

ENGLISH



Coelho da Silva

FLAT ROOF TILES INSTALLATION GUIDE

Thank you for choosing our products.

This booklet has been prepared to help you install CS products. Understanding and complying with these guidelines is essential for your roof to fulfil its function effectively.

coelhodasilva.com



Plasma⁽⁻⁾



Plasma⁽⁻⁾ TX5



Coelho da Silva

For us at CS, the quality of our products and services is of the utmost importance. To ensure this quality is not compromised, and because a product by itself cannot guarantee the function it is intended to perform, it is crucial to install it correctly according to the appropriate building standards. This guide provides essential information on how to correctly install flat clay roofs and/or façades.

GENERAL INSTALLATION RECOMMENDATIONS

1. Read this guide immediately after receiving the material on site;
2. **BEFORE** installation, carefully check if there are any manufacturing defects. If so, contact us immediately via the channels below, and send us a photo record of the occurrence.
 - a. Whatsapp +351 964 171 140 / +351 912 987 364
 - b. Email info@coelhodasilva.com
 - c. Telephone +351 244 479 200
3. If in doubt regarding the information in this guide or the installation of our products, please contact CS' Technical Support Department using the details above;
4. For any installation matter not covered in this guide, the responsibility for the incorrect installation of the product should not be attributed to CS, in which case the recommendation of the previous point prevails.



REMEMBER

- In case of complaint, it's essential to present the label that accompanies and identifies the product on the pallet/box. Do not proceed installing the product without first contacting our Technical Support Department.
- The measurements/figures presented in this guide should be considered indicative and confirmed with the products on-site when planning their installation.

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PLASMA TILES SPECIFICATIONS



Plasma^(↵)

BASE

Brown |

Red |

DIMENSIONS

48,7 x 25,1 cm

49,1 x 25,3 cm

COLOURS

Anthracite
Steel Grey
Metallic Grey
Brown

Natural Red
Natural Glazed
Pearl White
Copper Green
Weathered



WEIGHT 4 Kg

INSTALLATION

TILES PER m²

12,5

BATTEN SPACING

38,5 cm (recommended)

MINIMUM PITCHES

21°*



Roof



Façade



Roof
and Façade



Plasma^(↵) TX5

BASE

Brown |

DIMENSIONS

48,7 x 25,1 cm

COLOURS

Anthracite
Slate



WEIGHT 4 Kg

INSTALLATION

TILES PER m²

12,5

BATTEN SPACING

38,5 cm (recommended)

MINIMUM PITCHES

21°*



Roof

* If other guidelines exist in construction standards or manuals of the destination country, those prevail.



Casa da Argela
Caminha, Portugal

ARCHITECT

Balonas & Menano Porto
Pedro Balonas e Helena Bessa

PRODUCT

Plasma Anthracite

1
ROOF

1.1 ROOF SUPPORTING STRUCTURE

1.1.a TYPES OF SUPPORTING STRUCTURES FOR THE ROOF

The roof tiles need a support structure to keep them in position, aligned, and the roof looking uniform. An adequate support structure is also the best way to guarantee the ventilation of the roof, which promotes the quick drying of the tiles, reducing the likelihood of condensation occurring and contributing to the overall durability of the roof.

Below are the top recommended support structure solutions:



Wood batten and counter batten

Wood batten over an underlayer

Ventilated metallic batten

Whatever the solution chosen, it must ensure a minimum air gap of 3 cm (if using ventilated metal battens) to 5 cm (if using wood battens and counter battens or wood battens over underlayer) between the underside of the tiles and the material placed underneath – whether it is a membrane, slab, insulation or waterproofing material. This, together with the use of ventilation tiles, forms vertical corridors of ventilation that allow the air to circulate from the eave of the roof all the way to the ridge. See section 1.4 Ventilation.

DID YOU KNOW...?

The use of PVC battens, prefabricated concrete battens, or strips of mortar is not recommended, as these do not guarantee an efficient support, compromising the performance and appearance of the roof.

1.1.b FIXING THE ROOF TILES TO THE SUPPORT STRUCTURE

On roofs with very steep slopes and/or exposed to winds, the roof tiles must be fixed to the support structure in order to prevent their displacement or lifting.

Plasma tiles come with two pre-half-drilled holes that allow mechanical fixing to the batten using 4.5x60 mm self-tapping Phillips flat head screws (for wood battens) or 4.8x50 mm self-drilling screws (for metal battens) and washers. For the roof, it is recommended to use only one of the holes (the left one).

The following are general criteria for fixing the roof tiles. These must be analysed on a case-by-case basis, by the person responsible for the work, depending on the height of the building, its geographic location and exposure to winds:

- a) Pitches up to 100%: In most situations, fixing is not necessary;
- b) Pitches between 100% and 150%: 1 in every 5 roof tiles must be fixed (evenly distributed). The tiles on the perimeter of the roof may all be fixed;
- c) Pitches over 150%: It is recommended to fix all tiles.

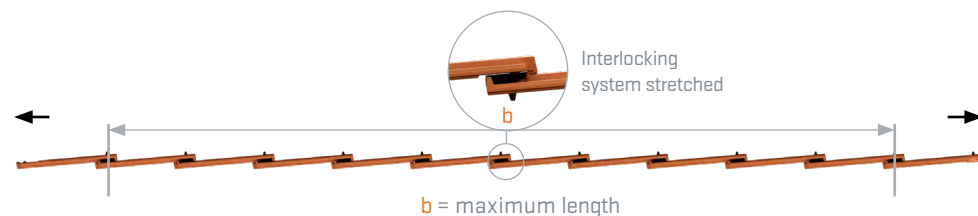
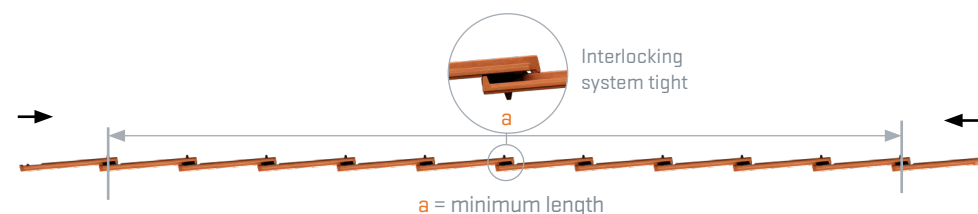
1.1.c CALCULATING THE DISTANCE BETWEEN BATTENS

In order for the tiles to interlock together perfectly and fit the support structure correctly, the supporting battens must be distanced appropriately.

To calculate this distance:

- Place 12 interlocked roof tiles upside down on a flat surface (see schematic below).
- Measure length 'a' with the tiles set as closely together as the interlocking system allows.
- Measure length 'b' with the tiles set as far apart as the interlocking system allows.
- The average distance between the battens (from top to top of each batten) is then calculated as follows:

$$\text{Distance between battens} = (a + b) / 20$$



The calculation must be carried out on-site, with the material supplied, and mixing tiles from several pallets.

The recommended distance between battens (indicative measurement) can be found on page 02 - Plasma tiles specifications.

DID YOU KNOW...?

A support structure that is well executed and correctly calculated speeds up the process of laying the tiles, saving in labour costs as a result. Furthermore, it ensures the correct interlocking and overlapping of the tiles contributing to an effective and aesthetically balanced roof.

1.2 MARKING THE ROOF AND INSTALLING THE ROOF TILES

In order to achieve a uniform and balanced distribution of the tiles on the roof, as well as minimize cuts and difficult adjustments, the roof must be marked both horizontally (rows) and vertically (columns). In situations where façade and roof connect, the façade must be planned prior to marking and installing the roof (see section 2.1). The planning and marking of the roof also makes it possible to identify situations where complementary fittings can be used, making the overall installation of the roof easier.

1 MARKING POSITION OF THE BATTENS (ROWS)

First, decide what the overhang of the tiles located at the eave will be or, in a situation where the roof connects with the façade, determine the necessary measure to work with a Linkage tile (see section 2.4.a From roof slope to façade wall). After, using a chalk line, mark lines parallel to the roof eave (starting at the bottom and moving upwards), distanced from each other by the measure previously calculated in section 1.1.c. Any necessary adjustments should be made on the last/top row of tiles, by the ridge. Then, install the battens according to the markings made.

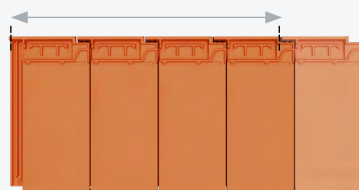
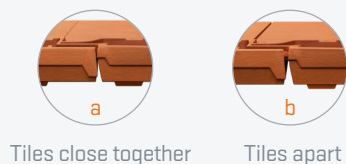
2 MARKING COLUMNS

Marking columns (each being equivalent to the width of 4 tiles) helps ensure all tiles are evenly positioned across the roof. Calculating the width of the columns is done in a similar way to what was previously done to calculate the distance between battens, but now interlocking the tiles laterally.

- Place 5 roof tiles interlocked on a flat surface (see schematic below).
- Measure width 'a' with the tiles set as closely together as the interlocking system allows, and width 'b' with the tiles set as far apart as possible.
- The average width of the columns is then calculated as follows:

$$\text{Width of columns} = (a + b) / 2$$

a = minimum width
b = maximum width



Then, define the position of the 'base reference tile for marking' relative to the gable (see schematic on the next page). From there, use the width calculated above to mark the columns in lines perpendicular to the battens, and from right to left.

This marking also helps predict where the last tile of each row will sit, at the left end of the roof slope. By playing with the available lateral room provided by the interlocking system of the tiles, we can bring all tiles in a row slightly closer together or further apart to make sure each row ends with an entire tile without having to make any adjustment cuts.

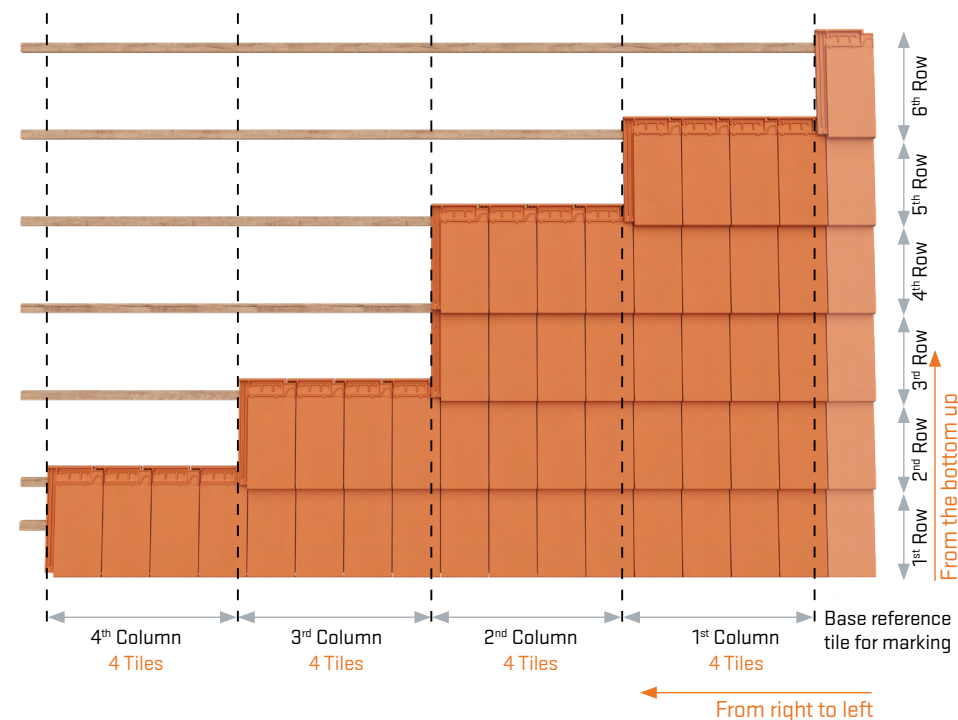
Indicative column width (average of 4 tiles) by roof tile model:

PLASMA (red base) = 83,7 cm | PLASMA (brown base) = 83,5 cm

3 LAYING THE ROOF TILES

Install the tiles starting on the right end of the roof slope going left, and from the bottom going up, according to the column markings made (see schematic below).

When installing the tiles, we recommend randomly mixing tiles from several pallets in order to minimize slight variations in size and colour. These are considered normal due to the nature of the clay material and the tiles manufacturing process.

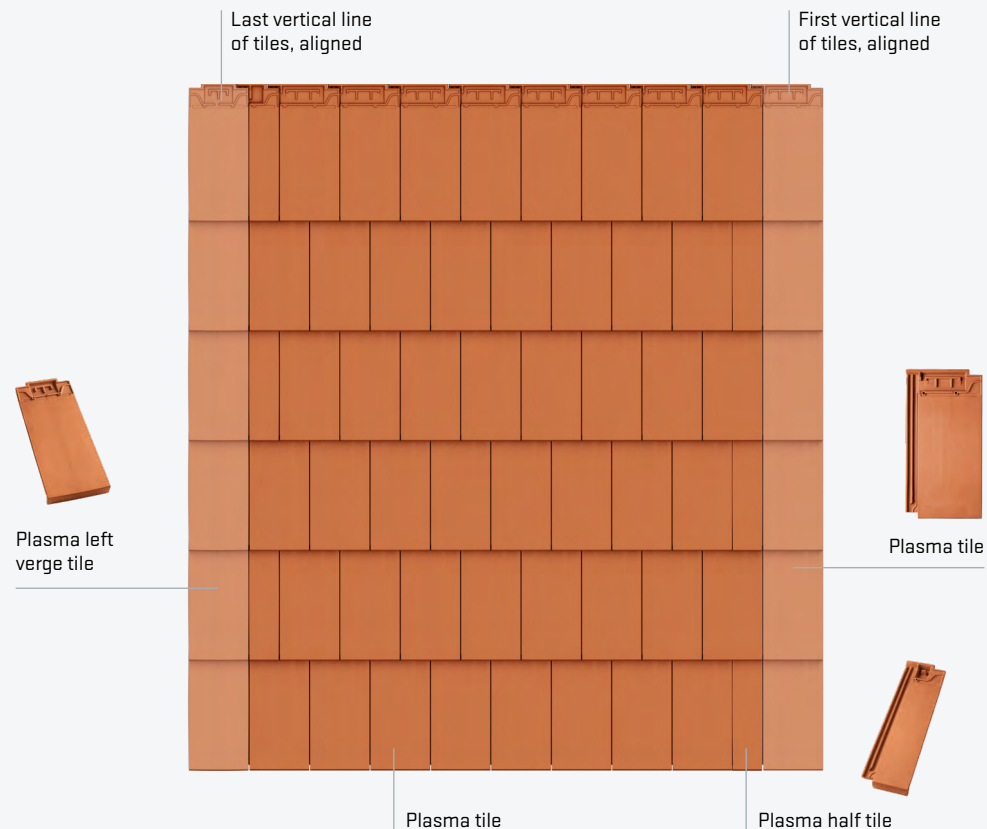


1.2.a CROSS BONDED OR STRAIGHT BONDED APPLICATION



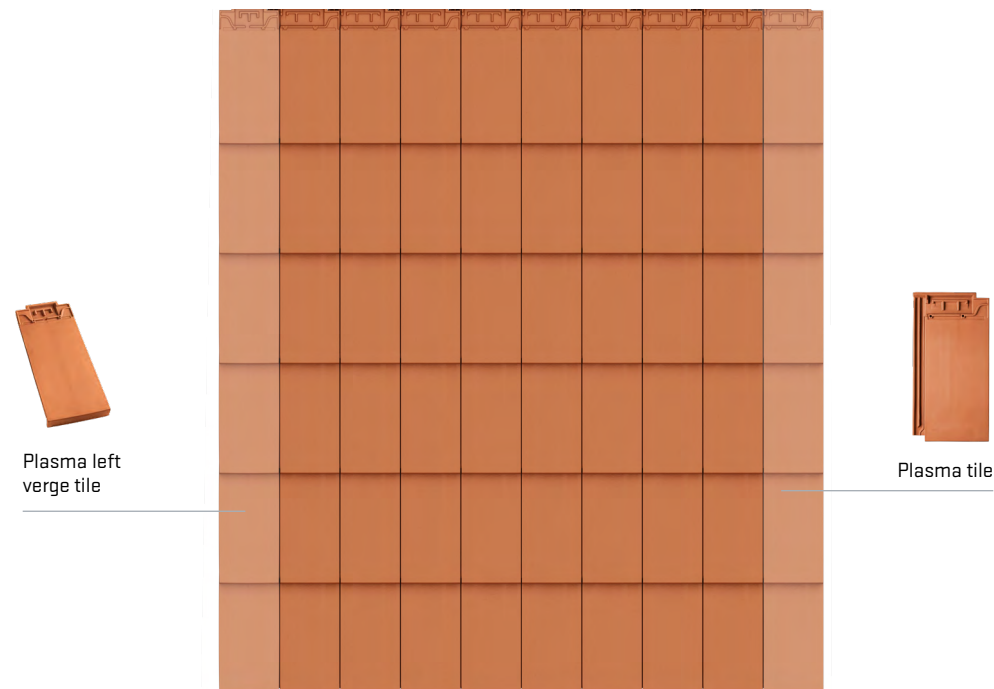
CROSS BOND

Regardless of the type of finish chosen for the gables (with or without gable rakes), the first and last vertical lines of tiles are installed aligned. The cross bond pattern is created by using a Half tile immediately after the first tile every second row, and another Half tile immediately before the last tile, in the other rows, as exemplified below.



STRAIGHT BOND

The straight bond pattern simply requires the use of standard Plasma tiles, and then Left verge tiles at the left end of the roof slope.



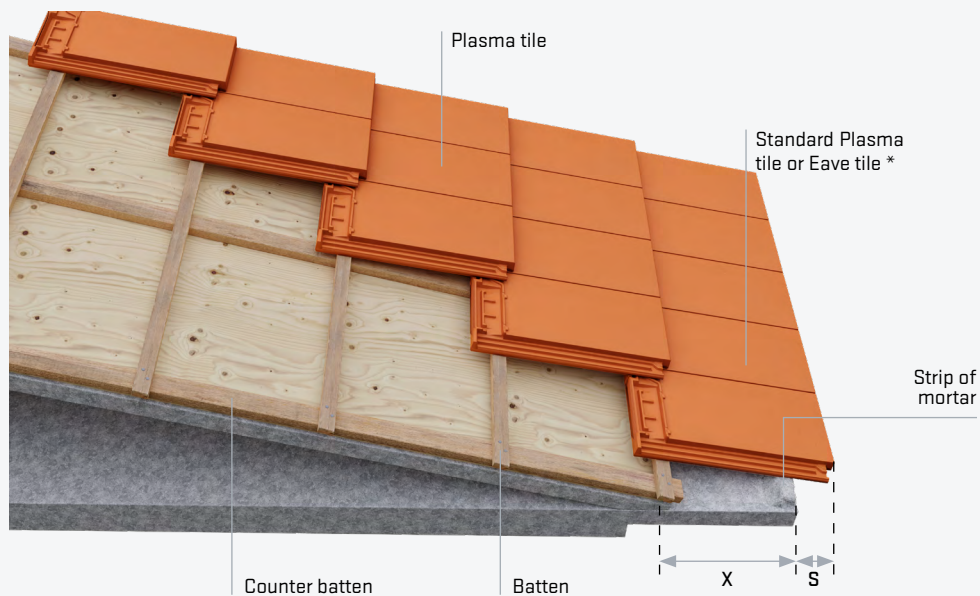
The images above exemplify cross and straight bond patterns in situations with a basic gable finish, or a gable with a parapet wall. For examples using gable rakes and ridge end caps see section 1.7.a. With gable rakes and ridge end cap.

1.3 EAVES

1.3.a EAVE WITH STANDARD TILES OR EAVE TILES

Install the eave as follows:

1. Decide how much the tiles at the eave will overhang, keeping in mind that their weight should be properly supported by the first batten. It's recommended a maximum overhang **between 5 and 15 cm**;
2. Mark and secure the first batten and, using the **distance between battens** calculated in section 1.1.c, mark and secure the other battens all the way from the eave to the ridge.
3. Support the front of the tile at the eave with a ventilated batten (mechanically fixed) or, alternatively, with a strip of mortar suitable for securing clay materials (in which case small holes should be made on the strip of mortar to ensure air can enter the roof).



* In the case of a roof with a coloured finish, this tile can be engobed on both sides for a better aesthetic finish.

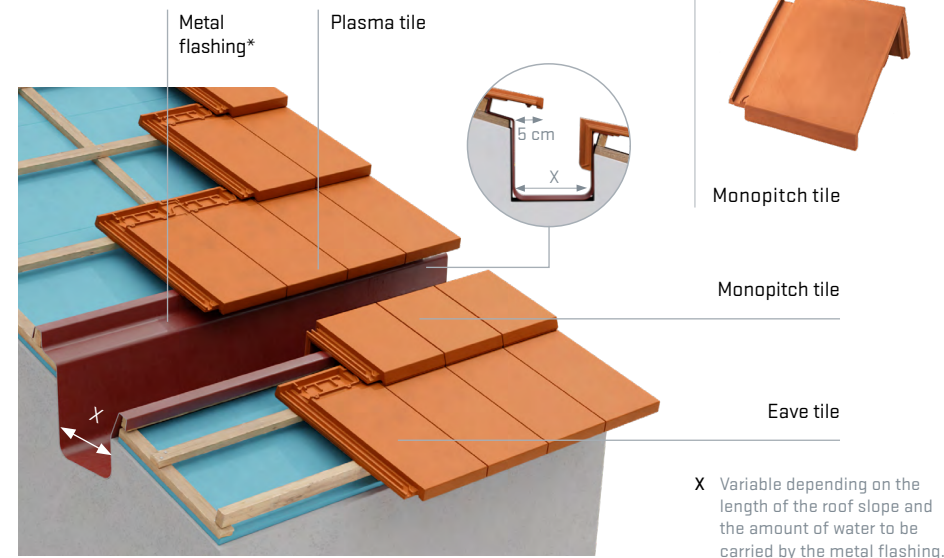
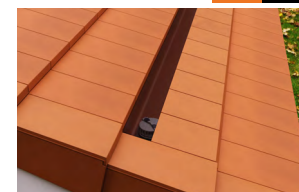
S Overhang of 5 to 15 cm

X Variable depending on the roof pitch and the desired overhang of the tile at the eave.

1.3.b EAVE WITH INTERNAL GUTTER

The goal of an internal gutter is to remain as discreet/hidden as possible. It's located by the eave in order to collect and drain the water from the roof slope without it going through the eave tiles.

Use the Monopitch tiles over the metal gutter to provide a uniform and continuous clay finish.



1.3.c EAVE AGAINST WALL

When the eave line ends at an emerging wall, a metal flashing must be installed, built into the wall to prevent infiltration.



* As an alternative to metal flashing, there are other viable transition solutions on the market, namely multi-purpose or specific adaptable membranes. Their installation instructions, durability and warranties must be provided by the manufacturer.

1.4 VENTILATION

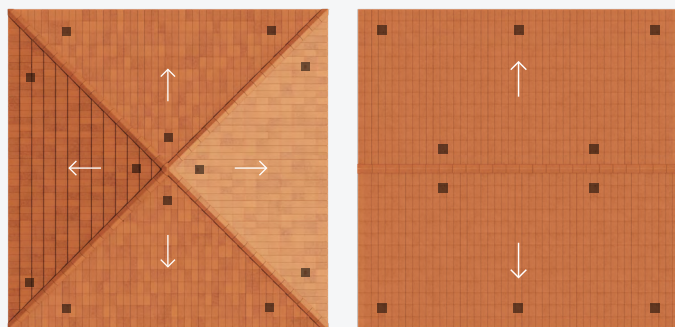
Good air circulation on the underside of the roof tiles is essential for the good performance and durability of a roof. **Ventilation helps the tiles dry quicker**, reducing the presence of moisture, which in turn prevents condensation and potential frost damage.

Respecting the correct roof pitches and using an adequate batten support structure are necessary to ensure an efficient ventilation of the roof. However, **air inlets and outlets are also essential to facilitate air circulation**. This can be done through the installation of ventilation tiles (with or without a safety step).

CALCULATING THE NUMBER AND DISTRIBUTION OF VENTILATION TILES

It is recommended a minimum of 1 Ventilation tile every 9m², distributed in a staggered way over 2 or 3 lines. **Position them on the 2nd and penultimate rows of tiles** in order to provide air inlets close to the roof eave and outlets close to the ridge. This ratio may need to be reassessed for roofs of complex geometry, maintaining the same principle of ensuring air inlets and outlets with ventilation tiles on all roof slopes.

- Roof slopes of up to 6 metres: distribution over 2 lines;
- Roof slopes of over 6 metres: distribution over 3 or more lines.



Ventilation tile

Note: It comes with a metal mesh to prevent the entry of animals and dirt. There's a specific groove in the tile where the mesh should be placed, and then secured with a suitable glue and seal product.



Safety step and ventilation tile

Example of ventilation tiles distributed over 2 lines.

■ Ventilation tile

DID YOU KNOW...?

A well-ventilated roof preserves its original appearance for longer, prolongs the durability of the tiles and contributes to the health and thermal properties of the building.

1.5 RIDGES AND HIPS

On ridges and hips, use PL1 ridge tiles when roof slopes have pitches of up to 30° (58%), or PL2 ridge tiles when pitches are equal or over 31° (60%).

There are two possible installation methods:

- Using mortar (see section 1.5.a)
- Dry installation (see section 1.5.b)

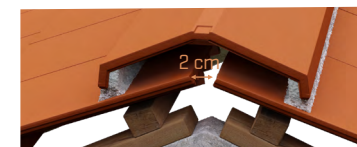
Whatever the method, it's crucial to ensure there is good ventilation along the ridge and hips. Make sure there is a gap of about **2 cm** between the tiles on each side of the ridge/hip to allow the air to circulate inside the ridge tiles.



PL1 ridge tile

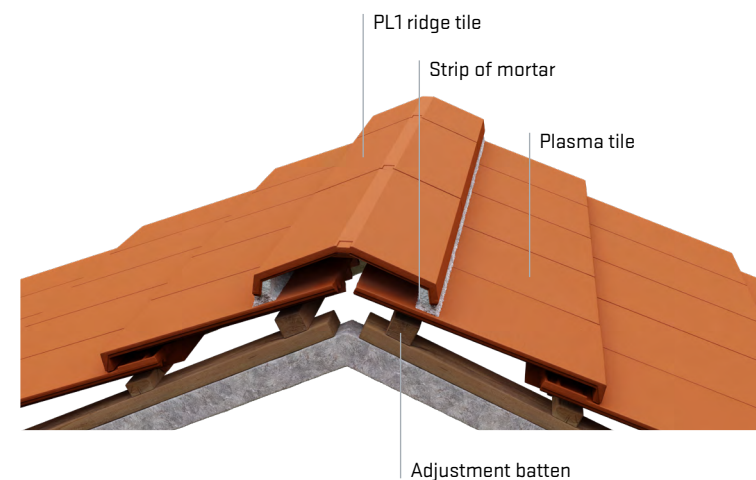


PL2 ridge tile



1.5.a INSTALLATION USING MORTAR

1. Using mortar suitable for securing clay materials, **apply two strips of mortar** (one on each roof slope) where the ridge tiles will sit, as shown in the schematic below. To ensure air circulation through the roof as well as along the ridge and hips, it's important to use only a moderate amount of mortar – the inside of the ridge tiles must not be filled with mortar.
2. Remove any excess mortar on the outside the ridge tiles and clean the area immediately before it dries, using clean water and a damp sponge.



DID YOU KNOW...?

Some manufacturers supply ready-made mortars suitable to use on clay roofs and that do not compromise the performance of the clay materials. These are available in various tones to match the colour of the roof tiles for a better aesthetic finish.

1.5.b DRY INSTALLATION

As an alternative to the traditional use of mortar, a dry installation uses specific complementary fittings to fix ridges and hip lines. It's a **clean, quick and easy method** that guarantees a very effective ventilation. It can be summarized in 4 steps:



1. The ridge battens will sit on Ridge supports. Mold these to the pitch of the roof and desired height, and fix them together with the adjustment battens by the ridge. Ridge supports should be distanced approximately 70cm from each other along the ridge line, with reinforcement in the areas where ridges intersect or transition to hips;

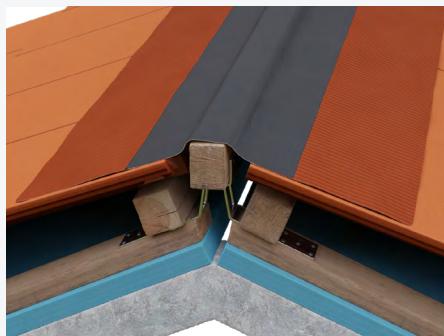
2.

Place the ridge batten in the "U" shaped socket of the Ridge support and screw them through the lateral holes of the support;



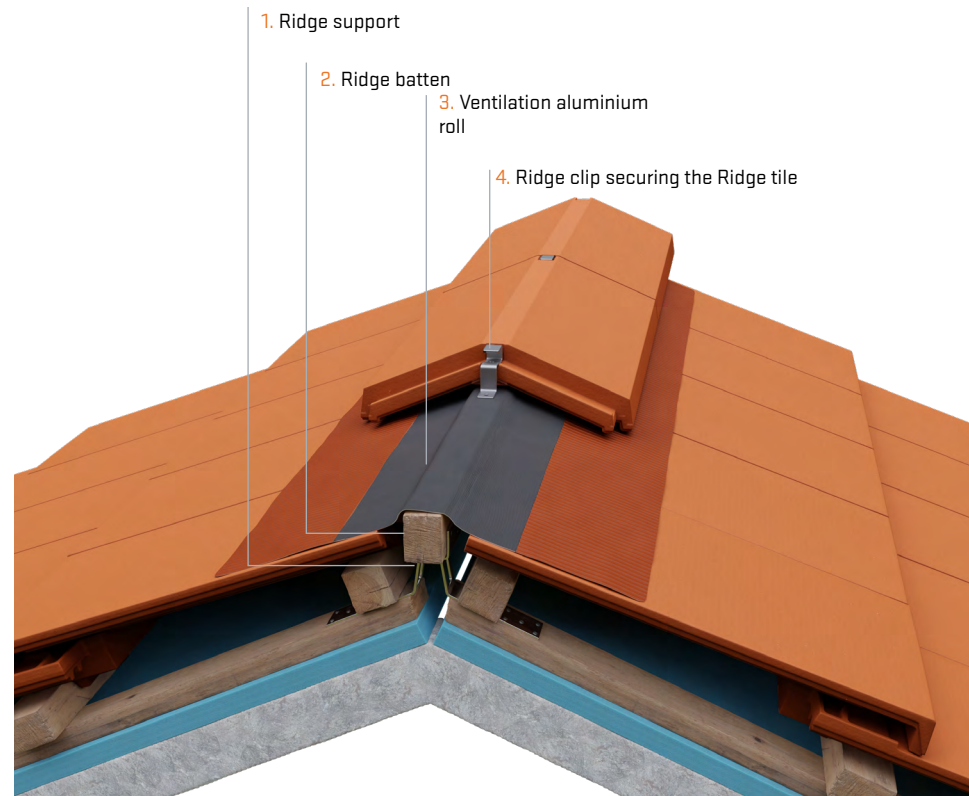
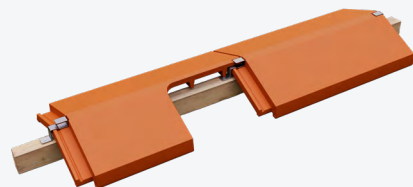
3.

Install the Ventilation aluminium roll. Align the central area of the roll with the ridge (or hip) batten and overlap the roof tiles on both sides with the adhesive flaps.



4.

Install the Ridge tile using a PL clip screwed to the ridge batten at the male end of the tile.



Ridge support



Ventilation aluminium roll
(red/black)



Screw
Self-tapping flat head
screw (4,5x40mm)



PL clip

1.5.c MAPPING COMPLEMENTARY FITTINGS

The diagram below shows the position of some ridge and hip fittings. For more, please visit the CS website.



1 PL1 hip starter



2 PL1 ridge tile



3 PL1 female 3-way apex



4 PL1 L-shaped 3-way apex



5 PL1 T-shaped 3-way apex



6 PL1 male 3-way apex



7 PL1 4-way apex

Use PL1 fittings on roof slopes with pitches $\leq 30^\circ$ [58%]
Use PL2 fittings on roof slopes with pitches $\geq 31^\circ$ [60%]

EXCLUSIVE CS



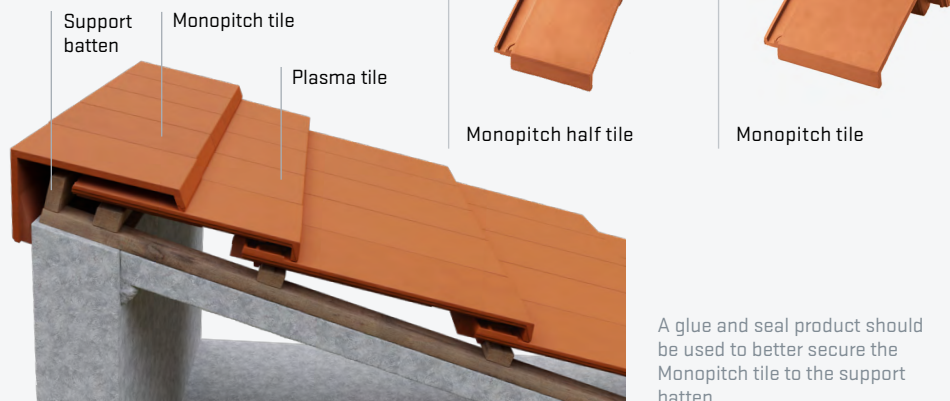
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1.6 OTHER INSTALLATION SCENARIOS

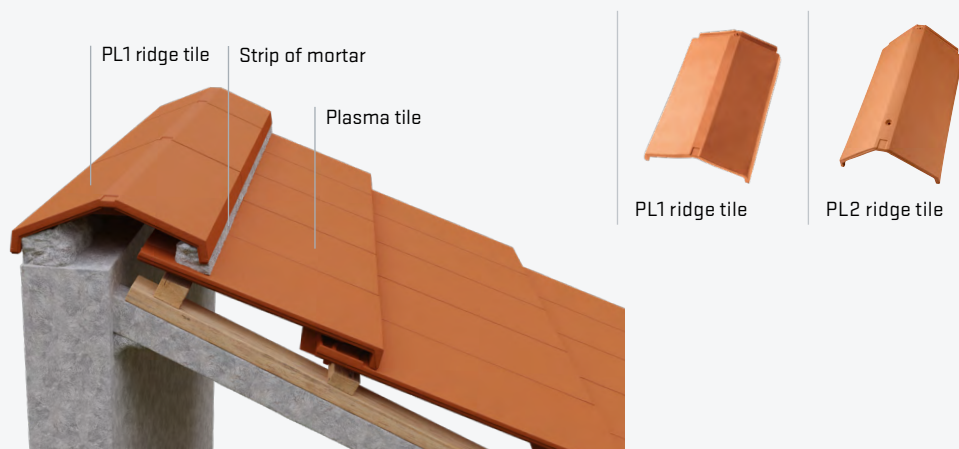
1.6.a MONOPITCH

In situations where the roof has only one slope, there are 3 possible ways of finishing the top of the roof:

FINISH WITH MONOPITCH TILES

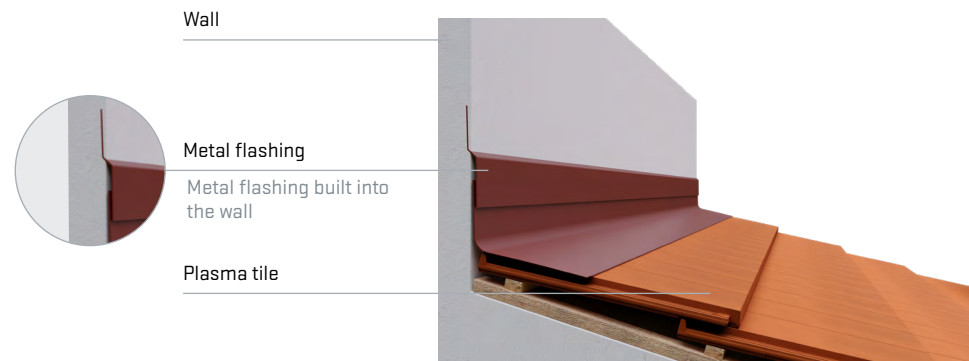


FINISH WITH RIDGE TILES



Use PL1 fittings on roof slopes with pitches $\leq 30^\circ$ (58%)
Use PL2 fittings on roof slopes with pitches $\geq 31^\circ$ (60%)

FINISH AGAINST A WALL

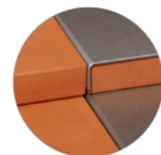


1.6.b FINISH AROUND A CHIMNEY

The areas where roof tiles and masonry chimneys meet must be done using custom-made or adaptable metal flashing, and/or self-adhesive and waterproof multi-purpose membranes.

The metal flashing must be bent up where it meets the chimney and overlapped by the covering

At its other end the metal flashing should be bent down in-between the tiles.



DID YOU KNOW...?

The area surrounding the chimney is a critical part of the roof that must be monitored regularly to ensure it is clean and well maintained.

1.7 GABLES

Gables can be finished in 3 different ways – with Gable rakes and Ridge end cap, with a basic gable finish, or with a parapet wall.

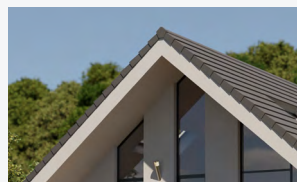
1.7.a WITH GABLE RAKES AND RIDGE END CAP*

Where the roof meets a gable, the best aesthetic and functional finish is achieved using gable rakes and a Ridge end cap. It is an alternative to the usual use of firewalls or parapets.

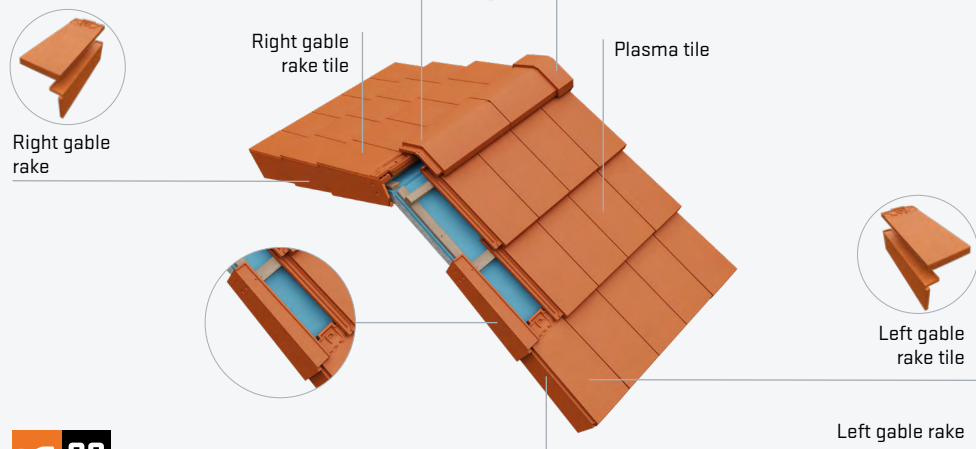
Requiring prior roof planning, this solution uses left and right gable rake tiles and their respective gable rakes – the left one identified with the letter 'E', and the right one with 'D'. Each gable rake has two pre-half-drilled holes on its side and one on the top so it can be secured to the structure using screws and sealing washers without the need to use mortar.

A Ridge end cap* is then installed at each extremity of the ridge, overlapping both top Gable rakes and closing the opening at the first and last Ridge tiles. It should be secured, if possible, using its two pre-half-drilled holes.

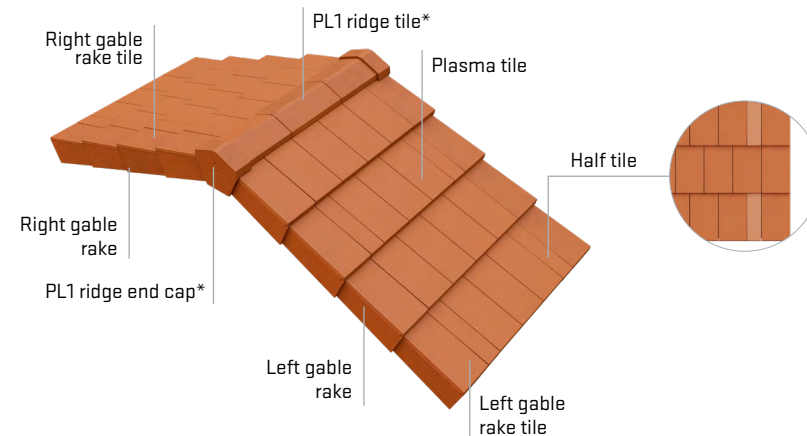
It may be necessary to cut the exposed male side of the last Ridge tile for the Ridge end cap on that end to fit properly.



INSTALLATION WITH A STRAIGHT BOND PATTERN



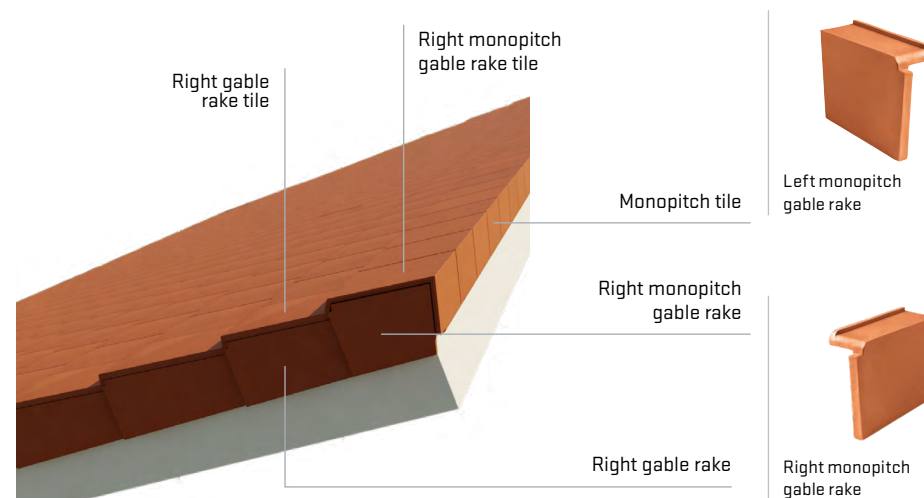
INSTALLATION WITH A CROSS BOND PATTERN



* Use PL1 fittings on roof slopes with pitches $\leq 30^\circ$ (58%)
Use PL2 fittings on roof slopes with pitches $\geq 31^\circ$ (60%)

INSTALLATION ON A MONOPITCHED ROOF

On a monopitched roof, the Monopitch gable rake – right or left – must be applied with its respective Monopitch gable rake tile – right or left. A glue and seal product should be used to better secure the Monopitch tile to the support batten.



1.7.b BASIC GABLE FINISH

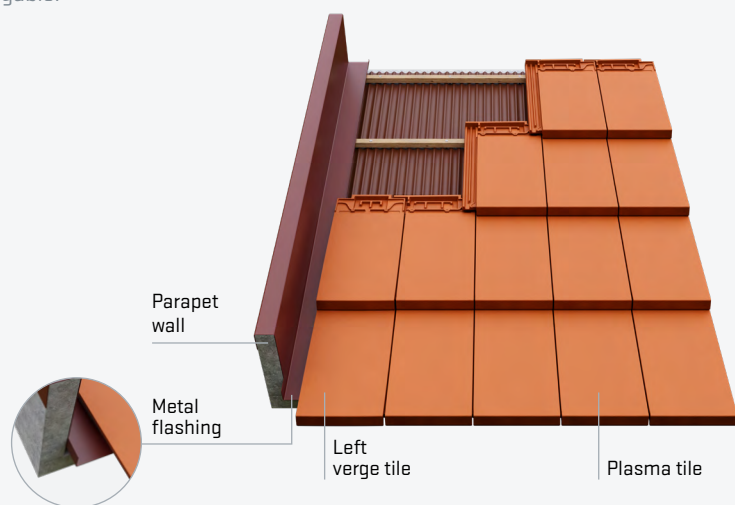
A basic gable finish is done using standard roof tiles along the first vertical line of tiles at the right end of the roof slope, and Left Verge Tiles along the last vertical line of tiles at the left end of the roof slope, independently of being a roof with a cross or straight bond pattern (see section 1.2.a Cross bonded or straight bonded application).

The tiles along the gables, should overhang 1,5 to 2 cm beyond the wall, and should be secured with a strip of mortar suitable for securing clay materials, applied (only) where the tiles sit, similarly to what's done to install ridge tiles along ridges and hips (see section 1.5.a Installation using mortar).



1.7.c GABLE WITH PARAPET WALL

This is done in the same way as section 1.7.b above, although now tiles are installed over a side metal flashing or membrane that makes the transition between the tiles and the parapet or firewall along the gable.



DID YOU KNOW...?

When finishing the gable with a parapet or firewall, it is crucial to use side gutters as a transition between the tiles and the wall. Do not 'embed' tiles directly into the wall as this not only makes it difficult to replace them if they break, but also often results in serious infiltration issues.

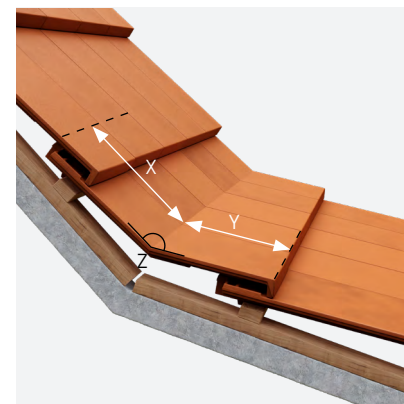
1.8 EXCLUSIVE CS COMPLEMENTARY FITTINGS



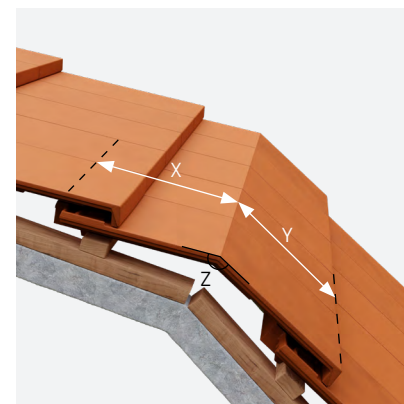
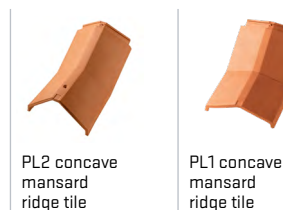
EXCLUSIVE CS

1.8.a MANSARD ROOF

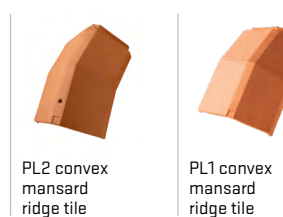
These fittings are "made to measure" to fit the measurements of each specific job - measurements 'X' and 'Y' vary depending on the desired angle 'Z'.



Concave mansard



Convex mansard



X / Y

Min: 15 cm | Max: 35 cm

Note: 'X' and 'Y' may either be the same or different measurements, but the sum of both must not exceed 500mm.

1.8.b CHIMNEY SETS

Clay chimney sets provide ventilation/exhaust outlets to sanitary facilities and kitchens. These sets consist of 3 parts: a chimney base (with openings of 125 or 150mm in diameter), a chimney (200 or 450mm high) and a chimney cap (type A or B). The chimney part has a side without openings that must be oriented to face the prevailing winds so the wind goes around the chimney (instead of entering it), not affecting exhaust..



Chimney support tile Ø150 mm



Chimney support tile Ø125 mm



Chimneys Ø150/Ø125 mm



Chimney cap A
Ø150/Ø125 mm



Chimney cap B
Ø150/Ø125 mm



Angle for chimney
Ø150/Ø125 mm

Depending on the roof pitch, the use of the Angle For Chimney piece ensures the verticality of the chimney set.



1 angle piece



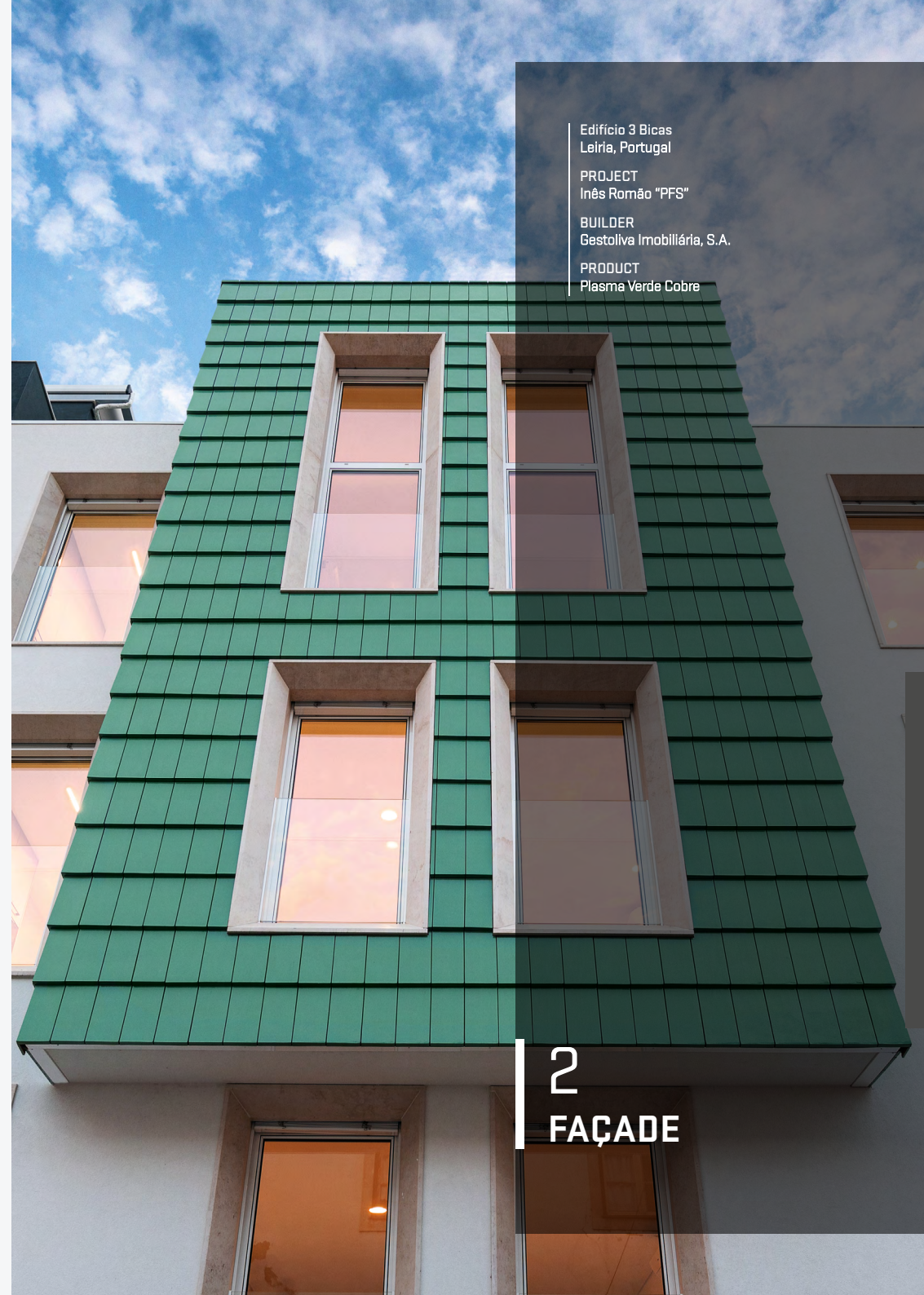
2 angle pieces

1.8.c GLASS TILE

The installation of Plasma glass tiles must take place at the same time as that of the clay tiles in order to ensure their compatibility, which may be compromised if installed after the roof is completed. It is not recommended to apply more than 4 glass tiles together, in pairs.



Glass tile



Edifício 3 Bicas
Leiria, Portugal

PROJECT
Inês Romão "PFS"

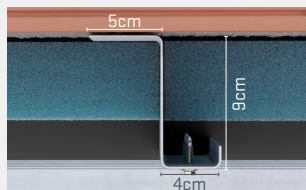
BUILDER
Gestolva Imobiliária, S.A.

PRODUCT
Plasma Verde Cobre

2
FAÇADE

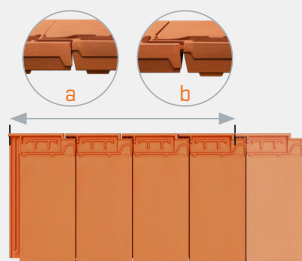
2.1 SUPPORT STRUCTURE, MARKING AND INSTALLATION OF THE VENTILATED FAÇADE

As with the roof, the installation of tiles on the façade requires an adequate support structure to ensure their position/alignment, proper support and ventilation. It must also be durable and provide a hidden and safe way of fixing each tile. In situations where façade and roof connect, the façade must be planned prior to marking and installing the roof (see section 2.1). Tiles on the façade must be installed with a straight bond so that each tile can be fixed at 3 locations – with a clip as well as using the tiles two pre-half-drilled holes. The planning and marking of the façade are also vital to achieve a uniform and balanced distribution of the tiles. For this, the following steps are recommended:



1. Z-profiles act as vertical supports and can be installed up to 1 meter apart, so that thermal insulation is placed between profiles.

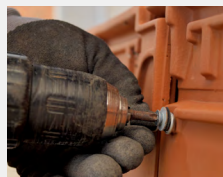
2. Omega profiles act as horizontal battens, where the tiles sit and get fixed to. These are installed over the vertical Z-profiles using 4.8x19mm hexagonal head self-drilling screws. Make sure there's an air gap between insulation and tiles for ventilation of the façade.



3. Marking the façade and installing the tiles. Follow the 3 main steps described in section 1.2 Marking the roof and installing the roof tiles, with the necessary adaptations regarding the overhang of the tiles at the eave:

- If the façade connects with the roof, the starting point for marking the placement of the omega profiles becomes the C-profile that supports the Linkage Tile (see section 2.4.a From roof slope to façade wall);
- If tiles are being installed only on the façade, determine where the first (bottom) row of tiles will go and then mark, from that point onwards, where the omega profiles will sit.

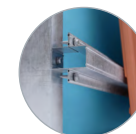
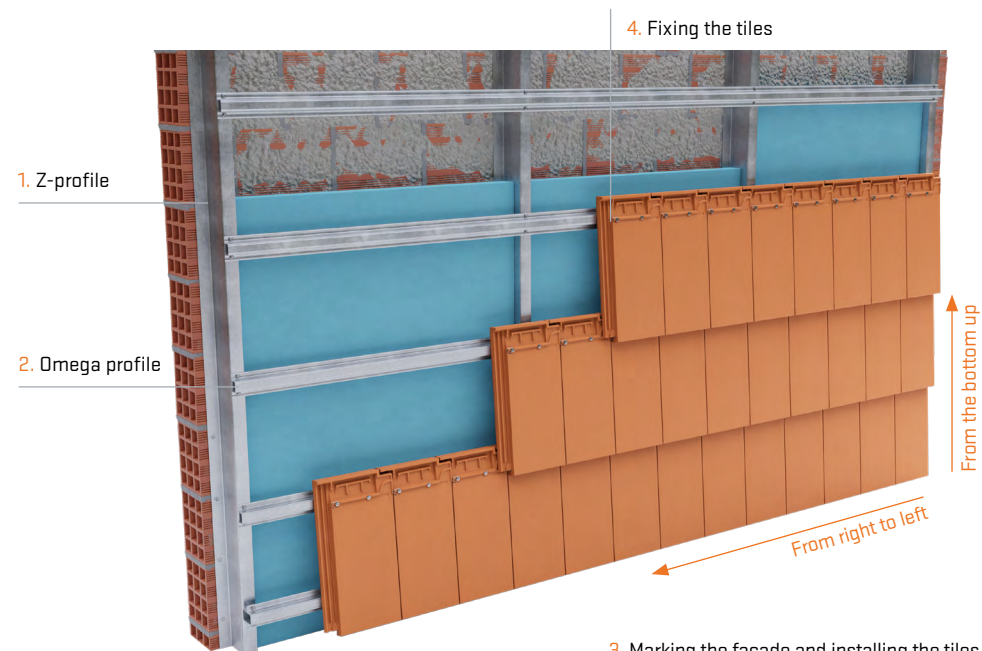
4. Fixing the tiles to the omega profile. All tiles on the façade must be screwed* via their two pre-half-drilled holes, using a drill, placing a stainless steel clip on the left screw in order to obtain a third point of support for each tile installed.



*Self-drilling Phillips flat head screw (4.8x50mm), and sealing zinc washer (øint. 5mm, øext. 14mm).

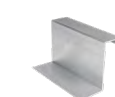


STRAIGHT BOND



Adjustment batten

Use an adjustment batten to help correctly position the tiles on the first row so they keep the same inclination as the rest.



Z-profile in aluminium 6,5m



Omega profile in aluminium 6,5m



Self-drilling hexagonal head screw, 4.8x19mm



Self-drilling Phillips flat head screw, 4.8x50mm [available in stainless steel]



Sealing washer in zinc, Øint. 5mm Øext. 14mm



Stainless steel clip 10mm

2.2 FAÇADE CORNERS

Depending on the characteristics of the project, façade corners can be resolved in one of two ways with Internal/External corner tiles, or with Gable rakes.

2.2.a WITH INTERNAL/EXTERNAL CORNER TILES

External and Internal façade corner tiles keep the cladding uninterrupted when transitioning from one Plasma façade to another. When the cladding is to be extended to the roof (which must have a levelled eave line), this corner transition between façades and roof is done with Linkage external/internal façade corners (see section 2.4.c At the corners).

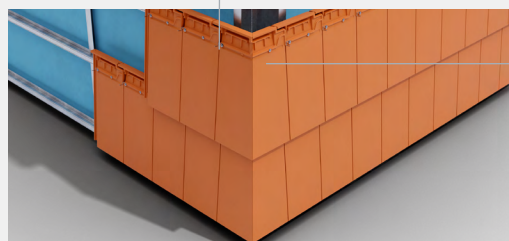
To ensure perfect placement of all tiles and complementary fittings, the planning of a façade with corners must start from where the corner tile is fixed.

EXCLUSIVE CS



Screw, washer and clip

Self-drilling Phillips flat head screw (4.8x50mm), sealing zinc washer (oint. 5mm, øext. 14mm), and stainless steel clip (10mm)



External façade corner

A/B
Standard: 14 cm
Min: 9,5 cm
Max: 16 cm

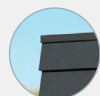
C
Standard: 90°
Min: 84,6°



Internal façade corner

A/B
Standard: 12,3 cm
Min: 9,5 cm
Max: 12,3 cm

C
Standard: 90°
Min: 84,6°



DID YOU KNOW...?

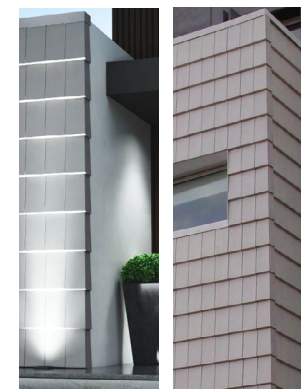
Along the top of the façade, the last row of tiles is not overlapped by another row, which leaves the top interlocking system of the tiles exposed. To resolve this situation, this area must be covered by a metal flashing, which can be painted to match the color of the tiles.

2.2.b WITH GABLE RAKES

A façade cladded with Plasma tiles can have its edges finished using Gable rakes (left or right) and respective Gable rake tiles, just like it's done at the gables on a roof (see section 1.7.a With Gable rakes and Ridge end cap).

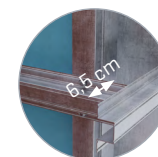
Similarly, if there is an intersecting façade also cladded with Plasma tiles, the intersection between the two can also be finished with Gable rakes, which should overlap the side façade. To do this, it must be guaranteed that the omega profiles supporting the Gable rakes project beyond the battens that support the tiles cladding the side façade by approximately 6.5 cm.

If the use of Gable rakes is to be extended to the roof, this requires the use of Linkage gable rakes (see section 2.4.b At the gables).



Screw, washer and clip

Self-drilling Phillips flat head screw (4.8x50mm), sealing zinc washer (oint. 5mm, øext. 14mm), and stainless steel clip (10mm)



Left gable rake

Screwed via the pre-half-drilled hole on its top, overlapping the side façade.

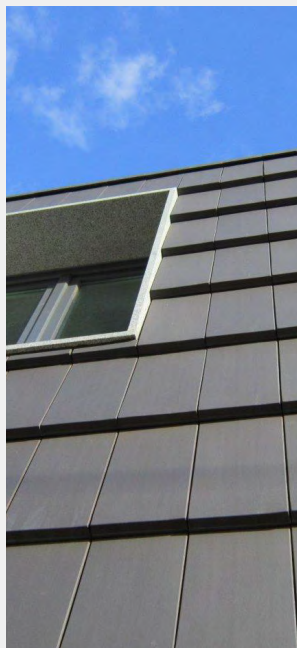


DID YOU KNOW...?

A façade cladded with Plasma tiles is completely non-combustible (class A1).

2.3 OPENINGS ON THE FAÇADE

We suggest resolving openings in the façade – like doors and windows – by creating a frame (which can be in wood, stone or metal) that projects outwards beyond the steps effect created by the overlapping tiles. See examples below:

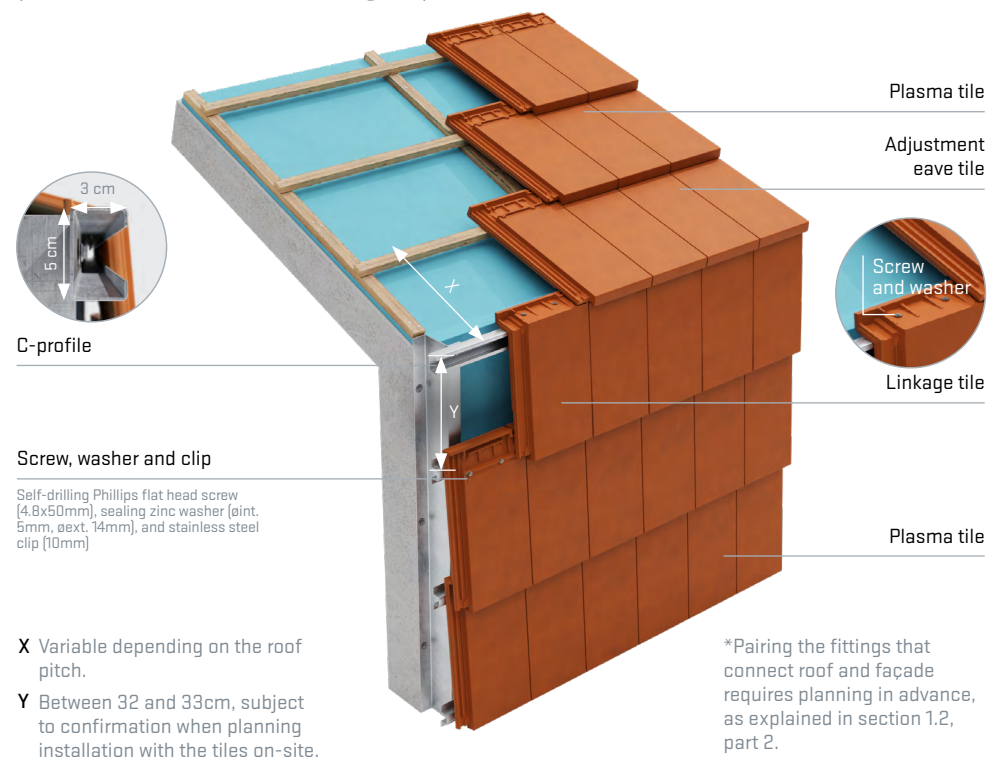


2.4 CONNECTING ROOF AND FAÇADE

2.4.a FROM ROOF SLOPE TO FAÇADE WALL

Eave tiles (installed on the roof) and Linkage tiles (installed on the facade) are fittings used specifically to resolve the connection between roof and façade while keeping the cladding transition looking uniform and uninterrupted*. Installing these requires starting the planning and marking of the façade at the metal C-profile that supports and fixes the Linkage tile, moving downwards to the first row of tiles at the base of the façade (even though the actual installation is still done from the bottom row upwards).

To include an internal gutter before the eave, the Eave tile can be overlapped by the Monopitch tile (see section 1.3.b Eave with internal gutter).



C-profile in aluminium
6.5m



Eave tile



Linkage tile

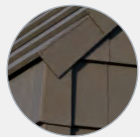


Half linkage tile

2.4.b AT THE GABLES

When using Gable rakes to finish the roof and façade edges, the connection between roof and façade is done using a Left/Right linkage tile and respective Left/Right linkage gable rake.

These complementary fittings can be used whether the gable/side wall is clad with Plasma tiles or not – the following image shows both situations.



Right linkage tile and Right linkage gable rake



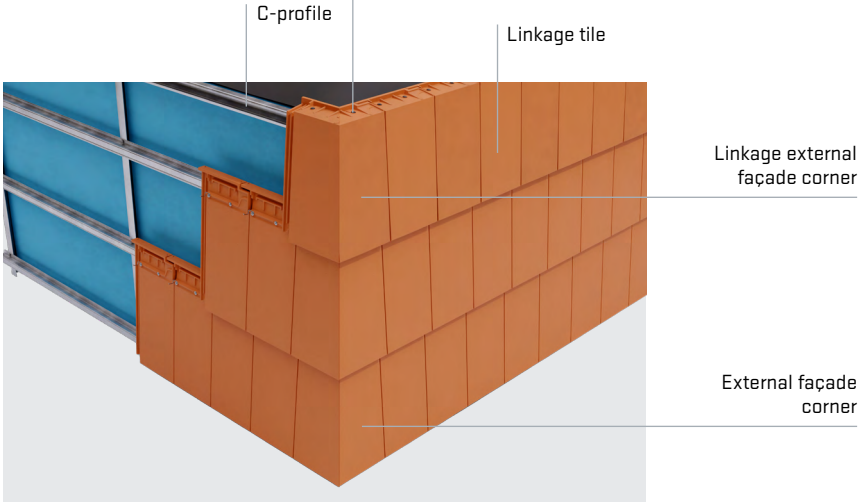
The unavoidable opening that results from the overlap between the Gable Rakes and the façade tiles should be filled with mortars/products suitable to be used with clay materials.

2.4.c AT THE CORNERS



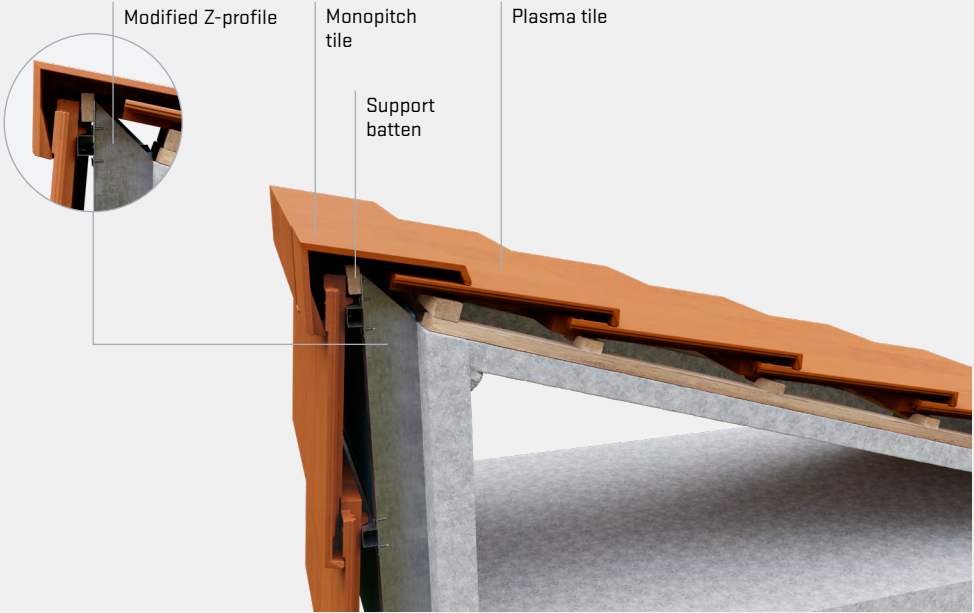
When External/internal façade corners are used in the intersection of two façades (see section 2.2.a With internal/external corner tiles), the connection to the roof is made using the respective Linkage external/internal façade corner (assuming the eave line is levelled).

Screw and washer
Self-drilling Phillips flat head screw (4.8x50mm) and sealing zinc washer (dint. 5mm, øext. 14mm)



2.4.d MONOPITCH ROOF WITH BACK WALL

When a monopitch roof meets a cladded back façade, its top is finished using Monopitch tiles that then overlap the façade tiles. This requires adapting the Z-profile at the intersection area (see image below). A glue and seal product should still be used to better secure the Monopitch tiles to the support batten.



PRODUCT
Plasma Anthracite M30

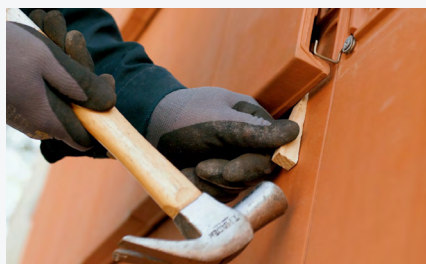
3
ADDITIONAL
INFORMATION

3.1 FREQUENTLY ASKED QUESTIONS

HOW TO REPLACE A DAMAGED TILE ON THE FAÇADE?



1. Very carefully, completely remove the tile to be replaced and the screws fixing it;



2.

Place small wooden wedges under the adjacent tiles to lift them slightly. This will provide enough space to insert the new tile;



3.

In order to be able to install the new tile in the available space, cut off and remove its batten lugs, its top interlocking system, and the lower part of its side interlocking system, as shown in the side images;



4.

Position the new tile in place using a suitable mastic at several gluing points between the new tile and the adjacent ones. Make sure the bond pattern is kept consistent with the rest of the façade, using small wedges if necessary.

For more information, contact our Technical Support Department.

CONDENSATION ON CLAY ROOF TILES. WHY IT HAPPENS AND HOW TO PREVENT IT?

Condensation is a common natural phenomenon that occurs when air saturated with water comes into contact with a cooler surface forming moisture, or droplets, on that surface. It happens in clay, glass, concrete, painted walls, aluminium and other materials, and can occur with or without rain. When condensation appears in clay tiles, it's a common misconception to think that there is a problem with the tiles or the roof. However, clay tiles are waterproof and an infiltration only happens if the roof is not well constructed.

To reduce the probability of condensation occurring, the roof must be well ventilated and the minimum roof pitch recommended by the manufacturer respected, following the principles presented in this booklet. A breathable waterproof membrane can also be added to the roof to protect other materials.

PROXIMITY TO THE SEA AND THE EFFECT OF SALINITY

Clay roof tiles, as most building materials installed in coastal areas, can be affected by salinity, resulting in its early degradation. This happens as the result of crystallization of soluble salts inside the tile, naturally absorbed when exposed to saline fog.

In order for the tiles to fulfil their role effectively in coastal areas and delay damage by salinity, good installation practices must be followed, namely when it comes to the pitch and ventilation of the roof.

Engobed tiles (coloured) are not recommended for coastal areas as their appearance can change in a short period of time due to the exposure to salt. When close to the sea, choose Natural Red where the effect of salinity is less noticeable.

CS product warranty does not cover the effect of salinity on clay tiles.

LOCATIONS WHERE FREEZE-THAW CYCLES OCCUR. HOW TO PREVENT FROST DAMAGE?

Despite being waterproof, clay tiles absorb some water when it rains. In areas with frequent freeze-thaw cycles, if there's a rapid drop in temperature, this absorbed water can freeze inside the tile. After many cycles, the tile may show spalling/delamination, which compromises its appearance and durability. In order for roof tiles to efficiently fulfil their role in climates with freeze-thaw cycles, follow good installation practices, namely when it comes to the pitch and ventilation of the roof, so the materials can dry quickly.

CS product warranty covers frost damage in clay tiles, provided that their installation instructions are duly complied with.

MOSS/LICHENS ON THE ROOF. HOW TO PREVENT AND REMOVE IT?

Moss and lichens are a common occurrence that, under the right light, temperature and humidity conditions, can develop on the surface of materials like clay, stone, paint, wood, concrete or even glass (which is not even porous), affecting from floors to walls, façades or the roof. The growth of moss on the roof is not possible to predict, but contributing factors are the proximity to vegetation and/or farmed land, the existence of shady areas, damp conditions, the orientation of the building, its exposure to sunlight, and atmospheric pollution. While it's impossible to control or avoid all these factors, a well-constructed roof and/or façade is crucial in delaying and minimising the growth of moss and lichens. Good ventilation throughout the roof is essential as well as all other factors that promote the fast drying of the roof materials such as an adequate support structure, air inlets and outlets, use of ventilation tiles, avoid excessive use of mortar, and respecting the minimum roof pitch recommended for the climate region where the building is located.

Usually, just the aesthetics of the roof are impacted. However, the efficient drainage of rainwater can eventually be affected as well, and the stagnation of rainwater in certain areas can potentially lead to infiltrations.

To remove moss/lichens, wash the roof and/or façade or apply a product of proven effectiveness, which must not be harmful to the roof tile and other materials (see section 3.3 Roof Maintenance).

ARE COLOUR VARIATIONS A DEFECT?

Clay roof tiles and fittings have a natural raw material in their origin – clay. For this reason, their mineral composition can vary slightly which results in small (and expectable) colour/shade variations after the firing process, even when manufactured on the same date, and regardless of being in its natural colour or an engobe colour chosen from a marketing brochure. It's not possible to ensure absolute uniformity. These differences are acceptable, not considered a defect, and often welcomed as a nice visual effect in the overall natural aesthetic of the roof.

As a way to mitigate possible more significant variations, we recommend mixing tiles at random from several pallets on site.

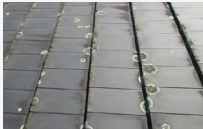
3.2 COMMON INSTALLATION ERRORS

The following table summarises the most common installation errors, their consequences and the location in this manual where the correct installation is explained.

INSTALLATION ERROR	CONSEQUENCES	CORRECT INSTALLATION
Insufficient roof pitch	Each roof tile model must respect the minimum roof pitch indicated by its manufacturer, below which the tile can no longer perform its function correctly. An insufficient roof pitch compromises the efficient drainage of rainwater promoting the development of moss and favouring the accumulation of dirt, often causing infiltrations. It also contributes to the early deterioration of clay products (by frost damage) by keeping moisture on the tiles long after it has stopped raining.	Plasma tile specifications Page 02
Absence or inadequate support structure	Roof tiles installed directly onto the insulation material, on battens made of mortar or on a structure without counter battens, will deteriorate quickly, particularly in areas where freeze-thaw cycles occur. The absence of ventilation space and/or vertical ventilation channels underneath the roof tiles keep moisture for longer periods, favouring the development of moss/lichens. This can result in undesirable aesthetic effects and lead to condensation.	1.1.a-Types of supporting structures for the roof Page 04 2.1-Support structure, marking and installation of the ventilated façade Page 26
Incorrect calculation or installation of the batten structure	Roof tiles installed too tightly or too spaced out due to an incorrect calculation or incorrect installation of the batten structure lead to serious infiltrations and a lot of broken tiles during roof/façade installation and maintenance/cleaning. This often results in undesirable aesthetic effects too.	1.1.c-Calculating the distance between battens Page 05
Excessive use of mortars	Mortar may be necessary to secure the tiles but, when used excessively, it can cause infiltrations and humidity inside the roof and on the tiles it is in contact with. This causes frost damage to the clay tiles, especially in climatic zones with freeze-thaw cycles. The moisture retained by the mortars makes it difficult for the roof to dry, also promoting the development of moss/lichens. "Strong" mortars can also cause breakages and cracks in clay tiles.	1.3-Eaves Page 10 1.5.a-Installation using mortar Page 13



INSTALLATION ERROR	CONSEQUENCES	CORRECT INSTALLATION
Insufficient ventilation	The lack of ventilation tiles, ventilation space and ventilation channels enhances the development of moss; increases the probability of condensation, frost damage due to freeze-thaw cycles and the degradation of the roof support structure and other materials; and compromises the overall durability and appearance of the roof.	1.4-Ventilation Page 12 2.1-Support structure, marking and installation of the ventilated façade Page 26
Not mixing tiles from different pallets before installation	Mixing tiles from different pallets can reduce undesirable colour nuances in the roof. However, slight differences in shade between clay materials are normal, given the characteristics of clay as a natural material and roof tiles manufacturing process.	1.2-Marking the roof and installing the roof tiles Page 06
Not using clay fittings	The performance and durability of the roof can be compromised when clay fittings are not used or are replaced by materials of a different nature (metallic, mortar, canvas, etc.). Clay fittings are the ones that resolve more perfectly, both functional and aesthetically, a number of roof/façade situations.	1.3-Eaves Page 10 1.7-Gables Page 20 1.8-Exclusive CS complementary fittings Page 33
Lack of regular maintenance / cleaning	The lack of maintenance is responsible for most roof problems (infiltrations, moss, etc.), which would be easily avoided if the roof was checked before each winter and cleaned regularly (frequency dependant on the characteristics of the surrounding area).	3.3-Maintenance Page 41



3.3 MAINTENANCE

Like all other building materials exposed to the elements, the roof/façade needs cleaning and preventive maintenance on a regular basis to ensure its functionality and good appearance. The following table summarizes the main maintenance actions and their recommended frequency.

MAINTENANCE ACTIONS	FREQUENCY	
	TWICE A YEAR	ONCE A YEAR
General inspection of the roof		
Inspection of the water drainage system		
Inspection of transition areas		
Checking fixings of clay pieces		
Clearing ventilation areas		
Removal of moss/vegetation and other debris		

REMOVAL OF MOSS, VEGETATION AND OTHER DEBRIS

It is recommended to remove moss/lichens, vegetation and other debris every year and whenever these compromise the efficient drainage of rainwater. The roof should be washed with ONLY pressurized water and gentle brushing, from the ridge downwards to the eaves. The use of water must be restricted to the minimum necessary for adequate washing, in order to prevent infiltrations during the process. Alternatively, you can use the CS ANTIFUNGI product sold by CS. For more information on its features and application, please get in touch with our Commercial Department.

WALKING ON PLASMA ROOFS

Plasma tiles comply with all the requirements of the Standard EN 1304:2005 at the time of manufacturing. However, care must be taken when walking over a Plasma roof. You must walk on the area where tiles overlap each other and where they are supported by the battens, as shown below. This prevents breaking the tiles as well as potential accidents.



ATTENTION

Maintenance work involving the application of sealants, paints, varnishes or other similar products on clay tiles is strongly discouraged as these can cause their rapid and severe deterioration.

3.4 ENVIRONMENTAL ASPECTS



ENVIRONMENTAL IMPACT OF EACH PHASE OF A ROOF LIFE CYCLE

Transport:

The construction of a building begins with the transport of materials to the construction site. In order to minimize the environmental impact of this phase, the associated logistics must be well-considered, namely the distances travelled and the use of vehicles with better energy and environmental performance.

Installation:

During this phase, mortar must be rationed and never used in excess. This phase leads to material waste – packaging (plastics, straps, etc.), broken and cut tiles – as well as some noise and potential issues associated with cargo handling, and the emission of dust and exhaust gases. All waste must be sent to the appropriate licensed waste management operators.

Use:

There is no negative environmental impact of your roof/façade while in use.

Maintenance:

Roof/façade maintenance is a simple operation, consisting of cleaning vegetation debris (eg. moss, fungi), replacing any damaged tiles and washing the roof with water (keeping water usage to a minimum). Any waste resulting from this process must be discarded in the appropriate manner.

End-of-Life:

Once a roof/façade reaches the end of its life, check if the roof tiles can be reused. If not possible, any waste resulting from the demolition or disassembling of the roof/façade must be sent to a licensed operator (as mentioned, preferably to be reused).

For any further clarification, please contact the Sales Department on +351 244 479 200 or email info@coelhodasilva.com.





Coelho da Silva

FLAT ROOF TILES INSTALLATION GUIDE

Plasma⁽⁻⁾ Plasma⁽⁻⁾ TX5

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