Introduction

This section provides guidance on meeting the performance requirements for open light gauge steel frame (LGSF) panels which are manufactured off-site under factory conditions. For guidance on closed panel LGSF systems, please refer to the 'MMC Systems' section.

6.3.1 Compliance

The design, specification and erection of Light Gauge Steel Frame panels shall meet the performance requirements of this section.

6.3.2 Information to be provided

The Designer shall provide sufficient design details to demonstrate it meets the performance requirements of this section.

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

1. SCI stage 1 certificate, or evidence of a third party system approval (UKAS or equivalent).
2. Evidence of an ISO 9001 Quality management system covering the manufacturing of the panels including the material supply chain.
3. A full set of detailed drawings, including:
    a. Plan layouts indicating dimensions.
    b. Elevations with dimensions shown.
    c. Junction details showing position of DPCs, cavity trays, other building elements such as roofs, floors etc.
    d. Detailed drawings showing base rail levels in relation to external ground levels for all elevations.
4. Details of proposed breather membranes and VCLs to be used.
5. Engineers drawings, calculations and fixing schedules for each connection made on site (e.g. framing, sheathing, structural connections, membranes etc.) including size, type, number, spacing, method of fixing. Details of the corrosion protection of the fixing should also be provided.
6. Details relating to the securing and fixing of the panels to the substructure and between panels.
7. Details relating to the galvanisation coating of the frame, taking consideration of the anticipated exposure rating and potential aggressive meteorological environments.
8. Details of proposed cavity barriers including location, materials and technical assessments (third party product conformity certificate).
9. Details of any cladding material fixed back to the LGSF including type, size and location of fixings. Where masonry cladding is present on the external leaf, details of wall tie and movement joint provision.
10. Where insulation in the external wall makeup are to be fitted on site we would require details of proposed insulation to be used.
11. A condensation risk analysis should be provided for the external wall makeup.

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.

6.3.3 Structural design requirements

Load bearing LGSF panels shall:

- Meet the requirements of relevant standards.
- Be durable.
- Safely support and transmit intended loads to the foundations without undue movement.

A comprehensive full structural design specification and supporting calculations for each house type on the proposed project should be provided.

The structural design, specification and supporting calculations should be in accordance with the relevant parts of BS EN 1993 with dead, imposed, wind and snow loads calculated in accordance with:

- BS EN 1991-1-1
- BS EN 1991-1-3
- BS EN 1991-1-4

Please note we do not accept LGSF systems which rely on racking resistance of the sheathing board. Engineers Design Philosophy must clearly identify how lateral stability will be achieved by the steel frame design. This Engineers Design Philosophy should confirm that the stability system can resist the full horizontal wind and notional loadings, without any assistance from the sheathing board.

Wall panels may provide resistance to racking forces using one or more of the following techniques:

- Internal bracing.
- Cross flat bracing.
- Rigid frame action.

6.3.4 Certification

LGSF systems shall be provided with an SCI stage 1 certificate, or evidence of a third party system approval (UKAS or equivalent).

In addition to the SCI stage 1 certificate or third party system approval:

- A valid ISO 9001 Quality Assurance Certification (or equivalent) held by the Manufacturer, covering the manufacture of their product/ system should be provided.
- The manufacturer should demonstrate compliance with BS EN 1090 for factory production control and provide a declaration of performance certificate.

Please note, actual wall makeup, components, individual products used for the external waterproof, thermal and fire resistant envelope, are outside the scope of the SCI Stage 1 assessment. These elements will still need to meet the requirements of this Technical Manual.

6.3.5 Independent Engineer verification

An independent Engineer with suitable experience and PI insurance shall review the site specific design and calculations in accordance with the stage 1 SCI certificate.

The Engineer should review the site specific details and provide confirmation to the Warranty provider where requested that the structural design meets the site specific design and all relevant structural standards.

6.3.6 LGSF protection against corrosion

There shall be adequate protection against protection for all LGSF elements.

Steel and fixings should be suitable for the design and adequately protected against corrosion. Galvanised strip steel should be designated grade S280GD to 450GD to BS EN 10346.

All light gauge steel frame framing:

- Should be only used in warm or hybrid construction - including floors, walls, pitched roofs, flat roofs and terraces.
- Must be protected from the external conditions with the use of appropriate wall and roofing membranes.
- Must be located entirely above DPC level and a minimum 150mm above external ground level, the use of a masonry foundation kerb upstand may be an appropriate method to achieve this.
- Walls, upper floors and pitched roof framing, should be pre-galvanised in accordance with BS EN 10346 with a minimum 275g/m^2 zinc coating (Z).
- Ground floor joists and ring beams in such floors should be pre-galvanised to 450g/m^2 zinc coating (Z).
- Positioned below the waterproofing layer of a flat roof, balcony or terrace should be pre-galvanised to a minimum 600g/m^2 zinc coating (Z).
- Where level access requirements result in the floor joists, ring beams and base rails etc. being less than 150mm above external ground level, then these elements should be pre-galvanised to 600g/m^2 zinc coating (Z). Level access arrangements should be kept to a minimum and no more than 15% of the external perimeter of an individual building (e.g. a single plot in a row of terraced homes).

6.3.7 Gas protection system

Where a gas protection system is required (e.g. gas membranes) it shall:

- Be specified in accordance with relevant standards.
- Not impede on the drainage requirements of the LGSF system.
- Be installed to manufacturers recommendations.

Where a gas barrier is required it should be specified and installed by suitably qualified persons.

Please refer to the ‘Ground Conditions – Managing Ground Contaminants’ section for further guidance.

6.3.8 Site preparation and substructure detailing

The substructure shall be correctly set out to receive the LGSF system. LGSF panels shall also be securely fixed to the substructure as per the Engineers specification.

Tolerances

For accurate erection of the frame the following tolerances are required at the level of the base of the wall frame:

- Length of wall frame: +/-10mm in 10m.
- Line of wall frame: +/-5mm from outer face of plate.
- Level of base of wall frame: +/-5mm over complete wall line.

Some packing may be needed to achieve the required tolerances.

Anchoring

The LGSF system should be anchored to a suitable substrate to resist both lateral movement and uplift in accordance with the Engineers design and specification.

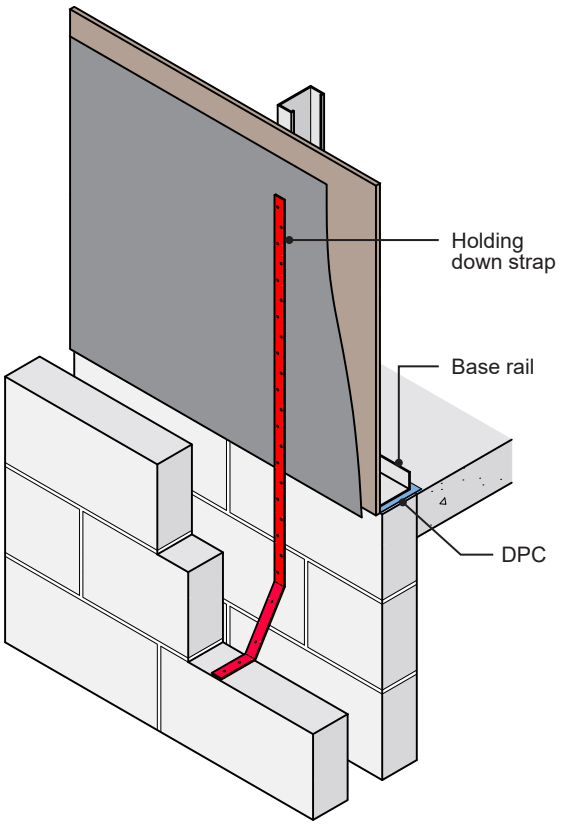
Where gas membranes are specified, they should not be punctured. Where puncturing is unavoidable the gas membrane should be appropriately sealed in line with the gas membrane manufacturers recommendations.

Holding down straps

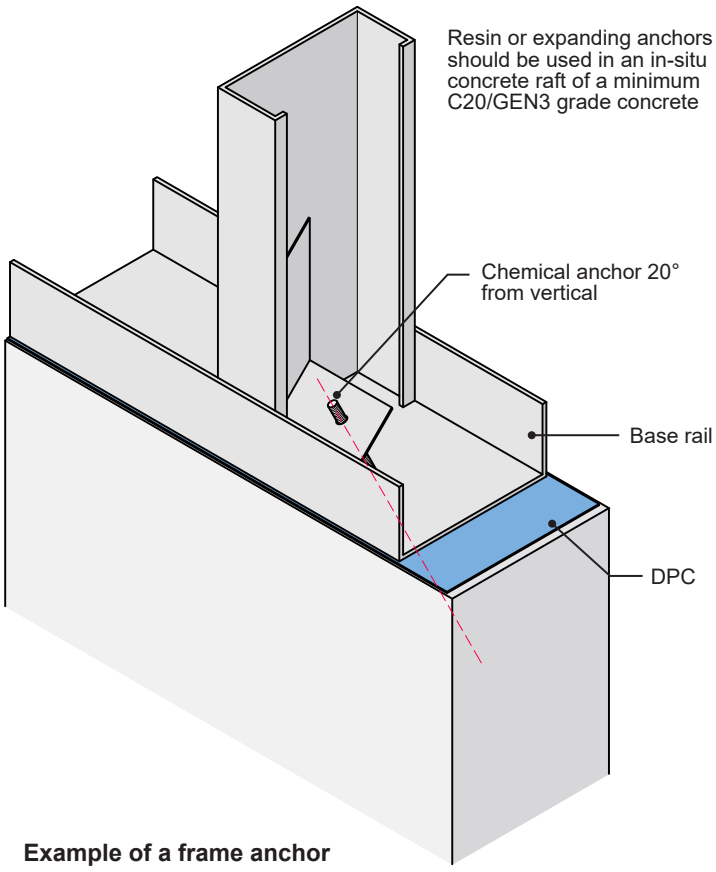
If stainless steel straps are used, they should be grade 1.4301 steel to BS EN 10088 and isolated from the studs with neoprene gaskets or similar. Non stainless connections should be isolated from the straps with suitable grommets and washers.

Frame anchors

Bolt down frame anchors should be specified and installed as per the Engineers design and specification.



Example of a holding down strap

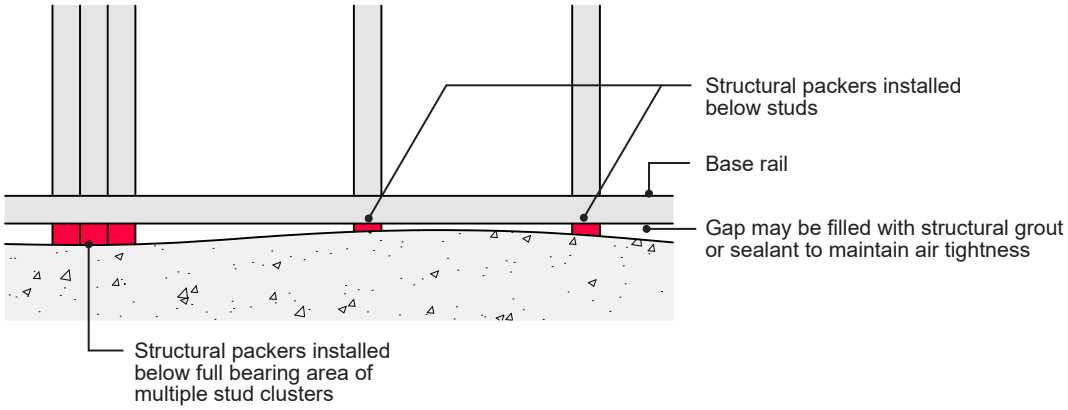


Example of a frame anchor

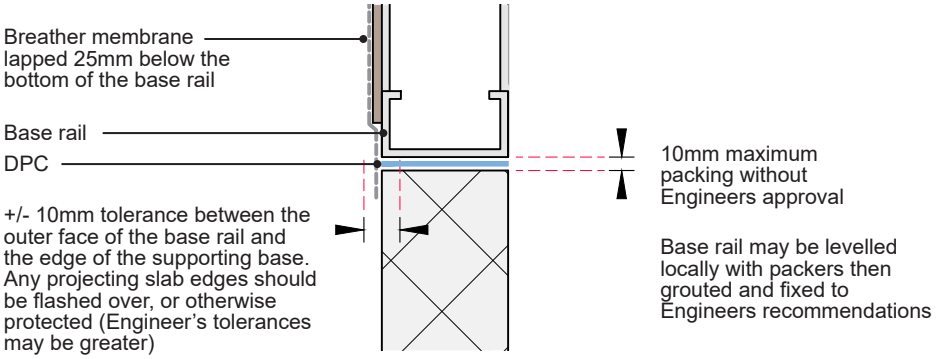
Packing under the steel frame

Structural shims or grout may be required under the steel frames to level them and transfer vertical load. Longer frame to foundation fixing may be needed to allow for the size of the gap.

- Less than 10mm; pack under each steel with pre-galvanised steel shims.
- 10mm-20mm; pack under each steel with steel shims and grout over length of the base rail.
- Over 20mm; refer to the frame designer.

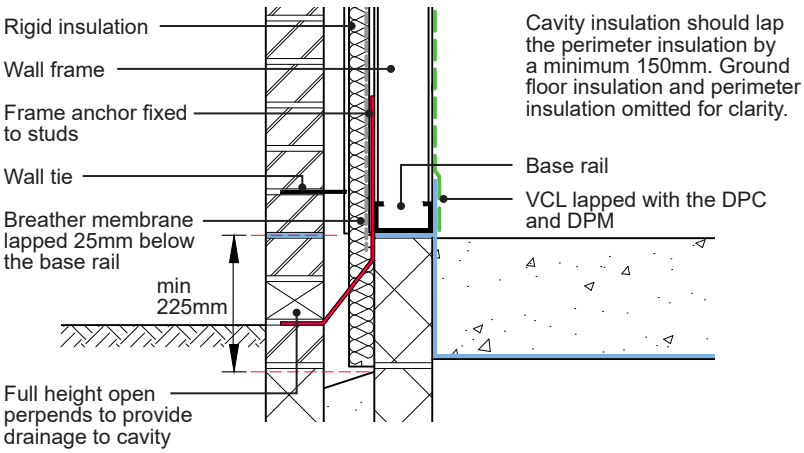


Base rail positioning with the substructure



DPC and DPM detailing

The oversite DPM should be attached to the side of the slab and returned under the DPC on which the frame is placed. The DPC/DPM detail requires careful attention to prevent the cavity being bridged and providing a ledge for mortar droppings.



Note: Internal linings have not been shown for clarity. A service void may be specified.

6.3.9 Location of frame above ground level

The LGSF shall be located above DPC level and a minimum 150mm above external ground level except where level access arrangements are required.

The use of a masonry foundation kerb upstand may be an appropriate method to having the LGSF 150mm above external ground level.

It is recommended that the inner leaf DPC is turned up approximately 30mm above the screed to protect the bottom of the studs from construction moisture and spillage, and weep-holes are provided at 900mm centres to drain cavities at ground level.

Level access requirements

Where level access requirements result in the floor joists, ring beams and base rails etc. being less than 150mm above external ground level, then these elements should be pre-galvanised to 600g/m^2 zinc coating (Z). Level access arrangements should be kept to a minimum and no more than 15% of the external perimeter of an individual building (e.g. a single plot in a row of terraced homes).

6.3.10 Light gauge steel frame panels

LGSF panels shall be designed and installed to support and safely transmit loads to the substructure without undue movement.

The wall panel usually consists of a head rail, base rail (sole plate) and possibly horizontal noggins at mid-height, together with vertical wall studs. The following shall be taken into account:

Tolerances

Framed walls should be accurately aligned, plumb, level without twist and securely fixed to adjacent elements. Vertical installation tolerances are:

- +/-15mm in overall height of wall 3 storey, **or**
- +/-10mm in overall height of wall 2 storey, **or**
- +/-5mm in storey height (approx. 2.5m).

Please refer to the ‘Tolerances’ section of this for further guidance.

Lintels

Lintels should be provided within LGSF panel over openings. They should safely support the applied loads, be of the correct size, and have adequate bearing.

Openings in LGSF panels should have lintels which are supported off of studs where one or more studs is cut or displaced to form an opening. Additional studs may be required to provide support to the lintel or to provide additional fixing points for wall ties, cladding or wall linings.

Lintels are not required where an opening falls between studs.

For guidance on steel and concrete lintel provision in external masonry cladding, please refer to the ‘External Walls – External Masonry Walls’ section.

Connections and fixings

The design should detail how joints between the wall panels and other elements are to be securely fixed:

- To the structure.
- To adjacent panels.
- To the floors and roof.

Recommended site connections include self-drilling, self-tapping screws or 10mm-12mm diameter grade 4.6 bolts. Welding is not recommended on-site. Workmanship should comply with BS 8000: 5.

Movement joints

Non-load bearing walls should not bridge movement joints in the main structure. A movement joint should be constructed between the frame and any chimney flue or lift shaft to prevent load transfer.

Holes and notches

Cutting holes in steel frame for services on-site is not recommended without approval from the steel frame designer. Holes, penetrations and cuts should be carried out in factory environments in accordance with the structural design. Holes should be fitted with grommets.

Accommodation of deflection

Infill walls should accommodate anticipated deflection within the primary frame.

6.3.11 Structural sheathing boards

Structural sheathing boards shall be of a suitable material, strength and durability.

Structural sheathing boards should be compatible with the LGSF.

Materials

Structural sheathing board materials may be any of the following:

- Orientated strand board (OSB). OSB should be grade 3 or 4 in accordance with BS EN 300.
- Plywood. Plywood should be at least Class 2 or 3 Structural in accordance with BS EN 636.
- Cement bonded particle board in accordance to BS EN 634.
- Non timber based boards or other board material must have a suitable third party product conformity certificate which is acceptable to us.

All wood-based panel products should comply with BS EN 13986: Wood-based panels for use in construction characteristics, evaluation of conformity and marking.

Please note:

- We do not accept the use of MgO boards.
- The selection of materials for the structural sheathing boards should satisfy the relevant Building Regulations in respect to fire safety.

Fixings

The sheathing board shall be fixed to the LGSF studwork in strict accordance with the board manufacturers' specification and Engineer's fixing schedule. Fixings should be specified for strength and long term durability for the anticipated exposure condition.

6.3.12 Breather membrane

Breather membranes shall be installed to protect the LGSF system and sheathing board from moisture whilst allowing water vapour from within the frame to pass into the cavity. The following shall be taken into account:

- Specification of the membrane
- Positioning
- Lapping
- Fixing
- Exposure of the breather membrane

Specification

Breather membranes should:

- Have an appropriate third party product conformity certificate.
- Have a vapour resistant to less than 0.6MNs/g (0.12 Sd) when tested in accordance with BS EN ISO 12572 using the set of conditions C and using five test specimens.
- Be a minimum Class W2 or better in accordance with BS EN 13859-2.
- Be a minimum Class W1 in areas of very severe exposure, where liquid water penetration of the cladding is anticipated or where the membrane is likely to be left exposed during construction.
- Be UV resistant in accordance with BS EN 13859-2 where the cladding does not exclude UV exposure (e.g. such as open jointed cladding panels).
- Be capable of resisting water penetration.
- Be durable to resist site damage when wet.
- Be self-extinguishing.
- Be securely fixed to protect the outside face of the framed structure with austenitic stainless steel staples.
- Be trimmed to leave 25mm lap below the base rail.
- Be repaired if damaged.
- Have the location of the LGSF studs clearly marked on the outer face of the breather membrane to ensure that cladding fixings are installed into the LGSF studs.

Positioning

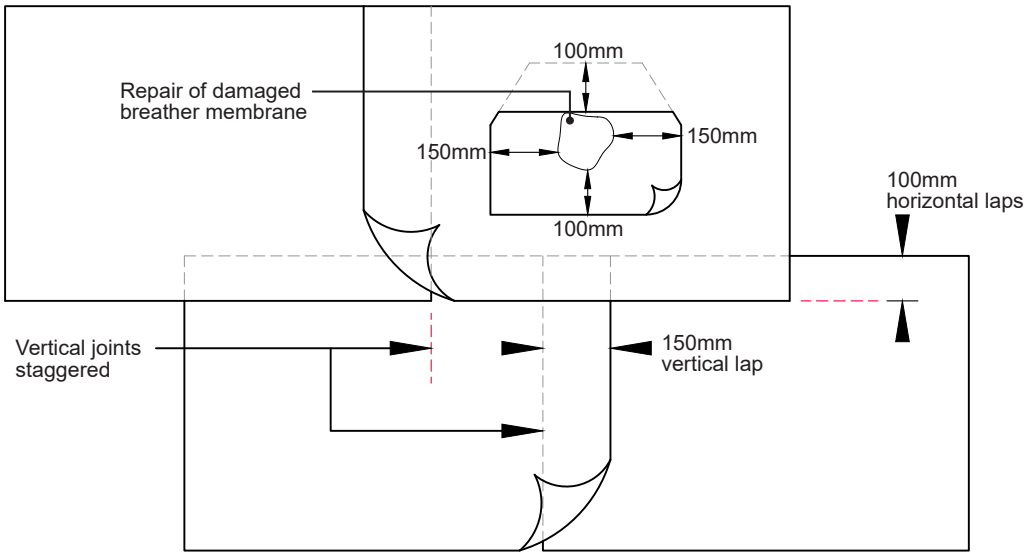
Breather membranes must be placed on the external face of the sheathing board to help provide weather protection to the sheathing board and the structural frame during construction. Any penetrations such as bracketry or fixings should be appropriately sealed as per the membrane manufacturer's instructions.

A breather membrane may also be required on the external face of the insulation which is in the cavity zone where required by the insulation manufacturer or third party product conformity certificate.

A breather membrane must always be installed irrespective of the external sheathing board product.

Lapping

Breather membranes should be lapped by a minimum of 100mm at horizontal joints, and a minimum of 150mm at vertical joints. Vertical joints should be staggered at regular intervals where possible. The breather membrane should be lapped to deflect moisture away from the framed structure (upper layers over lower layers).



Fixing

Breather membranes should be fixed using austenitic stainless-steel staple nails at the following centres:

- Horizontal
  - Panel centres – 600mm max
  - Horizontal membrane joint - 150mm
  - Head and base of panels – 150mm
- Vertical
  - 300mm centres vertically (may be increased to a maximum of 500mm when verified with the third party product conformity certificate).
  - Vertical membrane joint – 150mm
  - Ends of panel – 150mm
- Around openings – 150mm

If breather membranes are trimmed flush with the edges of wall panels, additional strips of breather membrane, at least 300mm wide, should be supplied and site fixed over panel junctions.

Exposure of the breather membrane

In situations where open jointed claddings are used, **and/or** the breather membrane is left exposed during construction for a duration which exceeds what the manufacturer recommends (or what the third party product conformity certificate for the breather membrane states):

- The performance of the breather membrane should be based on artificial aged behaviour in accordance with BS EN 13859-2.
- A ventilated tarpaulin (or similar protective sheeting) should be used where there is an expected period of heavy rainfall followed by freeze thaw conditions.
- Where the cladding is not open-jointed (render board, brick cladding etc.) performance should be based on artificial aged behaviour in accordance with BS EN 13111.

6.3.13 Thermal insulation

Thermal insulation shall be specified correctly and installed to avoid damp and interstitial condensation issues occurring within the wall makeup. The overall insulation value of the wall shall meet the requirements of relevant Building Regulations.

Thermal insulation should:

- Have a suitable third party product conformity certificate.
- Be of a suitable material and thickness to satisfy the regional Building Regulation requirements.
- Be fixed to the outside face of the steel studs to create a ‘warm frame’ construction.
- Retain a minimum 50mm clear cavity.
- Be covered with a breather membrane adjacent to the cavity where required by the insulation manufacturer or third party product conformity certificate for the insulation.

External walls should be subject to U-Value and condensation risk calculations. A wall build up will be considered satisfactory if there is no calculated risk of surface or interstitial condensation at any time of the year.

Special consideration should be given to condensation risk where non-breathable insulation products are installed on the outside of the steel frame structure.

Where the condensation risk has been assessed and shown to be negligible additional insulation may be placed between the studs. The additional insulation should be placed in contact with the studs to minimise air gaps and prevent local condensation.

Joints between foil faced insulation boards

Joints between the foil faced external insulation boards must not be taped as this forms a vapour control layer on the cold side of the insulation.

Where the insulation manufacturer requires the joints to be taped, the tape must be of a type as recommended by the insulation manufacturer, breathable to allow water vapour to move freely and resist water penetration.

Where the insulation board has an integral foil facing on one side only, the insulation should be fixed so the foil is facing towards the cavity side.

Thermal bridging

Insulation should be continuous at all junctions and all voids within the wall panel should be insulated to ensure thermal continuity is maintained and any small gaps which cannot be insulated effectively should be avoided.

6.3.14 Air and vapour control layer (AVCL)

AVCL's shall be specified and installed to restrict the passage of air and water vapour from within the home into the Light Gauge Steel Frame.

An AVCL is a moisture vapour-resistant material located on, or near, the warm side of the thermal insulation. Its purpose is to restrict the passage of moisture vapour through the structure of the wall and mitigate the risk of interstitial condensation.

Specification

The AVCL may take the form of:

- A vapour control plasterboard.
- A minimum 125 micron thick (500 gauge) polythene sheet.
- A proprietary vapour control membrane product which has an appropriate third party product conformity certificate.

Criteria for a condensation risk analysis

For Warranty purposes, the boundary conditions for a condensation risk analysis should be as follows:

- 60% relative humidity.
- External temperature -2°C.
- Internal temperature 21°C.

Where external temperatures are considered to fall below -2°C due to exposure or geographical locations, lower temperatures should be used based upon climatic data within relevant standards.

Installation

A sheet membrane (polythene or proprietary) VCL should be:

- Securely fixed to and cover all areas of the LGSF external walls, including all base rails, head binders, and lapped/sealed fully into window/door reveals. The VCL should be Fixed at 250mm centres to the top and bottom of the frame.
- Lapped and sealed by at least 100mm at joints. Joints in the VCL should occur over studs, rails or noggins and be mechanically fixed.
- Lapped and sealed over studs, rails or noggins.
- Sealed around service penetrations.
- Lapped and sealed with DPM/DPC at the junction with the ground floor/foundation by a minimum of 100mm.
- Made good where damage as occurred to the VCL.

Vapour control plasterboard should be:

- Fixed in accordance with the plasterboard manufacturer's installation guidance.
- Tightly cut and fitted around service penetrations.
- Discarded if the vapour control backing is damaged.
- Junctions, joints and penetrations (switches and sockets for example) should be appropriately detailed to ensure the vapour resistivity is not adversely comprised.

Notes

- The AVCL should not be installed until the building is weather tight.
- Small holes in the AVCL should be sealed with a suitable self-adhesive tape. If a proprietary membrane is being used, the manufacturer's proprietary sealing tape should be used. Larger holes should be re-covered to lap over adjacent studs and rails.

6.3.15 Internal wall linings

The internal wall lining shall provide an adequate surface to receive the intended finish required by the design. Supporting evidence will be required, where the wall lining is intended to perform additional functions such as:

- Racking resistance.
- Fire resistance.
- Acoustic performance.

Wall linings are typically:

- Gypsum plasterboard.
- Fibre reinforced gypsum board.
- Cement bonded particle board.

Lining materials should satisfy all relevant performance criteria, e.g. fire resistance, acoustic performance and have a relevant third party product conformity certificate.

Moisture resistance linings should be specified in high moisture environments (e.g. bathrooms).

Please note: we do not accept the use of MgO boards.

6.3.16 Fire resistance

LGSF walls shall have adequate fire resistance in accordance with the relevant Building Regulations. Supporting test evidence to an appropriate standard shall be made available upon request.

Fire performance of openings

All openings including doors, windows, flues and ventilation ducts, should also be designed and constructed to maintain fire performance. The following should be taken into account:

- Internal reveals require equal fire resistance to the rest of the structure.
- Window fixing straps should not compromise the integrity of any fire-resistant reveal linings.
- Cavity barriers should be installed in the external wall cavity around the perimeter of openings. They must be mechanically fixed to rigid construction (for both vertical and horizontal positions).
- If profiled steel lintels are used as cavity barriers, triangular gaps behind lintels, which occur at each end, should be closed with careful positioning of adjacent cavity barriers.

6.3.17 Provision of cavities

LGSF external walls shall be provided with a drained cavity which resists the passage of moisture to the inside of the home and prevents interstitial condensation.

LGSF external wall panels should be provided with a cavity between itself and the external cladding.

Minimum cavity widths for different cladding types

External leaf	Minimum cavity width
Masonry	50mm
Render on un-backed lath	50mm
Render on backed lath or board	25mm
Timber	19mm
Tile hanging	25mm

Cavity drainage

All external wall cavities should be adequately drained to resist the passage of moisture to the inside of the home.

Ventilation requirements for rainscreen cladding systems

Adequate ventilation should be provided at the head and base of rainscreen cladding systems where required by the manufacturer (or the third party product conformity certificate) of the rainscreen cladding system.

6.3.18 Cavity barriers

Cavity barriers shall be durable and must not adversely affect the structure of the external wall or the performance of the weatherproof envelope.

Where required by statutory regulations, cavity barriers shall:

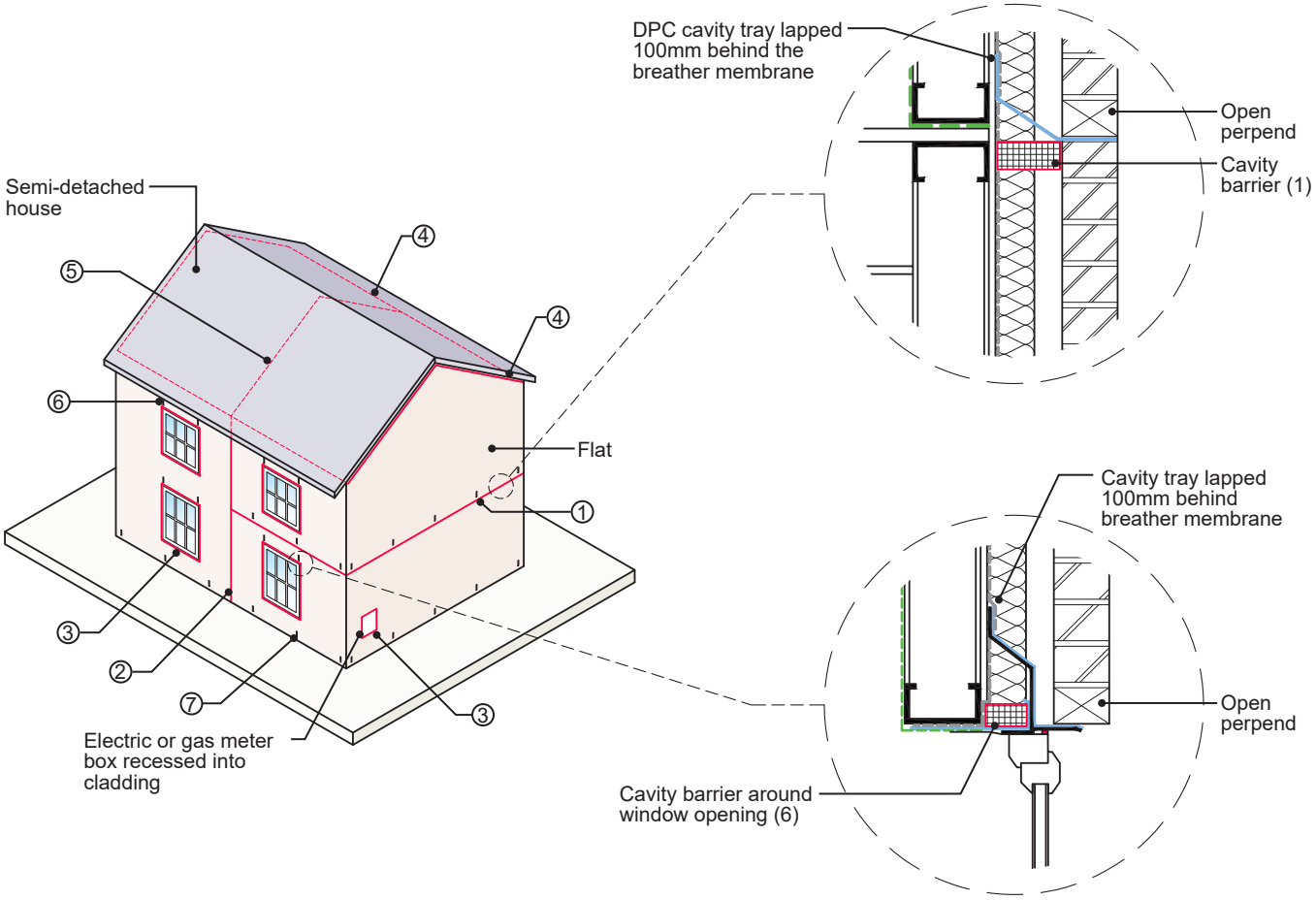
- Be of a suitable material.
- Specified and installed within the scope of the test certification and/or the third party product conformity certificate.
- Be installed in accordance with the manufacturer's recommendations.
- Be suitable for the location they are installed.

Where cavity barriers are required by statutory regulations, their specification, positioning and installation should satisfy the requirements of the Building Regulations.

Locations of cavity barriers and open perpends within the external wall

Notes

- Lightweight cladding systems will require a cavity barrier along the bottom of the cavity.
- Cavity barriers may also be required between walls and floors within the building, consult National Regulations for further guidance.



1. Cavity barriers are required at the junction of party floors and external walls (flats).
2. Cavity barriers are required at the junction of the external wall and the party wall.
3. Cavity barriers are required around the edges of all openings.
4. Cavity barriers are required at eaves and verge.
5. Cavity barriers/firestopping at the head of the party wall.
6. Open perpends over openings installed at maximum 900mm centres, with at least two over each opening.
7. Open perpends installed at maximum 1350mm centres to drain and ventilated external wall cavity.

Cavity barrier installation

Cavity barriers should be installed:

- So they fully close the cavity by friction fitting for the designed cavity width.
- Backed by LGSF studs, rails or floor joists.
- In accordance with manufacturer or independent certifier's guidance.
- So they are mechanically fixed to rigid construction (for both vertical and horizontal positions).

Where insulation is placed outside of the LGSF frame and where a cavity barrier is required, it must be fixed back to the LGSF structure.

Specification

Where vertical cavity barriers are required, they should be continuous for the full height of the wall and extend below DPC level.

Where horizontal cavity barriers are provided they must be tested for the scenario and have an third party product conformity certificate. A cavity tray should be installed directly above a horizontal cavity barrier and lapped up at least 100mm behind the breather membrane (except at eaves and verges).

Note: Lightweight cladding systems may require a cavity barrier along the bottom of the cavity. This may not be necessary however where a horizontal batten is present at the bottom of lightweight cladding systems.

Materials

Cavity barriers may be constructed from:

- Steel at least 0.5mm thick.
- Timber at least 38mm thick.
- A proprietary mineral wool product which has an appropriate third party product conformity certificate.
- Calcium silicate, cement-based or gypsum-based board at least 12mm thick.
- An independently assessed and certified proprietary product.

6.3.19 Forming weather resistant openings

Openings within the LGSF walls shall be designed and constructed to prevent the passage of moisture to the inside of the building. Particular attention shall be paid to:

- Detailing around reveals
- Window sill detailing
- Thermal performance and thermal bridging

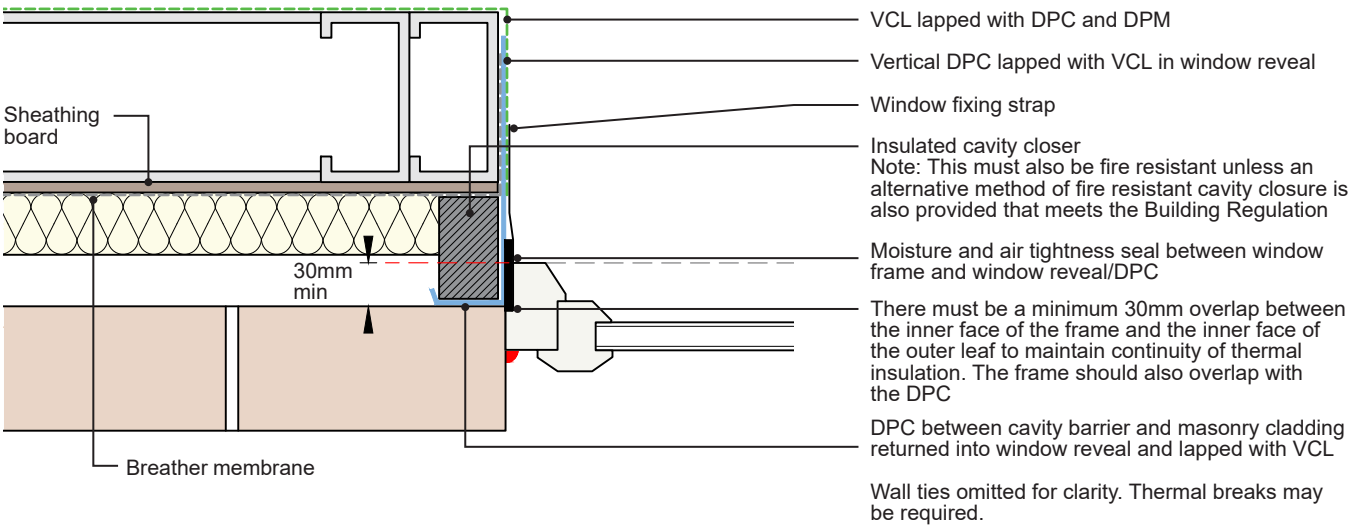
Openings shall also be designed and constructed to maintain fire and acoustic performance.

Detailing around reveals

A DPC should be provided between the cavity barrier and external cladding which is returned into window reveal and lapped with VCL. Where no DPC is used, breather membrane should be lapped with internal VCL.

There must be a minimum 30mm overlap between the inner face of the window/door frame and the inner face of the outer leaf to maintain continuity of thermal insulation. The frame should also overlap with the DPC.

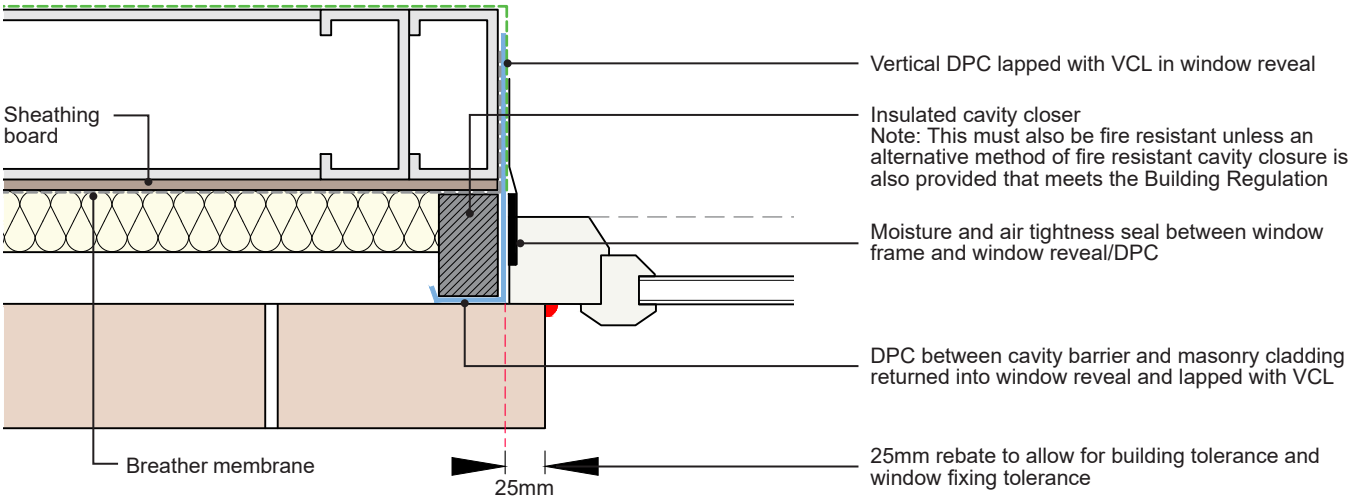
Typical window reveal detail (normal exposure)



Checked rebates

Checked (rebated) reveals are required in Scotland and in any areas of very severe exposure in England and Wales. The frame should be set back behind the outer leaf and should overlap.

For further information on external windows and doors please refer to the ‘External Windows and Doors’ section.

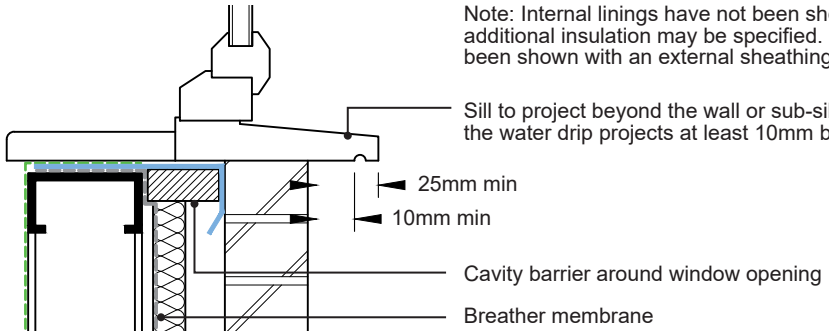


Thermal performance and thermal bridging

Detailing around openings should avoid thermal bridging and interstitial condensation. To avoid these issues, detailing should consider the following:

- The element being installed into the opening will have a minimum thermal performance.
- Junction between the window/door frame and the opening also has a thermal performance value assigned to it (psi value) designs may incorporate insulated reveals.
- The gaps between the LGSF wall and the element being installed into the opening may include the use of air sealing tapes, compressible seals or EPDM to promote thermal performance and continuity, weather tightness and air tightness.

Window sill detailing



6.3.20 Cavity trays and their ancillary components

Cavity trays and their ancillary components shall be suitable and durable for their intended purpose and be provided to prevent moisture entering the home.

Specification

Cavity trays should:

- Meet the requirements of BS EN 14909.
- Comply with the relevant Building Regulations.
- Have an appropriate third party product conformity certificate confirming suitability for use as a cavity tray.
- Rise at least 150mm from the outer to the inner leaf, be self-supporting or fully supported and have joints lapped and sealed.

Cavity trays should be proprietary preformed cavity tray systems at stepped and lower storey abutments, complicated junctions and around corners in low rise masonry walls.

Cavity trays should lap behind the breather membrane by at least 100mm.

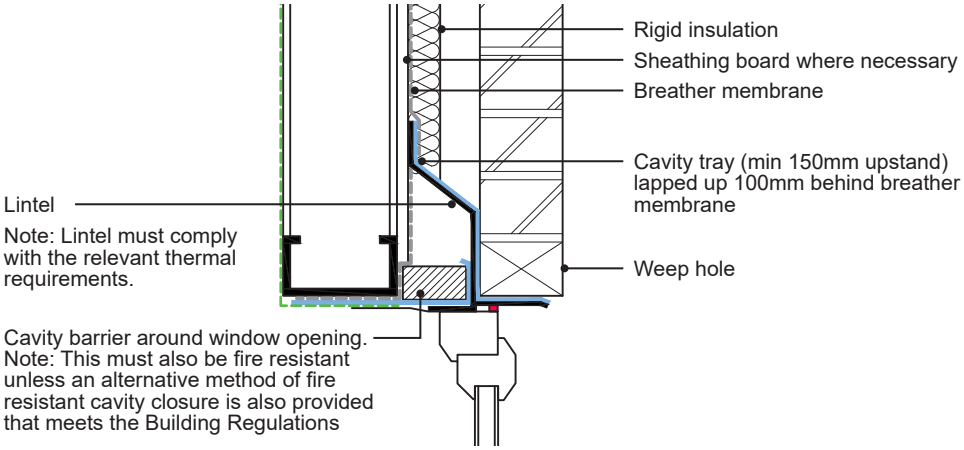
Please note: Polyethylene DPCs should not be used as a cavity tray. Please refer to ‘Appendix C’ for further guidance.

Locations

Cavity trays should be provided in the following locations:

- Above all openings and interruptions likely to direct rain water across the cavity such as window and door openings, rectangular ducts, lintels and recessed meter boxes.
- Above horizontal cavity barriers.
- Above cavity insulation that is not taken to the top of the wall, unless that area of wall is protected by impervious cladding e.g. where a spandrel is provided cold pitched roof.
- Continuously above lintels where openings are separated by short piers.
- Above openings where the lintel supports a brick soldier course.
- Directly above openings that are under a compartment floor with a cavity barrier and cavity tray already present.

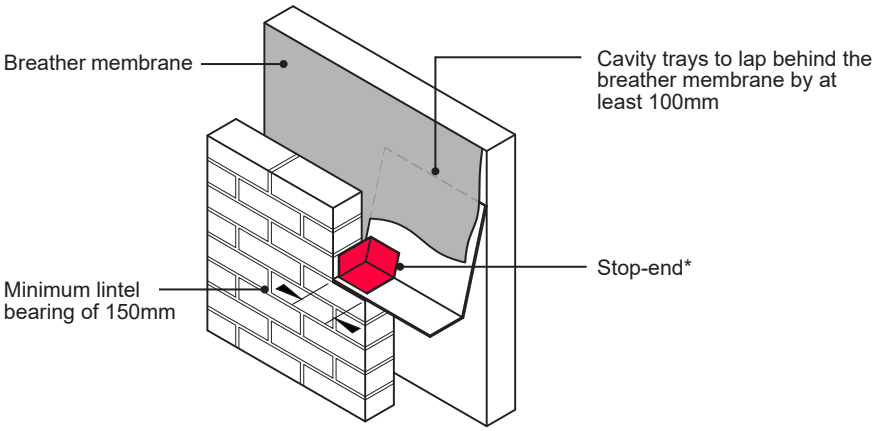
Cavity tray and lintel



Drainage and ventilation

Where cavity trays are provided there should be provision to drain moisture from the cavity with the use of cavity vents. Cavity vents should prevent the ingress of moisture, insects or vermin.

Stop end to cavity tray



*Stop-ends need to be bonded to the cavity tray material or clipped to the lintel, so that a stop to the structural cavity of at least 75mm high is provided. Normally, the stop-end is located to coincide with the nearest perpend to the end of the cavity tray.

Stop-ends can be formed by sufficiently turning up the end of a DPC tray into the perpend joint. Surplus mortar should be removed from cavities and wall ties cleared of mortar droppings and debris as the work proceeds.

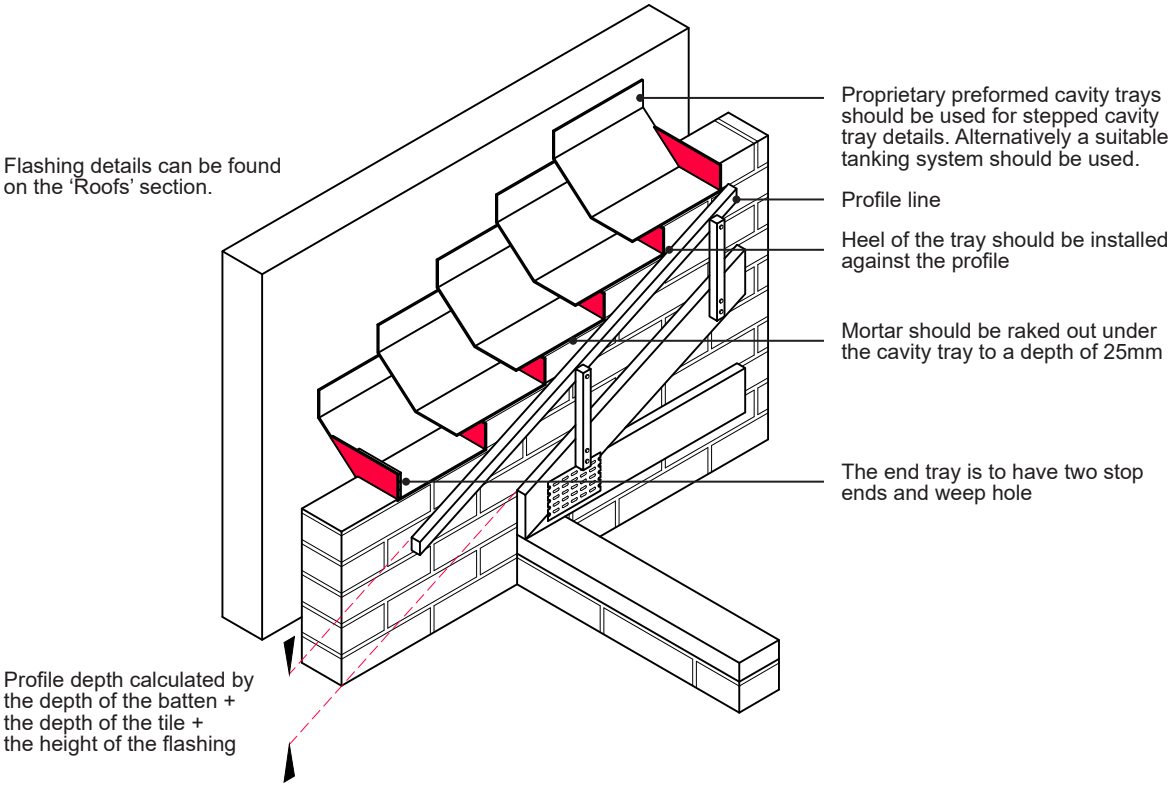
Cavity trays should rise at least 150mm from the outer to the inner leaf, be self supporting or fully supported and have joints lapped and sealed.

Installation of stepped cavity tray

Stepped cavity trays are required at all pitched (stepped) roof abutments with external walls, e.g. attached garages or staggered terraces.

Preformed rigid cavity trays should be used for stepped cavity tray details. Stepped cavity trays to lap behind breather membrane by at least 100mm. Additional measures may be needed to ensure the breather membrane adequately laps the tray to prevent moisture ingress behind the stepped cavity tray.

A lead cover flashing should be linked into the cavity tray (lapped in below). Flashing details can be found in the 'Roofs' section.



6.3.21 External claddings

External claddings for the LGSF building shall be durable and fixed back to structural steel as per the Engineers specification whilst maintaining a separating cavity.

Exterior claddings should be compatible with the steel frame.

Claddings supported on the LGSF should be connected to it on a carrier system, to form a separating cavity to all areas of the external wall. These should be fixed into structural steel not just through the sheathing and to the Engineer's specification.

For further information on the provision of cavities, please refer to the guidance within this section.

Please refer to the 'External Walls – External Masonry Walls' section where masonry cladding is specified.

For additional guidance on claddings supported on LGSF please see the 'External Walls - Render' and 'External Walls - Claddings' section.

6.3.22 Services

Where services pass through the LGSF panel they shall be specified and installed to:

- Ensure the structural integrity of the LGSF panel is unaffected.
- Prevent moisture ingress.

Any penetrations to the LGSF panel be fully considered in the design in order to avoid unintended removal or alteration of structural timbers.

Where services pass through the LGSF panel they should be designed to prevent moisture transfer to the LGSF or to the inside of the building. Service penetrations such as flues and vents should have cavity barriers around and be protected with a cavity tray.

All service penetration should be carried out to maintain acoustic performance. The following should be taken into account:

- Seal gaps between timber frame wall and the element being installed into the opening.
- The element being installed into the opening may have a minimum acoustic requirement.