PGB ARCHITECTURAL SERVICES LTD

Writtenstone Farm
Writtenstone Lane

Thermal upgrades to ground floor structure, external walls and roof. Provision of Wc facility at ground floor and En-Suite to first floor

HERITAGE DESCRIPTION DESIGN AND ACCESS AND METHOD STATEMENTS

July 2025

1 Introduction

1.1 PGB Architectural Services are retained by Mr D Norris to prepare documents necessary for a listed buildings application for thermal upgrades to the ground floor structure, external walls and roof. Provision of Wc facility at ground floor and En-Suite to first floor.

1.2 Mr and Mrs Norris have recently bought the listed property and associated outbuildings. A separate planning application has already been submitted to convert one of the barns into a residence.

1.3 Applications have recently been approved to re-roof and repoint the property and there is a subsequent application that has been made regarding the installation of replacement windows and doors. This roof works is almost complete.

1.4 As part of the wider and ongoing project to sympathetically bring Writtenstone farmhouse up to current living standards and as close to modern levels of energy efficiency as possible under the current building regulation levels, permission is sought to upgrade the Ground Floor, External walls and Roof. Also, as part of this application, it is intended to provide a Wc at ground floor and an En-Suite at first floor.

1.5 The remainder of this statement is structured as follows:

- Section 2 – Relevant planning history
- Section 3 – Description of listing
- Section 4 – Archaeological interest
- Section 5 – Historical interest
- Section 6 – Impact of the proposed works on the significance of the heritage asset
- Section 7 – Justification for the works

2 Relevant Planning History

2.1 The house was granted listed building consent to be re-roofed and re-pointed 3/2024/0746 on 22/11/2024. Subsequent discharge of conditions has been granted 07/02/2025

2.2 There is an application (3/2025/0311) awaiting determination for replacement doors and windows

2.3 A curtilage Barn was granted planning permission and listed building consent to be converted into a dwelling 3/2024/0622 and 23 0n 17/01/2025

3 Description of Listing

3.1 WRITTEN STONE FARMHOUSE (GRADE II LISTED): "House, probably late C18th. Sandstone rubble with slate roof. L-plan. 2 storeys. Facade of 3 bays with chamfered quoins and windows of 3 lights with square stone mullions and plain stone surrounds, except for the central window on the 1st floor which has a plain stone surround with semi-circular head. The door has a plain stone surround with a semi-circular head."

4 Archaeological Interest

4.1 The property is typical of many other farmhouses of the same period in the use of wall and roof materials and its detailing. It does, however, differ in plan form with the location of the

staircase and the eccentricity of the front entrance. It also looks to have had various modifications/additions to the rear and may even sit on the foundations of an older building (apparent filled in basement opening on Eastern Gable may just be access to an ash pit – It appears there is no basement in the property)

5 Historical Interest

5.1 The listed status describes its interest and significance.

6 Impact of the proposed works on the significance of the heritage asset

6.1 Floors

- The proposal to upgrade the floors requires the existing floors to be broken up and removed. The existing floors to the hallway and 2 front reception rooms have stone flags of a good quality. These are to be recorded and numbered as shown, prior to being carefully lifted and stored on site, to be re-laid in the same locations as they were removed. The floors to the remaining rooms are concrete. This is impacting on the general breathability of the floors resulting in moisture concentrated towards the walls and increasing the risk of condensation.
- The new floor is to comprise of a geotextile membrane over the exposed earth, to be covered with 150mm of 'Foamglass 40' 20 – 40mm aggregate with a further layer of geotextile membrane.
- A layer of light weight steel reinforcing mesh is to be laid for underfloor heating pipe to be secured and covered over with 100mm NHL5 based Lime screed reinforced with fibres. A 40mm thick cork perimeter insulation is to be incorporated.
- Existing stone flags are to be re-laid on lime mortar in recorded positions.
- Externally, a gravel margin is to be provided with a perforated drain to discharge to the existing drainage system.
- During the floor works, 2 No. soil pipes are to be located as indicated to pass to the exterior of the building to connect to the existing drainage system

6.2 Exterior walls

- The applicant is keen to improve the insulation levels of the building but in doing so understand the importance of maintaining breathability. Various systems have been considered and on balance the preferred route is to use wood fibre boards rather than insulating lime plasters because this gives a better insulation level. Modern phenolic foam type insulations have been avoided due to their complications in detailing and breathability. The provision of replacement windows in a current application facilitates the woodfibre solution avoiding condensation risks in reveal situations.
- Due to the high likelihood that modern, non-breathable paints have been used and probably over many layers of previous decorations, it is proposed to remove all existing plaster to avoid later issues with interstitial condensation forming on these non-breathable surfaces. This includes removing cement plasters in the rear ground floor rooms.
- Apply a levelling coat of breathable plaster (Lime Green Duro) in accordance with the manufacturer's instructions.
- 60mm thick 'WarmShell' woodfibre board is to be adhesive bonded to the levelling coat using 'WarmShell' board adhesive

- The walls are to be finished with 'LimeGreen Solo' one coat plaster applied in 2 layers, 5mm thick with 'LimeGreen SoloMesh' embedded between.

6.3 Interior walls

- The interior walls are to be stripped of existing wall papers and paints to allow for inspection of the underlying plaster finish. Areas of loose lime plaster are to be removed, and patch repairs afforded with 'LimeGreen Ultra' lime based base coat and 'LimeGreen Solo' lime plaster skim to finish smooth and flush to the surrounding plaster.
- Where cement plaster has been used this is to be completely removed and replastered in lime as described above.
- Skirtings and Architraves
- It is noted that to facilitate the works to the walls, some Architraves and Skirtings will have to be removed.
- It is proposed that Architraves are to be removed carefully and recorded to allow for their reinstatement upon completion where these are deemed to be original to the house.
- Where skirtings are present and modern (much of the skirting at first floor is absent) or damaged due to the presence of dampness. We propose to have skirtings made of high-quality softwood using a section of the original skirting as a pattern.
- New skirtings are to be treated against decay and be fully primed prior to installation.

6.4 Roofs

- The roof is to be insulated at rafter level in the front section of the house. This roof space has the floor area boarded out with an access stair and may have been servant's quarters in the past. The proposal will hide the ceiling joists but leave principal purlins and trusses exposed.
- The work is necessary to ensure continued use of this upper floor area whilst providing an improved level of insulation.
- The remaining roof areas to the rear will be insulated at ceiling joist level.
- As part of the re-roofing works, a breathable membrane has already been installed below the slates.
- As part of the replacement window application, it is proposed to install 3 No. roof lights.
- The existing rafters vary in depth. It is proposed to install makeup pieces, screw fixed to the under side to provide a flat level surface to install the ceiling and to give an overall depth of 225mm to give sufficient depth for the insulating construction.
- 50 x 25mm battens are to be installed to each side of each rafter to support a 15mm thick Woodwool board and provide a 50mm air space over.
- 160mm 'Parvaflex' insulation is to be installed between the rafters to finish flush to the underside.
- Install 'Proclima Intello' intelligent membrane below rafters in accordance with the manufacturer's instructions
- 40mm 'WarmShell' Woodfibre board is to be fixed to the underside of the packed-out rafters.
- The ceiling is to be finished with 'LimeGreen Solo' one coat plaster applied in 2 layers, 5mm thick with 'LimeGreen SoloMesh' embedded between.

6.5 Wc and En-Suite

- The house has no downstairs WC which is ideal for most households especially when occupied by elderly persons. Similarly with all the bedrooms there is only one

bathroom. An en-suite in a large family residence is essential for modern living.

- The new internal walls to form the Wc and En-Suite facilities are to be formed of lightweight timber stud partitions with plasterboard and skim finish. This type of construction is such that these interventions can be readily reversed with no permanent harm to the historic fabric of the building.
- The walls are proposed to be of 75 x 50mm CLS timber studs at 400mm centres with mineral wool quilt between the studs.
- The walls are to be finished with 12.5mm 'SoundBloc' wallboard and 3mm plaster skim or tile backerboard.
- New doors are to match existing in softwood timber frames.
- Skirting boards are to be as those manufactured as part of the external wall proposal.
- Architraves are to be manufactured, bespoke, to match the existing found throughout the building.

7 Justification for the Works

7.1 The works are necessary due to changes in the way buildings and their occupants consume energy and improvements to modern living standards .

Appendix

A. Foamglass 40

FOAMGLASS 40

Foamed Glass Aggregate 20 - 40mm for commercial and residential construction

Foamglass 40 is an extremely lightweight aggregate for use in the building sector as a lightweight fill material. Foamglass aggregate is manufactured from waste container glass and a small amount of foaming agent. Foamglass prevents the land-filling of reject glass generated at glass recycling plants. Any organic impurities in the raw material is removed during the production process and is also recycled. Thanks to its closed cellular structure, Foamglass is a high performance, low weight aggregate with excellent thermal insulation.

Environmentally Friendly

Foamed Glass aggregate is made from 100% recycled glass, it's an eco-friendly material that supports recycling and reduces landfill waste.

Superior Thermal Insulation

Foamed glass aggregate offers excellent thermal insulation, ideal for building foundations and green roofs, reducing energy costs.

Lightweight and High Strength

Provides high strength and stability, perfect for roads and railways, reducing ground pressure and preventing settlement. Foamglass is 85% lighter than traditional aggregates.

Excellent Drainage & Filtration

Ideal for storm water management and landscaping, promoting efficient water infiltration and reducing runoff.

Reduces Construction Costs

Minimises the need for heavy machinery and extensive labour due to its lightweight and easy-to-handle properties. This leads to significant cost savings on large-scale infrastructure projects.

Faster Construction Process

The lightweight nature of Foamglass allows for quicker handling and installation, accelerating the overall construction timeline. This efficiency is particularly beneficial in time-sensitive projects.

Reduces Water Runoff

Efficiently manages water runoff, promoting sustainable water practices. It is crucial in urban areas for storm water management, supporting urban water systems' health and reducing flooding risks.

Improves Structural Stability

Reduces structural stress and prevents subsidence, enhancing the durability of foundations and supporting structures Its lightweight nature minimises soil pressure and ground movement.

85%
Lighter Than Traditional Aggregates

99%
Recycled Glass in final product

10m+
Glass Bottles Recycled Every Year

Typical Applications

- Frost-resistant layers
- Capillary break layers
- Building foundations
- Lightweight backfill
- Pipe infill / support
- Insulated green roofs
- Floors - sub, intermediate & upper
- Drainage layers
- Sports fields
- Floating odour barriers

Technical Details

Foamglass Aggregate is a lightweight gravel made of cellular foamed glass for unbound and bound applications according to BS EN 13055. Also for use in for use in civil engineering work & road construction to BS EN 13242.

See overleaf for physical and technical properties.

www.foamed-glass.uk

A Thomas Armstrong Group Company

February 2025

Technical Data

Characteristic	Value	Reference
Technical standards	BS EN 13055 BS EN 13242	Lightweight Aggregates Aggregates for unbound and hydraulically bound materials for use in civil engineering work & road construction
Loose Bulk Density (dry)	230 - 280 kg/m^3	EN 1097-3
Compaction Ratio (dry)	1.15 - 1.20	Typical, production data
Aggregate Size	20 - 40 mm	EN 933-1
Particle Shape	Irregular, angular	Production data
Water Absorption	2.73% at 5 mins 2.73% at 60 mins 16.4% at 24 hours 32.2% at 28 days	EN 1097-6
Capillary Water Suction Height	140 - 160 mm	EN 1097-10
Confined Compressive Strength - 10% compaction	> 0.45 N/mm^2	EN 1097-11
Confined Compressive Strength - 20% compaction	> 0.95 N/mm^2	
Bulk Crushing Resistance	> 0.10 N/mm^2	EN 13055 Annex C Procedure 1
Resistance to Disintegration	0.97%	EN 1367-8
Freeze Thaw Resistance	Durable and frost resistant	EN 1367-7
Angle of Repose	35^o - 45^o	Production data
Thermal Conductivity, dry, 10^{o}C	0.092 W/mK	EN 12667 / EN 12939
Resistance to Fire	Incombustible, Class A1	EN 13501-1 in accordance with Commission Decision 96/603/EC as amended by Decision 2000/605/EC
Purity	< 1% organic substances	Production data
Sulphate as SO_3	0.22%	EN 1744-1
Sulphate as SO_4	0.26%	EN 1744-1
Chloride	0.00%	EN 1744-1
Carbon Footprint	45 - 55 CO_2 eq / m^3	Indicative GWP data based on verified data from equivalent products; EPD due mid-2026

- We operate in accordance with our ISO 9001 Quality and ISO 14001 Environmental management systems and certification is underway.
- Foamglass is produced from End of Waste raw material , is completely inert and contains no dangerous substances. A comprehensive programme of leach-testing is underway to ensure compliance and further detail will follow in due course.

Site Work

Installation:
Ensure a flat, uniform laying surface. Use a non-woven geotextile layer as a separation membrane. Foamglass can be tipped directly and spread by hand using rakes ensuring as level a surface as Possible. Avoid loading with traffic until the layer is fully compacted.

Compaction:
Typically 1.3:1 and requires minimal compaction; can be installed using standard construction equipment being careful to avoid over-compaction. For layers thicker than 300mm, placing and compaction should be done in two or three separate layers to ensure uniformity.

Layer thickness:
A Foamglass layer offers an excellent and simple capillary break against the rising of groundwater. With a capillary rise height of 100-200mm, the recommended layer thickness is between 300-600mm typically.

Packaging and Delivery

Bulk:
Delivered in large capacity trailers to suit the application.
Typical load size 50 - 100 m^3. Walking-floor trailers recommended.

Bags:
Available in 1m^3, 1.5m^3 and 2.0m^3 big bags.

Storage and Handling

Foamglass is inert and non toxic. Employ standard PPE measures when handling Foamglass aggregate and take measures to minimise dust generation. There are no special requirements for storage but store in as clean and dry a position as possible to maintain quality. Bagged materials should be stored undercover or protected from the weather.

For further details, datasheets, certifications and safety datasheets, please visit our website.

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E: enquiries@foamed-glass.uk
T: 01977 661631

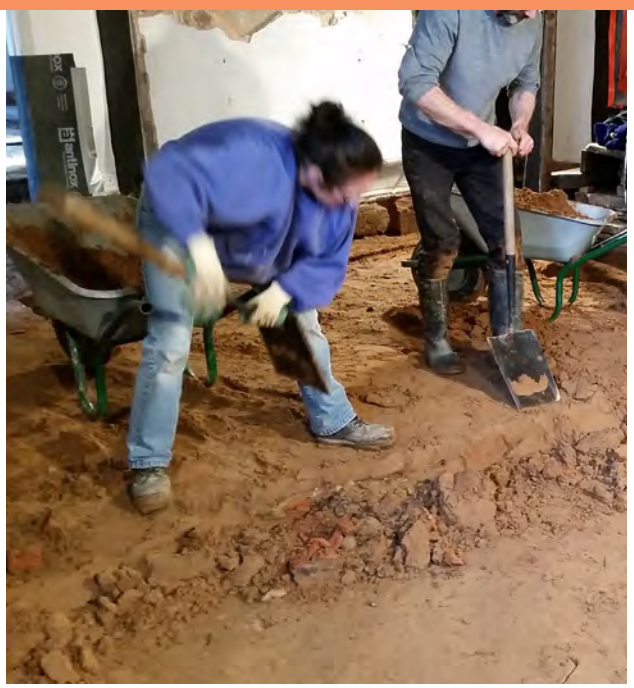
A Thomas Armstrong Group Company

B. Chorley Old hall Case Study

Chorley Old Hall
Insulated Floor

Womersley's

An Introduction to Limecrete Floors



Breathable, insulated and limecrete floors have now become quite common in the UK but one design does not fit all buildings and this is one in a series of case studies which may help you decide on the best floor build up for your old building.

It has long been recognised that in old buildings we should avoid pushing dampness in to walls from the ground by not using un draining compacted fill, cement subbases and impermeable layers and membranes.

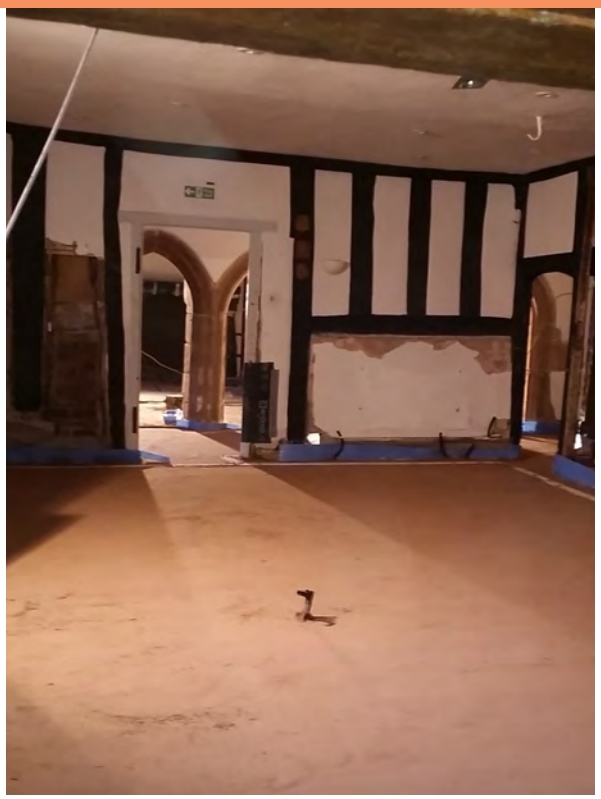
By allowing the lowest section of the floor build up, the sub base, to drain freely and by insulating within and above this sub base it is possible to create well insulated, free draining floors, that help prevent dampness rising up walls in old buildings. This case study illustrates one such build up.

Chorley Old Hall, Alderley Edge

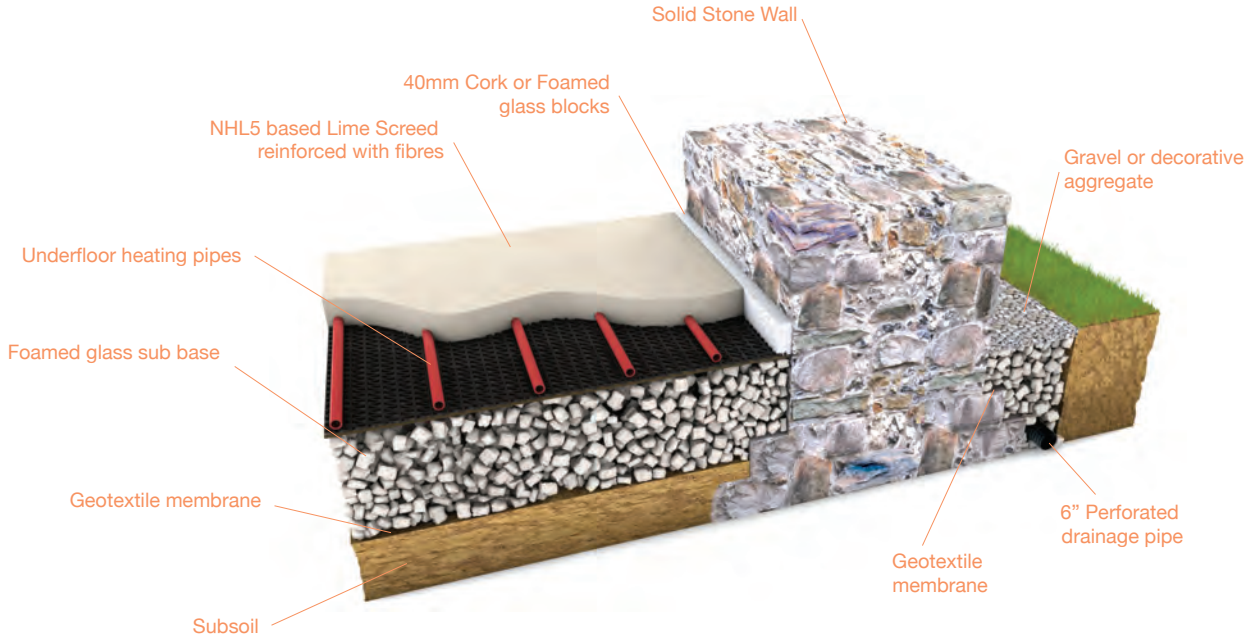
In the early 17th century the house was owned by the Stanley family who carried out alterations around 1640 and built a bridge across the moat. The two houses were joined by a brick link in the late 18th or the early 19th century. In 1915 the house was fully restored and further renovations are now being carried out.

The owners, their architect and project manager were keen to protect archeological evidence below the floors and avoid problems seen elsewhere where buildings with compacted ungraded hardcore and concrete sub bases prevent any water that gets under the building from draining away. They also wanted to avoid dampness being pushed from below an impermeable floor into surrounding walls. They instead have installed a floor build up that allows the whole floor structure to be able to breath.

At the old hall later concrete floor coverings and impermeable membranes were taken up and the ground excavated by archeologists.



The floor was then built up from the bottom with a geotextile membrane, 250mm of free draining foamed glass subbase, another geotextile membrane, underfloor heating pipes, clipped to lightweight steel reinforcing mesh and then an 85mm deep glass fibre reinforced eminently hydraulic lime screed, before finished with floor coverings including some areas of stone flags.



Further Advice

Further advice and support is available from...

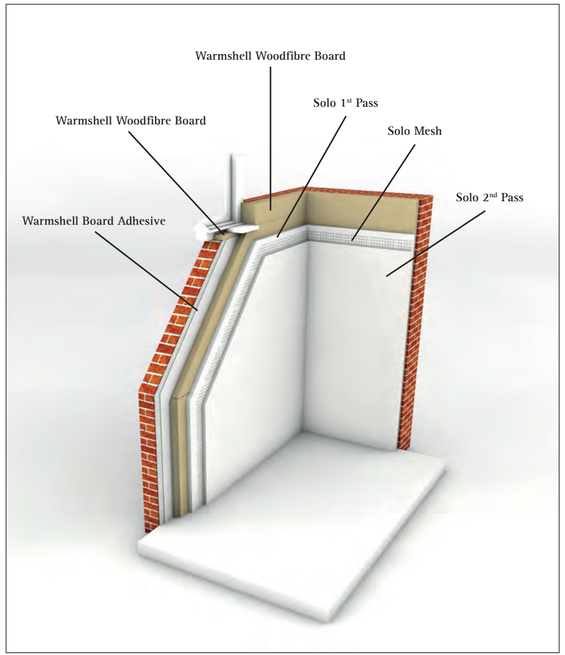
Womersley's Ltd

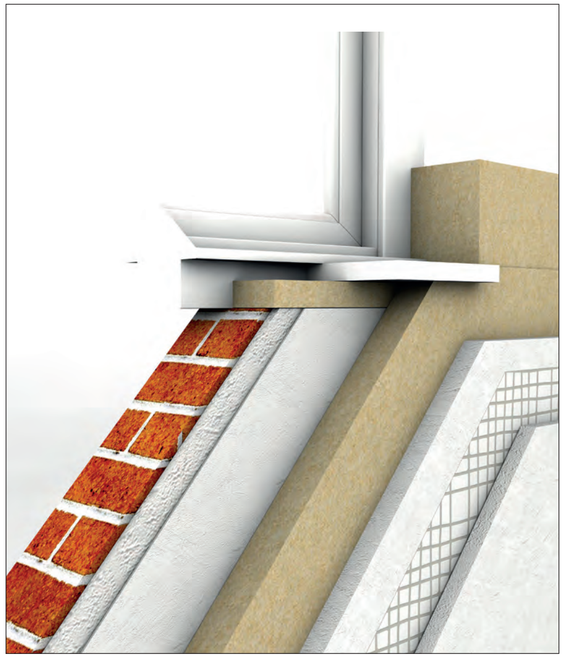
Ravensthorpe Indust Est, Low Mill Lane, Ravensthorpe

tel: 01924 400651 www.womersleys.co.uk

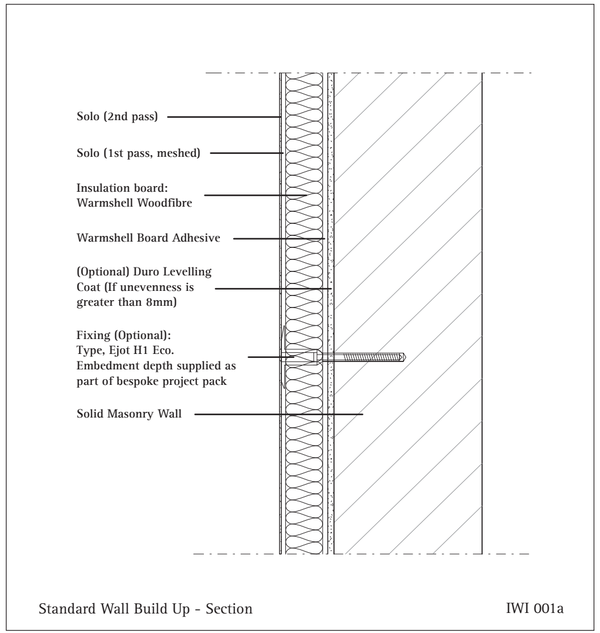
C. WarmShell Interior Wall Insulation

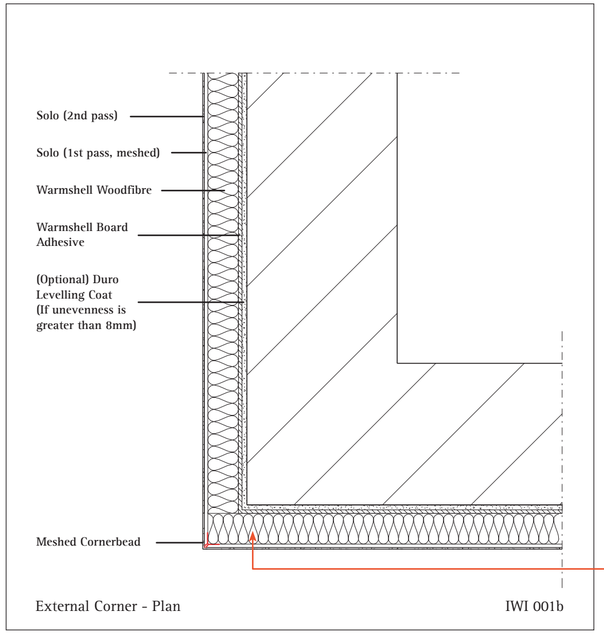
3D Image



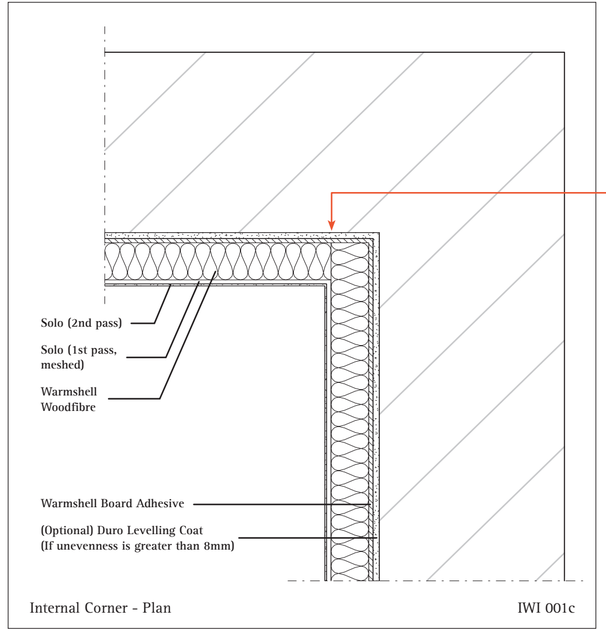


It is essential, when fitting any IWI system, that there are no gaps between the insulation and the substrate.





Ensure that external corners are tightly butt jointed as they do not benefit from the board's tongue and groove.



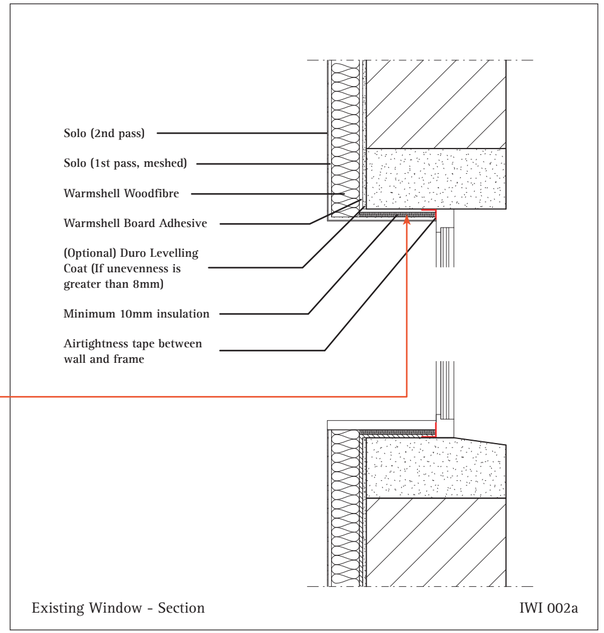
Ensure that internal corners are tightly butt jointed as they do not benefit from the board's tongue and groove.

Architectural Details - With Notes

Drawing Title
Existing Window - Section

Drawing No.
IWI 002a

It is vital that some insulation is fitted to the window reveals to prevent the formation of condensation on the internal surface and subsequent mould growth.



Existing Window - Section IWI 002a

It is important to remember by fitting internal insulation there is less heat getting into the wall. This makes the wall, including any exposed uninsulated surface, colder than before and more likely to result in the formation of condensation on the exposed surface.

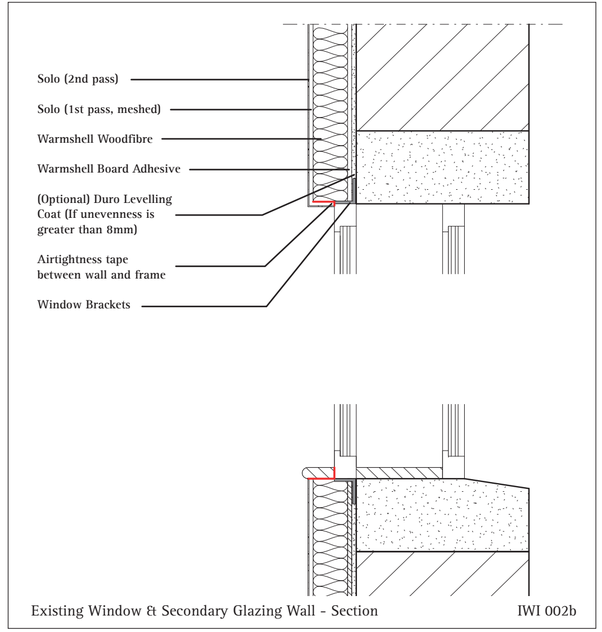
warm|shell

Architectural Details - With Notes

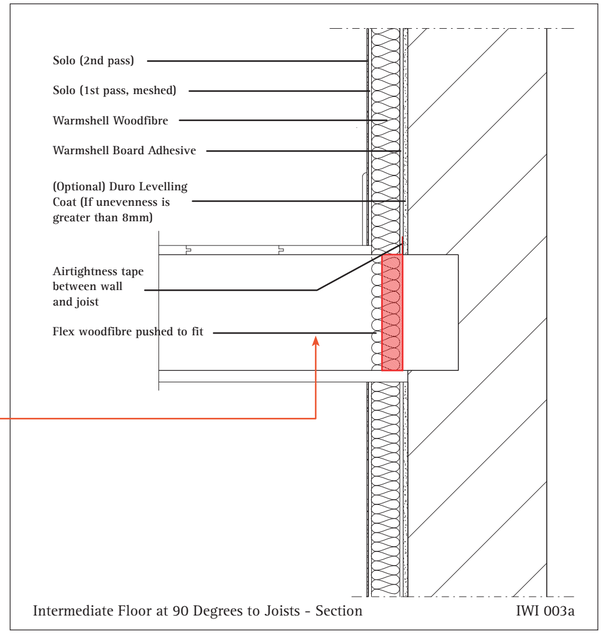
Drawing Title
Existing Window & Secondary Glazing Wall - Section

Drawing No.
IWI 002b

Where possible new secondary glazing fitted in line with the internal wall insulation significantly reduces thermal bridging.

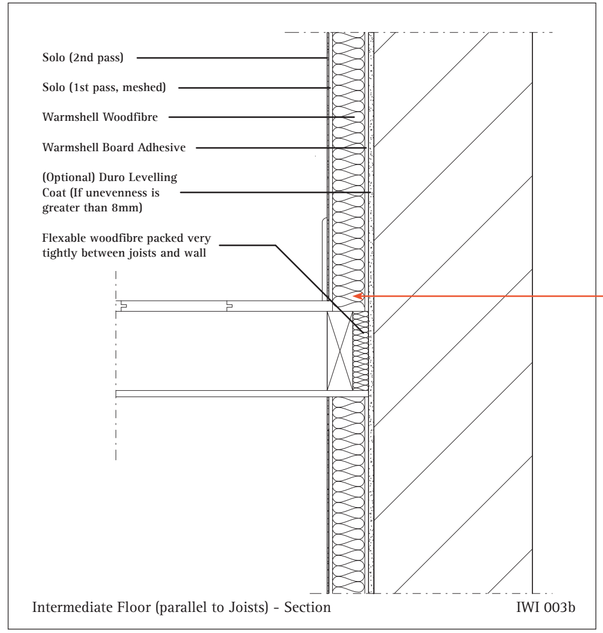


Existing Window & Secondary Glazing Wall - Section IWI 002b



It is very important to insulate between the floor void. If this is not done the final thermal performance of the building will be significantly worse than predicted.

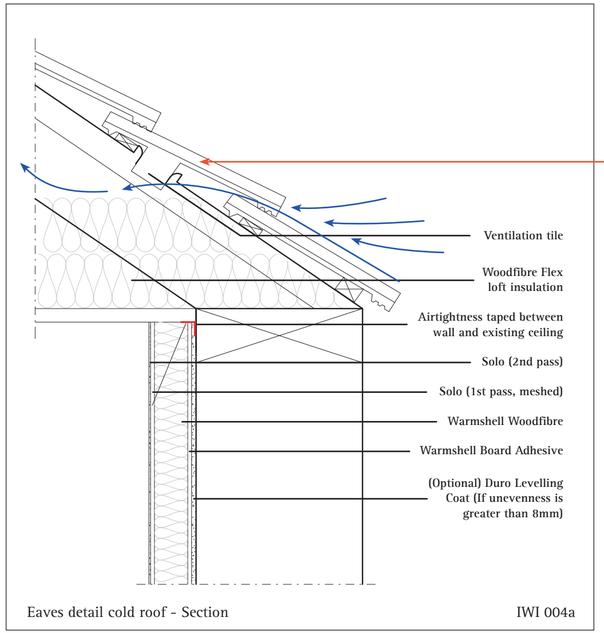
It is very important to achieve good levels of airtightness around the joists, either with airtightness tapes, or with Solo plaster, before installing the insulation.
This will also ensure the long term integrity of the joist ends by stopping humid air from inside the building condensing at the end of the joist, where it sits in the cold wall, and causing it to rot.



Floorboard cut back to accept full depth of Warmshell Woodfibre.

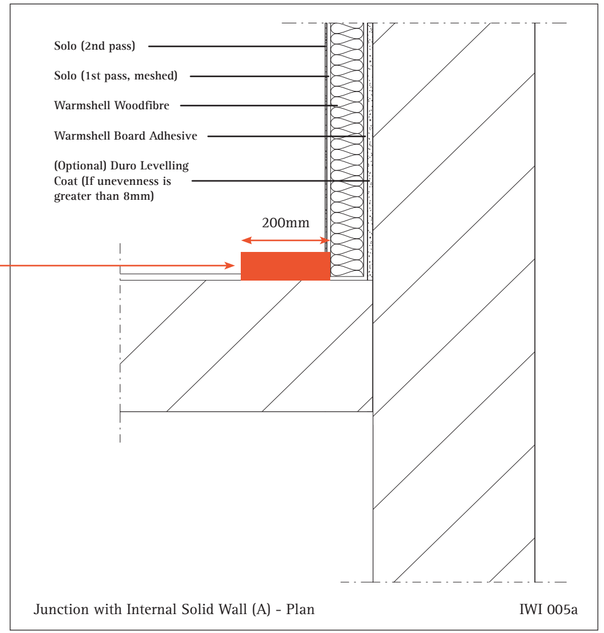
Eves details are numerous, but the key principles to follow for IWI in conjunction with cold roof insulation are;

- Loft insulation to be as close to IWI insulation as possible.
- Loft insulation to extend as far as possible into the eves, WITHOUT blocking ventilation into the cold roof space, to minimise thermal bridging.



Ensure adequate ventilation is able to enter the cold roof space.

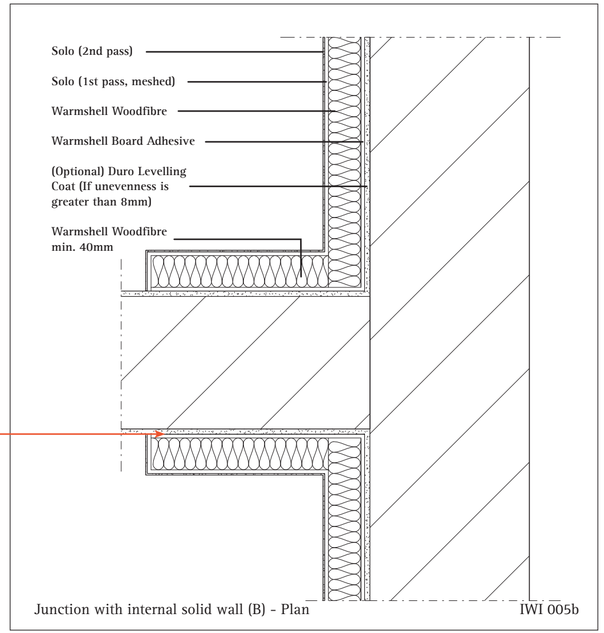
Eaves detail cold roof - Section IWI 004a



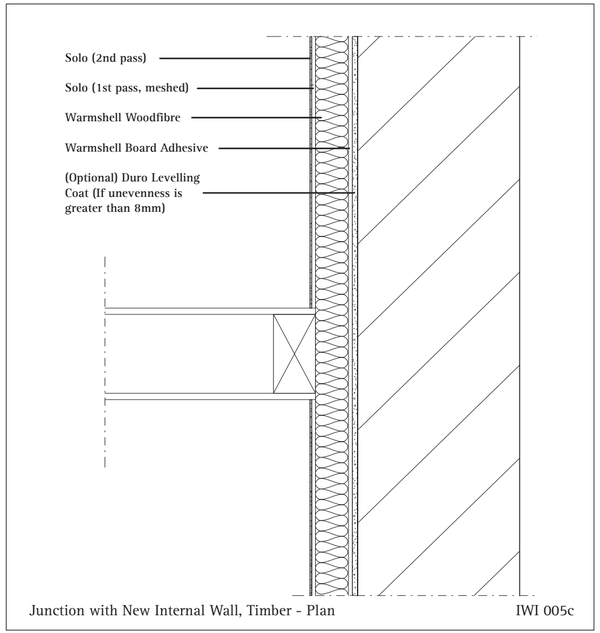
If the insulation fitted to the outside wall is greater than 60mm there is a risk that condensation could occur on the return of the a joining. It is important to install approximately 200mm (See IWI 005b) of insulation on the return wall in order to eliminate the risk of cold spots and mould growth.

Junction with Internal Solid Wall (A) - Plan IWI 005a

If the main insulation thickness is greater than 60mm then it is important to install approximately 200mm of insulation on the return wall in order to eliminate the risk of cold spots and mould growth.

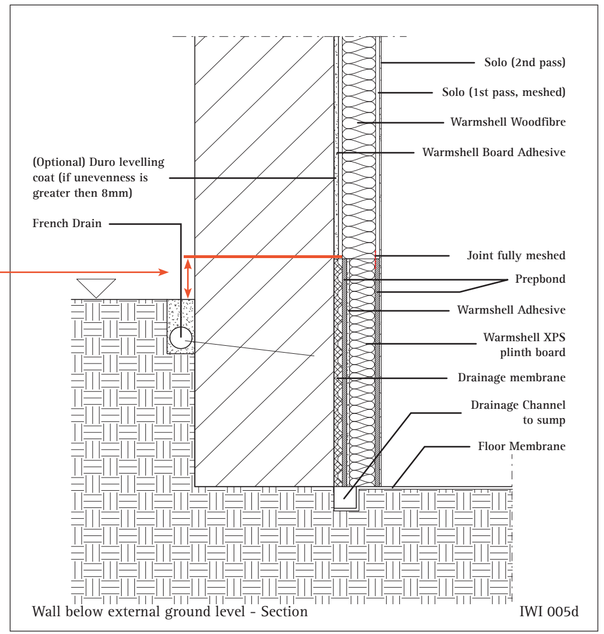


Junction with internal solid wall (B) - Plan IWI 005b



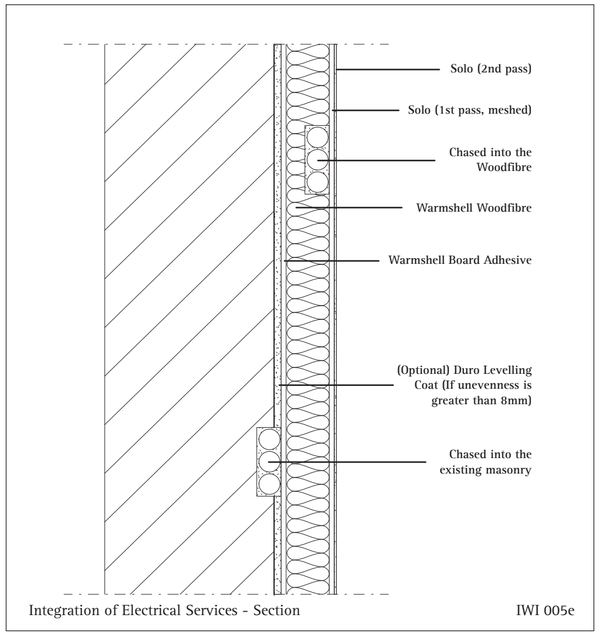
Junction with New Internal Wall, Timber - Plan IWI 005c

Warmshell XPS should finish 150mm above external ground level.



Wall below external ground level - Section IWI 005d

Where possible fit electrical services on walls internal to the structure. If this is not possible services can be chased out into either the board surface or into the substrate wall. If the latter it is vital that the any voids around the services are fully filled in with either Duro or Solo plasters.



Integration of Electrical Services - Section IWI 005e

D. LimeGreen Ultra Plaster

Product Data Sheet: Ultra

9/09/2014

Lime Green Ultra is a thermally insulating lime basecoat for rendering and plastering.

General Information

Ultra is made using modern manufacturing techniques, its formulation is based on traditional Natural Hydraulic Lime and light-weight mineral aggregates to make a product unique in the marketplace. Key benefits include:

- Reduced heat loss through the wall;
- Enhanced resistance to salts;
- Fibre reinforced;
- Highly breathable;
- Builds out in thick layers;
- Mineral ingredients are guaranteed never to rot.

Packaging

Available in 15 litre bags, 96 to a pallet. For handling purposes, assume 10kg per bag.

Coverage

1 litre per mm of thickness over 1m^2.

One bag will cover:

1.5m^2 at 10mm thick
1m^2 at 15mm thick
0.6m^2 at 25mm thick

Surface Preparation

Remove dust, surface contaminants and loose or friable coatings. Apply Beeks Fungicide if necessary. On dense, smooth masonry backgrounds or high suction backgrounds apply Lime Green Natural Stipple for improved bond. Other primers are available for difficult substrates - contact us for further details.

How to Mix

Ultra can be mixed using a drum mixer, or in a tub using a plasterer's paddle mixer. Mix with approximately 4 to 4.5 litres of clean water per bag; do not add anything else. Use eye protection and dust masks and avoid creating excessive dust.

How to Apply

Only use Ultra above 5°C and below 30°C. Ultra should be applied to a straight, flat, dampened surface in a uniform thickness of between 10 and 30mm, make sure this coat is keyed. After 2 to 7 days and the coat has stiffened/hardened, but is still 'green' more coats may be added. Make sure that curing is carried out between each coat (see below).

Careful consideration must be given to detailing of areas such as cills and drips, especially on sites exposed to high levels of wind and rain. We recommend the use of a reinforcement mesh (Lime Green 910 mesh) to be applied to the final coat of Ultra when Ultra is used externally.

Each section of mesh should overlap the next by 100mm.

For application to lath, please refer to Lime Green.

Lime Green Products Ltd. Coates Kiln, Stretton Road, Much Wenlock TF13 6DG.
Tel: 01952 728611 enquire@lime-green.co.uk www.lime-green.co.uk

Curing

The prevention of drying out too quickly is the key to the success of the application. Lightly spray the Ultra in hot weather if it is drying out too quickly. In addition, protect from harsh weather conditions, for example, frosts, rain and direct sunlight. The use of damp hessian, fixed to the wall can slow down the drying out process and provide protection from adverse weather conditions.

Finishing Coats

Suitable fiinishing coats are Lime Green Natural Finish, Lime Green Solo or Fine Stuff, applied once the Ultra has set. Finishing coats should be applied in a uniform 3 to 6 mm thick layer with a trowel.

Performance

Test	Result	Standard Info
Compressive strength @ 28 days N/mm²	>1 (CSI)	EN 1015
Compressive strength @ 90 days N/mm²	>2	
Capillary water absorption kg/m².min	WI	EN 1015
Bulk Density (Dry) grams / litre	700	EN 1015
Thermal Conductivity w/m.K	0.18	EN 1745

Health and Safety	
Risk Phrases	Safety Phrases
R36/37/38 Irritating to eyes, respiratory system and skin	S22 Do not breathe dust
R66 Repeated exposure may cause skin dryness or cracking	S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	S24/25 Avoid contact with skin and eyes
	S36 Wear suitable protective clothing

This is not a specification. Trials should be undertaken on old surfaces & backgrounds to ensure compatibility. Lime plasters do not set or perform like gypsum or cement based materials

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E. LimeGreen Solo Plaster

Lime Green: Solo One Coat Lime Plaster

4/7/24

Solo is highly breathable yet simple and convenient plaster for multiple different indoor backgrounds. With a matt, traditional style it is ideal to create various wall finishes, from very lightly textured walls ready to paint to more rustic or decorative surfaces. Solo is suitable for many backgrounds and helps control and manage moisture in your walls.

Description

For use on various internal walls and backgrounds such as masonry, woodfibre boards, plasterboard and suitable undercoats, Solo is designed to be labour saving and quick to use. Made to an historic recipe for gauged lime plasters, Solo recreates the simplicity of traditional lime plastering without the need for specialists, consultants, or confusing mixing processes.

Colour

Light off white.

Textures

The texture can be varied by the plasterer, see the information in the application section or videos. Solo cannot be polished to a mirror finish like gypsum plasters; however fine, closed in finishes are possible, as are rustic textured finishes. Skilled plasterers can also mimic travertine and other stone-like effects.

Performance

Solo One Coat Lime Plaster is extensively tested in the lab and real world.

- Final Compressive Strength : 2 to 4N/mm^2
- Vapour Permeability (μ) : typcially 8 to 12 depending on the degree it is polished.
- Elasticity – Young's Modulus 2000 to 4000 N/mm^2

Packaging

Packed in 25kg valve sacks, 49 per pallet.

Storage

Store in a dry, draft free area free from any damp. Shelf life is 6 months. Use bags within 2 days once open.

Coverage

Each bag will cover approximately 1.5m^2 at 10mm thick, or 3m^2 at 5mm thick. Allow for 1.6kg of dry powder per mm of thickness over 1m^2.

Mixing

Add between 5 and 6 litres of clean water per 25kg sack and mix until a smooth creamy consistency is reached. Water and materials should be stored and used between 5°C and 25°C.

lime|green

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Lime Green Products Ltd.
Coates Kiln, Stretton Road,
Much Wenlock TF13 6DG.

Preparation & Application

Backgrounds should be porous, clean and dust free before starting. Apply using a hawk and trowel or suitable spray machine. The required thickness and method will vary depending on the background:

- *Warmshell Woodfibre Boards*: ensure the boards are dry and level (sand back lips only if required) and remove all sawdust from cutting the boards off the surface. Do not wet down, apply directly to the board. Apply a pass of approximately 5mm, then push in vertical lengths of Solo Mesh, with a 10% overlap. Apply a second pass of Solo a further 5mm straight away, or within 24 hours. Do not allow the first pass to dry before applying the second.
- *Plasterboard:* standard paper faced plasterboard do not need to be primed unless they have been installed for some time. Moisture resistant grades should be sealed with an appropriate, non-permeable gritty acrylic primer beforehand. For tapered edge plasterboard joint and fill with the suitable materials beforehand. Standard boards should be reinforced with joint tape. Once prepared apply a coat of Solo approximately 4 to 5mm thick.
- *Hemp:* lightly damp down with clean water shortly before application. Scarify lightly to a flat surface and apply while the hemp is 'green' but hard. Apply in one coat of approximately 5 to 10mm, depending on the flatness of the background.
- *Woodwool*: lightly damp with a mist of clean water. Apply a pass of approximately 5mm, then push in Solo Mesh in vertical strips with a 10% overlap. Apply a second pass of a further 5mm straight away, or within 24 hours. Do not allow the first pass to dry before applying the second.
- *New lime undercoats*: ensure it has a light key and apply Solo while it is still 'green', typically within 2 to 5 days. The undercoat must be level and flat, do not use Solo to build out inconsistencies. Apply a skim finish approximately 4mm thick.
- *Old lime plasters*: remove any paint or wallpaper residue. Distempers should be washed off with warm water. Apply a coat of Solo Primer 24 hours beforehand. Apply a skim finish approximately 4mm thick.
- *Painted surfaces:* apply a gritty acrylic primer 24 hours beforehand. Apply a skim finish approximately 4mm thick.
- *MgO Boards*: please note that many MgO boards are not suitable for Solo. Contact us for further information in writing before proceeding.

Finishing

Solo One Coat Lime Plaster can be finished with different techniques by the applicator depending on the desired finish.

- The smoothest finish requires the most work, and Solo cannot be polished hard. Apply the Solo on the wall as above, and straight edge then leave it to pull in and firm up, typically for around 2 hours. Once it is firm enough, work over the surface with a very wet orange sponge float, bringing up the fat. Shortly after close the surface back in with a trowel – flexible plastic trowels are popular for this technique.

- For a lightly textured finish, apply as above but use a wood float or polyurethane float to finish.
- For a rustic finish, apply Solo as above and straighten off. Allow to pull in before lightly working over with a damp sponge to create a textured finish. A circular action will create a very rustic patina and a more methodical straight, repetitive sweep with the sponge will look more uniform.
- For a stone-like appearance, allow Solo to pull in before lightly sponging in straight sweeps left to right, bringing up the texture to a heavy gritty finish. Allow to harden a little further before crushing the top with a trowel also in left to right sweeps, leaving “misses” and low spots. Many other decorative techniques are also possible.

Aftercare

Ensure the room remains above 5°C and lightly ventilate. Do not force dry or use dehumidifiers, instead allow the plaster to slowly dry out over 5 to 10 days. Allow the surface to carbonate before applying paint.

Cleaning & Disposal

Clean tools with plenty of water. Dry powder should be vacuumed up using a machine with appropriate filters. Wear PPE and wash of skin immediately – see the SDS for further details. The product is covered by the regulations on hazardous waste. Dispose of contents/container to an approved waste disposal plant.

EWC Code
16 03 03* Inorganic wastes containing dangerous substances.
16 03 04 Inorganic wastes other than those mentioned in 16 03 03.

Disclaimer

Information is based on our latest knowledge and testing under controlled conditions. Variations on site due to different materials, building methods and designs, weather etc. may affect the outcome.

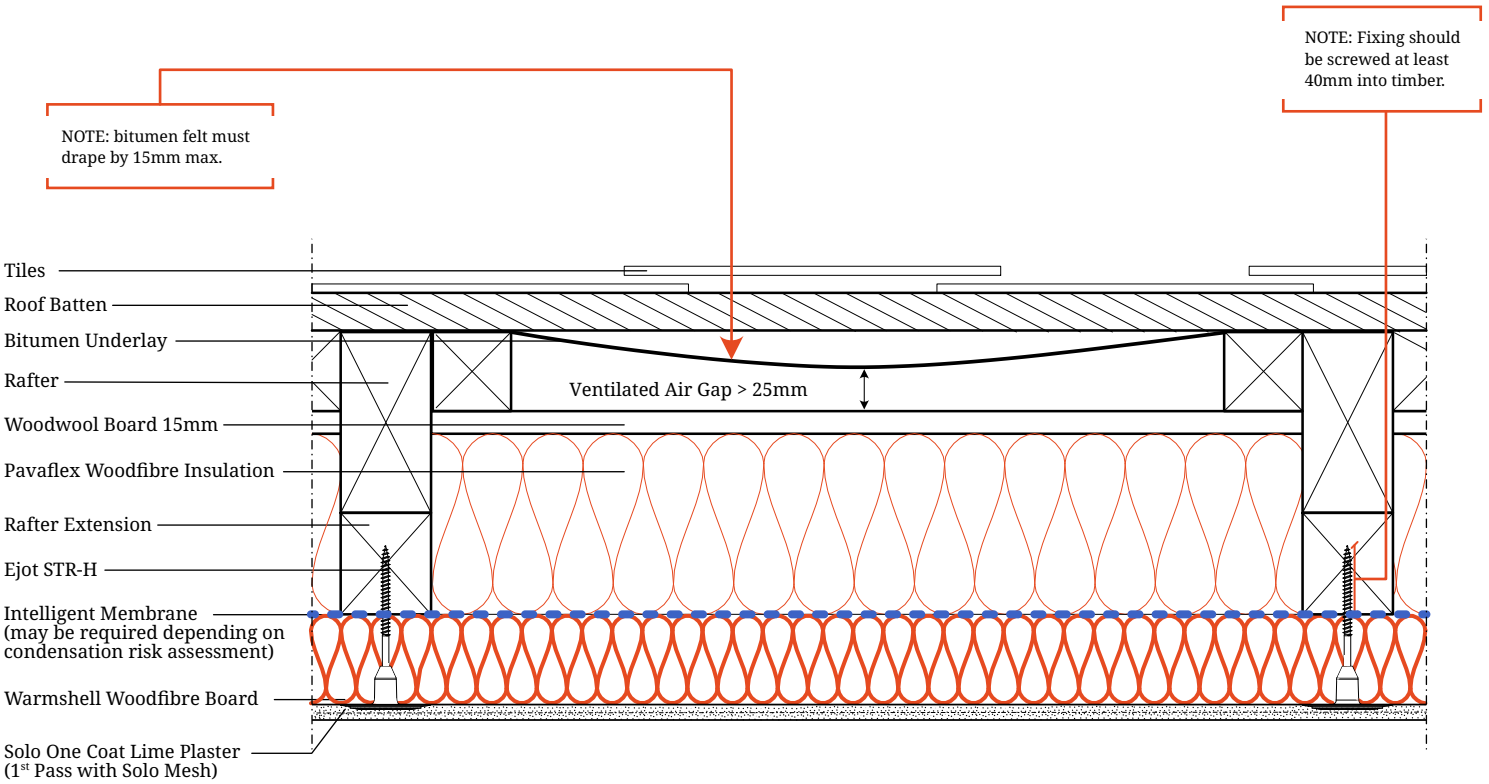
F. WarmShell Roof Insulation

Architectural Details - With Notes

Drawing Title
Retrofit Pitched Roof with Existing Bitumen Underlay

Drawing No.
ROOF 003

For installing insulation from the inside, where the roof and a bitumen felt remain in situ.

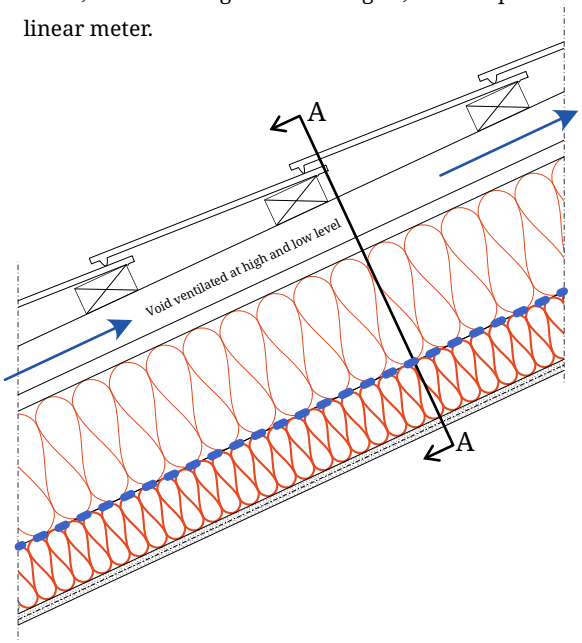


Retrofit Pitched Roof with Existing Bitumen Underlay

Section A-A / Not to Scale

Bitumen felt prevents the roof from breathing, therefore, a well-ventilated void must be formed between the insulation and the felt. Note that the depth of this void is given as a minimum of 25mm in BS5250, or 50mm in the Government Best Practice Guidance.

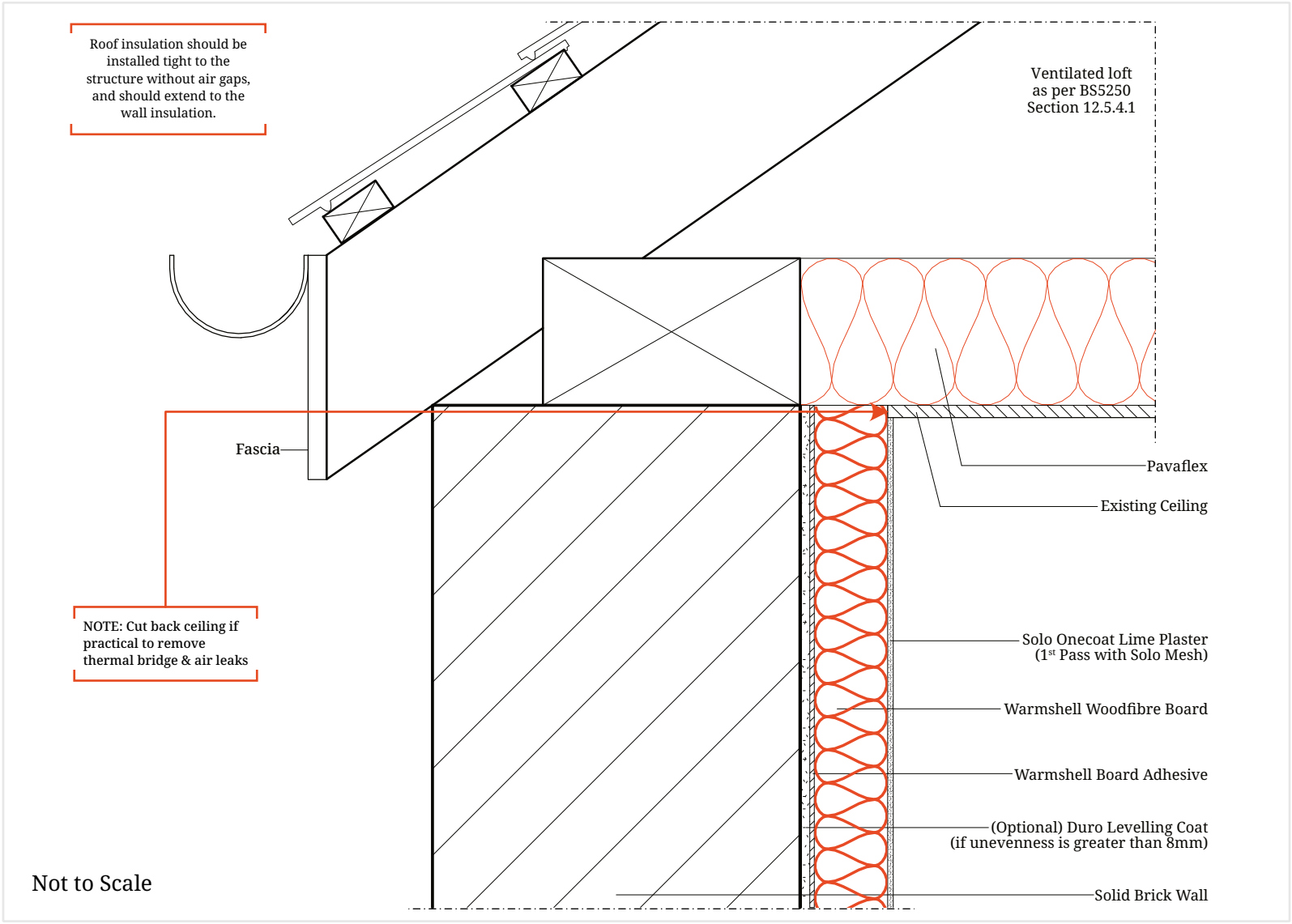
Ventilation must be formed at the top and bottom of each rafter void. Openings at the low level or eaves should have a minimum of 25,000mm² per linear meter, and at the high level or ridge 5,000mm² per linear meter.



Architectural Details - With Notes

Drawing Title
Cold Roof with Internal Wall Insulation

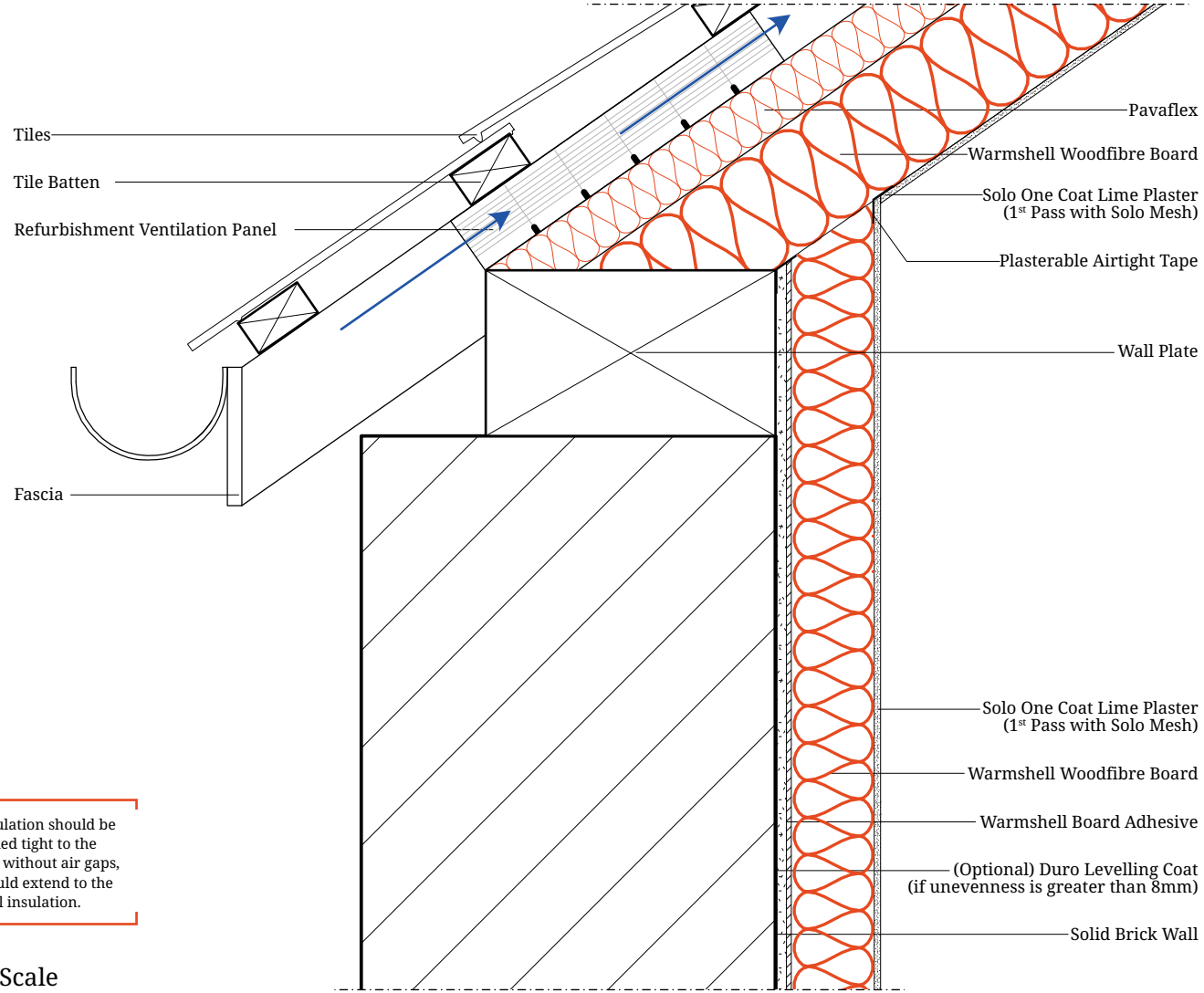
Drawing No.
ROOF 006



Architectural Details - With Notes

Drawing Title
Warm Roof with Internal Wall Insulation

Drawing No.
ROOF 007



Roof insulation should be installed tight to the structure without air gaps, and should extend to the wall insulation.

Not to Scale

U Values with Warmshell Woodfibre Insulation

Expected U Values: Woodfibre Insulation (e.g. 400mm centres)

Rafters infilled with Pavaflex (mm)	Warmshell Woodfibre Boards (mm)						
	40	60	80	100	120	140	160
50	0.46	0.38	0.31	0.27	0.24	0.21	0.20
80	0.36	0.31	0.26	0.23	0.21	0.19	0.17
100	0.31	0.27	0.24	0.21	0.19	0.18	0.16
*130**	0.26	0.24	0.21	0.19	0.17	0.16	0.15
140	0.25	0.22	0.20	0.18	0.17	0.15	0.14
*150**	0.24	0.21	0.19	0.17	0.16	0.15	0.14
*160**	0.23	0.21	0.18	0.17	0.16	0.15	0.14
*180**	0.21	0.19	0.17	0.16	0.15	0.14	0.13
*200**	0.19	0.18	0.16	0.15	0.14	0.13	0.12
*230**	0.18	0.16	0.15	0.14	0.13	0.12	0.12
*250**	0.17	0.15	0.14	0.13	0.13	0.12	0.11

Pavaflex batts are available in 50mm, 80mm, 100mm and 140mm.
*Insulation batts can be combined to give additional depths between rafters.

All calculations have been adjusted to allow for the difference in U Value when installing Warmshell Woodfibre with thermally broken fixings.

Expected U values: Woodfibre Insulation with Hemp (e.g. 200mm centres)

Rafters (mm) infilled with Hemp Insulation (0.068 W/mK)	Warmshell Woodfibre Boards (mm)						
	40	60	80	100	120	140	160
50	0.59	0.46	0.36	0.31	0.27	0.24	0.21
75	0.50	0.41	0.32	0.28	0.25	0.22	0.20
80	0.48	0.40	0.32	0.27	0.24	0.22	0.20
100	0.43	0.36	0.29	0.26	0.23	0.21	0.19
150	0.34	0.30	0.25	0.22	0.20	0.18	0.17
200	0.28	0.25	0.22	0.20	0.18	0.16	0.15
250	0.24	0.22	0.19	0.18	0.16	0.15	0.14

U Values that meet the values as stated in Table 4.3 of Approved Document L V1 (2021) and Table 4.3 in Approved Document L V2 (2021)

U Values that meet Passivhaus standards.

U Value as stated in Table 1.1 of ADL1B (2021) for new dwellings.

U Value as stated in Table 4.2 of ADL1B (2021) for new fabric elements in existing dwellings.

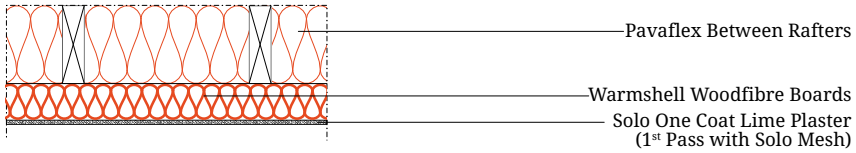
Bespoke U Value calculations can be calculated upon request.

Finishing Options with Solo®One Coat Lime Plaster

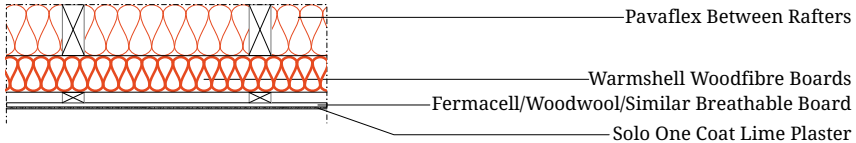
Solo One Coat Lime Plaster. is a breathable, lime based plaster made from recycled content. Offering all the qualities of a traditional Lime Plaster without the limitations, Solo regulates humidity effectively and allows the building to breathe, creating a healthy indoor environment. Working with lime used to be painstakingly hard work. Now, everyone can create works of beauty, without losing the benefits, qualities and advantages of lime.

Finishing Options

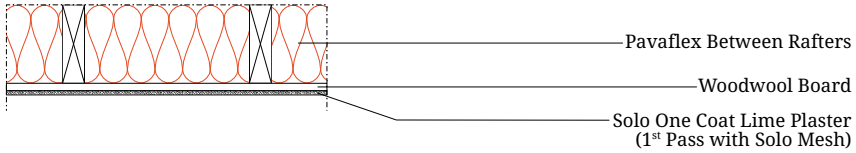
Plastering directly over Warmshell Woodfibre Boards



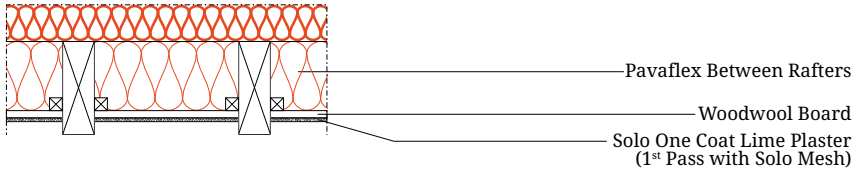
Installing a service void



Plastering directly under rafters



Where rafters/purlins are to remain exposed



Your builder or plasterer can alter the finish by using various tools and techniques. Whether you prefer a sophisticated and clean finish or a more rustic and textured one, Solo One Coat Lime Plaster offers the versatility to give you the unique finish you desire.

Breathable paints and lime washes can be applied over Solo One Coat Lime Plaster, or the plaster can be left unpainted for a natural finish.

Finishes

Products by Lime Green

Warmshell Woodfibre Boards

Pavaflex Batts

Solo One Coat Lime Plaster

Solo Guard

Solo Mesh

Ejot STR H Fixings

Solo Primer

Solo Filler

Woodwool Boards

Lime Green Hemp Binder

Fibrelime

Ultra Lime Plaster Basecoat

G. Proclima Intello

INTELLO®

Hydrosafe® high-performance vapour control membrane, suitable for all fibrous insulation mats and boards

Technical data

	Material
Fleece	Polypropylene
Functional film	Polyethylene copolymer

Property	Regulation	Value
Colour		White-translucent
Surface weight	EN 1849-2	85 g/m² ; 0.28 oz/ft²
Thickness	EN 1849-2	0.25 mm ; 10 mils
Water vapour resistance factor µ	EN 1931	56 000
sd value	EN 1931	14 m
sd value, humidity-variable	EN ISO 12572	0.25 - >25 m
g value		70 MN·s/g
g value, humidity-variable	EN ISO 12572	1.25 - >125 MN·s/g
Vapour permeance	ASTM E96-A	0.23 perms
Vapour permeance, humidity-variable	EN ISO 12572	< 0.13 - 13 perms
Hydrosafe value (sd)	DIN 68800-2	2 m
Surface burning characteristics	ASTM E84	Class A (Flame Spread 0; Smoke development index 35)
Fire class	EN 13501-1	E
Airtightness	ASTM E2178	≤ 0.004 cfm/ft²
Airtightness	EN 12114	Tested
Tensile strength MD/CD	EN 12311-2	110 N/5 cm / 80 N/5 cm ; 13 lb/in / 9 lb/in
Elongation MD/CD	EN 12311-2	40% / 35%
Nail tear resistance MD/CD	EN 12310-1	60 N / 60 N ; 13 lbf / 13 lbf
Durability after artificial ageing	ETA-18/1146	Passed
Temperature resistance	EN 1109, EN 1296, EN 1297	Permanent -40 °C to 80 °C ; -40 °F to 176 °F
Thermal conductivity		0.04 W/(m·K) ; 0.3 BTU·in/(h·ft²·°F)
CE labelling	ETA-18/1146	Yes

Areas of application

Vapour control (alternate terms: vapour check or retarder) membrane for use on roofs, walls, ceilings and floors on structures that are open or closed to diffusion on the exterior, e.g. flat/pitched roofs and green roofs, after appropriate design calculations have been carried out.

Supply forms

Art. no.	GTIN	Length	Width	Folded	Contents	Weight	Sales unit	Container
10091	4026639011176	20 m	1.5 m		30 m²	3 kg	1	42
10090	4026639011190	50 m	1.5 m		75 m²	7 kg	1	20
10077	4026639011985	50 m	3 m		150 m²	14 kg	1	20
12221	4026639122216	50 m	3 m	⇔	150 m²	14 kg	1	20

Advantages

- ✔ Best possible protection against moisture damage to structures and mould because this product is humidity-variable with a variation of a factor of over 100
- ✔ Permanent protection: performance tested and certified by independent testing authority (ETA-18/1146)
- ✔ Protected winter building sites thanks to hydrosafe® behaviour
- ✔ Can be combined with all fibrous insulation mats and boards
- ✔ Easy to work with: dimensionally stable, no splitting or tear propagation
- ✔ Excellent values in hazardous substance testing, has been tested according to the ISO 16000 evaluation scheme

General conditions

Where possible, INTELLO should be installed in such a way that adhesion can be carried out using single-sided adhesive tape on the smooth (printed) side of the sheeting. It should be installed taut and without slack either in parallel with or perpendicular to the supporting structure, e.g. the rafters. In the case of horizontal installation (perpendicular to the supporting structure), the separation distance of the supporting structure is limited to a maximum of 100 cm (3'). After installation, perpendicular battens on the inside at a separation distance of a maximum of 50 cm (1' 8") must be fitted to carry the weight of the insulation material.

If regular tensile loads on adhesive tape bonds are to be expected – for example, due to the weight of the insulation material – when using mat or panel-shaped insulation materials, an additional supporting batten should be fitted over the overlap sealing. When attaching the membranes in the case of mat or panel-shaped insulation materials, a maximum separation distance of 10 to 15 cm (4" to 6") applies for the fastening staples, which must be at least 10 mm (3/8") wide by 8 mm (5/16") long. The overlaps between the membrane strips must be approx. 8 to 10 cm (3" to 4").

Airtight seals can only be achieved on vapour control (alternate terms: vapour check or retarder) membranes that have been fitted with no folds or creases. Ventilate regularly and systematically to prevent build-up of excessive humidity (e.g. during the construction phase). Occasional, intermittent ventilation is not sufficient to remove large quantities of moisture due to construction work from a building; use a dryer if necessary.

To prevent condensation formation, INTELLO should be sealed and taped in an airtight manner immediately after the installation of the thermal insulation. This particularly applies when working in winter.

The information provided here is based on practical experience and the current state of knowledge. We reserve the right to make changes to the recommended designs and processing or to make alterations due to technical developments and associated improvements in the quality of our products. We would be happy to inform you of the current technical state of the art at the time you use our products.

Further information about installation and design details is available in the pro clima planning documentation. If you have any questions, please contact [pro clima Technical Support](https://proclima.com/service/technical-support).

MOLL

Installation instructions

INTELLO®

Installation steps

1. Install the membranes

Roll out the membrane and fasten it using galvanised staples that are at least 10 mm (3/8") wide by 8 mm (5/16") long at intervals of 10-15 cm (4" to 6") or, if blown-in insulation is to be installed, 5-10 cm (2" to 4"). Install the membrane leaving an additional 4 cm (1 5/8") overlap at adjacent building components so that an airtight bond can be applied here subsequently.

2. Fasten to stud wall frame members

Fastening of membranes to metal frame members on stud wall and ceiling structures using pro clima DUPLEX. Stick the membrane, ensuring that there are no folds or tension. Rub using the PRESSFIX application tool to secure.

3. Overlap the membranes

Allow for an overlap of approx. 10 cm (4") between the membranes. The marking that is printed onto the membrane will serve as a guide here.

4. Clean the subsurface

Clean the subsurface (dry and free of dust, silicone and grease) before taping; carry out an adhesion test, if necessary.

5a. Tape the overlaps

Centre the TESCON VANA system adhesive tape on the overlap and gradually stick it in place, ensuring that there are no folds or tension.

5b. Rub the adhesive joint firmly

Rub the tape firmly using the pro clima PRESSFIX to secure the adhesive bond. Ensure that there is sufficient resistance pressure.

6. Sealing to smooth, non-mineral subsurfaces ...

... (e.g. knee walls made of wood-based panels) should also be implemented using TESCON VANA system adhesive tape. Centre the tape and gradually stick it in place, ensuring that there are no folds or tension. Rub the tape firmly using the pro clima PRESSFIX to secure the adhesive bond.

7. Sealing to rough or mineral subsurfaces

Clean the subsurface. Apply a line of ORCON F adhesive sealant of at least d = 5 mm (3/16"), or more in the case of very rough subsurfaces if necessary. Place INTELLO onto the adhesive bed, leaving slack to allow for expansion. Do not press the adhesive completely flat.

8a. Alternative: Sealing to mineral subsurfaces

Position ORCON MULTIBOND on the subsurface, roll it out and gradually stick it to the subsurface. Gradually remove the release film.

8b. Sticking the membrane / Rubbing the joint firmly

Apply the membrane onto the adhesive strip, leaving slack for expansion so as to allow for relative motion between components. Rub firmly to secure the adhesive bond using the pro clima PRESSFIX. Ensure that there is sufficient resistance pressure.

9. Sealing to unplastered subsurfaces

Stick the CONTEGA PV plaster-sealing tape onto INTELLO using self-adhesive strips. Ensure the tape remains in place by using ORCON F at discrete points. First plaster behind the tape, then apply the tape to the wet plasterwork and plaster over it fully.

10. Masonry gable end wall, creating an airtight joint

Guide the vapour control membrane into position. Leave slack for expansion so as to allow for relative motion between components. Remove all release films from CONTEGA SOLIDO SL or CONTEGA SOLIDO IQ. Centre the tape and gradually stick it in place. Rub the tape firmly using the pro clima PRESSFIX to secure the adhesive bond.
To achieve airtightness, plaster over the masonry and sealing tape.

11a. Sealing to roughly sawn timber

Clean the subsurface. Apply a line of ORCON F adhesive sealant of at least d = 5 mm (3/16"), or more in the case of very rough subsurfaces if necessary. As an alternative, a roll of ORCON MULTIBOND adhesive sealant can be used.

11b. Sealing to roughly sawn timber

Place INTELLO onto the adhesive bed, leaving slack to allow for expansion. Do not press the adhesive completely flat.

12a. Sealing to plastered chimney (insulated or double-shelled)

Seal INTELLO using ORCON F as shown in Figure 7.

12b. Sealing to plastered chimney (insulated or double-shelled)

Then cut into short pieces of TESCON VANA as far as the centre, create corner shapes and then stick in place.

13. Sealing around pipes and cables

Place a KAFLEX or ROFLEX sealing grommet over the cable or pipe and stick to INTELLO. The cable grommets are self-adhesive. Tape the pipe grommets to the membrane using TESCON VANA.

14. Corner sealing

Guide TESCON PROFECT pre-folded corner sealing tape into the corner while the release film is still in place and stick the first independent adhesive strip. Then remove the release film and stick the second independent adhesive strip.