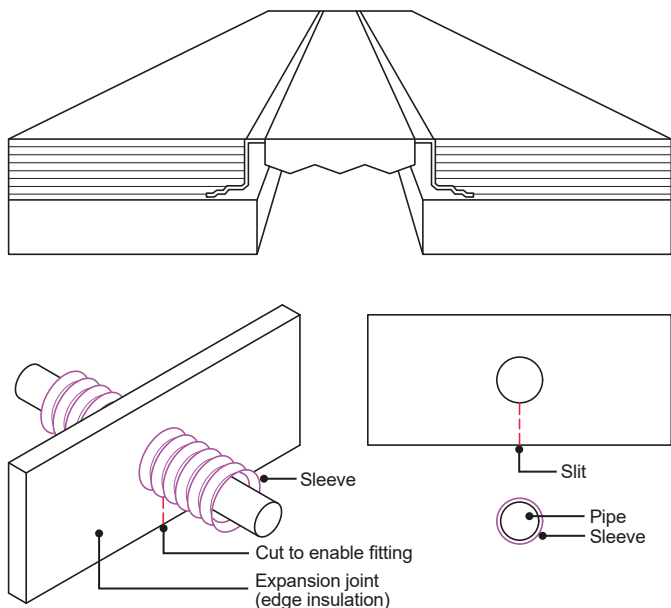
Movement joints should be provided in the floor screed / fixed floor finish where floor heating is provided in the following places:

- Between independently controlled heating zones.
- Between heated and unheated areas of screed.
- Additional joints should be considered in areas of high thermal gain e.g. large conservatories or glass atria.

Bay joints should be formed using rigid joint formers where possible, which can be placed during the preparation phase and will remain in place during operation. The joint former should be 5mm lower than the finished screed depth to allow a smooth transition in height between bays.

- All joints in the screed should extend through to any subsequent bonded floor covering.
- Joint positions should be specified prior to the installation of the screed and full consultation between all parties including the main contractor, underfloor heating installer, finished flooring installer and the screed installer should take place to determine appropriate locations.
- Movement joints should be carried through the subfloor to the floor finish and all applied layers terminated either side of the joint.
- The joint should be filled with a suitable flexible filler and a proprietary cover strip applied to cover the joint. Grout must not be used.
- Movement joints should not be bridged by any resilient, textile or other adhered floor finish.
- Movement joint covers may be flush, surface mounted or bedded in mortar and metal, metal with a rubber insert or PVC (see typical detail below).

#### Typical movement joint covers



#### 2. Provision of edge strip perimeter expansion joint

When incorporating under floor heating (UFH):

- Screeds should be isolated at all edges, abutments and columns to allow for movement due to thermal loadings.
- The floor screed and finished floor manufacturers guidance to be followed particularly when incorporating under-floor heating to determine the minimum thickness of edge strip required to allow for expansion. Typically, between 6-15mm may be required.
- The joint can be concealed by the skirting.
- These joints must be left empty, or else filled with a compressible material.
- Movement joints must not be filled with grout.

#### 3. Screed drying time

- The drying time allowed must be calculated for the proposed depth of screed, taking account of the environmental conditions present e.g. temperature and humidity. Where polymer modified type screeds are being used the manufacturer's requirements must be strictly followed for the actual depth of screed. Surface finishes placed on a screed too early will fail.
- Drying times for polymer modified screeds could potentially be different to cementitious screeds.
- All subcontractors involved with the screed and floor finishes (including installation of underfloor heating systems) must follow the installation requirements and not deviate or change materials.
- The screed should not be walked on until fully cured.

#### 4. UFH testing and commissioning

- Ensure there are no joints in the heating system loops.
- UFH systems should be commissioned before floor finishes are applied. This will add to the total time before any floor finish can be applied. Note: If floor finishes are installed prior to the UFH being turned on and commissioned, any residual moisture in the floor is driven to the surface of the screed and can potentially cause delamination of the floor finish.
- Pressure testing of the system does not constitute commissioning of the system. The heat source has to be in place and operating in order to deliver the correct temperatures.
- The UFH system must be commissioned in accordance with the manufacturer's recommendations by their approved installers. A commissioning certificate will be required.

#### 5. Moisture testing of the screed where floor finishes are proposed

- Moisture testing should be carried out after the commissioning of the UFH system but before any floor finishes are laid.
- Where UFH is not installed, moisture testing of the screed should still be carried out before floor finishes are installed.
- Moisture testing is carried out using a suitable approved method such as a flooring hygrometer or carbide bomb test. Due to the potential inaccuracies of using hygrometers at high humidity levels, a direct measurement should be used such as Carbide Bomb or oven dried sample.
- The base is deemed to be sufficiently dry when the relative humidity, as measured by a surface mounted flooring hygrometer/probe is 75% RH or less. For the use of a flooring hygrometer, reference should be made to Dampness testing in BS 5325, BS 8203, BS 8425 and BS 8201.
- If underfloor heating is present in the base, the heating must be switched off 96 hours prior to any hygrometer test being carried out.
- The hygrometer must be allowed to remain in position until full equilibrium has been established. This is generally considered to be 72 hours but could be longer over thick sections and considerably longer on power floated concrete.

#### 6. Screed preparation for finishes

- The top surface of screeds may require to be scored, sanded or keyed in preparation to accept the primer and floor finish.
  - Sanding, keying etc. of the screed surface allows the penetration of primers. It also provides a "key" for the adhesive to grip onto.
  - The surface must then be cleared of dirt and debris prior to primers being applied.
  - Any primers and adhesives must not be applied until the screed has fully hardened and dried out. Drying times vary depending on the type of screed.
  - Surfaces to receive fixed floor finishes should be rigid, dimensionally stable, flat with no dips and rises, sound, clean and free from laitance, paints, salts, grease, dust and any contamination which may prevent adhesion.
7. Adhering to the manufacturers' process during the installation of the flooring finish.

All the relevant manufacturers recommendations should be followed which will identify timelines to adhere i.e:

- Removing the laitance by sanding to provide a key for the primer and/or adhesive.
- Commissioning the underfloor heating before installing the fixed floor finish.
- Allowing the UFH system to cool down for at least 48 hours before installing the fixed floor finish.
- Moisture testing to confirm the dryness of the screed before installing the fixed floor finish.
- Ensuring the time from screed completion to installing the fixed floor finish commencement is calculated and adhered to.
- Ensure the fixing of the finished floor finish has stabilized before walking on. Some finishes require typically 12 -24 hours dependent on environmental conditions.
- Ensure the UFH system is not turned on for at least 48 hours after any adhered floor finish is completed.
- If an anhydrite screed is used, it must be sealed before the application of a cement based floor finish adhesive if proposed in conjunction with a finished floor surface covering.

#### 8. Exceeding the Maximum 27°C floor temperature

The underfloor heating system must be correctly commissioned to ensure temperature fluctuations are avoided and potential damage to the floor finishes.

BS 8203 Code of Practice for the Installation of Resilient Floor Coverings states: When used with many flooring materials underfloor heating can cause problems if the temperature at the interface between the subfloor and flooring exceeds 27°C, or is subject to rapid fluctuations in temperature.

Where a resilient floor covering is proposed: 'the temperature should never exceed the agreed maximum of 27°C at the underside of the floor covering (the adhesive line).

Note: UFH designers may refer to this as the 'interface' temperature.

Please Note: BS EN 1264 - 2 refers to a max 29°C however for Warranty purposes a maximum 27°C is to be followed.

#### 9. End user information

End users must be aware of how to use an UFH system, as these need to be operated differently than other heating systems both for in use and to avoid damage to screeds and finishes.

# 10.

## Upper Floors


### 10.9


#### General Requirements - Cavity Barriers and Fire Stopping

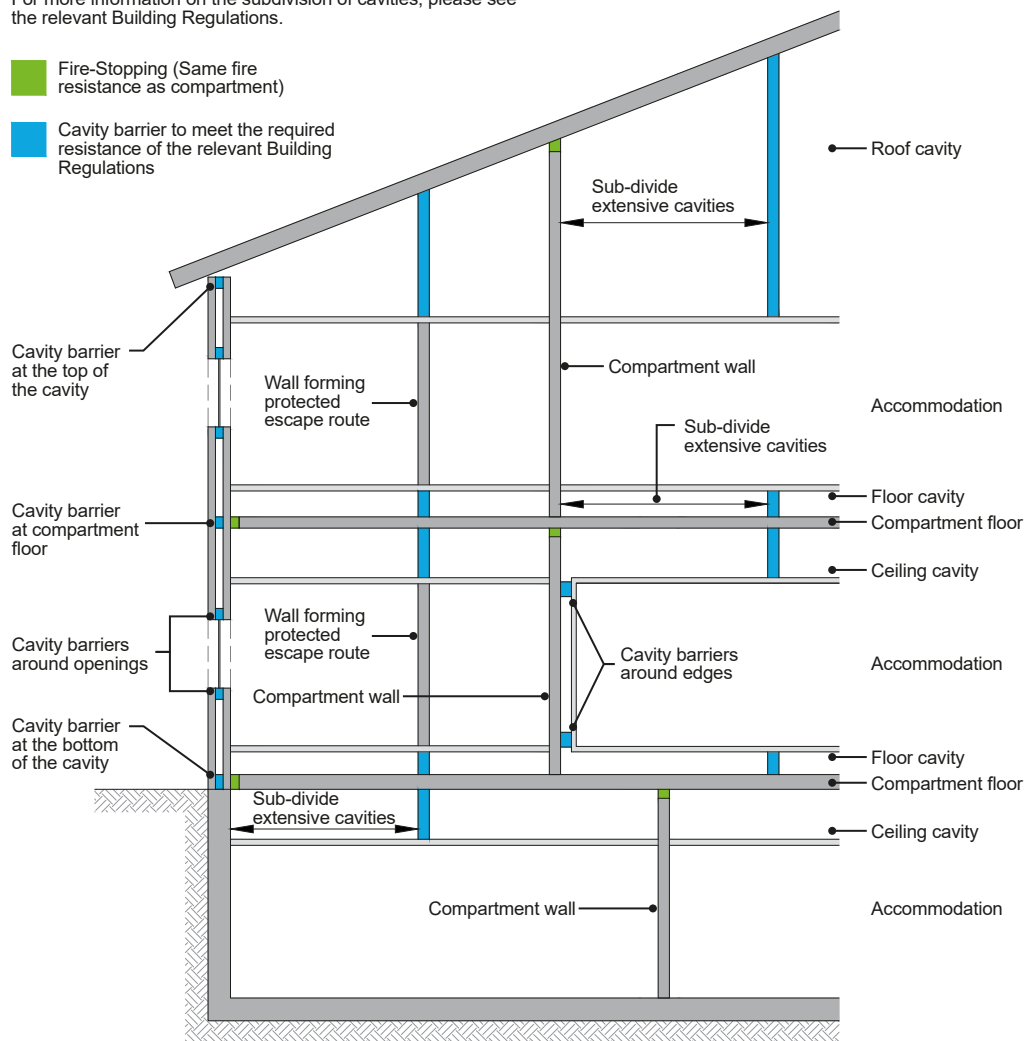


### Provisions for cavity barriers and fire stopping

For more information on the subdivision of cavities, please see the relevant Building Regulations.

 Fire-Stopping (Same fire resistance as compartment)

 Cavity barrier to meet the required resistance of the relevant Building Regulations



Note: Diagrams courtesy of the approved documents for England

### Fire resistance general

All floors should have the fire resistance required by the relevant Building Regulations. To achieve the same fire resistance, I-joists and metal web joists may require a different specification for the ceiling than that for solid timber joists. Holes should not be made in the ceilings, e.g. for down lighters, unless it can be proven that the floor construction achieves the required fire resistance.

### Fire stopping

Penetrations in floors between buildings shall be fire stopped, there are to be no holes or gaps for smoke to pass through once the fire stopping has been fitted. Where down lighters are incorporated in a ceiling they should be fitted in accordance with the manufacturer's instructions.

### Further additional requirements for internal fire stopping and fire protection for compartment floors, walls, and roof junctions to flats and apartments with a floor 4.5m or more above the ground

The following additional guidance applies to internal fire stopping and fire protection only to buildings with a floor 4.5m or more above the ground that contain flats or apartments.

Although building legislation is robust in applying provisions for fire protection and fire stopping, it can often be difficult to implement high standards of fire stopping in complex buildings. This can lead to significant safety risks if the building does not have the correct levels of fire protection and if holes in compartment walls are not sealed correctly. This guidance assists Developers in providing good standards of fire stopping and fire protection.

It is not the intention to enhance the requirements of the Building Regulations, but more to ensure that the statutory requirements are applied correctly to the construction. It is therefore deemed that the requirements of Part B of the Building Regulations in England and Wales, or Section 2 of the Scottish Building Standards (whichever is appropriate depending on region), that apply to fire stopping, separating walls, service penetrations, minimum periods of fire resistance and concealed spaces will also meet the requirements of this guidance.

#### Openings for pipes in fire resisting floors

Pipes which pass internally through fire resisting floors must not compromise the required fire resistance of the element through which they pass. As a minimum, openings through floors should be as few as possible in number, as small as practicable in size and fire-stopped to the surrounding construction. For pipes passing through compartment floors, guidance supporting the Building Regulations in the relevant UK nation will need to be consulted for additional provisions.

#### 1. Fire stopping

##### Design information

Drawings showing the lines of compartmentation and the lines of fire-resisting construction should be provided to the Surveyor and the Builder. The drawings should also give the required level of fire resistance for each element. Drawings to show the position of cavity barriers should be provided, and the specification of cavity barriers included.

##### Materials for fire stopping and cavity barriers

All materials used to form a fire barrier must have relevant third-party certification or be CE marked in accordance with the Construction Products Regulations. The materials must be installed in accordance with the manufacturer's instructions and recommendations.

##### Installation

The fire stopping material or cavity barriers should be installed by a person who is deemed competent to install such products. A competent person is deemed to be a third-party approved contractor specialising in fire stopping and passive fire protection.

#### 2. Fire protection in buildings

##### Design information

The design details must show the correct level of fire resistance for the building, in accordance with Part B of the Building Regulations or Section 2 of the Scottish Building Standards, depending on region.

##### Materials for fire protection

All materials used to form a fire barrier must have relevant third-party certification, or be CE marked in accordance with the Construction Products Regulations. The materials must be installed in accordance with the manufacturer's instructions and recommendations.

##### Installation

The fire stopping material or cavity barriers should be installed by a person who is deemed competent to install such products.

Where intumescent paints are used to provide the required level of fire protection, certification confirming that the paint applied will achieve the correct level of fire protection is required.



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