

CAVITY BEST PRACTICE GUIDE

PRECISION ENGINEERED CLAY BLOCKS



ROOF / BRICK / PAVER / FACADE / BLOCK

INTRODUCTION

A modern construction method with the reassuringly traditional values of clay. The Porotherm System gives you the ability to construct a water-tight structure by taking the external leaf off critical path, where appropriately designed.

This guide has been designed and prepared to provide all the information required to assist your Porotherm build. The aim is to illustrate the 'Do's and Don'ts' from all aspects of the build.

Porotherm blocks are a multi-cellular clay block measuring 224 mm in height for cavity construction and when ZeroPlus mortar is applied with the roller at 1 mm thick it achieves a coursing height of 225 mm, coursing in with three courses of brickwork. Zero Plus mortar comes as a bag dry mixed. When mixed with water on site in accordance with the instructions it will lay one entire pack of blocks.

For all details of the Porotherm system please visit www.wienerberger.co.uk/products/clay-blocks

Contact Technical & Design Services at
0161 491 8200.

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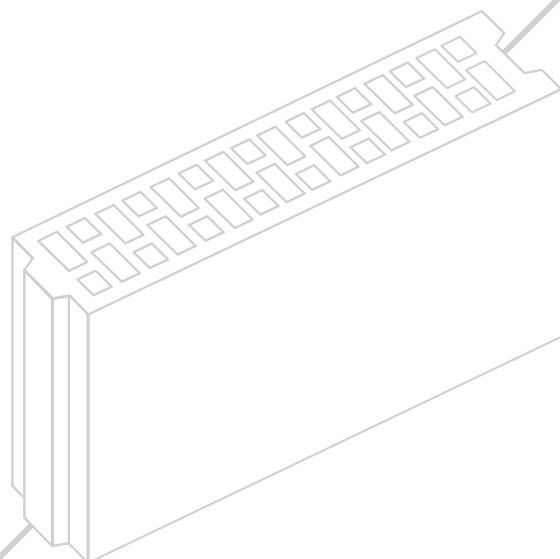
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BUILDING WITH POROTHERM

The build process consists of the following steps:

1. Completed slab including internal and external splash course
2. Scaffolding erected & maintained minimum of 1 storey ahead of construction
3. Base course
4. Block work to first floor level
5. Install timber floor / concrete plank
Please refer to concrete plank section when applying this to multi-storey developments.
6. Beam fill / reset base course and commence next lift
7. Repeat to wall plate height
8. Install roof
9. Parge coat and begin internal fit out



GUIDANCE NOTES

You are about to undertake a project using the Porotherm system. The following points offer some simple guidance notes to ensure your Porotherm build is completed in a way that is beneficial.

Porotherm build tips

- Scaffold should be erected with Porotherm loaded out onto the slab prior to commencement of block work.
- If using tube and fitting scaffold, a minimum two inside board system should be considered along with telescopic transoms.
- Scaffolding should be a design scaffold, set out top to bottom, top lift 450mm below eaves followed by two 2m or 2.1m lifts below that, with a possible need for a kicker lift at the base.
- When setting out the all-important base course, consider your storey heights. All floor types should sit on a full block, so any course height adjustment should be under taken here. For example:
2335mm = 1 coursing brick followed by 10 block courses
2410mm = 2 coursing bricks or a cut block and 10 block courses
2485mm = exactly 11 courses of blocks
- Consider bay windows and walk in bays when scaffolding to allow windows and GRP's to be fitted while scaffold is still erected.
- Call off times are greatly reduced due to the speed of the Porotherm system, so orders for all related materials i.e. formers, lintels, joists, stairs, windows and trusses MUST be placed early. During an average Porotherm 2 storey house build you will require your lintels and window formers (ensure order notes for use with Porotherm) on day one of the build, joists and flooring on day 3, trusses day 5, stairs and first fix timbers day 7 and windows on day 8!
- When ordering lintels tell your supplier that you are building with Porotherm (this will ensure the appropriate lintels are supplied). Some manufacturers allow internal and external parts of the lintel system to be called off separately.
- Appointment of Scaffolding and Bricklaying contractors needs to be done early, as Bricklayers may need training if not familiar with the system, and scaffolding needs to be erected a storey ahead, minimum, prior to super structure commencing.
- Porotherm is inert. Keep any waste separate and crush it and utilise below hard landscaped areas.
- Instruct your carpenter to provide a split price for the roof, main roof and roof final. With the external skin off the critical path, ensure the soffit is detailed to allow for installation after the external skin is constructed.
- Ask your brickwork subcontractor to price to carry out the parge coating. Instructional videos for this, and many other Porotherm related activities can be found at www.wienerberger.co.uk/walls.
- Parge coat can replace the need for mastic around joist ends, if applied around built in joists with a paint brush!
- When bringing up the facework to the gable end, you will need a "Cullen FT 75, 100 or 125 tie" fitted to the face of the timber end panel for tying, if you are using a gable end panel.
- First and second fix fixings are widely available (see Fixings, page 27), and are not a costly item that would affect pricing from a subcontractor point of view.
- Consider how you are going to finish your roof. There are several options that can be employed. See roofing section (page 24) or contact the technical team at porotherm@wienerberger.com for product specific advice.
- Drilling into Porotherm couldn't be easier, simply use a masonry bit as you would expect, but without hammer action.

SCAFFOLDING

Ensure your scaffolding allows you to make the most out of the Porotherm system, on your specific project. Both a system scaffold or tube and fitting can be employed. Please speak to your scaffolding company for the options to suit your build design.



Scaffolding considerations

To gain the most from the Porotherm system, the following considerations should be made when considering tube and fitting scaffolding.

- Use a design scaffold where possible.
- As with any scaffolding, a good solid base must be achieved before the scaffold is erected.
- Scaffold should be erected prior to the commencement of blockwork.
- A minimum of a 2 inside board system should be employed.
- Considerations for the fitting of doors, bay windows and walk in bays should be made as and where if applicable.
- Extendable transoms make for much easier adaptations, and can save both time and money.
- Lifts should be calculated from the top down.
Start with a lift 450mm below eaves, then set out minimum 2m lifts below that.
- A “scaff step” can be utilised to split a lift when bringing up face brickwork.
- Any timber joists & floors that will become a working platform should be propped and braced from below.
- Erect the loading towers as high as is practicable. With two storey housing, this can be all the way up, where as low rise multi storey may want to remain within one lift ahead. Then simply move the gates as and when required.

THE METHOD

This page shows the overall method of laying Porotherm, the independent components of the system will be explained in greater detail over the next few pages.



1. Lay the first course on a traditional sand-cement mortar bed.



2. Ensure the first blocks are level across both planes. This is the most crucial stage of the process, as it determines the levelness of each of the subsequent build courses.



3. Mix ZeroPlus in strict accordance with instructions. NOTE: It is essential to give the mortar a five minute standing time.



4. Apply ZeroPlus to the blocks with a Porotherm roller.



5. Repeat until a precision wall is complete.



6. Wall ties are installed (should be wiped and turned to ensure both sides are covered).



7. Insulation can then be installed.



8. Block-cutting is straightforward.



BASE COURSE

The base course is the most crucial part of the system, and it is laid on traditional mortar, ensuring the following points are followed precisely.

You MUST ENSURE your base course is in-line and level across both planes of the block with NO steps or staggers across the top.

Don't try plumbing up the face of the blockwork at base course, simply rely on a boat level as shown in the images.

All coursing heights should be accounted for in the base course, including any coursing bricks or cut blocks to ensure you finish on a full block.

The use of traditional mortar and the coursing being taken into account at the base, is very useful when overcoming the camber in concrete planks. Porotherm should only ever be laid above ground, and above DPC.

For video tutorials please visit:

wienerberger.co.uk/tips-and-advice/blockwork/how-do-you-lay-clay-blocks

Please refer to the specific technical information on bonding and note that it is relevant to the size of the block being used. The UK cavity range of 100mm, 140mm & 190mm only require a minimum of 100mm bond.



BONDING IN

Please refer to the series of images below, when bonding in two different sizes of PoroTherm block.

Please note, all cuts should be a minimum of 100 mm to ensure bond is maintained.



THE BASICS

Tools

The images below show some of the basic Porotherm tools.

Drilling

When drilling into Porotherm blocks, simply use a traditional masonry bit, but please ensure that there is no percussion employed. Percussion and or hammer action simply isn't required. Drilling with a rotary setting and masonry bit is more than sufficient to give the desired results.

Mortar

When applying a traditional mortar course to Porotherm i.e. wall plates or joists, it is best practice to install a DPC bedded on ZeroPlus mortar.*



*Not for NHBC sites

BLOCKWORK STANDARDS

A minimum bond of 100mm MUST be achieved in all areas (applies to 100 mm / 140 mm / 190mm).

- Porotherm should be closely abutted using the interlock system with cut blocks. The optimum joint when using cut blocks should be 10 to 15mm.
- If ZeroPlus is mixed and applied correctly, there should be no excessive mortar runs on the face of the block.



Lines, pins and profiles.

The image below shows how to use your lines and pins, when constructing in Porotherm.



ANGLE SETTING OUT

The setting out of any angle can be achieved if you follow the series of images below to create the bond.



CUTTING

The images below show the effectiveness of cutting Porotherm with an Alligator, or Reciprocating saw on all sizes of blocks.



Please refer to the cutting instructional videos for more information on methods of cutting.

Please ensure you adhere to site Health and Safety rules and regulations when cutting any material. Dust suppression can be easily achieved by plunging the block into a bucket of water prior to cutting it.

PARTY WALL CONSTRUCTION ROBUST DETAIL

Porotherm party wall performance far exceeds the requirements of Approved Document E of the Building Regulations when pre-completion tests are utilised, or Robust Details E-WM-25 or E-WM-29 can be used.



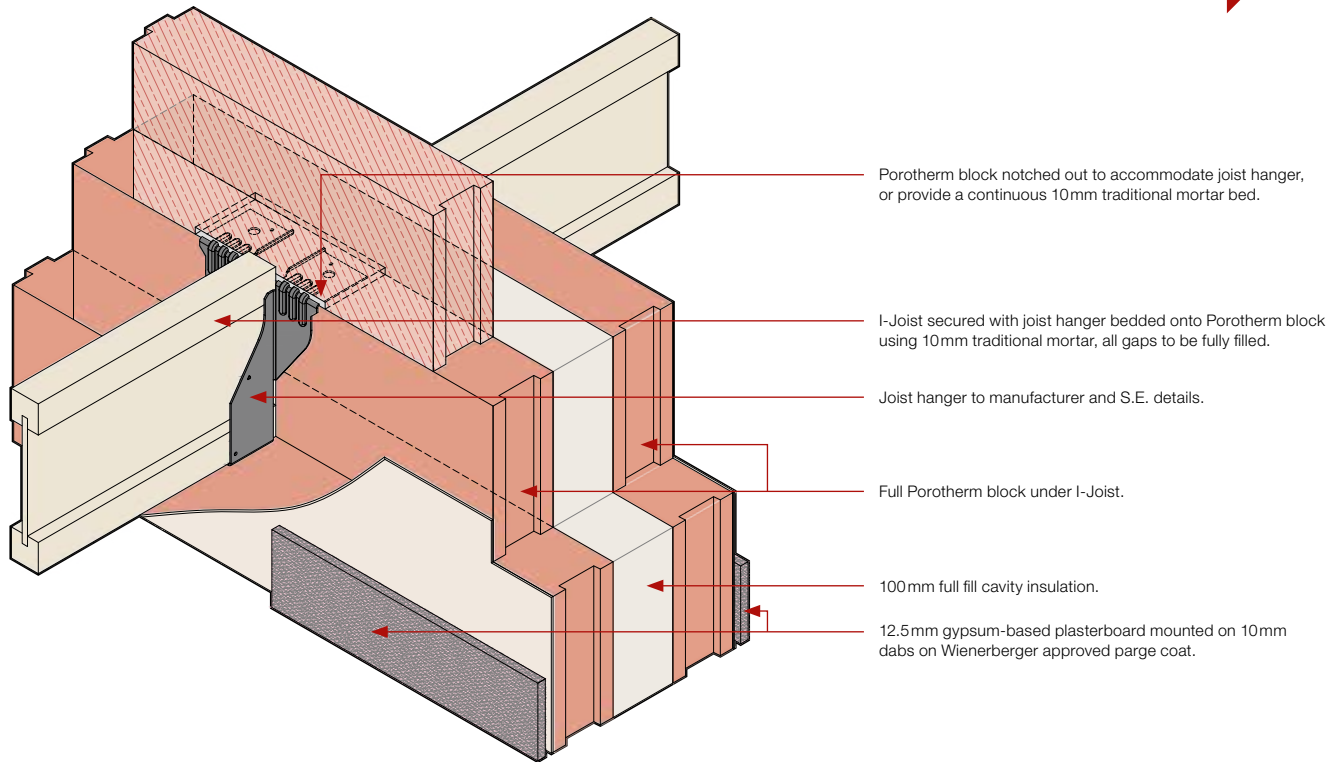
Please note, there is no mixture of materials and block work should be bonded, not straight jointed. Only the following wall ties may be used in this separating wall:

* Ancon Building Products CCBA.

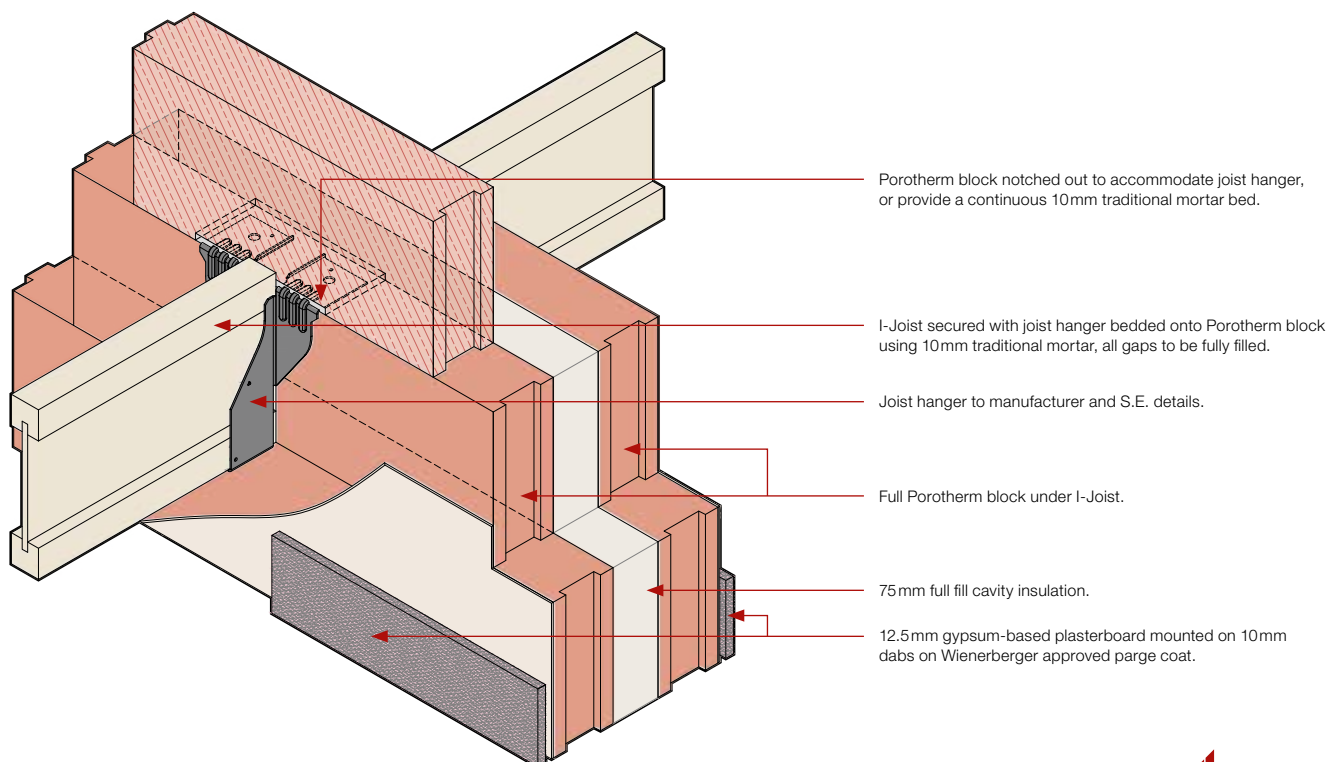
- Porotherm blocks - thin joint
- Insulated Cavity
- Wienerberger approved parge coat and Gypsum based board

ROBUST DETAILS E-WM-25 & E-WM-29

Party Wall to Robust Detail E-WM-25



Party Wall to Robust Detail E-WM-29



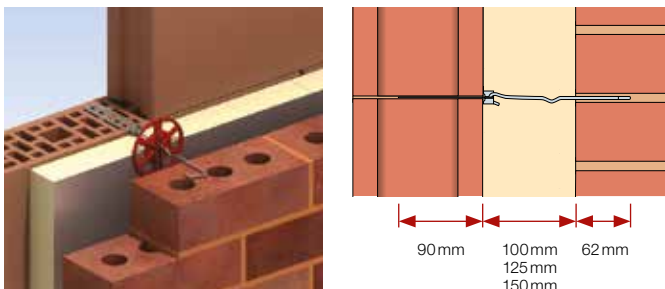
WALL TIES

Ancon has developed an innovative range of wall ties for use with cellular clay blockwork, where the horizontal bed joints are just 1 mm. The range includes ties for internal wall junctions and internal/external cavity walls. They are manufactured from corrosion-resistant stainless steel and are suitable for use in housing and commercial applications.



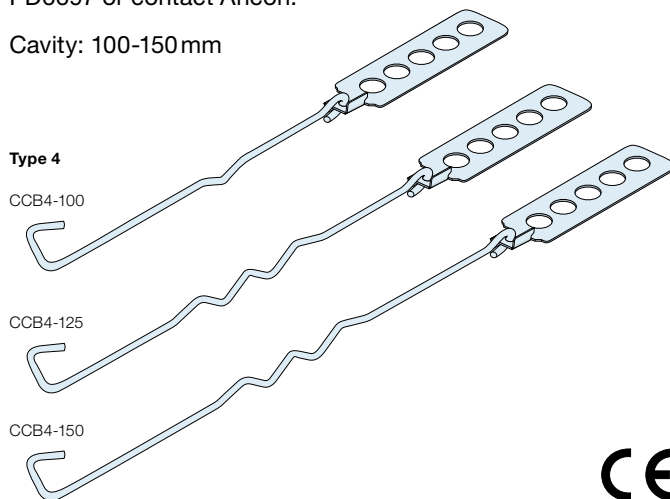
Brick-to-block cavity walls

Ancon CCB4



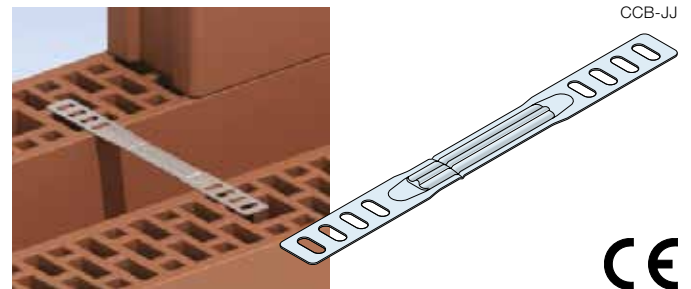
Two-part wall ties to connect external brick to internal cellular clay block. Installation is phased which eliminates any danger of injury from wall ties projecting from a part built cavity wall. For complete information on tie types refer to PD6697 or contact Ancon.

Cavity: 100-150mm



Cellular clay block cavity walls

Ancon CCB-JJ for External Walls



One-part wall tie for use in external walls where both leaves are constructed from cellular clay block. Suitable for use with Ancon TJ Insulation Retaining Clip.

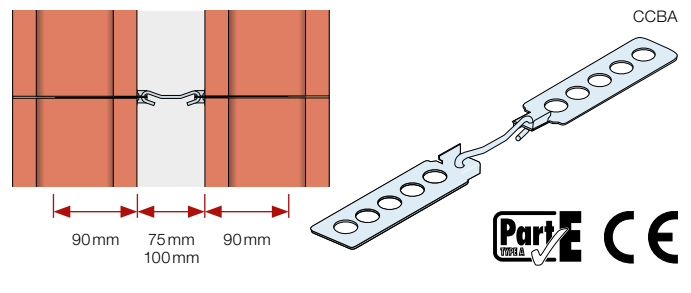
Cavity: 50-200mm

Available in three lengths:

Type 3: 210mm, 260mm

Type 4: 360mm

Ancon CCBA for Internal Walls



Three-part wall tie for use in internal separating (party) walls where both leaves are constructed from cellular clay block.

Cavity: 75mm, 100mm

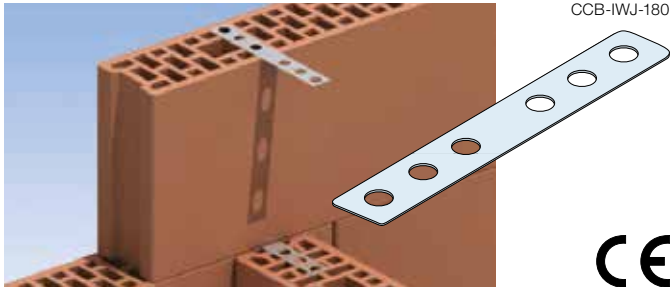
Cellular Clay Block to Traditional Masonry				
Product reference	Cavity width (mm)	Type 4 performance	Type 3 performance	Type 2 performance
		Horizontal x vertical spacings (mm)		
CCB4-100	100	900 x 450	600 x 450	450 x 450
CCB4-125	125	900 x 450	600 x 450	375 x 400
CCB4-150	150	900 x 450	450 x 450	-

Note: At vertical edges of an opening, unreturned or unbonded edges, additional ties should be used at a rate of one per 300mm height, located not more than 225mm from the edge. For complete information on tie types refer to PD6697.

WINDPOSTS

Internal wall junctions

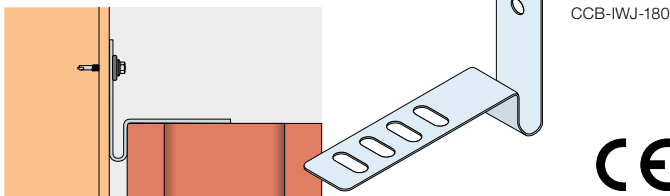
Ancon CCB-IWJ-180



Flat tie for connecting perimeter walls to internal walls.
Standard Length: 180 mm

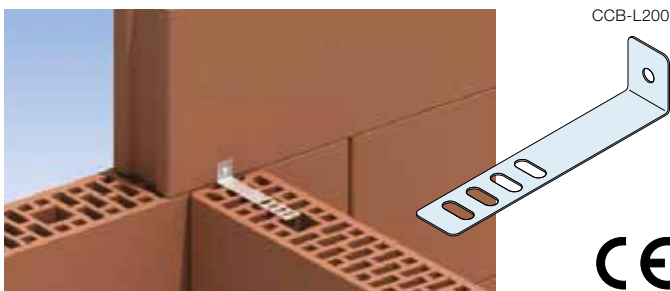
Note: For block widths greater than 140mm, two ties should be used per course.

Ancon CCB-SMJ-200



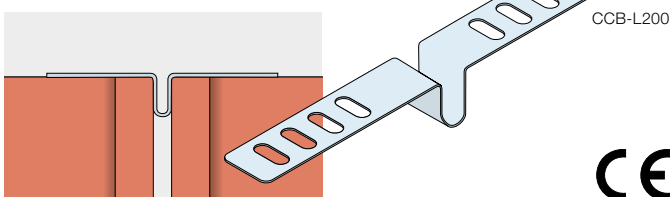
Movement tie for fixing to an in-situ structure.
Standard Length: 110 mm
Declared Shear Value: 159 N

Ancon CCB-L200



Abutment tie for connecting perimeter walls to dividing walls.
Standard Length: 130 mm
Declared Shear Value: 159 N

Ancon CCB-TMJ-200



Movement tie for use in vertical movement joints.
Standard Length: 180 mm
Declared Shear Value: 159 N

Ancon Windposts are designed to span vertically between floors to provide lateral support for panels of brickwork.

A range of wall ties is available to suit Ancon windposts when used with an inner leaf of cellular clay blocks.



Windposts for Cellular Clay Blockwork

Ancon WP1/3 Channel Windpost



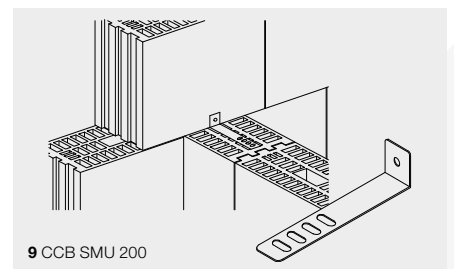
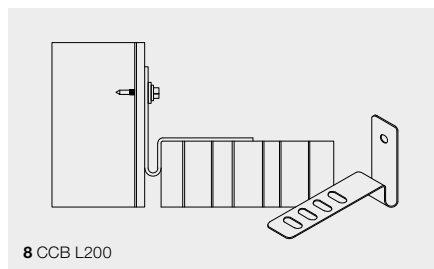
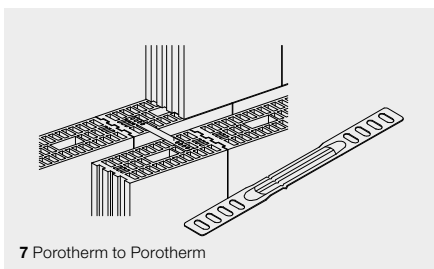
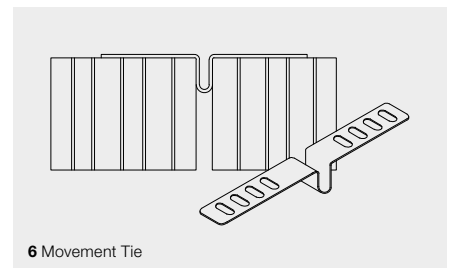
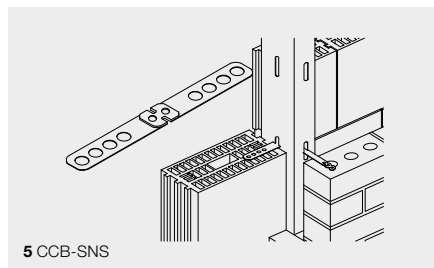
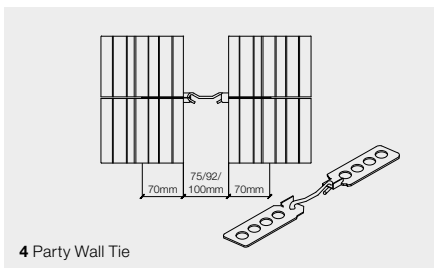
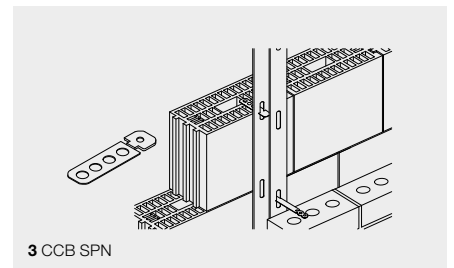
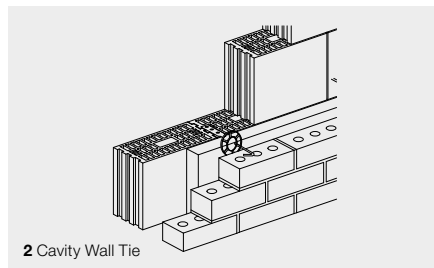
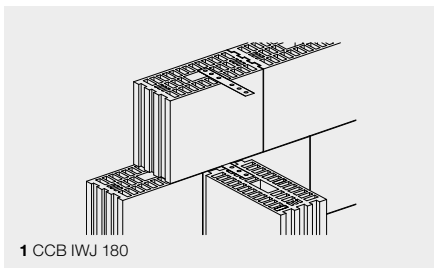
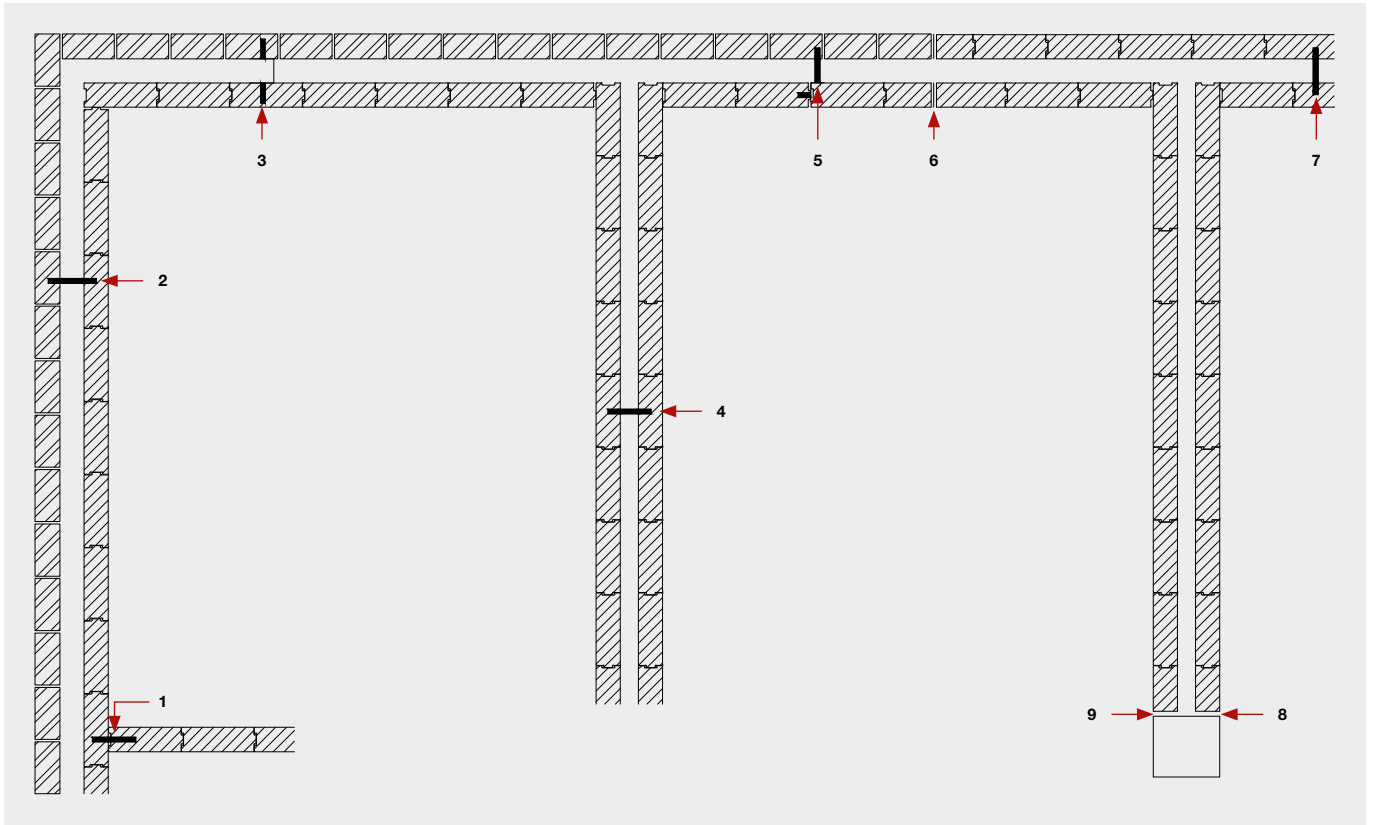
One way windpost tie. The CCB-SPN connects channel profile posts to the inner cellular clay block leaf.

Ancon WP2 Angle Windpost



Two way windpost tie. The CCB-SNS ties are used across angle shaped posts installed in the inner leaf.

WALL TIES



LINTELS, TRAYS & MEMBRANES

Porotherm lintels are designed as a two part system, a box lintel to build into the Porotherm, and an external leaf that clips in as the outer skin is constructed. Lintels are bedded on with traditional mortar, while your tray will bed on with ZeroPlus. When constructing out of two skins of Porotherm traditional style lintels can be employed.

If your build includes a Radon barrier, this will always be bedded into traditional mortar, as it will not sit within a 1 mm bed joint.

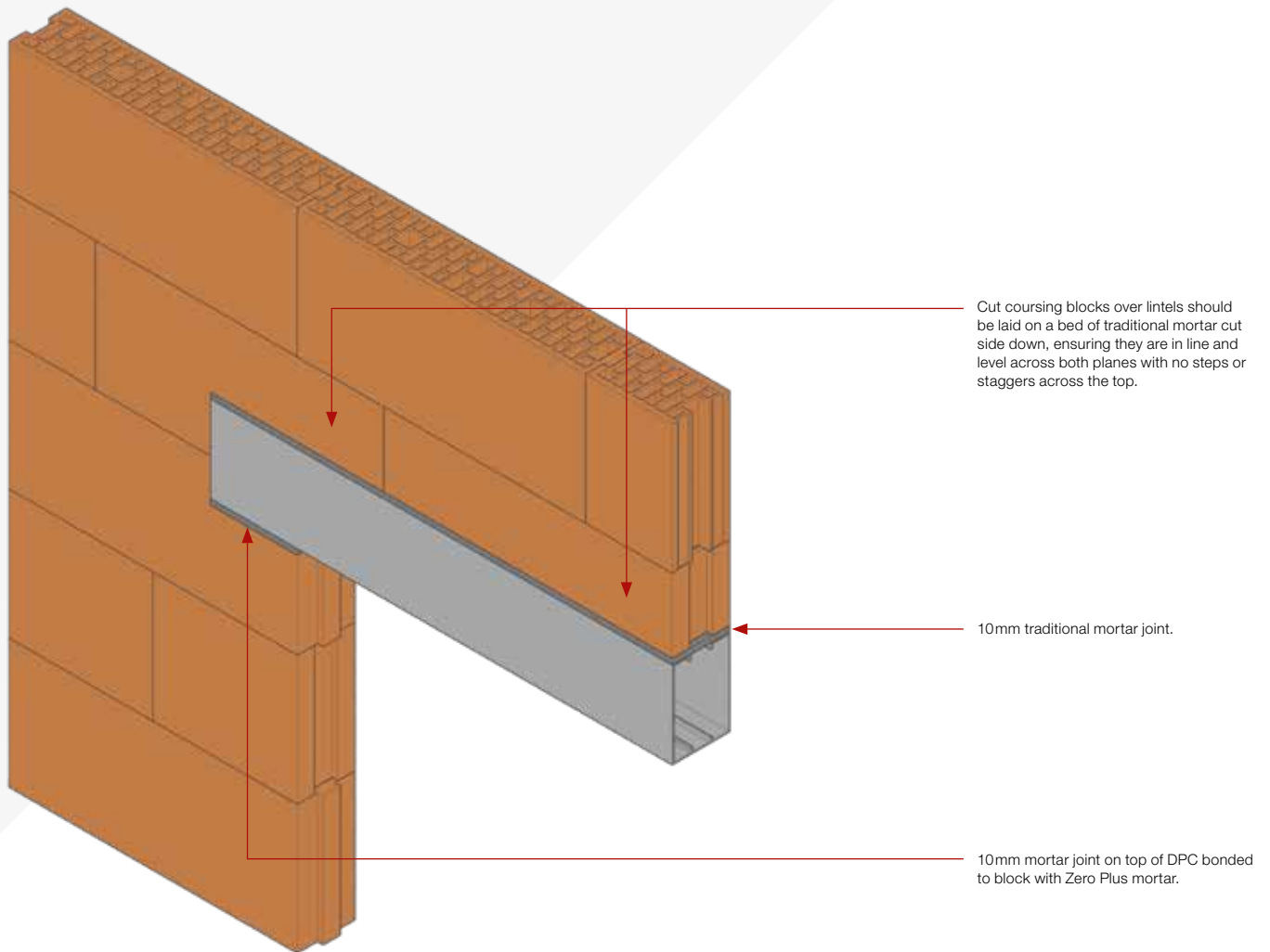


Where possible it is best practice to use a boot cut block for Lintel bearings and then cut the Porotherm blocks above the Lintels.

LINTELS & REVEAL DETAILS

Installation of lintels in Porotherm block walls.

Where lintel heights do not course in with block heights it is considered best practice to use a boot cut block for the lintel bearing.



1. A piece of DPC should be laid on the bearings using Zero Plus mortar.



2. The lintels are installed using traditional mortar on the bearings.



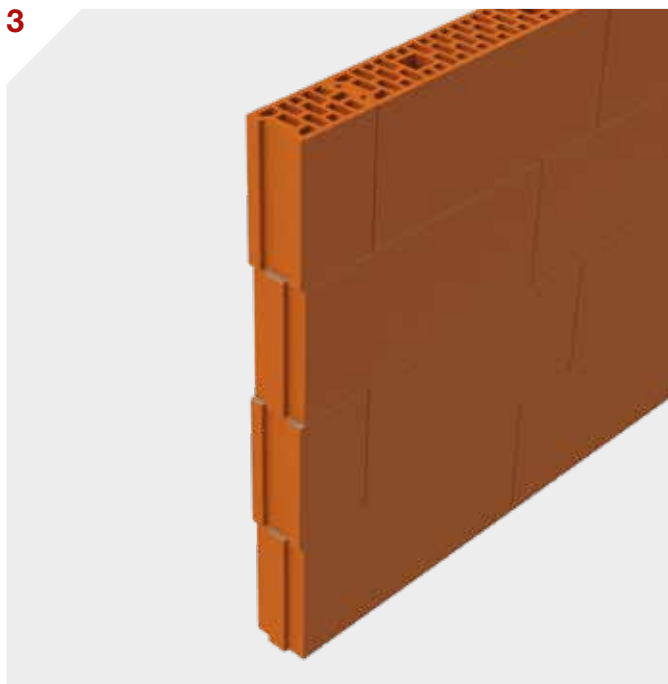
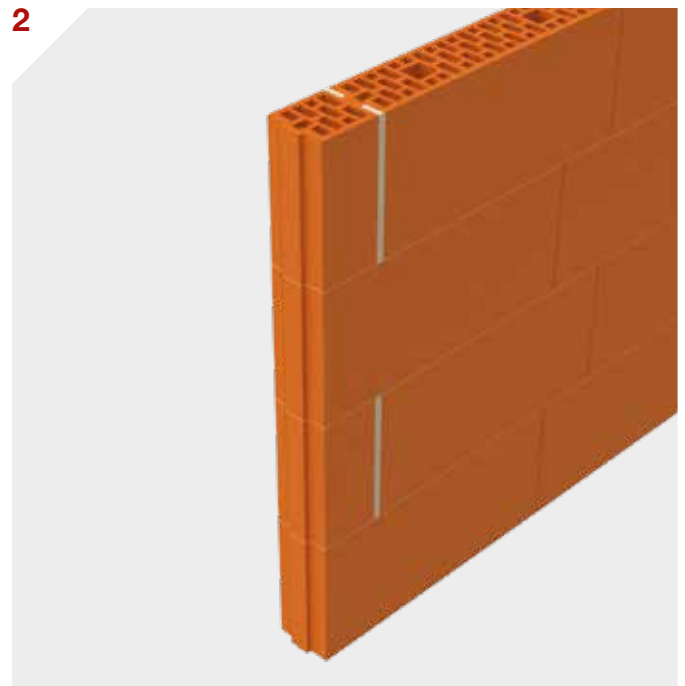
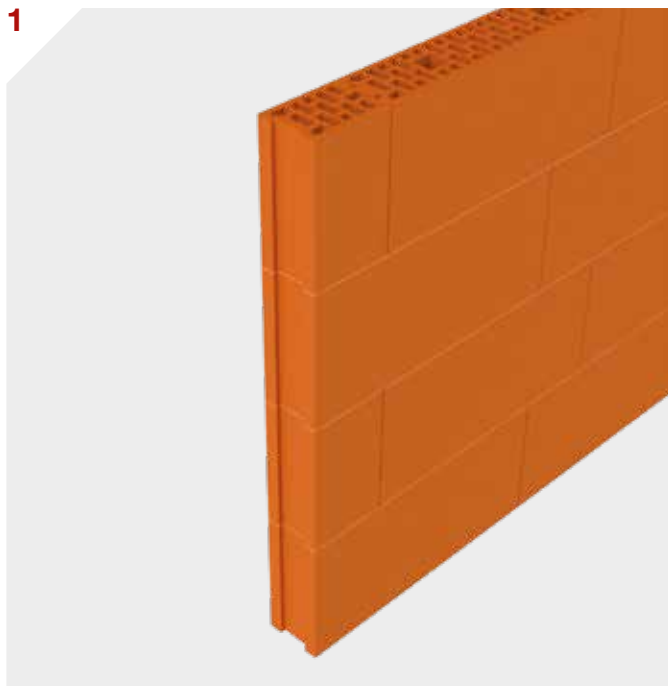
3. The lintel can then be built in using traditional mortar and again using boot cuts where possible.

LINTELS & REVEAL DETAILS

When terminating block work into reveals any of the following methods shown in the imagery of this page can be considered to best minimise wastage.

Image 4 below shows a closed cavity utilising Porotherm blocks.

It is strongly recommended that your chosen option is approved/agreed with building control and warranty provider.



JOISTS & FLOORS

Joists

Any joists should always be positioned on a full block, so therefore any modification to course height will need to be made below this course. Best practice is to have timber joists block ended, to enable them to course in with Porotherm, however if this is not possible then notch out the block above to sit over the top of the joist end.

Hangers

When installing hangers, always ensure the hanger back flange is tight against the block. Hangers can be installed using a traditional 10mm mortar joint, or alternatively by notching the block above the hanger, thin jointing can continue, ensuring the notch is fully filled with traditional mortar. Please refer to hanger manufacturers guidelines when installing joists hangers before loading.



CONCRETE PLANK PLACEMENT

Where appropriately designed the Porotherm Building System allows construction to proceed up to two storeys ahead of construction of the outer leaf.

Specific guidance is provided within "The Use of Precast Concrete Floors with the Porotherm Building System" which has the approval of the technical committee of the Precast Flooring Federation.



THE USE OF PRECAST CONCRETE FLOORS WITH
THE POROTHERM BUILDING SYSTEM



LAYING AT HEIGHT

Another benefit of building with Porotherm, is that there is no course limit to how high you can build in one lift, it simply comes down to health and safety and weather conditions. Please ensure your methods of laying at height are approved by site management.



1. To lay at height, don't use the roller above your head.



2. Roll the blocks on the floor or across the top of the pallet.



3. Turn them over.

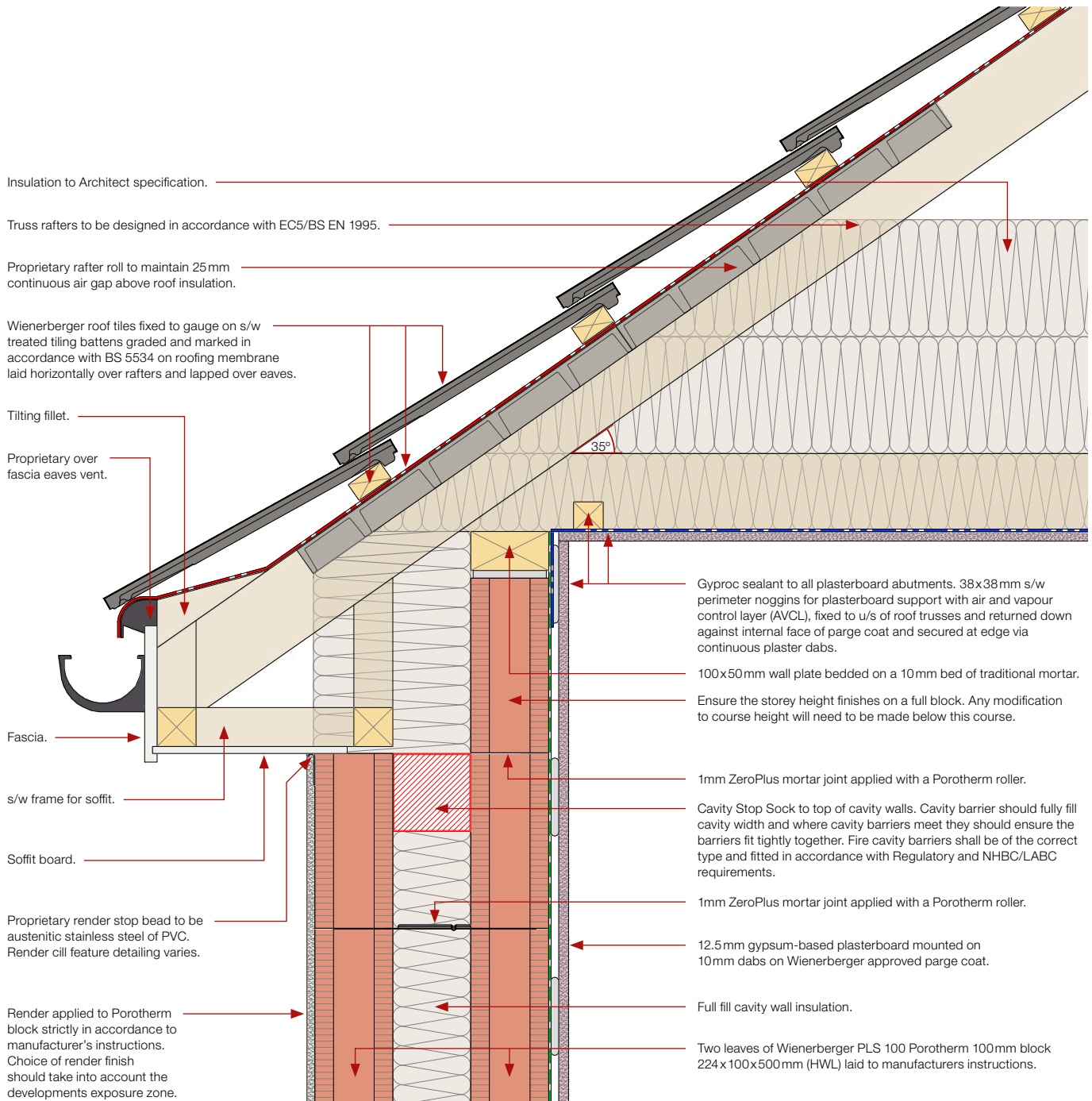


4. Lay them mortar side down.

WEATHERING IN

There aren't any hard and fast rules when it comes to roof covering when building using the Porotherm system, where fascia/soffit details are appropriately designed, fascia and rainwater goods can be installed, allowing tiling to be completed, with soffit being installed after the external skin is completed.

The diagram below illustrates typical Porotherm eaves detail.



FIXINGS

When fixing into Porotherm, ensure the fixings you are using are suitable for multi cellular clay blocks, or as sometimes known, vertically perforated brick. Please contact your fixing supplier for more information on fixings.

When drilling into Porotherm blocks, use a rotary drill without hammer action.

Heavy duty fixings are available, and if required, technical guidance should be sought from the fixing manufacturer.



WINDOW INSTALLATION & SUPPORT

Windows are installed in exactly the same way as you would expect. Where the window installation happens before the external skin is brought up, use two screws when strap fixing, to reduce the risk of the window dropping in the opening. Please discuss this with your window company/installer before your project commences.

If it is deemed that the window needs further support in the opening, prior to the external leaf being constructed, this can be achieved in a number of ways. The images here show an angle bracket in use, but a timber support could also be employed in its place.

When placing your order for cavity closers, please ensure that you get the relevant thin joint ties at approximately 0.7 mm thick, and not the standard plastic type.



PARGE COATING

Porotherm is a dry perpend system, so something is required to seal the vertical joints for air-tightness, and that is the job of Wienerberger approved parge.

Please ensure Porotherm walls are dry before applying parge.

It comes as a bagged dry powder and is mechanically mixed with water in accordance with instructions. Wienerberger approved parge has an expansive quality as it dries to assist with the filling of the joints. If applied correctly around built in joists, it can reduce the need for mastic pointing.



When applying parge coat to the 1st floor walls, extend the parge coat a minimum of 300mm into the roof space.

For further information refer to the technical data sheet.

PROTECTION OF WORKS

The use of ZeroPlus mortar means that the usual issues with working in the cold and wet present less of a challenge.

Please consider the following when laying in inclement weather:

- U shaped foam protector (as shown in the image to the right) is ultimately the most effective method. However, more traditional methods can be used as an alternative. It is important to protect blocks from freezing and never lay a frozen block.
- A scaffold board.
- Hessian.

Please consider temporary conditions when constructing in a single leaf, and the use of buttress walls and/or temporary props as a solution.



ROLLER MAINTENANCE



1. Maintenance of the Porotherm rollers is simple.



2. When you're done with the roller, simply remove the split pin & spindle to release the drum.



3. Wash clean.



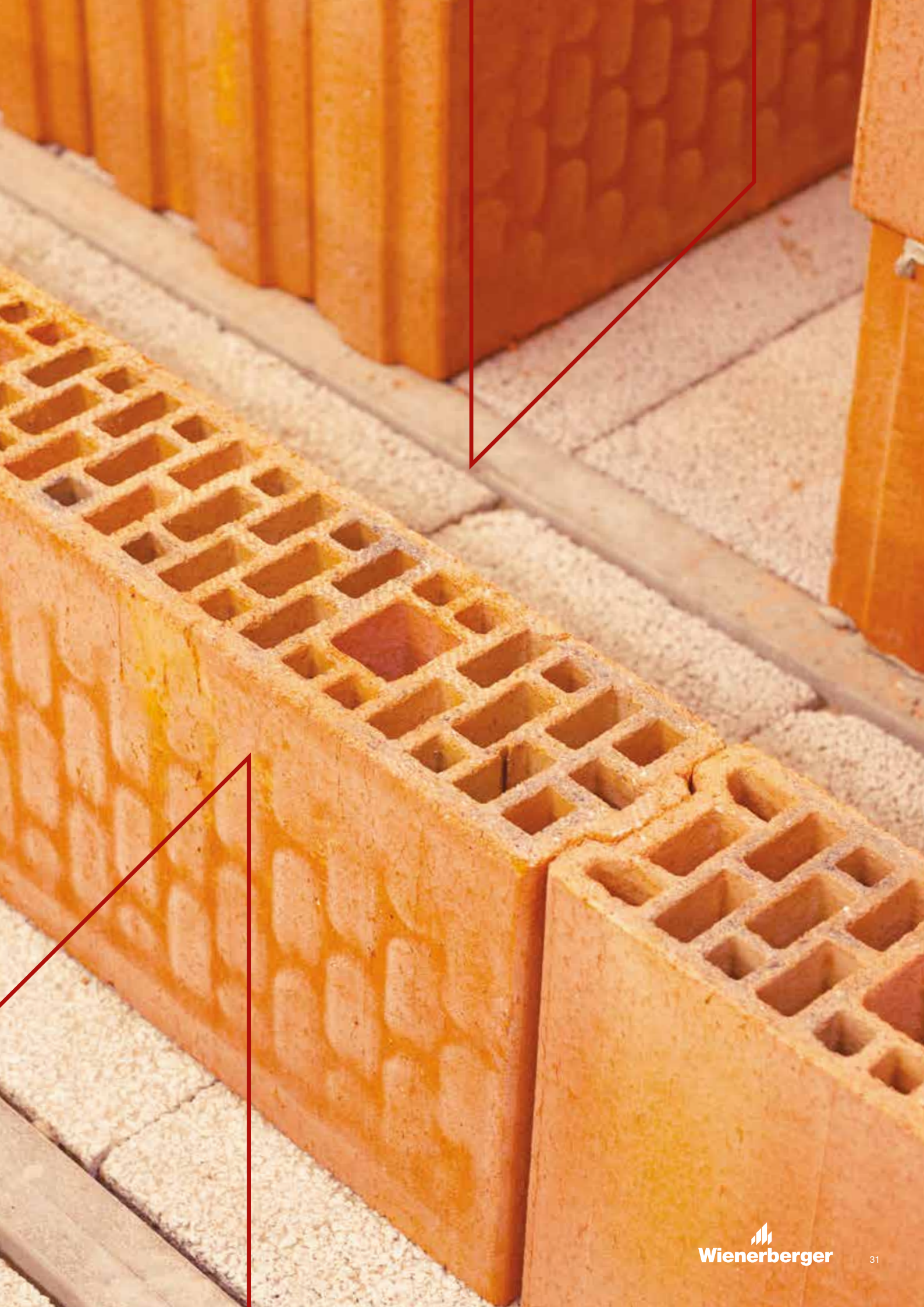
4. Remove any remaining ZeroPlus mortar from the trough before thoroughly washing that out also.



5. Replace the drum and spindle once clean and retain back in place with the split pin.



6. You're ready to go again.



HEALTH & SAFETY



HEALTH & SAFETY NOTES

The Safe Use of Porotherm Clay Products (1)

The Health and Safety at Work Consumer Protection Act and other legislation requires us to provide relevant information with regard to our products in respect of handling, processing, storage, transportation and disposal without causing risk to health.

Handling

Porotherm blocks are vertically perforated clay masonry units. They are manufactured from natural materials and are considered to be an inert substance, which presents no risk to safety and health through handling or use, subject to good practice being followed. The use of Personal Protective Equipment (PPE), such as hats, safety footwear and gloves is strongly recommended where practicable, to reduce the risks from sharp edges and falling objects.

Clay blocks should not be hit with a trowel, chisel or hammer as this may result in flying sharp fragments that may cause injury and result in damage to the external and internal structure of the products. Where cutting or shaping of blocks is required, it is recommended that suitable cutting equipment is used, according to the manufacturer's guidance. Suitable eye protection and Respiratory Protective Equipment (RPE), e.g. goggles, dust masks and ear protection, should be worn when cutting Porotherm blocks. When drilling Porotherm blocks, only rotary drilling is required.

Porotherm clay blocks are packed on a pallet, banded and shrink-wrapped to maintain the integrity and stability of the pack and for the protection of the products from the elements. Packs are heavy and great care should be taken when handling and transporting. The appropriate equipment suitable for the lifting task should always be used and the safe working load (SWL) of the lifting equipment should always be above the weights of the pack being lifted.



Ear Defenders



Dust Mask



Safety glasses



Safety gloves



Safety Boots



HEALTH & SAFETY NOTES

The Safe Use of Porotherm Clay Products (2)

All personnel should be made aware that products are not secured to the pallet with straps. When handling the packs, this should always be done using forks i.e. pallet truck or forklift truck/cranes with suitable fork attachments.

Avoid:

- Abnormal shocks to packs
- Sliding one pack against the face of another pack
- Stacking packs more than two pallets high

Note: Security of straps can deteriorate over time

It is strongly recommended that packs should be placed wherever possible on dry, well-drained, flat, solid ground, suitable for the purpose. The multiple stacking of packs is inadvisable and potentially dangerous, but in no circumstances should this be more than three packs high. Minimising product movement around the site will contribute significantly to safety.

Only lift by inserting forks beneath the pallette provided. It is recommended that lifting holes have a width of 90 mm and a length of 1100 mm. Under no circumstances should a 'wide grab' device be used to lift packs of Porotherm, as this can both damage the products and lead to the pack becoming unstable.

Opening the packs for use

Packaging should be removed using appropriate tools. Straps should be cut out by wire cutters and not burst open by application of levered pressure. When cutting straps, the operative should stand to the side of the strap being cut and not in line with that strap. Highly tensioned straps can spring away from the package when tension is released. In accordance with the Personal Protective Equipment at Work Regulations 1992, persons cutting bands under tension **MUST** wear suitable eye protection.

The strapping around packs of Porotherm has sharp edges. Suitable gloves should be used when handling this material. When the straps are cut, care must be taken to protect operative from blocks that may fall from the pack - particularly when products may have moved during irregular transport or storage, causing them to be unstable. It is recommended that protective footwear and overalls are worn when carrying out this operation.



HEALTH & SAFETY NOTES

The Safe Use of Porotherm Clay Products (3)

COSHH (Control of Substances Hazardous to Health)

In general, fired clay products typically contain between 50%-70% silica. If standard power tools (e.g. disc cutter) are used to cut this product, substantial levels of dust may be produced. This is significantly reduced when using an electric reciprocating saw. Depending on the environment and the method of cutting, it is possible that some respirable silica may be generated and released into the air.

The main effect in humans in the inhalation of respirable silica dust is silicosis. There is sufficient information to conclude that the relative lung cancer risk is increased in persons with silicosis.

Under the COSHH Regulations, the Workplace Exposure Limit (WEL) for respirable silica is 0.1 mg/m³ (from October 2006). The only reliable way to ascertain the levels of individual exposure is to carry out detailed personal monitoring.

Persons carrying out dry cutting operations **MUST** wear suitable respiratory protection. A suitable respirator or disposable mask meeting BS EN 149 (specification for filtering masks to prevent inhalation of particulates), preferably class FFP3 is recommended. The use of suitable respiratory protection by those working near to the dry cutting operation should be considered. Guidance on selection and use of RPE can be found in HSG53 Respiratory Protective Equipment at Work.

Our advice would be to avoid the dry cutting of blocks whenever possible. Wet cutting reduces the amount of dust generated. Cutting operations should always be carried out in well ventilated areas. Unless a reciprocating saw is available, or bench mounted wet saw, it is recommended that off site, specialist cutting services be used.

Manual Handling

There is a large range of Porotherm products available and an individual block may weigh anywhere between 8 kg - 19 kg. This could present a risk of manual handling injury. We recommend that the HSE Information Sheet Guidelines CIS77 (Preventing Injury From Handling Heavy Blocks) be followed.

It is the customer's responsibility to obtain technical data on all materials to be used with Porotherm Products.





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