Chapter

6.9

Curtain walling and cladding

This chapter gives guidance on meeting the Technical Requirements for curtain walling and cladding.

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Introduction

This chapter gives guidance on the forms of curtain walling and cladding acceptable to NHBC. Curtain walling and cladding systems that do not conform to the descriptions in this chapter will not generally be acceptable. Conservatories are not covered by this chapter.

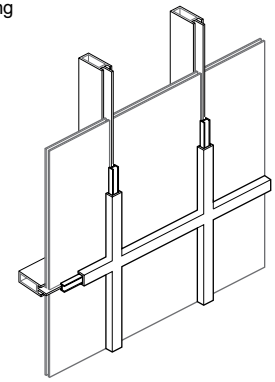
Guidance on the use of other types of cladding, including brickwork, rendered masonry, vertical tile and slate cladding and timber cladding, is given in Chapter 6.1 External masonry walls and Chapter 6.2 External timber framed walls.

Curtain walling

Comprising a prefabricated or site-assembled support framework, with infill panels and/or wall sections with glazing systems which include:

- structural silicone glazing
- mechanically fixed structural glazing
- slope glazing, excluding patent glazing
- coupled door and window frame assemblies (including spandrel panels) which are one storey or more in height, or not contained between a floor and ceiling.

Figure 1: Curtain walling

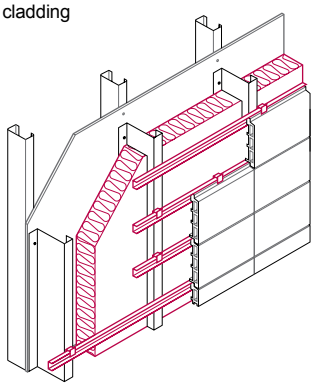


Rainscreen cladding

Comprising:

- an outer skin of panels which have unsealed, open, baffled or labyrinth (rebated) joints
- a minimum 50mm pressure equalised air gap between the insulation and the panels
- an insulated and airtight backing wall.

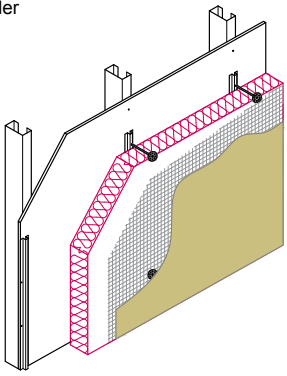
Figure 2: Rainscreen cladding



Insulated render

Comprising insulated render systems fixed to a backing wall.

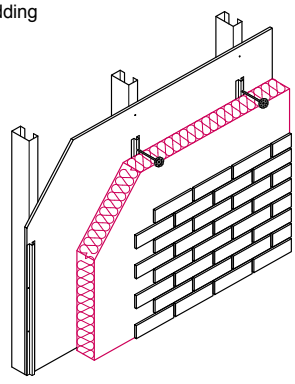
Figure 3: Insulated render



Brick slip cladding

Comprising brick slip cladding fixed to a backing wall.

Figure 4: Brick slip cladding



Stone and precast concrete cladding

Stone and precast units should be designed as curtain walling or rainscreen cladding in accordance with this chapter.

Definitions for this chapter

Air barrier	A continuous layer that limits air leakage through the backing wall.
Air cushion	Balancing external and internal air pressure to create a cushion within the air gap.
Air gap	The space between the back of the cladding panels and the external face of the insulation in a rainscreen system.
Backing wall	A framed or masonry wall to which the system is fixed.
Brick slip cladding system	A brick slip system fixed to masonry or framed backing walls, generally supported by a proprietary carrier.
Cavity	The space between the cladding system and the backing wall. The cavity should be adequately drained, and ventilated where required.
Cladding panels	The outer units of a rainscreen cladding system which provide some protection.
Compartmentation	The provision of baffles and cavity closers to form compartments within the air gap of a rainscreen cladding system to equalise pressure.
Curtain walling	A form of enclosure that supports no load other than its own weight and the environmental forces that act upon it, eg wind, water and solar.
Curtain walling system	The vertical building enclosure system, including frames, brackets, fixings, flashings, gutters, copings, glass, panels, gaskets and sealant, that forms the assembly.
CWCT	The Centre for Window and Cladding Technology at Bath University.
CWCT Standard	The current Centre for Window and Cladding Technology Standard for systemised building envelopes.
Design life	The period for which materials, products and systems should be designed to be durable, assuming routine inspection and maintenance.
DPC/DPM	Prevents the passage of moisture. In curtain walling terminology, a DPC is often referred to as a DPM.
Earthing System	Part of a lightning protection system that terminates the current and transfers it safely to the ground.
EPDM	EPDM (ethylene propylene diene monomer rubber) is a type of synthetic rubber that is used in construction waterproofing and sealing applications.
Façade	The external facing part of the building envelope.
Fire-stop and smoke stopping	Prevention of the transmission of fire and smoke through voids or cavities.
Fixing	Componentry used to attach or secure other components, eg curtain walling or a cladding system, to the structure.
Gasket	A compressible material used to form an airtight and/or watertight seal.
In-service performance	The manner or quality of functioning of a material, product or system.
Insulated render system	A cladding system applied externally to an insulating layer which is fixed to a backing wall.
Interstitial condensation	Condensation caused by vapour from within the building condensing on colder surfaces within the wall construction, often occurring due to a cold bridge.
Negative pressure	Where the air pressure on the internal face of the system is greater than that on the external face.
Positive pressure	Where the air pressure on the external face of the system is greater than that on the internal face.
Pressure equalisation	The creation of an air cushion within the cavity to reduce the amount of water passing through the joints of a rainscreen. Compartmentation and adequately large joints are required to achieve pressure equalisation.
Primary components	Components and parts of the system that are not easily replaceable. These may include: • cladding panels • fixings • framing • insulation • vapour control layers • weathering components.
Rainscreen	The part of the assembly, generally the outermost, that prevents the majority of rain from penetrating the wall. Some water may pass through the joints of a rainscreen, but this should be limited by appropriate detailing of open joints or the provision of baffled or labyrinth joints.
Rainscreen cladding system	A façade that provides a barrier to wind and rain and which typically includes a vapour control layer, air barrier, supporting framework and fixings, insulation, breather membrane, cavity/air gap and cladding panels. Traditional tile hanging and timber cladding are not classed as rainscreen cladding systems under the definitions of this chapter.
Replaceable components	Those which are readily replaceable without compromising the design and durability of the building or the need for progressive dismantling of the envelope. Where this cannot be achieved, components should be designed as primary components. A method statement should be provided to demonstrate how components will be replaced with specific reference to accessibility as detailed in this chapter.

Secondary components	Components and parts of the system that are easily replaceable. These may include: ● cladding panels ● external finishes ● glazing and gaskets ● internal linings ● seals and sealant ● window and door furniture.
Separating floors and walls	Floors and walls designed to provide separation between homes.
Slope glazing	A drained and ventilated sloped roofing system.
Spandrel panel	A panel used in place of glazing units to hide the edges of floor slabs, ceiling details, insulation, and other building elements.
Systems	For the purposes of this chapter, this term refers to acceptable forms of curtain walling, rainscreen cladding, insulated render systems and brick slip cladding systems.
Test pressure	The pressure at which testing is conducted.
Vapour control layer (VCL)	A layer used to restrict the passage of water vapour into the construction to reduce the risk of interstitial condensation.

6.9.1 Compliance

Also see: Chapter 2.1

Curtain walling and cladding systems shall comply with the Technical Requirements.

Curtain walling and cladding systems that comply with the guidance in this chapter will generally be acceptable.

6.9.2 Provision of information

Designs and specifications shall be produced in a clearly understandable format, include all relevant information and be distributed to appropriate personnel.

Clear and fully detailed drawings should be available on site to enable work to be carried out in accordance with the design. Design and specification information should be issued to site supervisors, relevant specialist subcontractors and suppliers, and include the following information:

- a full set of drawings
- a schedule of revisions
- manufacturer's specification
- specific details of all interfaces
- fixing schedules
- manufacturer's recommendations for proprietary items
- details of the on-site testing regime.

6.9.3 Certification

Curtain walling and cladding systems shall be adequately tested, certified and designed in accordance with appropriate standards.

Curtain walling and cladding systems should have certification confirming satisfactory assessment, undertaken by an independent technical authority. Where applicable, certification should be in accordance with the CWCT Standard for systemised building envelopes (or a suitable alternative acceptable to NHBC). UKAS Accredited Independent technical approvals authorities acceptable to NHBC include:

- British Board of Agrément (BBA)
- Building Research Establishment (BRE), or
- UL International (UK) Ltd
- accredited certification bodies considered by NHBC to be a suitable alternative.

Certification and test documentation should be:

- made available to NHBC before work begins on site
- used as reference to ensure compliance.

The use of the system should be within the scope of the certification and test documentation.

6.9.4 Loads

Curtain walling and cladding systems, including brackets and fixings, shall allow movement without causing damage or deformation, and safely transfer loads to the building.

Dead loads and live loads should:

- be transferred safely to the building's structure without undue permanent deformation or deflection of any component
- be calculated in accordance with BS EN 1991-1-1 and BS EN 1991-1-4, and taking into account internal and external pressures and the location, shape and size of the building.

The following should be accommodated without any reduction in performance:

- thermally induced loading due to differential stresses caused by temperature gradients within materials or components
- stresses in components and materials (these should not exceed the permissible values recommended by the product manufacturer)
- movement within the curtain walling or cladding.

Causes of movement include:

- dead and live loads
- changes in temperature
- changes in the moisture content of components
- freezing of retained moisture
- creep.

Allowance for movement should be provided in accordance with the design.

6.9.5 Support and fixings

Curtain walling and cladding systems shall be securely fixed with suitably durable fixings to ensure adequate in-service performance.

The cladding system and associated fixings should be correctly located and securely fixed in accordance with the design and the manufacturer's recommendations. Fixings and supports, including the type, size and positioning of anchors, fixing rails, frames, fixings, fasteners and bracketry, should be in accordance with the design, and:

- accommodate specified loads
- account for packing of brackets to achieve surface tolerance, in accordance with the manufacturer's recommendations
- be accurately set out
- generally be stainless steel, suitable non-ferrous metal or appropriate plastics
- be installed ensuring dissimilar metals are separated to avoid bimetallic corrosion
- be installed ensuring aluminium components are separated from direct contact with cementitious surfaces.

Mechanically fixed systems should be in accordance with the manufacturer's recommendations, and fixings should:

- have the correct embedding, spacing and edge distances
- be installed to the correct torque settings
- have suitable locking nuts and washers.

Fixings should be manufactured from:

- phosphor bronze
- silicon bronze
- BS EN ISO 3506 stainless steel
- mild steel with coatings to BS EN ISO 2081, BS EN 1461, or other appropriate treatment in accordance with BS EN ISO 12944 or BS EN ISO 14713
- BS EN 573 and BS EN 755 aluminium alloy
- appropriate plastics
- materials assessed in accordance with Technical Requirement R3.

Materials that comply with recognised standards and which provide equivalent or better performance to those above will generally be acceptable to NHBC.

Pull-out or destructive testing of anchors and fixings should:

- comply with BS 8539 and BS 5080
- comply with the Construction Fixings Association Guidance Note 'Procedure for Site Testing Construction Fixings'
- be carried out in accordance with the design
- be carried out at a frequency agreed with NHBC.

The test report should be made available to NHBC.

Adhesive-fixed systems should be installed to a suitably prepared backing wall, providing:

- an assessment of the backing wall is available to confirm suitability
- it is used in accordance with the design.

Adhesive fixing of rails, frames, fixings and fasteners should:

- only be specified where there is no suitable alternative
- be used in accordance with the manufacturer's recommendations.

Timber should only be used where it is:

- easily inspected and replaced without disturbing the curtain walling system
- treated in accordance with Chapter 3.3 Timber preservation (natural solid timber).

6.9.6 Durability

Also see: Chapter 3.3

Curtain walling and cladding systems shall provide satisfactory durability (subject to routine inspection and maintenance). Timber shall be either naturally durable or preservative treated to provide adequate protection against rot and insect attack.

The system should be designed to avoid the need for disproportionate work when repairing or replacing individual components. In addition:

- primary components should provide satisfactory in-service performance for the design life of the building
- secondary components should provide satisfactory in-service performance for a minimum of 25 years.

The curtain walling system should be constructed with corrosion-resistant or adequately protected materials. The risk of bimetallic corrosion should be avoided by the isolation of dissimilar metals.

Systems should not include materials liable to infestation by micro-organisms, fungi, insects or vermin.

6.9.7 Interfaces

Curtain walling and cladding systems shall have suitable interfaces and resist the penetration of water and wind.

The design should indicate the contractor responsible for constructing interfaces.

Interfaces, including those between curtain walling and cladding systems, and those between curtain walling and cladding systems and other elements of the building (eg walls, roof, doors and windows), should be carefully designed and detailed to be weather resistant, and prevent moisture reaching parts of the wall that it could adversely affect.

The design should take account of:

- differing profile characteristics
- movement
- continuity of insulation, vapour barriers and breather membranes
- tolerances and deviation
- the erection sequence
- planned maintenance.

6.9.8 Insulation

Insulation shall be suitable for the intended use.

Insulation should be:

- in accordance with the design and the manufacturer's recommendations
- installed correctly to minimise the risk of thermal bridging, surface and interstitial condensation
- securely fixed to the support frame or backing wall with appropriate fixings and/or adhesive in accordance with the manufacturer's recommendations
- returned into window and door openings, and continuous around penetrations through the wall
- neatly cut around fixings and brackets.

Insulation materials should:

- be inert, durable, rot and vermin proof
- not be adversely affected by moisture
- be one of the materials listed in Table 1.

Table 1: Materials for insulation

Insulation type	Relevant standard
Mineral wool	BS EN 13162
Flame retardant (FR) grade expanded polystyrene (EPS)	BS EN 13163
FR grade extruded polystyrene (XPS)	BS EN 13164
Rigid polyurethane foam and polyisocyanurate	BS EN 13165
Phenolic foam	BS EN 13166
Cellular glass	BS EN 13167
Other materials	Technical Requirement R3

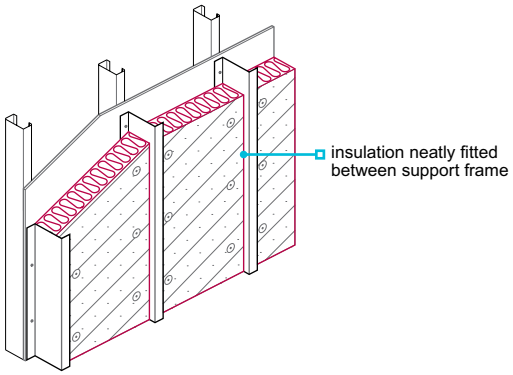
Reference should be made to BRE document BR135 — Fire performance of external thermal insulation for walls of multi-storey buildings: (BRE135) Third edition.

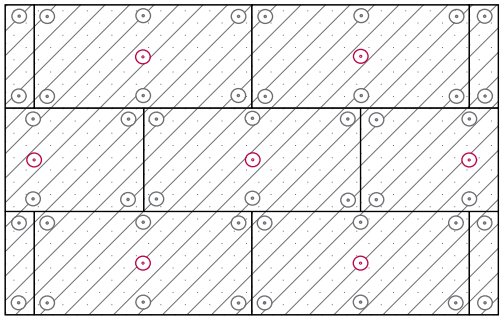
Rainscreen cladding

The backing wall should be adequately insulated, particularly at exposed areas. Where open joints are used, a continuous and durable breather membrane should be provided over the outer face of the insulation.

Where the insulation is fixed to the backing wall, a minimum of one non-combustible fixing per 1m² or per insulation batt, whichever is the lesser, should be provided in addition to the other fixings.

Figure 5: Insulated backing wall to rainscreen cladding



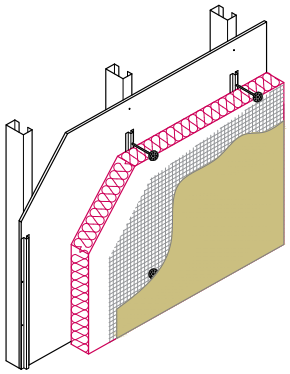


Insulated render

A minimum of one non-combustible fixing per 1m² or per insulation batt, whichever provides the greater number, should be provided in addition to the other fixings. Non-combustible fixings should be fixed through the mesh reinforcement.

Insulation should be suitable to receive the render finish, and keyed where appropriate.

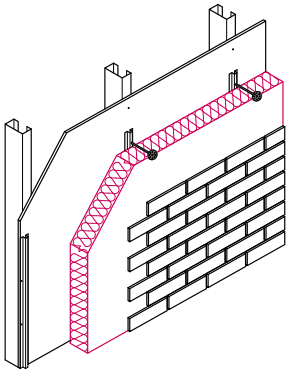
Figure 6: Insulated render with drained cavity



Brick slip cladding

Where the insulation is fixed to the backing wall, a minimum of one non-combustible fixing per 1m² or per insulation batt, whichever is the lesser, should be provided in addition to the other fixings.

Figure 7: Brick slip cladding with drained cavity



6.9.9 Damp proofing and vapour control

Curtain walling and cladding systems, including damp proofing materials and breather membranes, shall adequately resist the passage of water into the building and allow water vapour to pass outwards.

Damp proofing should:

- be installed correctly to provide a physical barrier to the passage of water, and to ensure water is directed to the outside
- include cavity trays with stop ends at the base of the system, above openings, above cavity barriers, interfaces and other interruptions to the cavity where necessary
- use DPCs/DPMs where necessary, including the junction between the system and any other component or systems
- use only appropriate tapes and sealant (but not solely rely on sealant) in accordance with the design and the manufacturer's recommendations.

For curtain walling systems, the DPC/DPM should extend the full height of the system and have appropriate details at each interface (including floors, walls, roofs, balconies and terraces).

DPCs/DPMs and flexible cavity trays

Damp proofing should be:

- formed from materials which are compatible with adjoining components
- the correct dimensions to suit the detailed design
- constructed from preformed components at complicated junctions.

The following materials are acceptable for use as DPCs/DPMs:

- BS 6515 polyethylene
- EPDM
- neoprene
- materials assessed in accordance with Technical Requirement R3.

Flashings

The following materials are acceptable as flashings:

- BS EN 12588 rolled lead sheet (minimum Code 4)
- BS EN 485 and BS EN 573 aluminium and aluminium alloys
- BS EN 988 zinc alloys
- stainless steel.

Breather membranes

Breather membranes should:

- comply with BS EN 13859-2: 2014 (Type 1 in areas of very severe exposure), or
- be in accordance with Technical Requirement R3.

6.9.10 Installation and tolerances

Also see: Chapter 9.1

Curtain walling and cladding systems shall:

1) be installed by competent operatives

2) be installed to achieve design tolerances and established standards.

6.9.10.1 Installation

Systems should be installed by operatives who:

- are competent
- are familiar with the system being installed
- hold a certificate confirming that they have been trained by the system manufacturer, supplier or installer.

6.9.10.2 Tolerances

Systems should be completed, within reasonable tolerances, in accordance with the design, and allowing for the line, level, plumb and plane of the completed wall to be within reasonable tolerances for the materials involved.

6.9.11 Electrical continuity and earth bonding

Curtain walling and cladding systems shall ensure electrical continuity and earth bonding.

Curtain walling and rainscreen cladding should comply with:

Table 2: Standards for Electrical continuity and earth bonding systems

BS 7671	Requirements for Electrical Installations. IET Wiring Regulations
BS EN 62305	Protection against lightning
BS EN 62305-3	Protection against lightning — Physical damage to structures and life hazard

6.9.12 Maintenance

Curtain walling and cladding systems shall have appropriate access arrangements for the purposes of cleaning, inspection, maintenance and repair.

Provision should be made for safe future access to the façade. Access should generally be provided from a safe working platform, such as a cradle or mobile elevating platform.

Appropriate arrangements should be made for the replacement of failed insulating glass units without incurring excessive costs for gaining access.

6.9.13 Glazing, gaskets and sealants

Glazing shall be carried out in accordance with relevant standards. Materials used for glazing, gaskets and sealants shall provide satisfactory performance.

Glazing, including insulating glass units, should be in accordance with Chapter 6.7 Doors, windows and glazing.
Extruded rubber gaskets should comply with BS 4255 or assessed in accordance with Technical Requirement R3.

Sealant and tapes should be selected and applied in accordance with:

- BS 6213
- BS EN ISO 11600.

Sealant used in locations where differential movement may be expected, eg interfaces between the façade and the structure, should be one of the following:

- one or two part polysulphide
- one part silicone
- one or two part polyurethane
- materials assessed in accordance with Technical Requirement R3.

6.9.14 Cavity barriers and firestops

Materials used for cavity barriers and firestops shall be capable of producing adequate resistance to fire and smoke.

Materials are acceptable where they are:

- specified in Building Regulations
- assessed in accordance with Technical Requirement R3.

Systems incorporating proprietary intumescent materials should follow the guidance provided by:

- the Intumescent Fire Seals Association (IFSA)
- the Association for Specialist Fire Protection (ASFP).

6.9.15 Ventilation screens

Ventilation openings shall be protected from the entry of birds and animals.

Where openings are larger than 10mm, a screen to prevent birds and animals entering the cavity should be provided:

- in accordance with the design
- at the top and bottom of the rainscreen
- at penetrations through the cladding.

6.9.16 Handling and storage

Materials, products and systems shall be protected and stored in a satisfactory manner to prevent damage, distortion, uneven weathering and degradation.

The handling and storage of curtain walling or cladding system should ensure:

- components are transported, lifted, handled and stored in accordance with the manufacturer's recommendations
- insulated glass units are carefully stored and protected in a sheltered dry area.

Practical steps should be taken to avoid the risk of damage to the curtain walling or cladding system during construction.

6.9.17 Curtain walling

Curtain walling shall ensure adequate in-service performance. Issues to be taken into account include:

1) acoustic performance
2) weather resistance
3) thermal bridging and condensation
4) air infiltration
5) opening doors and lights
6) off-site testing
7) site testing.

6.9.17.1 Acoustic performance

Noise from the curtain walling system caused by loads, movements and changes in the environmental conditions should be accommodated without being intrusive.

The curtain walling system should be designed to resist the passage of airborne and impact sound within the building. To reduce flanking transmission, precautions may be required at the:

- edges of separating floors
- outer ends of separating walls
- outer ends of partition walls
- junctions with roof constructions and parapets.

6.9.17.2 Weather resistance

Curtain walling systems should have:

- external and internal air and water seals, with a drained and ventilated cavity at each interface
- drained and ventilated glazing rebates, including gaskets and seals.

The following figures show typical interfaces and general design principles:

Figure 8: Curtain walling to insulated render system — horizontal section

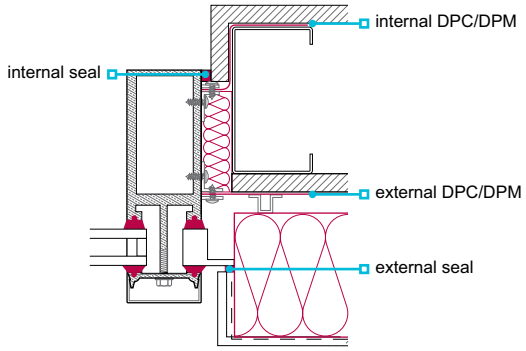


Figure 9: Curtain walling to balcony/terrace: vertical section

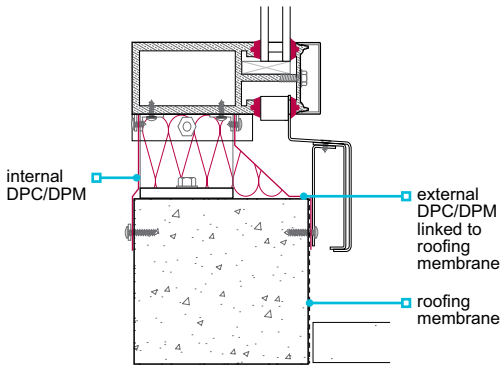


Figure 10: Curtain walling to conventional brick and block wall: horizontal section

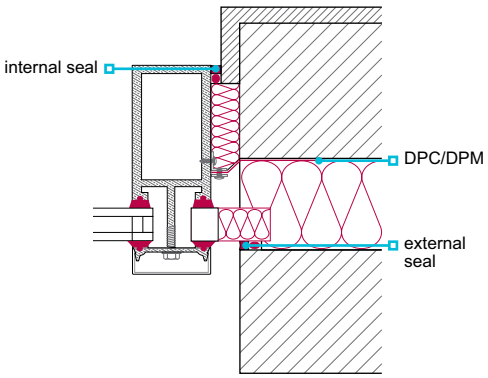


Figure 11: Curtain walling to soffit: vertical section

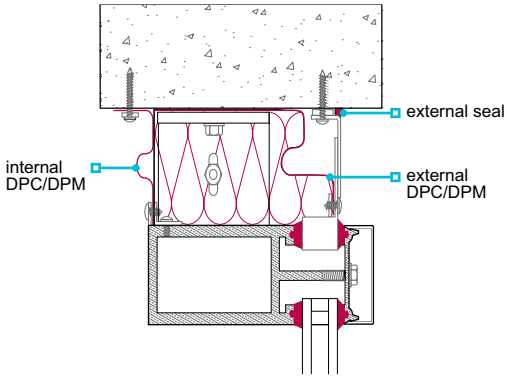
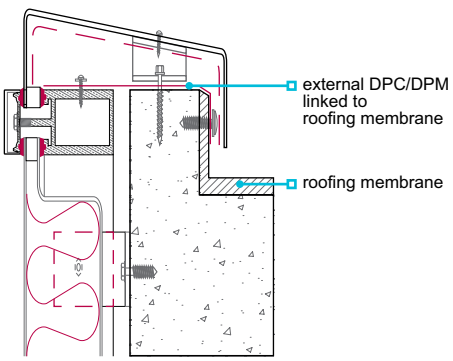


Figure 12: Curtain walling to roof, including coping detail: vertical section



6.9.17.3 Thermal bridging and condensation

The design and construction of curtain walls should:

- ensure interfaces are adequately insulated and installed in accordance with the design
- minimise the risk of surface and interstitial condensation by providing thermal breaks and a continuous, durable VCL, in accordance with the design
- ensure thermal bridging is controlled so that no part of the curtain wall is more at risk from surface condensation than the glazing.

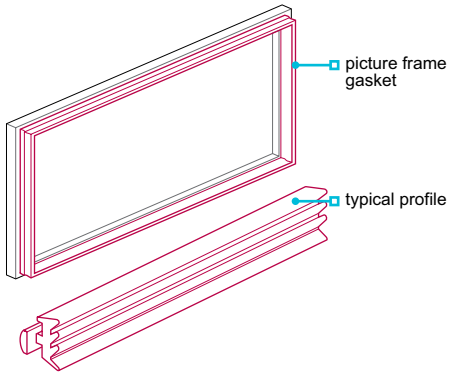
6.9.17.4 Air infiltration

Curtain walling systems should be sealed with preformed factory-moulded 'picture frame' type vulcanised EPDM or silicone internal gaskets. Gaskets and sealants should:

- be used to resist the flow of air from the outside to the interior surface of the curtain walling system
- comply with BS 6213 and be used in accordance with manufacturers' recommendations.

Particular attention should be given to the interfaces between the curtain walling system and the walls, roof, doors, windows and cladding system.

Figure 13: Frame perimeter weathersealing gasket



6.9.17.5 Opening doors and lights

Opening doors and lights should:

- hang square within the curtain wall frame
- fit neatly and with minimal gaps to ensure effective weatherproofing.

6.9.17.6 Off-site testing

Air and water testing of the 'prototype' curtain walling system should be carried out in accordance with, and pass, the CWCT Standard test sequence (A or B) up to a maximum test pressure of 600 pascals. Panels tested should be of a similar size and configuration to those to be used on the building.

Where the maximum calculated design wind pressure is above 2.4 kPa, the test pressure should be increased to 0.25 x the design wind pressure.

The prototype should remain watertight during and after the test.

At a test pressure of 600 pascals, an air infiltration rate no higher than 1.5m^3/hr/m^2 for fixed glazed panels is permissible, provided there is no evidence of concentrated leakage.

Wind resistance, serviceability and safety testing should be carried out in accordance with the CWCT Standard.

6.9.17.7 Site testing

Site testing should:

- be conducted to determine resistance to water penetration, including joints and interfaces which are intended to be permanently closed and watertight
- ensure a representative sample of the finished installation is hose tested in accordance with the current CWCT Standard for curtain walling
- ensure a minimum of 5% of the completed curtain walling system is tested, especially in vulnerable areas such as joints and interfaces.

Other testing may be acceptable where it is considered to be a suitable alternative by NHBC.

The results of the test should be made available to NHBC.

6.9.18 Rainscreen cladding

Rainscreen cladding systems shall ensure adequate in-service performance. Issues to be taken into account include:

1) **acoustic performance**
2) **weather resistance**
3) **thermal bridging and condensation**
4) **air infiltration**
5) **compartmentation**
6) **certification**
7) **site testing.**

6.9.18.1 Acoustic performance

Noise from the rainscreen cladding system caused by rain striking the outer surface of panels should be accommodated without being intrusive through the use of material that is:

- noise absorbing, or
- anti-drumming.

6.9.18.2 Weather resistance

To ensure moisture is directed to the outside, DPC/DPM arrangements should be correctly formed with suitable upstands and stop ends, including at the junction between the rainscreen cladding and any other component or system. External and internal air and water seals and a drained cavity should be provided at all interfaces.

The air gap between the face of the insulation and the back of the panels should be of sufficient width and have suitably sized drainage, allowing any water passing the joints to:

- run down the back of the rainscreen panels
- be discharged externally without wetting the insulation or the backing wall.

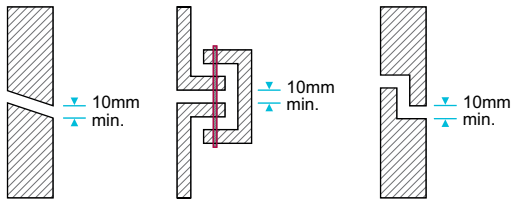
Free drainage

Air gaps should be adequately ventilated and the following minimum widths maintained behind all rainscreen panels:

- 50mm for panels with open joints, or
- 38mm for panels with baffled or labyrinth (rebated) joints.

Open, baffled or labyrinth (rebated) joints should have a minimum 10mm opening, unless specified otherwise.

Figure 14: Cladding panel joint types and spacings



6.9.18.3 Thermal bridging and condensation

The system should:

- be designed to minimise the risk of thermal bridging, surface and interstitial condensation
- be assessed using a BS 5250 condensation risk analysis
- generally include a vapour control layer fixed to the warm side of the wall insulation.

6.9.18.4 Air infiltration

Before installation of the system, the backing wall should be reasonably airtight with:

- masonry walls jointed to a high standard ie, each joint filled
- framed walls, including a rigid sheathing on the cavity face, with each joint taped or sealed.

Where reasonable airtightness cannot be achieved:

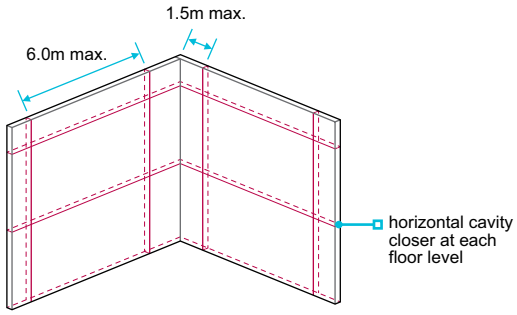
- a separate continuous vapour permeable air barrier should be provided on the outer face of the backing wall
- joints should be taped or sealed.

6.9.18.5 Compartmentation

Rainscreen cladding systems that have open joints between the panels should be designed to be pressure equalised. The cavity should be compartmented by:

- a horizontal cavity closer at each floor level
- vertical cavity closers at centres not exceeding 6m
- vertical cavity closers at centres not exceeding 1.5m within 6m of an internal or external corner
- a vertical cavity closer as close as possible to an external corner, generally within 300mm.

Figure 15: Compartmentation to achieve pressure equalisation



The NHBC Technical Requirements for rainscreen wall cavity compartmentation are in addition to Building Regulations (to control the spread of smoke and fire), but may be used for the same purpose.

Cavity closers should:

- be rigid and installed in accordance with the manufacturer's recommendations
- enable ventilation and drainage to be maintained in accordance with the design.

6.9.18.6 Certification

Rainscreen cladding systems, including panels, should have current certification confirming satisfactory assessment by an appropriate independent technical approvals authority accepted by NHBC.

6.9.18.7 Site testing

On-site hose or sparge bar testing should be carried out with emphasis on interfaces that are designed to be permanently closed and watertight.

The building should remain watertight during and after the test.

6.9.19 Insulated render and brick slip cladding

Also see: Chapter 6.2

Insulated render and brick slip cladding shall be designed and installed to ensure adequate in-service performance. Issues to be taken into account include:

1) **weather resistance**
2) **thermal bridging and condensation**
3) **air infiltration**
4) **insulated render: reinforcement and render**
5) **brick slip cladding: slips, carriers and joints.**

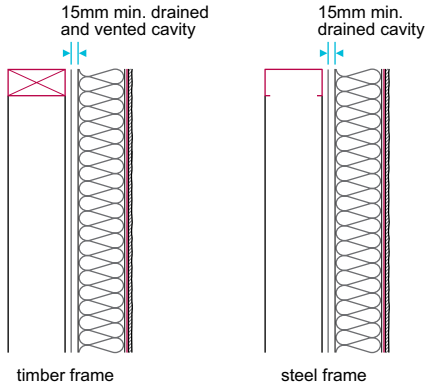
6.9.19.1 Weather resistance

Timber and steel framed backing walls should have a cavity between the wall and the insulation which is:

- a minimum of 15mm wide
- drained and vented (for timber frame)
- drained (for steel frame).

A cavity can increase the risk of damage from impact, especially at low level, around balconies and where cradle systems, etc can come into contact with the façade. Suitable precautions to resist impact damage should be provided eg by the provision of a rigid board behind the insulation whilst maintaining the cavity.

Figure 16: Insulated render system to timber frame or light steel frame wall



The following figures show typical interfaces and general design principles:

Figure 17: Insulated render system to windows and doors: horizontal section

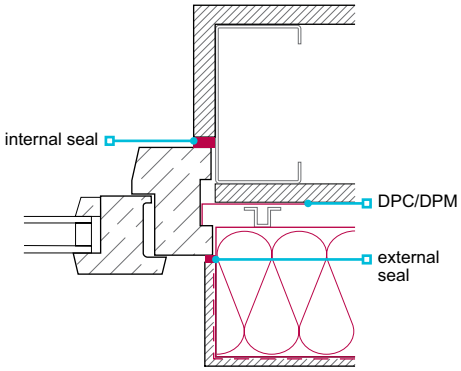


Figure 18: Penetration of gas flue through insulated render system on light steel frame: horizontal section

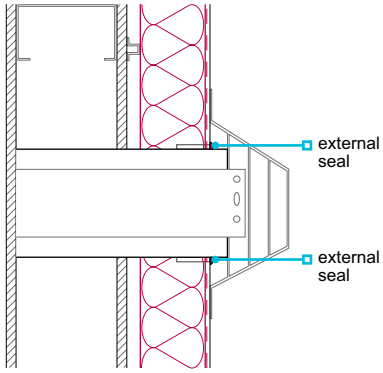
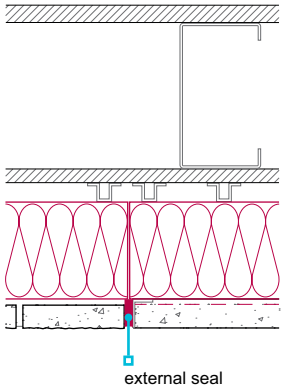


Figure 19: Brick slip cladding to insulated render system: horizontal section



Movement joints in the backing wall should be:

- continued through the insulated render system
- formed in accordance with the manufacturer's recommendations.

6.9.19.2 Thermal bridging and condensation

The system should:

- be designed to minimise the risk of thermal bridging and condensation
- be assessed using suitably accredited ie, IS 9001 condensation risk analysis
- generally include a VCL, fixed to the warm side of the wall insulation.

6.9.19.3 Air infiltration

Before installation of the system, the backing wall should be reasonably airtight with:

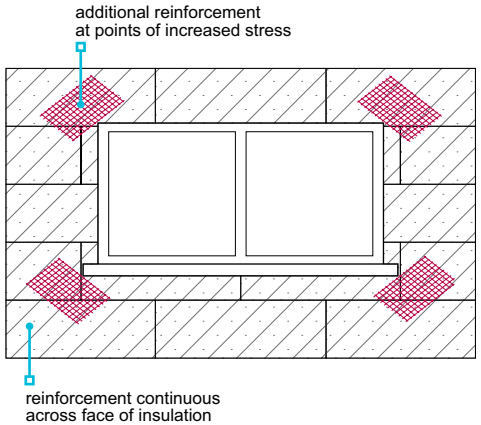
- masonry walls jointed to a high standard ie, each joint filled
- each joint taped or sealed on framed walls, including a rigid sheathing on the cavity face.

6.9.19.4 Insulated render: reinforcement and render

Reinforcement should:

- be detailed in the design and be in accordance with the manufacturer's recommendations
- be formed with appropriate trim at openings, corners, angles, interfaces and movement joints
- include additional mesh where there may be increased stress in the render system ie, at the corners of window or door openings
- be lapped to a minimum of 100mm.

Figure 20: Reinforcement mesh bonded to blockwork



Render should:

- not be applied where the surface has contamination, dust or loose particles
- have the appropriate number and thickness of coats in accordance with the manufacturer's recommendations
- be mixed to ensure colour consistency where coloured pigments are specified
- be specified and used with the appropriate trims to form corners, returns and features in accordance with the manufacturer's recommendations.

6.9.19.5 Brick slip cladding: slips, carriers and joints

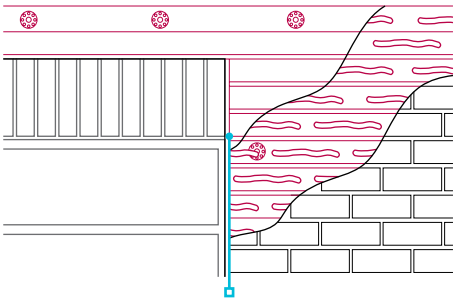
Brick slip systems, including proprietary carriers forming an integral part of the system, should:

- be specified and fixed in accordance with the design and the manufacturer's recommendations, taking account of relevant height restrictions
- be set out and designed to ensure that excessive cutting of brick slips is avoided ie, in the storey heights, at corners and around openings
- have coursing arranged to suit lintel heights.

Mortars, proprietary mortars and grouts should be specified:

- to enable each joint to be adequately filled and appropriately struck
- in accordance with the system manufacturer's recommendations.

Figure 21: Setting out of insulation layer and brick slip carrier system



6.9.20 Further Information

- *BS EN 1991-1-1 Eurocode 1 Actions on structures General actions — Densities, self-weight, imposed loads for buildings*
- *BS EN 1991-1-4 Eurocode 1 Actions on structures — General actions — Wind actions*
- *BS EN ISO 3506-1 Mechanical properties of corrosion-resistant stainless-steel fasteners. Bolts, screws and studs with specified grades and property classes*
- *BS EN ISO 2081:2008 Metallic and other inorganic coatings — Electroplated coatings of zinc with supplementary treatments on iron or steel*
- *BS EN ISO 1461 Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods*
- *BS EN ISO 12944 — Paints and varnishes. Corrosion protection of steel structures by protective paint systems*
- *ISO 14713-1:2017 Zinc coatings — Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 1: General principles of design and corrosion resistance*
- *BS EN 573-1 Aluminium and Aluminium alloys — Chemical composition and form of wrought products Part 1: Numerical designation system Nov-2004*
- *BS EN 573-2 Aluminium and Aluminium Alloys — Chemical composition and form of wrought products Part 2: Chemical Symbol Designation System Jan-1995*
- *BS EN 573-3 — Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition / form of products Aug-2019*
- *BS EN 772 — Methods of Test for Masonry Units Multi-part Document divided into Parts 1 — 22*
- *BS EN 755 — Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles Multi-part Document divided into Parts 1 — 9 refer to parts 1 and 2:*
- *BS EN 755 Part 1 Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Technical conditions for inspection and delivery*
- *BS EN 755 Part 2 Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Mechanical properties*
- *BS 5080 Part 1 Methods of test for structural fixings in concrete and masonry. Tensile loading*
- *BS 5080 Part 2 Structural fixings in concrete and masonry. Method for determination of resistance to loading in shear*
- *BS EN 13162 Thermal insulation products for buildings. Factory made Mineral Wool (MW) products*
- *BS EN 13163 Thermal insulation products for buildings — Factory made Expanded Polystyrene (EPS) products — Specification (FR grade (flame retardant) expanded polystyrene)*
- *BS EN 13164: 2012(+A1:2015)Thermal insulation products for buildings. Factory made Extruded Polystyrene foam (XPS) products. Specification (FR grade (flame retardant) extruded polystyrene)*
- *BS EN 13165: 2012(+A2:2016) Thermal insulation products for buildings. Factory made rigid Polyurethane foam (PU) products. Specification (Rigid polyurethane foam and polyisocyanurate)*
- *BS EN 13166 Thermal insulation products for buildings — Factory made Phenolic Foam (PF) products — Specification (Phenolic foam)*
- *BS EN 13167 Thermal insulation products for buildings — Factory made Cellular Glass (CG) products — Specification (Cellular glass)*
- *BR135 Fire performance of external thermal insulation for walls and multi-storey buildings 3rd Edition BRE 2013*
- *BS EN 12588 Lead and Lead Alloys — Rolled Lead Sheet for Building Purposes (minimum Code 4)*
- *BS EN 485 and BS EN 573 aluminium and aluminium alloys multi-part document divided into the following 2 parts:*
- *BS EN 485-1: 2016 Aluminium and aluminium alloys — Sheet, strip and plate — Part 1: Technical conditions for inspection and delivery*
- *BS EN 485-2: 2016 (+A1:2018) Aluminium and aluminium alloys. Sheet, strip and plate — Part 2: Mechanical properties*

- *BS EN 573 Multi-Part document divided into the following parts:*
- *BS EN 573-1 Aluminium and aluminium alloys. Chemical composition and form of wrought products. Part 1: Numerical designation system*
- *BS EN 573-2 Aluminium and aluminium alloys. Chemical composition and form of wrought products. Part 2: Chemical symbol-based designation system*
- *BS EN 573-3 Aluminium and aluminium alloys. Chemical composition and form of wrought products. Part 3: Chemical composition and form of products*
- *BS EN 573-4 Aluminium and aluminium alloys. Chemical composition and form of wrought products. Part 4: Forms of products*
- *BS EN 573-5 Aluminium and aluminium alloys. Chemical composition and form of wrought products. Part 5: Codification of standardised wrought products*
- *BS EN 988 Zinc and zinc alloys. Specification for rolled flat products for building*
- *BS EN 13859-2: 2014 Flexible sheets for waterproofing. Definitions and characteristics of underlays. Underlays for walls*
- *BS EN 7671 IET Wiring Regulations Requirements for Electrical Installations, formally 'IEE Wiring Regulations*
- *BS EN 62305-1 — Protection against lightning Part 1 Protection against lightning. General principles*
- *BS EN 62305-2 — Protection against lightning Part 2 Protection against lightning. Risk management*
- *BS EN 62305-3 — Protection against lightning Part 3 Protection against lightning. Physical damage to structures and life hazard*
- *BS EN 62305-4 — Protection against lightning Part 4 Protection against lightning. Electrical and electronic systems within structures*
- *BS 4255-1 Rubber Used in Preformed Gaskets for Weather Exclusion from Buildings — Part 1: Specification for non-cellular gaskets (Active, Most Current Publication Date:30-May-1986)*
- *BS 6213 Selection of construction sealants — Guide*
- *BS EN ISO 11600_2002 Building Construction Jointing products — Classification and requirements for sealants*
- *BS 5250:2011(+A1:2016) Code of practice for control of condensation in buildings*

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