

REPORT 1.2.2

BEST PRACTICE REPORT ON METHODS, SKILLS AND COMPETENCES IN RELATION TO CLAY PRODUCTS

ROOF TILE INSTALLATION PROCESS WITH MORTAR



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1. INTRODUCTION

1. Background

The BIMclay project was born with the purpose of producing and developing didactic materials based on the BIM methodology, which address the challenges related to Life Cycle Analysis (LCA) of clay products, to serve as a training base for professionals in the ceramic sector. To this end, it is necessary to define and compile the most suitable execution systems and placement methods for clay products.

The first task of the BIMclay project "O1. *Establishment of common learning outcomes on clay placement methods, Life Cycle Analysis (LCA) and regulations*" encompasses a number of specific tasks among which we find the elaboration of this report.

This good practice report addresses the establishment of skills and competencies, as well as the definition of the most sustainable and environmentally friendly implementation processes.

The present report "*Roof tile installation process with mortar*" deals with the execution of the construction process of a roof by mixed tiles with mortar.

2. Definition and type of roofs according to tile fixation

Depending on the type of fixing of the tiles, the roofs can be classified into:

Traditional roof characterised by the use of mortar as a means of fixing. The main disadvantage of this type of roof is that it does not allow micro ventilation under the tiles, which can cause condensation and frost problems.

Possible adverse effects on ceramic tile roofs due to lack of micro ventilation:



Source: Hispalyt.

Dry roof, characterized by a dry fixation (without mortar), on a continuous or discontinuous support. This type of roof allows microventilation, thus improving the technical performance of



IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF
WORKERS IN CERAMIC SECTOR WITH THE SUPPORT OF BIM
APPLICATIONS

2017-1-PT01-KA202-035955

Co-funded by the
Erasmus+ Programme
of the European Union



the pieces. Its use is recommended in areas of humid and cold climate and with an altitude higher than 700 meters (obligatory use in the case of Spain).

2. CONSIDERACIONES MEDIOAMBIENTALES

Ceramic tiles, like other ceramic products, respect the environment, as they are 100% natural and ecological materials. Moreover, due to the numerous clay quarries, it is not necessary to travel long distances to dispose of these materials, as they can be found locally, or they can be transported from the factory or warehouse to the construction site with minimum effort. This proximity means very low transport emissions.

Thus, a building built with ceramic materials, such as ceramic tiles and other masonry products, will automatically reduce its environmental footprint.

One of the most relevant environmental aspects is the wide availability of information on sustainability in the sector.

An example of this is the case of Spanish ceramic tiles, which have the environmental label type III, known as Environmental Product Declaration (EPD) for its entire life cycle (cradle to grave), whose ownership belongs to the Spanish Association of Manufacturers of Bricks and Clay Roof Tiles (HISPALYT).

[GlobalEPD 008-001. Tejas cerámicas según la Norma UNE-EN 1304](#)



	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	1,99E+02	1,67E+01	1,90E+00	0,00	0,00	0,00	0,00		0,00	0,00		3,85E+00	1,21E+00	8,67E+00	
ODP	8,78E-08	4,21E-11	1,09E-09	0,00	0,00	0,00	0,00		0,00	0,00		9,72E-12	1,26E-11	9,62E-11	
AP	7,29E-01	4,12E-02	1,46E-03	0,00	0,00	0,00	0,00		0,00	0,00		9,16E-03	8,36E-03	5,20E-02	
EP	7,95E-02	1,01E-02	3,47E-04	0,00	0,00	0,00	0,00	NR	0,00	0,00	NR	2,25E-03	2,02E-03	7,07E-03	MNE
POCP	7,85E-02	-1,27E-02	3,46E-04	0,00	0,00	0,00	0,00		0,00	0,00		-2,74E-03	1,22E-03	5,00E-03	
ADPE	2,70E-05	1,30E-06	-1,05E-07	0,00	0,00	0,00	0,00		0,00	0,00		2,99E-07	2,15E-06	2,99E-06	
ADPF	3,34E+03	2,27E+02	3,57E+00	0,00	0,00	0,00	0,00		0,00	0,00		5,25E+01	2,29E+01	1,13E+02	

GWP [kg CO₂ eq] Potencial de calentamiento global
ODP [kg CFC-11 eq] Potencial de agotamiento de la capa de ozono estratosférico
AP [kg SO₂ eq] Potencial de acidificación del suelo y de los recursos de agua
EP [kg (PO₄)³⁻ eq] Potencial de eutrofización
POCP [kg etileno eq] Potencial de formación de ozono troposférico
ADPE [kg Sb eq] Potencial de agotamiento de recursos abióticos para recursos no fósiles (ADP-elementos)
ADPF [MJ] Potencial de agotamiento de recursos abióticos para recursos fósiles (ADP-combustibles fósiles)

Tabla 7. Parámetros que describen los impactos ambientales definidos en la Norma UNE-EN 15804

Fuente: Hispalyt.



3. CONSTRUCTIVE CONSIDERATIONS

In Spain, the design and execution of dry roofs will be carried out following the indications of the standard UNE 136020 "Ceramic Roof Tiles. Code of good practice for the design and assembly of roofs with ceramic tiles".

In addition, the Basic Requirements for each requirement of the Technical Building Code (CTE) must be fulfilled.

In terms of design and execution of covers, the provisions of the following sections of the Technical Code shall be complied with:

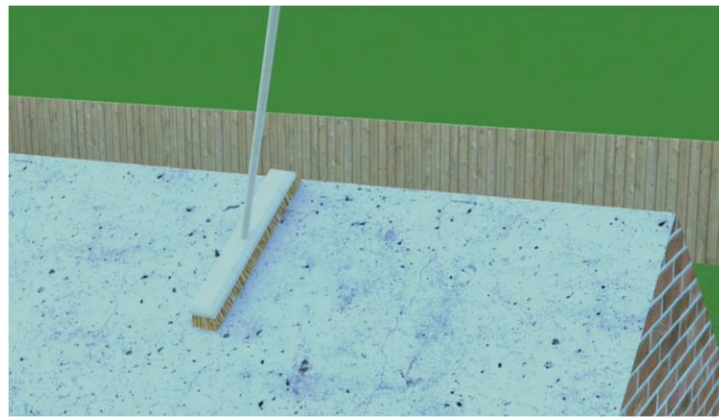
- Structural security DB SE.
- Fire Safety DB SI.
- Healthiness DB HS.
- Noise protection DB HR.
- Energy Saving DB HE.

4. CONSTRUCTION PROCESS

1. Clean the surface with a bristle broom.

The support of the tiles will be formed by linear elements that offer a physical plane that supports the dry execution of the roof, the so-called battens.

In order to achieve the required flatness, special care shall be taken when executing and finishing the board, not allowing variations greater than 3 cm with respect to the theoretical plane.



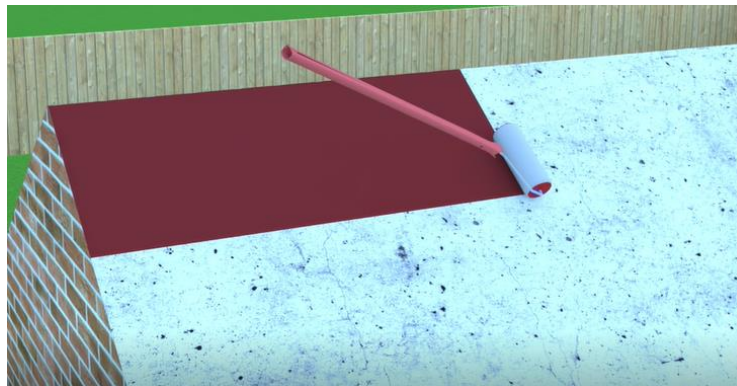
Source: BIMclay project website.

2. Cover the surface with a layer of sealer and waterproofing using a roller.

Cover the surface with a coat of acrylic or asphalt sealant using a roller. Let it dry for one-hour approx.

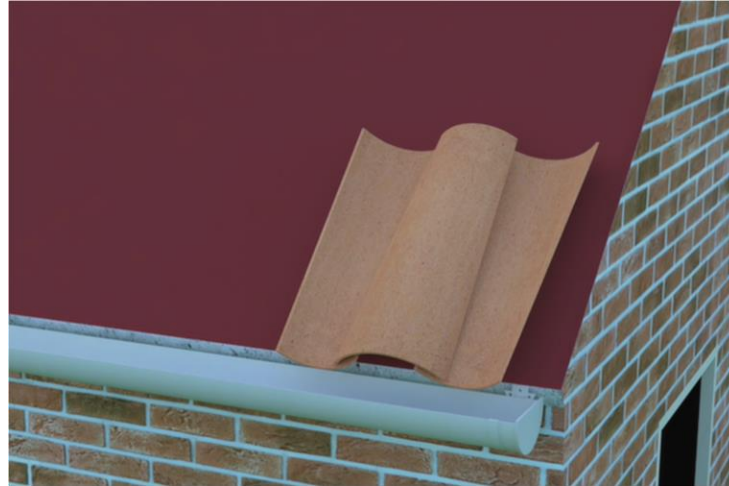
Apply the first coat of waterproofing perpendicular to the water flow. Let it dry for approximately four hours.

Apply a second layer of waterproofing in the direction of the water flow. Let it dry for 24 hours approx.



Source: BIMclay project website.

3. Layout of position and inclination of the tiles of the first horizontal row.



Source: BIMclay project website.

4. Mortar application for the first horizontal row of tiles.

Application of mortar for the placement of the first tile in the lower right corner of the eaves. Place the first tile taking care that it protrudes 5 cm.

For the placement of the first horizontal row of tiles, mortar will be applied over the entire surface under the tiles of this row.



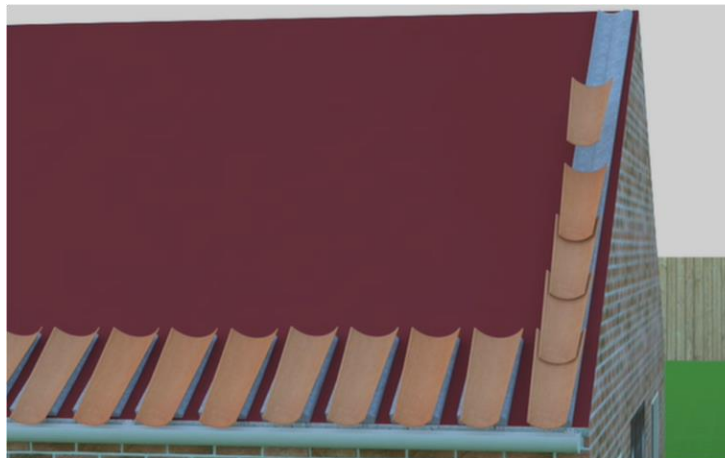
Source: BIMclay project website.

5. Laying the first horizontal row of tiles.



Source: BIMclay project website.

6. Form the vertical rows from right to left by applying mortar to their base.



Source: BIMclay project website.

7. Laying the following horizontal rows of tiles.

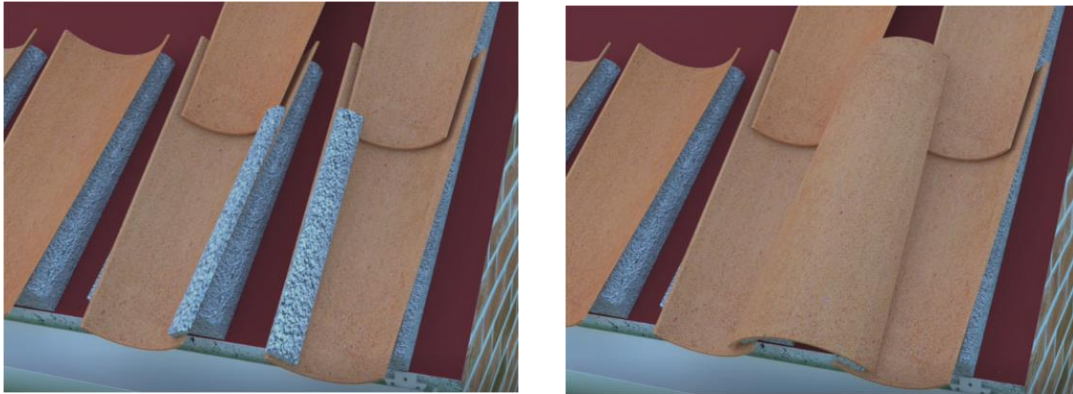
For the placement of the tiles in horizontal rows from the first one already placed, mortar will be applied only on the upper part of the tile.



Source: BIMclay project website.

8. Laying of the over tile with application of mortar.

For the placement of the over curved tile, both sides of the tile will be fixed to the adjacent tiles by applying mortar. It is necessary to leave a distance of more than 1 cm for the correct evacuation of water.



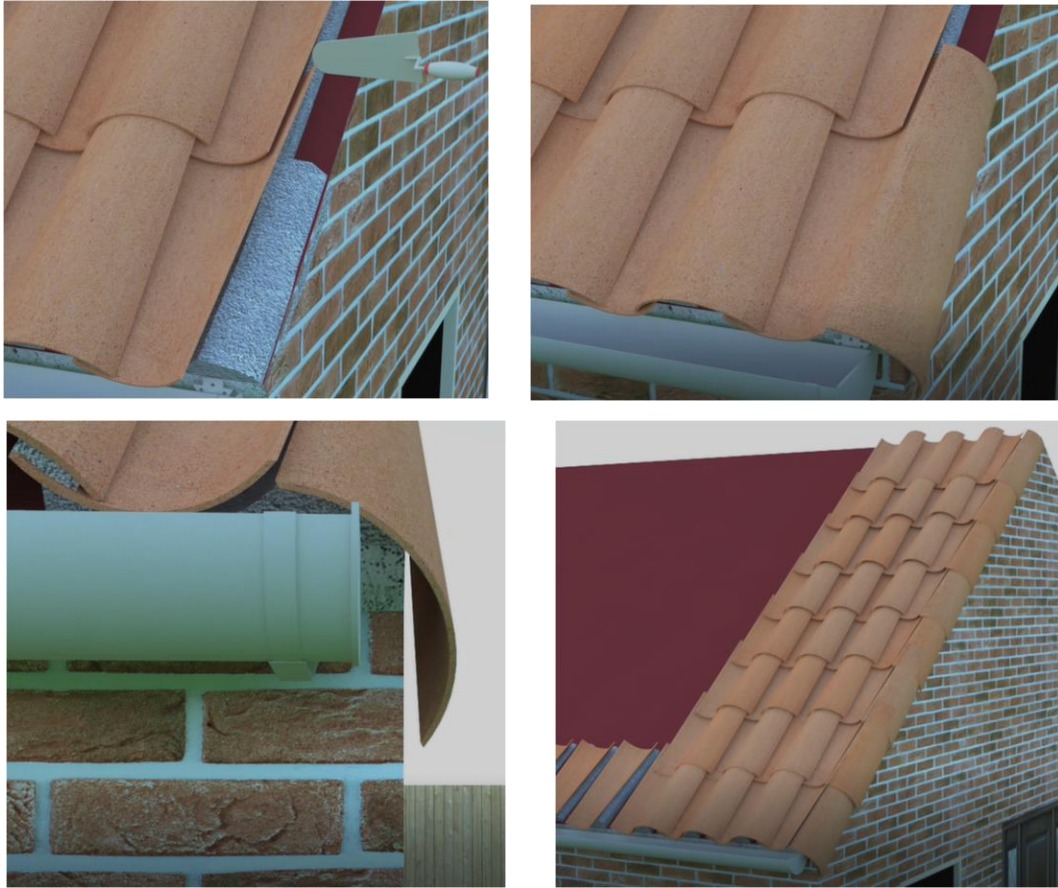
Source: BIMclay project website.

9. Complete the following vertical rows by following the same procedure.



Source: BIMclay project website.

10. Laying the last lateral row of tiles with mortar.



Source: BIMclay project website.

11. Fitting the end cap of the side tiles.

Place a row of curved tiles on the side finish with mortar.



Source: BIMclay project website.

12. Complete the entire vertical rows following the same procedure.

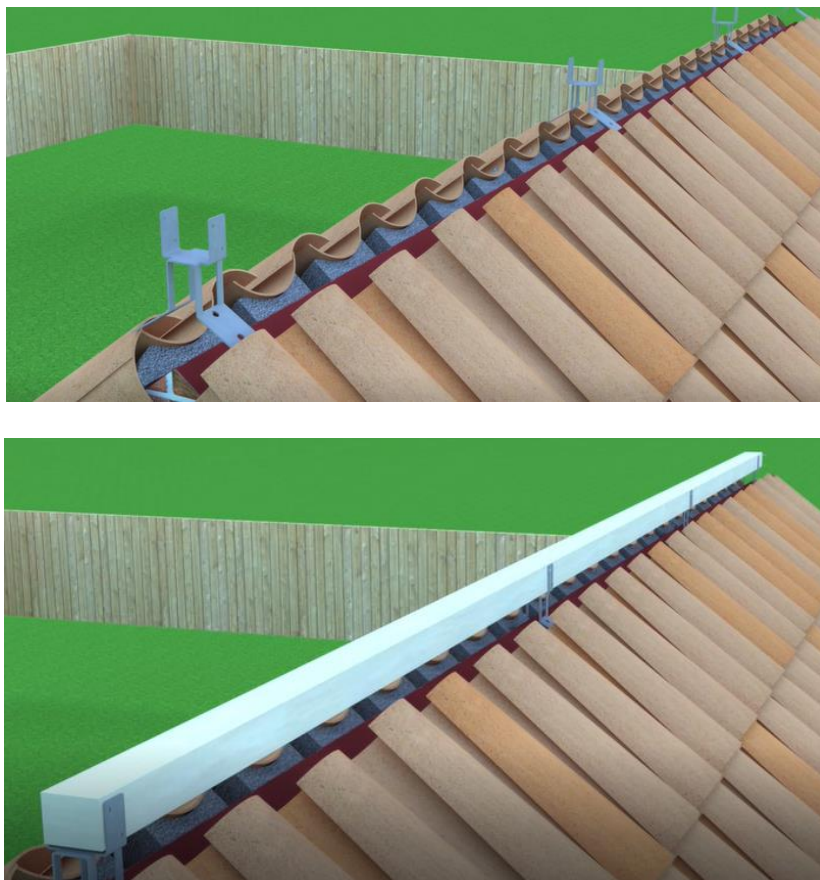
Every 5 vertical rows adhere the tiles completely to provide greater stability to the roof.

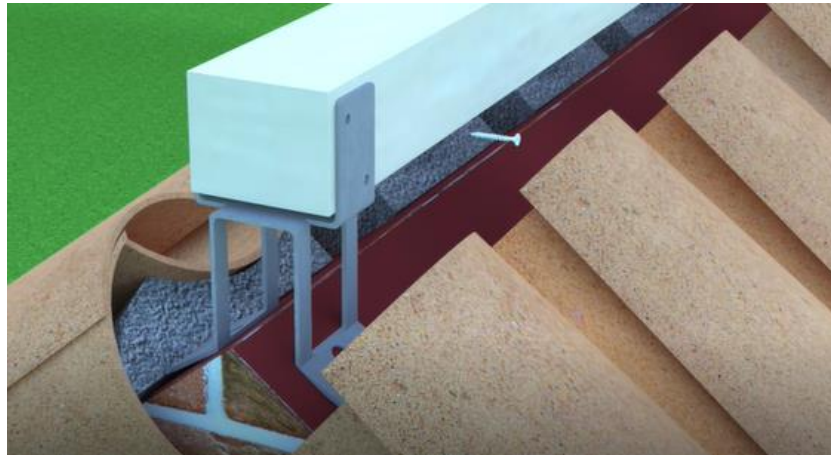


Source: BIMclay project website.

13. Placing the ridge strip.

Placing the ridge strip. Screw correctly to the concrete base and the wooden strip.





Source: BIMclay project website.

14. Application of mortar on both sides of the ridge to fix the tiles.



Source: BIMclay project website.

15. Laying the tiles on the ridge.



Source: BIMclay project website.

16. Completion of the roof with ridge covers.



Source: BIMclay project website.



5. SUMMARY OF THE STEPS TO BE FOLLOWED IN THE CONSTRUCTION PROCESS

ROOF TILE INSTALLATION PROCESS WITH MORTAR:

1. Clean the surface with a bristle broom.
2. Cover the surface with a coat of sealant and waterproofing with a roller.
3. Arrangement of the position and inclination of the tiles of the first horizontal row.
4. Mortar application for the first horizontal row of tiles.
5. Placement of the first horizontal row of tiles.
6. Formation of the vertical rows from right to left by applying mortar to their base.
7. Placement of the following horizontal rows of tiles.
8. Placement of cover tile with application of mortar.
9. Complete the following vertical rows following the same procedure.
10. Laying the last lateral row of tiles with mortar.
11. Fitting the end cap of the side tiles.
12. Complete the entire vertical rows following the same procedure.
13. Placing the ridge strip.
14. Application of mortar on both sides of the ridge to fix the tiles.
15. Laying the tiles on the ridge.
16. Completion of the roof with ridge covers.



6. REFERENCES

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https://www.youtube.com/watch?v=_Rb_YkcgY44

https://www.youtube.com/watch?v=Fd38aRa8Z_0