



Warmshell Timber frame insulation system: Design guidelines



Cladding the outside of a building with Warmshell is an excellent way to ensure thermal performance, looks and improve its weather protection.

Warmshell is a high performance construction system that uses insulating wall board and lime-based render. Once in place, it provides an effective and simple way to increase insulation values for a wide range of properties - keeping walls warm, dry and weather-proofed. Warmshell also helps to create a more comfortable and healthier living space within the property itself.

The Warmshell system is designed to be as warm and breathable as possible and is ideal for the thermal upgrade of historic and new timber frames.

Highly breathable Boards and render	Good airtightness
Good impact and weather resistance	Tested in accordance with ETAG 004
Hydraulic lime mineral render system	Low thermal bridging
Sound protection	Heat storage in hot and cold weather
Good fire protection	Thermal insulation for solid walls and timber frames

The Warmshell system has been tested against and meets ETAG004 external wall insulation and is certified with a CE mark. It is also undergoing BBA assessment.

The Warmshell system consists of interlocking insulation panels made of compressed natural wood fibre. These come in 40mm, 60mm, 80mm and 100mm thicknesses, depending on the insulation levels required.

Once the panels are in place, a first coat of Lime Green Prebond WP with reinforcing mesh is applied to give structural integrity across the whole wall surface, followed by a top coat of Lime Green Finish WP to a total thickness of 15mm.

Proprietary render bead profiles and trims are used at wall edges and corners. With Warmshell, the walls remain weatherproof and weather resistant but can still 'breathe', as trapped moisture is able to escape.



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Special additives in the render mix reduce the risk of cracking and algae growth, producing a durable, stable finish and vastly reducing the need for maintenance and repair.

To make sure you get the most from your Warmshell system, Lime Green offers an in-depth technical support service that covers all aspects of your build, from pre-planning right through to completion.

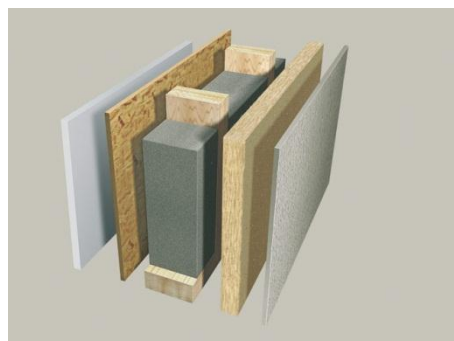
Woodfibre boards are made by pulping wood fibre from sustainably managed sources which is then reformed into sheet material.

Woodfibre boards include only natural materials which cause no health problems. They are predominantly (up to 98%) wood fibres. Only natural substances such as paraffin and natural starch are added to improve some of the properties. The boards are protected against wood-destroying insects and pests due to the removal from the wood of all of the aromatics which attract insects and pests.

Application	
Suitable	Unsuitable
Timber frame old and new.	Vapour impermeable wall design; i.e used in conjunction with synthetic insulation.
Good practice Designs with good overhangs, eaves detailing and measures to deal with water should be as robust as possible.	

Our Warmshell timber frame system is based around a “reverse wall” concept, the racking board is usually placed on the inside face of the timber frame with the insulation board and render system on the external face with no vapour control membrane. The high performance materials used are able to provide high levels of weather protection while at the same time offering exceptionally low water vapour resistance.

- Reduction of cold bridging, around 20% of a frame is timber using the Warmshell system eliminates these cold bridges



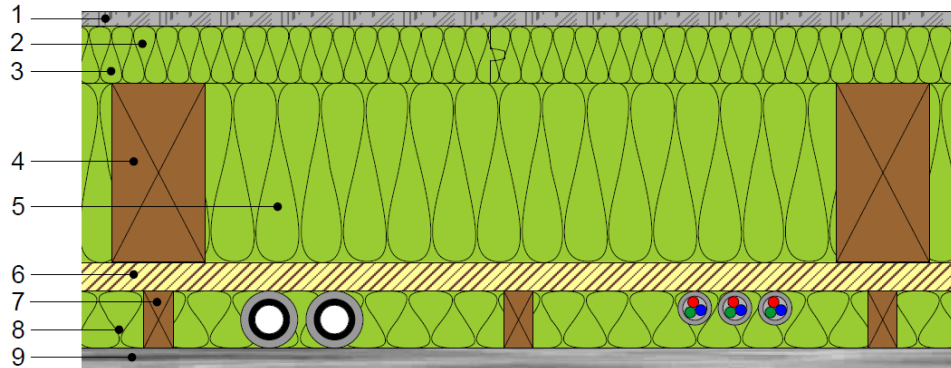


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Reverse wall build up

Inside to out – plaster finish, void for services, OSB/racking board, timber frame, woodfibre board (40,60,80 or100mm) Prebond WP with re-enforcing mesh, Finish WP coloured topcoat

Typical example:



1. Lime green render system; Prebond WP 8-10mm, Finish WP 5-7mm
2. Warmshell woodfibre board 60mm
3. Boards Fixed
4. Timber frame stud
5. Flexible insulation e.g. Black mountain Hemp batts 160mm
6. OSB board
7. Timber batten to form service void
8. Flexible insulation e.g. Black mountain Hemp batts 40mm
9. Plasterboard

U value of shown wall 0.168 W/m²k

Expected u values

Timber frame construction

Build Up	Thermal performance U value W/(m ² K)						Temperature Phase shift Ψ (hour) ²						Sound insulation Rw(dB)						
	100	120	140	160	180	200	100	120	140	160	180	200	100	120	140	160	180	200	
Timber stud/ insulation thickness ¹																			
Board Thickness	60mm	0.23	0.21	0.19	0.18	0.16	0.15	10.4	11.7	13	14.3	15.6	17	65	65	66	66	67	67
	80mm	0.21	0.19	0.18	0.16	0.15	0.14	11.7	13	14.3	15.6	17	18.3	66	66	67	67	67	67
	100mm	0.19	0.18	0.16	0.15	0.14	0.13	13	14.3	15.6	17	18.3	19.6	66	67	67	68	68	68

¹ Natural fibre flexible insulation

² Approximately 40% lower when the insulation material is mineral wool



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System components

Woodfibre insulation Board

The Warmshell insulation board is a woodfibre tongue and groove board that both insulates the wall and carries the render. It is produced from renewable materials; it achieves good thermal insulation values along with good acoustic insulation. In addition, the high thermal capacity ensures excellent protection against summer heat, known as phase shift.

Because of its very good permeability to water vapour these boards are designed for use in diffusion open constructions guaranteeing a high quality living environment.

It is important that any maintenance is carried out using material suitable for vapour permeable construction.

Thicknesses available; 40,60,80 & 100mm. Any of these may be combined together.

Where the insulation boards abut another material e.g. a window, door frame or between the above and beneath DPC system, a foam sealant strip such as Compriband 600 should be used to provide a weather tight seal between the two materials.

Base Rail

An aluminium profile specially designed for starting the system and protecting the boards at the bottom of a wall or anywhere the system starts. Ensure that the base rail supplied is the right thickness to match the boards being fixed. Fix the base rail to the frame using the correct screw. The base rail should be fitted a between 150- 300mm above the finished ground level. Please ensure the rail is level and each length is joined using the dedicated joining strip as this will provide the support for the first row of boards, dictating the levels for the system.

Board Fixings

Special fixings are used to fix the boards to the wall. These fixings are designed to conduct less heat than normal screws, keeping the wall warmer. Various types are available for different backgrounds; please consult us for further details regarding fixing type and length.

Timber frame and steel – specify *KC washer* and screw fixing

These fixings hold the boards using a screw to wooden and steel frame backgrounds.

Minimum two to three fixings per stud are required depending on the stud spacing.

Washers should be fitted tight against the boards.



Refer to Warmshell information sheet N°05 for further information



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Other components

To ensure the system is as robust as possible and retains its weatherproof integrity there are additional components to the system; mesh wing corner beads (Part No 00352) and clip on drip bead (Part No 00131) It is also advised that extra corner mesh (Part No 00159) is placed at the corner of each opening. Depending upon the design or as needs arise different profiles including; sill extenders, full system stop beads, horizontal and vertical movement beads etc will also be required.

Approximate Product Requirements for 1 m ² installed			
	Product	Thickness/Dimension mm	1m ² installed
Insulation board	System	20 -100mm	1.298 boards
Fixings for timber frame	KC washer	60mm washer & Screw	7.79 pieces
Undercoat render	Lime green Prepbond WP	Approx 8-10mm	10-12kg
Re-enforcement	Lime green glass fibre mesh 910	Standard	1,10 m ²
Finish coat	Lime green Finish WP	Approx 5-7mm	8-11kg
Addition components			
Base rail	The perimeter of the boards	2.5m lengths	As required
Base rail fixings	ZH fixing	Approx. 9 fixings per 2.5m length	
Joint between render and frames	Frame seal	2.4 m lengths	As required
Corner and stop beads			As required
No allowance for wastage has been made			

Installation

Cutting the boards

Protect edges from damage during handling.

The boards can be cut with conventional electric tools used for cutting or sawing wood or wood based materials. Also an electric jigsaw with special blades for cutting soft insulation materials can be used.

Any board waste may be disposed of in the same manner as untreated wood waste.

When cutting and handling products please ensure the correct personal protection equipment is used and inhalation of any dust produced is prevented.



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Insulation panels must be stored flat and protected from weather before use.

Fixing the boards

Only fix dry boards.

Gutters must be re-routed away from the building during the works.

Uneven walls need leveling before board installation.

The first board is placed on the base profile and fastened with screws.

Cut the Thermal Boards by hand or with a circular saw. Always cut out small pieces from a whole board.

The number of fixings is dependent on the height of the building and the wind load.

The boards are placed in a lattice horizontally and pushed tight together. They should alternate down the corner. Vertical joints must be staggered. Each board will usually have a min of 5 fixings.

Cut pieces and staggers between boards must be at least 200 mm wide.

Corners are alternated

Additional gluing of the boards to the subsurface is not necessary. However on uneven masonry the background should be leveled to ± 5 mm per linear meter. This can be carried out with Lime Green Ultra, a thermally insulating render. Please consult us for further details.

Reveals

Window and door reveals should also be insulated to prevent cold spots. However, frequently there is insufficient space to use the Board, in which case 2 options can be used:

- i) A 20mm or 40mm board is mechanically fixed and / or pushed in to a coat of Prepbond Render
- ii) A 5mm coat of Prepbond, followed by a coat of LG Ultra insulating render (5 to 20mm depending on depth available), followed by a 5mm coat of Finish WP.

Eaves

The exact detail around the eaves will vary depending on the roof and overhang etc. The roof ventilation profile is often useful (see section). Sometimes it may be necessary to move the gutter and extend the tiles/slates if there is limited overhang.

Beneath DPC

Below the starter track / baserail a different type of insulation and render system is used.

The insulation can be either XPS insulation or Foamglas. Render undercoat: Lime green Prepbond Q 10mm with lime green Finish WP as the final coat at 5mm thick.

Behind flashing and in proximity to roofs

Do not use the wood fibre board behind lead flashing or use XPS or Foamglas boards in place of the wood fibre. The lead flashing should be returned up (150mm) the XPS and back and under the woodfibre board see Dia.....



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Rendering

Preparation

The render system whether used on masonry or in timber frame construction relies upon a range of additional components that ensure the system performs correctly in its defense against the weather.

Gaps between the boards will be minimal due the innovative tongue and groove design. However if there are any gaps in the boards these should be filled with a combination of woodfibre and glue. Larger gaps should be filled with wedge shaped pieces of the board glued into place.

Frame seal

This special frame seal must be used around window and door frames to ensure long lasting weather protection. This bead receives the render and acts as a means of mitigating crack formation. Product reference drawing No

Corner beads

Corners beads come with a glass fibre mesh incorporated into the design to help ensure continuous reinforcement across the system. Rounded corners are unlikely to be successfully formed using either coloured render or on square edged boards and should not be specified. These should fitted by embedding them in a thin layer of Prebond WP before the main undercoat is applied. The mesh wing of the corner bead and glass fibre mesh within the undercoat should overlap.

Drip bead for base rail

The base rail should have the drip bead with glass fibre mesh attached ??? by slip it on from above ensure that it is properly seated and using the Prebond WP embed the mesh onto the boards before the main undercoat is applied.

The mesh wing of the drip bead and glass fibre mesh within the undercoat should overlap.

Movement Joints

It's not necessary to provide movement joints in the insulation system unless they are present in the background. If they are, a dedicated joint should be formed in the system with the correct horizontal, vertical render or full system movement joint. See Drawing

Other trims and flashings

Various other trims and flashings may be necessary, including enlarged window sills, expansion beads, copings, base profiles for corners etc. These often have to be made to a bespoke design for existing buildings, or may not be required at all on new build. Please consult us for further details.

Rendering



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All the renders are made with Natural Hydraulic Lime, for excellent levels of breathability, durability and elasticity. Lime green Prepbond WP and Finish WP give a beautiful traditional look, avoiding the synthetic, appearance of many “modern” renders.

Lime Green Finish WP is available in a choice of colours and textures, reducing the cost of regular painting and the possibility of inappropriate coatings being used in the future. A further larger range of up to 300 colours are available when using the Beecks silicate mineral range. The final coat may be finished in a number of different ways; scraped, floated or cast. Advice on how to achieve different finishes and the techniques required is available from the system supplier.

We only recommend light colours for use with the thermal board; strong colours will heat up more quickly in direct sunlight causing greater thermal movement.

Aftercare and Maintenance

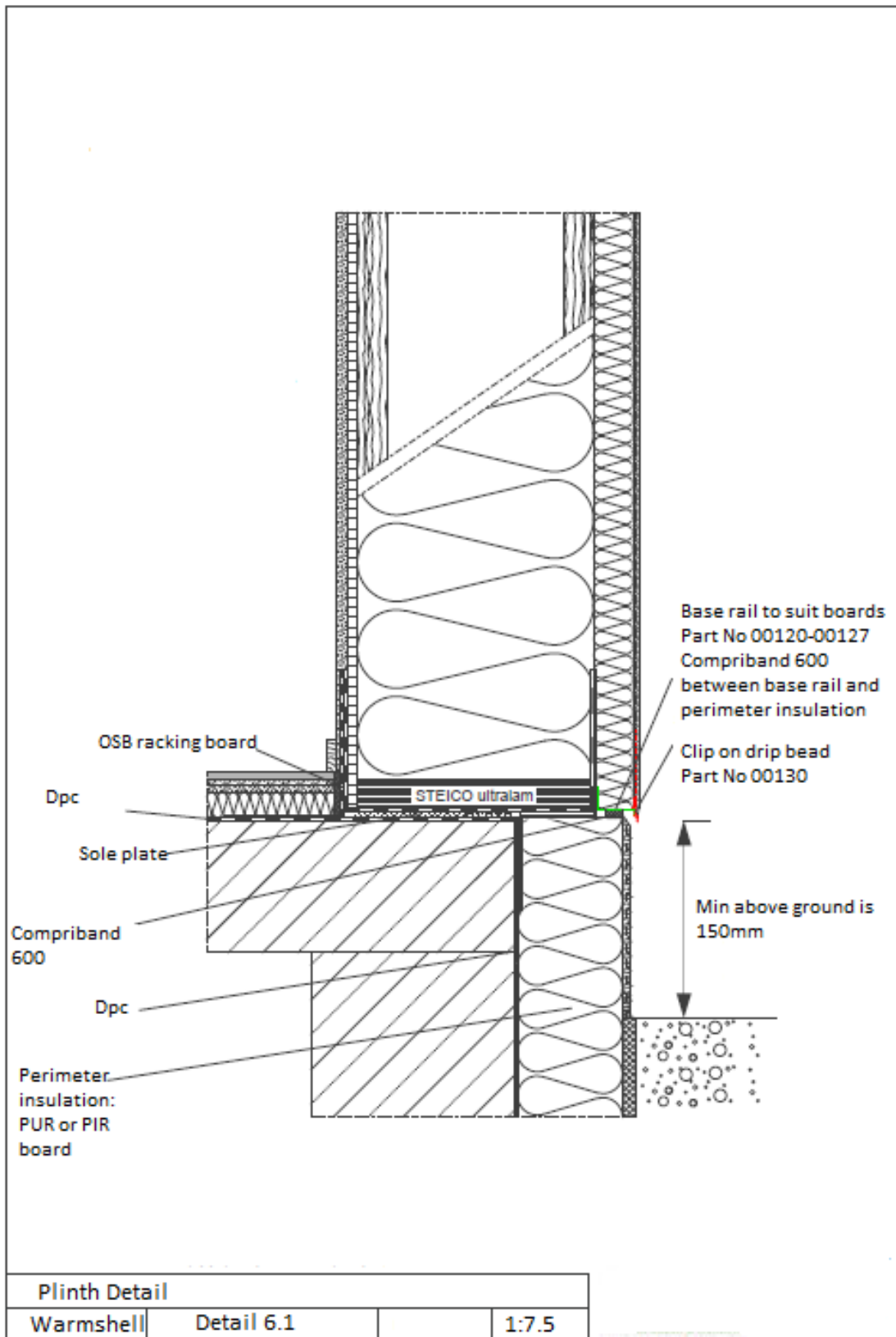
Cleaning

The renders are designed for low maintenance, and are unlikely to need painting for decades. Dirt and lichen can be removed with gentle scrubbing using a Beecks Fungicide. Downspouts and gutters should be checked on a regular basis to ensure water is not leaking on to the render.

Painting

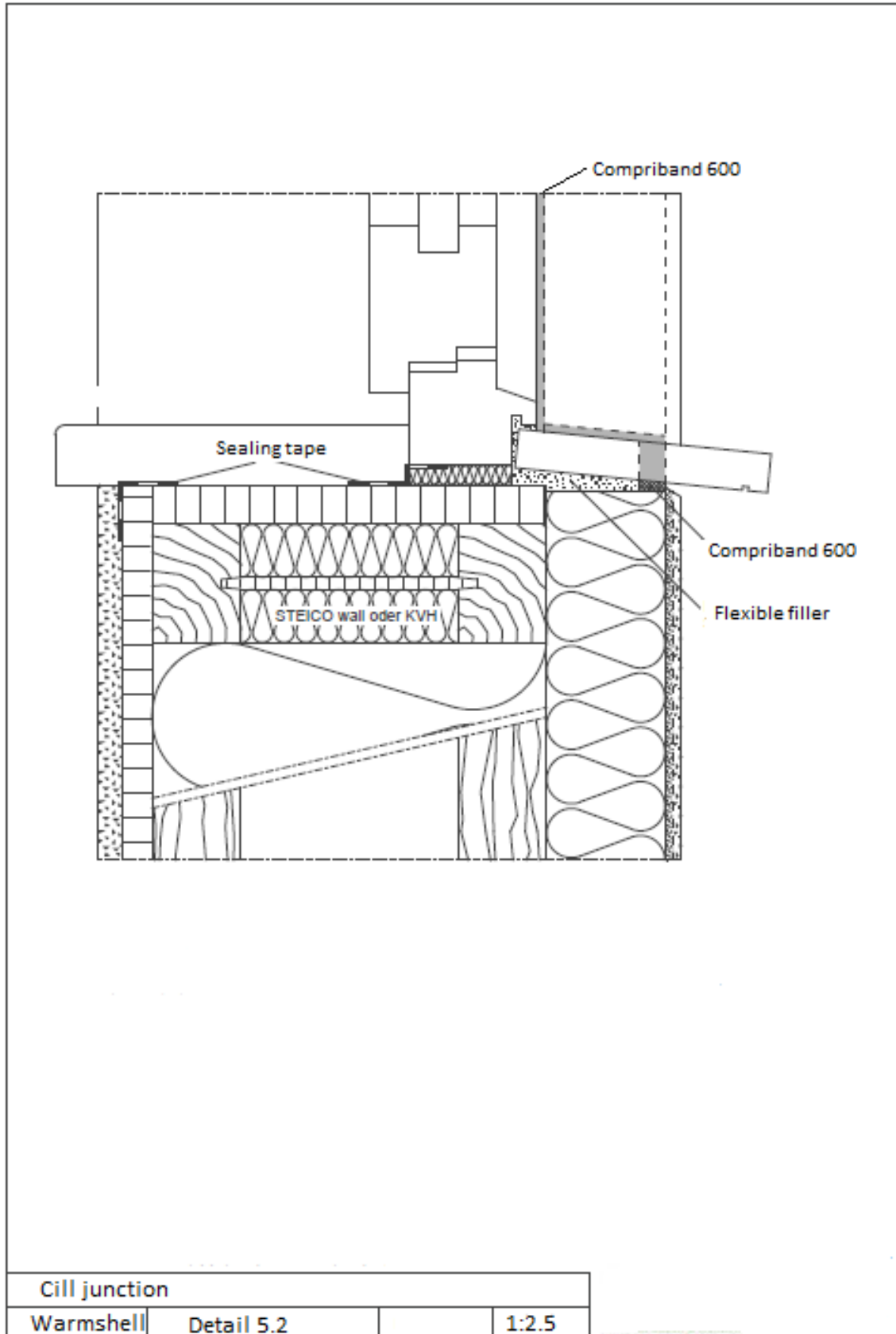
If at some point the owner wishes to change the colour of the render, it is possible to paint it. The recommended and correct paint to use is Beecks Renosil silicate mineral paint to prevent the buildup of moisture beneath. Do not apply masonry paint or other film forming paints with a high vapour resistance.

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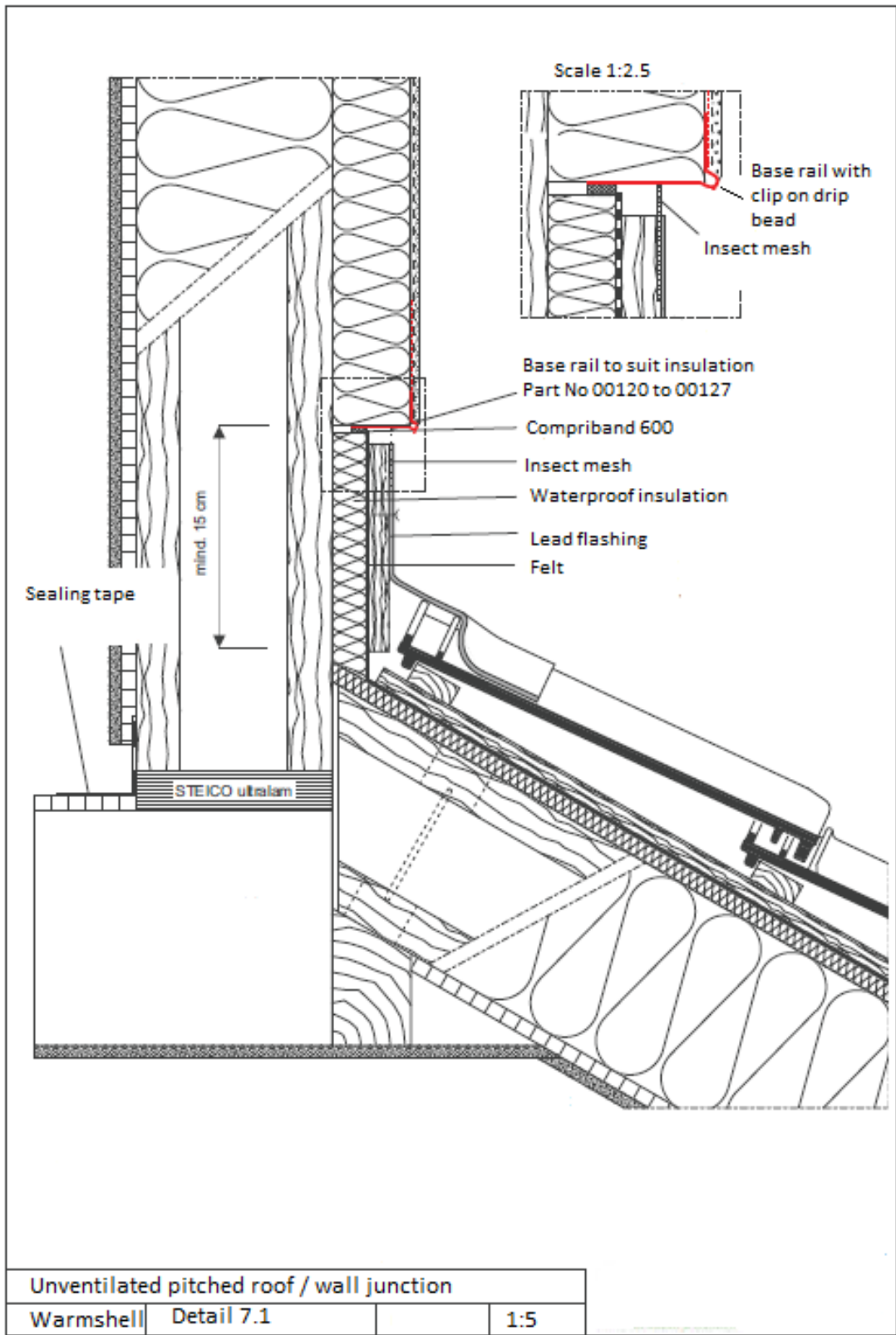




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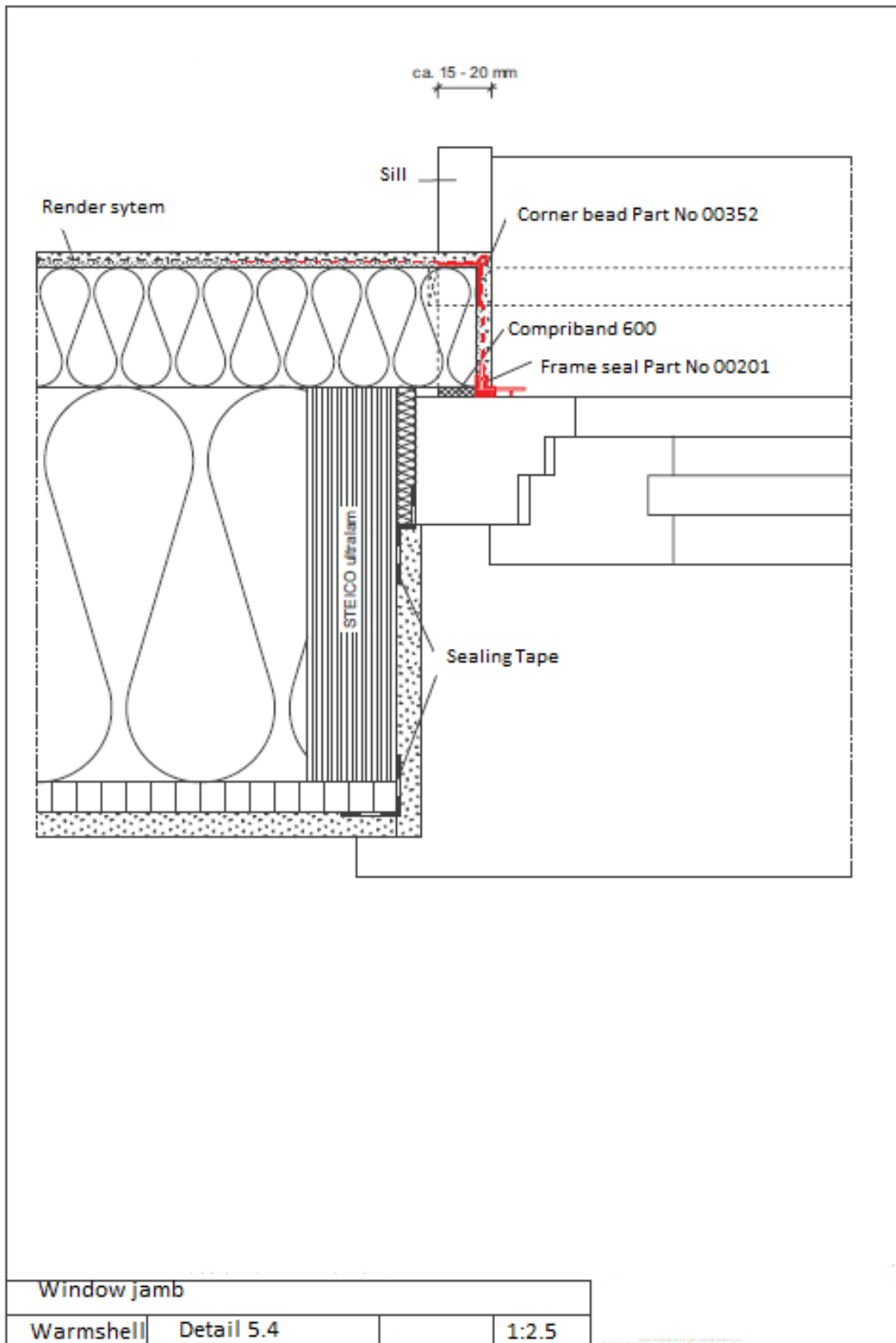


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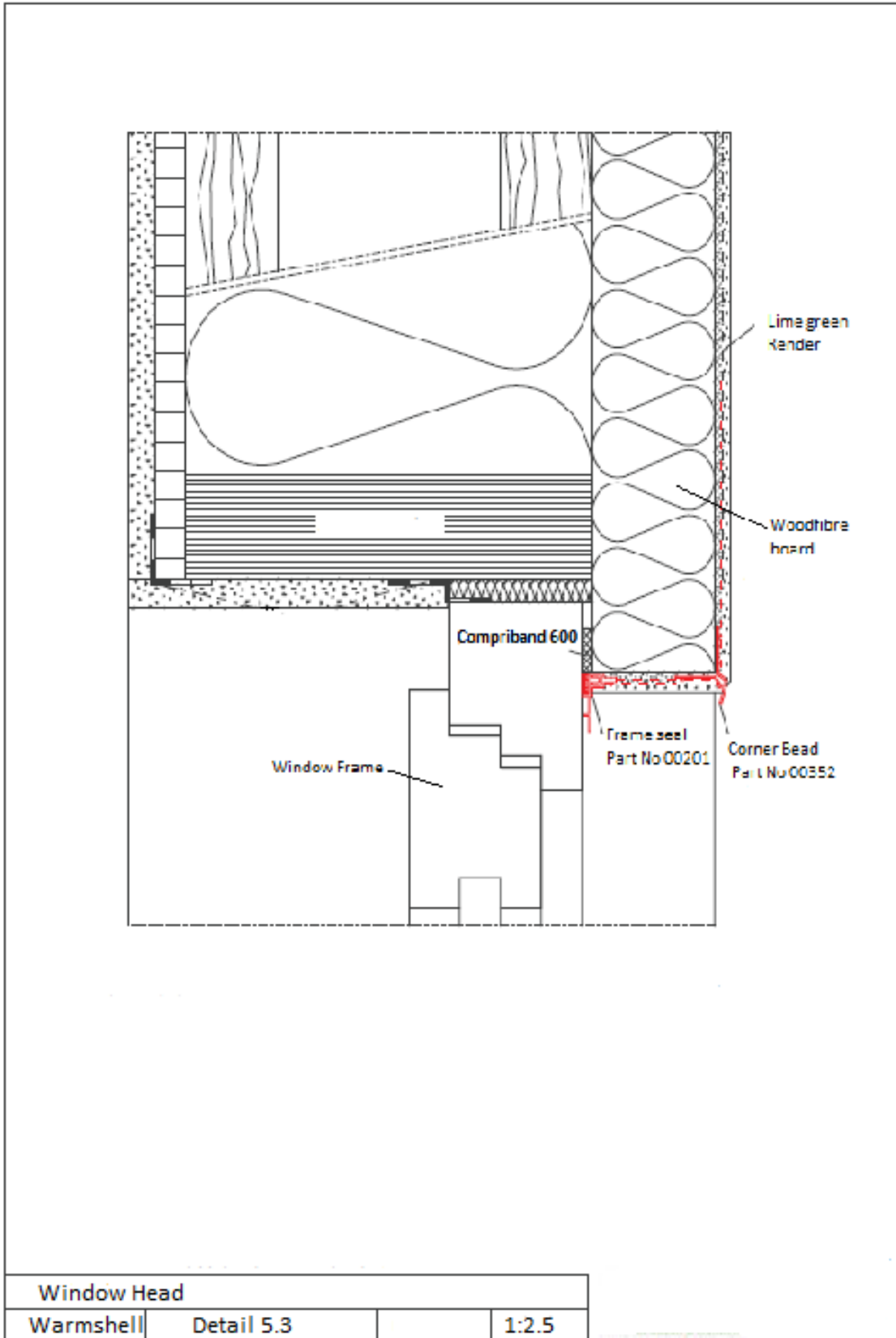




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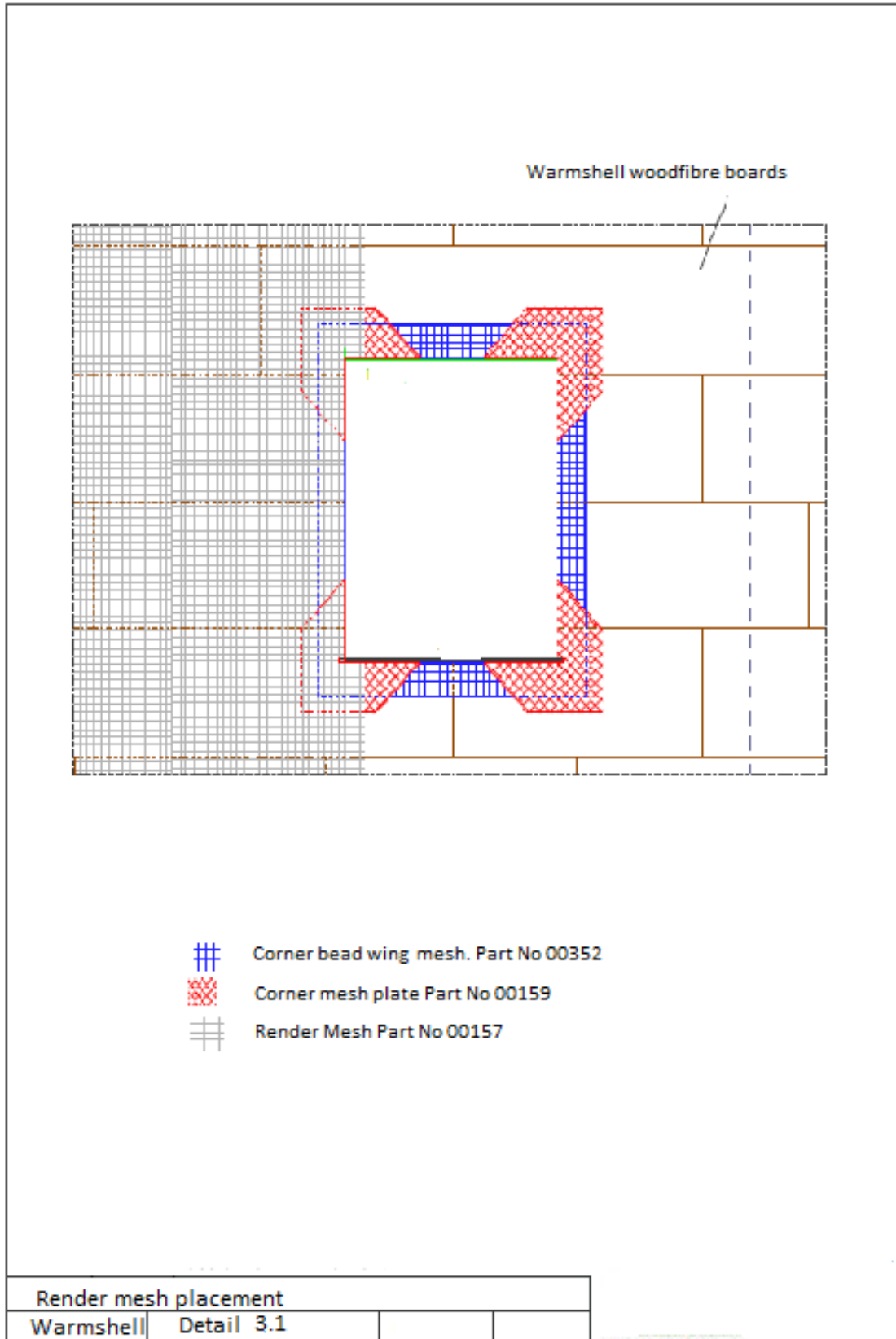


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The Warmshell system has been tested against and meets ETAG004 external wall insulation and is certified with a CE mark. It is also undergoing BBA assessment.

It is therefore vitally important that the correct components are used and are those specified by Lime Green. Lime Green is unfortunately unable to help with problems that arise when system components are substituted or omitted.

It is a requirement of your house building warranty provider and insurer that the system is used and installed is compliant with lime green's technical approvals, doing so will ensure a durable, robust system requiring minimal maintenance.

To make sure you get the most from your Warmshell system, Lime Green offers an in-depth technical support service that covers all aspects of your build, from pre-planning right through to completion.

Prior to the start of building, Lime Green will evaluate your project to make sure that all design and build requirements are in place for the Warmshell system.

For product comparison, and any necessary sign-off by local authorities, samples of all relevant materials can be provided, together with sample drawings for architects, planners and building control, trades people and other construction professionals. Lime Green also supplies thermal calculations and a condensation risk analysis to ensure compliance with all relevant regulations, together with costings for the project.

Once on site, Lime Green provides all the technical and installation advice required to ensure that your project runs smoothly to budget, brief and deadline.

For further information about the Warmshell system, call us on 01952 728611

Since its formation in 2002, Lime Green has established itself as the UK's foremost manufacturer of hydraulic lime mortars, renders and plasters.

And by working with other companies and organisations, as well as through ongoing research and development in key areas such as product chemistry, environmental assessment and historic building maintenance, we continue to make our products even better.