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REPORT 1.2.10

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

MOSAIC TILE INSTALLATION PROCESS









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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 tile installation methods for clay and ceramic 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 series 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.

This report "Mosaic tile installation process" deals with the execution of the construction process of an interior wall cladding with gresite mosaic tiling.

2. Definition and type of ceramic tile tiling

Mosaic is the name applied to pieces that are generally square and small, considering as such those that can be inscribed in a square of 7 x 7 cm, although they generally measure from 2 x 2 cm to 5 x 5 cm. The denomination of only refers to the measures of the pieces, but not to the class of product.

In general, for ease of installation, they are glued on the exposed side to sheets of perforated paper or, on the back, to a textile, paper or plastic net. In this way, they are kept in regular sets of 30 x 30 cm or 30 x 60 cm or similar, made up of equal pieces of one or more colours or even forming patterns. The paper on the exposed side is easily detached after installation and the dorsal net is incorporated into the gripping material, so that this auxiliary structure remains totally invisible once the installation process has been completed.

The types of mosaics that currently exist are:

Stoneware mosaic, with low or medium-low water absorption, white or coloured support by adding dyes to the mass. A few years ago, they were used in private kitchens and bathrooms, but today they are used in damp rooms (swimming pools, showers and rooms with similar characteristics).

Consortium members: Associação Portuguesa da Indústria de Cerâmica (APICER), Centro Tecnologico da Cerâmica e do Vidro (CTCV), Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM), Asociación Española de Fabricantes (Hispalyt), Institute of Entrepreneurship Development (iED).



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Enamelled mosaic, with medium-high or high water absorption, with light-coloured body, variable shapes, even non-rectangular; it is used for cladding bathrooms and private swimming pools, and for cladding curved surfaces or with concavities and convexities.

Glass mosaic that, not being ceramic, is mentioned by the similarity with the previous one; it has practically no porosity, it can have a great variety of smooth or mottled colors, and it is suitable to cover walls of humid places and swimming pools.

Finally, it is worth mentioning that the "**trencadís**" can be considered a mosaic, which is a tile made up of pieces cut into pieces of irregular and different shapes and colours, normally used for decorative purposes.

Depending on the type of fixing of the mosaics, the methods of fixing the coverings on the interior walls are classified into:

Traditional thick-bed tile installation, with cement and/or lime mortars, in different variants depending on the tiles and the location of the tiling. This tile installation technique is still in force under its own conditions: stable adherents (tiles and fixing surfaces) which, due to their texture and porosity, allow the adherence of the mortar, benign environmental conditions and limited requirements for use (in flooring). With the use of lime mortars and natural cement, the future of this technique is assured from the point of view of sustainability.



Source: Instituto Valenciano de la Edificación





Thin-bed fixing provides greater stability of the substrates and tiles, greater compatibility of cement and/or lime mortars with the tiles and fixing surfaces, as well as ease of application, safety and better adhesion, high mechanical resistance in screeds, chemical resistance, resistance to frost/thaw cycles in cold weather exteriors, etc. with respect to the previous technique.

Within this technique, two methods of installation can be distinguished:

- Laying tiles directly on the substrate:

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Source: Instituto Valenciano de la Edificación

- Laying of tiles on an evening/levelling layer:







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2. ENVIRONMENTAL CONSIDERATIONS

Ceramic tiles, like other ceramic products, respect the environment, as 96% of them are composed of supporting raw materials (clay, waste from ceramic pieces and other minority materials such as kaolins, sands and feldspars) and 4% of raw materials for enamel (feldspars, carbonaros, quartz, borates, silicates, kaolins, zirconium oxides, clays, alumina, zinc oxide...).

For this type of product, a useful life of equal reference to that of the building where they are installed is considered, provided that it is installed correctly, since it is a long-lasting product that does not require replacement. Therefore, the environmental product declarations (EPD) of ceramic tiles have assumed a useful life of 50 years and these considerations make the useful life shorter.

An example of this is the case of ceramic tilings, which have a type III environmental label, known as the Environmental Product Declaration (EPD) for their entire life cycle (cradle to grave), owned by the Spanish Association of Manufacturers of Ceramic Tiles and Flooring (ASCER).

Since ceramic coverings are totally inert products, they do not emit any compounds to the soil or water during their use stage, i.e. they do not undergo physical, chemical or biological transformations, they are not soluble or combustible, they do not react physically, chemically or in any way, they are not biodegradable, they do not negatively affect other materials with which they may come into contact in such a way as to lead to contamination of the environment or harm human health. It is a product that does not leach and therefore does not pose a risk to the quality of surface water or groundwater.

The results of the Life Cycle Assessment (LCA) of this EPD are based on the data provided by the manufacturers of 40% of the national production of ceramic tilings, so it is a representative study of this sector at a national level.

GlobalEPD 002-042. Recubrimientos Cerámicos Españoles



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			A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	02	в	64	D
	AENOR	GWP GWP	10,7	3,8E-01	5,2E-01		3,9E-02							8,8E-02	o	6,1E-02	-2,7E-01
Declaración	Recubrimientos Cerámicos Españoles	() 00P	5,9E-08	1,0E-14	2,6E-13		1,3E-10							2,4E-15	o	6,2E-14	-4,6E-09
Ambiental de Producto		AP	1,7E-02	3,3E-04	8,0E-04		4,1E-05							6,7E-05	0	3,6E-04	-10,0E-04
EN ISO 14025:2010 EN 15804:2012+A1:2013	Fecha de primera emisión: 2019-03-18 Fecha de expiración: 2024-03-19 Códieo GinbalFPD: 002-042		2,8E-03	7,0E-05	1,7E-04	NR	2,0E-05	NR	NR	NR	NR	NR	NR	1,6E-05	0	4,9E-05	-1,1E-04
ASCER Asociación Española de Fabricantes de Azulejos y Pavimentos Cerámicos	Asociación Española de Fabricantes de Azulejos y Pavimentos Cerámicos (ASCER)	оср Срад Роср	1,5E-03	4,3E-05	7,0E-05		3,6E-06							9,7E-06	0	2,8E-05	-1,1E-04
			2,5E-05	3,1E-08	7,3E-07		6,9E-09							7,2E-09	o	2,2E-08	-5,3E-08
		ADFP	148,1	5,1	2,5		2,2E-01							1,2	o	7,9E-01	-6,3
		GW	[kg CO, eq]	rg/ Potencial de calentamiento global													
		ODI	[kg CFC-11 eq]	Potencial de agotamiento de la capa de ozono estratosférico													
		AI	[kg SO, eq]	Potencial de acidificación del suelo y de los recursos de agua													
		E	P [kg (PO_)* eq]	egy Potencial de eutropuación de canno tronoclárico.													
		ADP	E [kg Sb eq]	supervisional de avoitamiento de recursos abióticos para recursos no fósiles (ADP-elementos)													
		ADP	F (M))	Potencial de agotamiento de recursos abióticos para recursos fósiles (ADP-combustibles (ósiles)													
			Tabla 10. Parámetros que describen los impactos ambientales definidos en la Norma UNE-EN 15804														

Source: AENOR.



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3. CONSTRUCTIVE CONSIDERATIONS

In Spain, standard UNE 138002:2017 "General rules for the installation of ceramic tiles by adhesion" defines the quality of ceramic tiles and aims to establish the general rules and associated processes for the design, selection of materials, preparation, installation, delivery and maintenance of the use of ceramic systems that must be considered to guarantee their quality and durability as well as their technical and aesthetic performance.

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

In terms of design and execution of coatings with ceramic tiles with adhesives, the provisions of the following sections of the Technical Code must be complied with:

- Structural security. DB SE.
- Fire safety DB SI.
- Healthiness. DB HS.
- Protection against noise. DB HR.
- Energy saving DB HE.



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4. EXECUTION PROCESS

1. Preparation of the substrate.

The method for thin-bed interior wall cladding has been selected for mosaic installation. To do this, the surface must be firm and perfectly level, clean and dry.

If during the cleaning process it has been necessary to wet the surface excessively, wait until it is completely dry to prevent the humidity from evaporating through the tiles, leaving traces of saltpetre.

If necessary, any cracks or crevices in the substrate should be repaired before starting to install the mosaic.



Source: Website BIMclay project.

2. Adhesive application.

For a correct placement of the porcelain material we must use white coloured adhesive cement, provided that a previous adhesion test has been carried out.

Once the necessary consistency of the mixture has been achieved, the mixture should be spread on the surface of the substrate. A regular layer of 2 to 3 mm should be applied with the help of a notched trowel number 3 in the longitudinal direction of the tiles to be laid.



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Source: Website BIMclay project.

3. Laying of the panels.

The panels or tesserae are then carefully placed while the adhesive is still soft. In order to maintain the uniformity of the joints, spacers of the same width as the distance between the components of the mosaic should be used.



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Source: Website BIMclay project.

4. Cutting the panels.

In most cases, in order to complete the entire surface, it will be necessary to adapt the size of the cloths. To do this, either the mesh will have to be cut with the help of a cutter, or the tiles will have to be cut with pliers.





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Source: Website BIMclay project.

5. Placing the cut pieces.

Like the rest of the pieces to place them in their final position, the adhesive must first be spread evenly.





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Source: Website BIMclay project.

6. Fixing the mosaic.

Once the pieces of the mosaic have been installed, during the fixing process, crosspieces will be placed in the joints.



Source: Website BIMclay project.



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In order for the mosaic to penetrate correctly into the mortar layer, tap gently and evenly with a smooth rubber trowel when all the surface covered by the mosaic is in place.



Fuente: Website BIMclay project.

5. Removal of paper.

Once the adhesive is dry, wet the paper that covers the plates with a sponge.

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Source: Website BIMclay project.



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The paper is then removed from the corner using a cutter before it dries. It is therefore important to wet only the paper that is to be removed at the time and not to allow this paper to dry without having been removed.

BIMclay BIMclay BIMclay BIMclay BIMclay BIMclay Mclay BIMclay BIMclay BIMclay BIMclay BIMclay BIMclay Mclay BIMclay BIMclay BIMclay BIMclay BIMclay BIMclay **SIMClay** BIMclay BIMclay BIMclay BIMclay ++ BIMclay BIMclay BIMclay BIMclav BIMclay BIMclay BIMclav BIMclav





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Source: Website BIMclay project.

8. Grouting the joints.

Let the adhesive dry for the time specified by the manufacturer and proceed to spread the grout with the help of a smooth rubber trowel. To achieve greater waterproofing in humid environments, use epoxy joints and, in any other environment, use cementitious joints.





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Source: Website BIMclay project.

9. Cleaning the tiles.

Using a wet sponge, clean the surface paste residues of the pieces that make up the mosaic.



Source: Website BIMclay project.

To finish the cleaning and have an impeccable result, finish the process by wiping with a dry cloth.

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10. Completion of the surface.

Finally, cover the entire remaining area so that there are no free spaces.





Source: Website BIMclay project.



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

MOSAIC TILE INSTALLATION PROCESS:

- 1. Preparation of the substrate.
- 2. Adhesive application.
- 3. Laying of the panels.
- 4. Cutting the panels.
- 5. Placing the cut pieces.
- 6. Fixing the mosaic.
- 7. Removal of paper.
- 8. Grouting the joints.
- 9. Cleaning the tiles.
- 10. Completion of the surface.



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