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

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REPORT 1.2.9

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

TECHNICAL OR FLOATING FLOOR INSTALLATION PROCESS

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).

Content

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 "Technical or floating floor installation process" deals with the constructive process of laying an elevated structure on which the ceramic flooring will be laid.

2. Definition of technical floor or floating floor

The technical or floating floor consists of an elevated load-bearing structure on which the tiles will be installed, leaving a free space between the support and the passable tiles. In this space, all the electrical cables, telephone cables, alarms and the rest of the wiring and pipes are normally placed. In this way, the plates or tiles are easy to remove in order to carry out any revision or modification in the installations, without the need to demolish them.

For this reason, technical or floating floors are mainly used in renovation or new construction works, which require great design flexibility, constant performance in wiring systems or periodic inspection of cables and pipes.

The technical floor system consists of a load-bearing structure made up of adjustable metal supports and crosspieces and the panels or tiles that are installed on the structure without the need for masonry work or the use of mortars or glues.

Source: Canal Construcción.

The **structure** is made of galvanised steel and has an anti-movement fixing system for the head to avoid possible variations in levelling that may occur due to vibrations or movements of the tiles once the installation has been completed.

The **pedestals or supports** are in charge of providing the floor with the necessary height for the project to be carried out. These elements incorporate anti-noise plastic joints with four positioning pins. Among its qualities it is possible to emphasize the facility to regulate the height thanks to the threaded bolt.

Source: Butech.

The **crosspieces** are used to give the pavement greater stability and resistance. In its upper part, like the pedestals, it incorporates anti-noise plastic strips along the entire surface. These rails are screwed to the head of the pedestal.

Source: Butech.

In terms of performance, the structure for technical flooring is highly resistant to bending under vertical and/or eccentric load, thanks to a M16 section threaded bolt, a 22 mm diameter tube 2 mm thick, internally calibrated to obtain a coupling with tighter tolerances and, consequently, less play and a direct coupling between the threaded bolt and the base disc and the tube, without the need for deformable plastic elements.

The free space between the support and the tiles can vary according to the needs of installation and overhaul, commercially the structures that are easier to obtain allow spaces of between 3.5 and 100 cm, since at greater heights the air conditioning ducts could also be installed.

- The advantages of the technical floor in porcelain stoneware are:
- Aesthetic improvement of the space thanks to the concealment of the installations under the pavement.
- Easy inspection of the floor.
- Simple maintenance of all networks.
- Acoustic and thermal insulation, due to the space between the floor and the modules or floating slabs.
- Freedom of reforms when necessary for the ease of change, without works, both piping and wiring.
- Easy replacement of damaged or worn parts, even the total change of the structure is quick and without works, with what this entails (dirt, work hours, economic cost, etc.).
- Low maintenance cost.
- Great variety of textures and colours.
- High resistance and easy cleaning.

- Different formats (usually 60 x 60 cm).

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 kaolin, sands and feldspars) and 4% of raw materials for enamel (feldspars, carbonaros, quartz, borates, silicates, kaolin, 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 tiling, which have an environmental label type III, known as the Environmental Product Declaration (EPD) for their entire life cycle (cradle to grave). In the case of Spanish ceramic materials, this environmental certification is considered for all ceramic coverings and pavements without detailing the method of tile installation to be used with each of them.

However, there are manufacturers of this high technical flooring system that have registered different Environmental Product Declarations. In the following links you can consult the EPD of some of the technical flooring systems, developed by Environdec owned by Kingspan, one of the leading companies in the manufacture of these floors, where it has been analysed from module A1 to A3, i.e. from the cradle to the door of the factory.

RG2 Europed Raised Access Flooring System

RG3 Europed Raised Access Flooring System

FDEB1 Europed Raised Access Flooring System

FDEB30 Alpha V Raised Access Flooring System

FDEB38 Alpha III Raised Access Flooring System

Below is one of the examples of EPD mentioned:

Kingspan ACCESS FLOORS

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025 and EN 15804

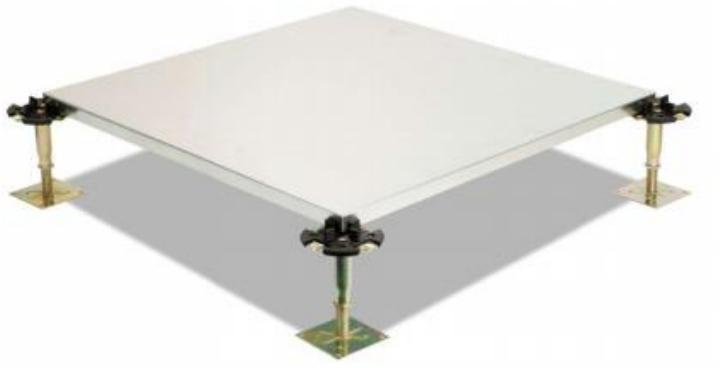
RG2 Europed Raised Access Flooring System

Kingspan Access Floors Limited

Declaration number: 5-P-00797 Issued on 1 February 2016; valid until 31 January 2021 ECO EPD registration number: ECO EPD 00000283	The environmental impacts of this product have been assessed from cradle to factory gate. This Environmental Product Declaration has been verified by an independent third party. The International EPD® System

Parameter – Environmental Impacts	Unit	Modules A1 - A3
Global warming potential* (GWP)	kg CO_2-eq	4.03E+01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11-eq	3.38E-06
Acidification potential of land and water (AP)	kg SO_2-eq	6.11E-01
Eutrophication potential (EP)	kg PO_4^{3-}-eq	1.21E-01
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg ethene-eq	2.06E-02
Abiotic depletion potential for non-fossil resources (ADPE)	kg Sb-eq	3.01E-03
Abiotic depletion potential for fossil resources (ADPFF)	MJ	6.23E+02

*Does not include biogenic CO_2 taken up in wood; see additional information



Source: Environdec.

3. CONSTRUCTIVE CONSIDERATION

In Europe, the standard UNE-EN 12825:2002 "Registrable raised floorings" specifies the characteristics and performance requirements of registrable raised floorings whose main use is their installation inside buildings in order to offer full access to the services located in the plenum. This standard does not apply to requirements related to hazardous substances that may be subject to regulations.

This standard applies to factory-made modular flooring elements including panels and pedestals and defines test and measurement methods. It also defines the elements for product conformity assessment. This standard can be consulted at the following link: https://www.une.org/encuentra-tu-norma/busca-tu-norma/norma/?c=N0026213

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

In terms of design and installation of registrable raised floors, the provisions of the following sections of the Technical Code shall be complied with:

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

4. EXECUTION PROCESS

1. Layout of the first tile.

In order to proceed with the process of installing the raised technical floor, the necessary measures will be taken for the staking out of the first tile.

The process will begin by measuring the height that the floor must have in order to cover the existing installations.

Source: YouTube.

Subsequently, the necessary markings shall be made on the horizontal plane where the two supports furthest from the wall which has been considered as the reference point shall be placed.

Source: YouTube.

2. Application of the fixation.

To ensure the correct adhesion of the structure of the raised technical floor, an adhesive shall be applied to the base of each of the four supports.

Source: YouTube.

3. Installation of the vertical supports.

With the adhesive still soft, the four supports of the elevated structure will be placed exerting pressure on its base and checking that they are perfectly placed and fixed.

Source: YouTube.

4. Laying of the crossbars.

Next, the crosspieces on which the tile is to be laid are laid. The crosspieces are supported directly on the supports and, to fix them, they are screwed with two screws at both ends. In this way, the structure is completely assembled and immovable.

Source: YouTube.

Source: YouTube.

5. Laying the ceramic tiles.

Since both the supports and the crosspieces are normally bonded with plastic parts that act as a noise protection system, the next step is to lay the tile on top of the structure that has already been assembled.

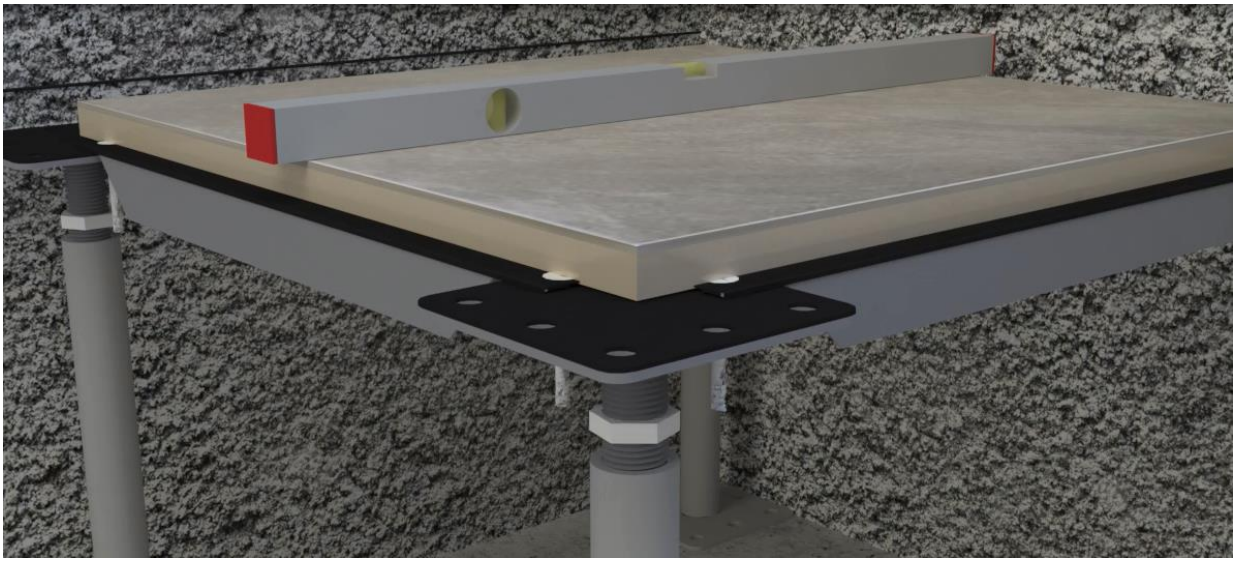
For correct tile installation, a suction cup will be used. With this suction cup, the tile can be placed in its exact position without leaving gaps between it and the walls.

Source: YouTube.

6. Levelling of the tiles.

Once the suction cup has been removed, the correct leveling of the tiles is checked, as well as any possible defects in planimetry that may exist between the tiles by tightening the screws of the vertical supports. For this purpose, a spirit level shall be used.

Source: YouTube.



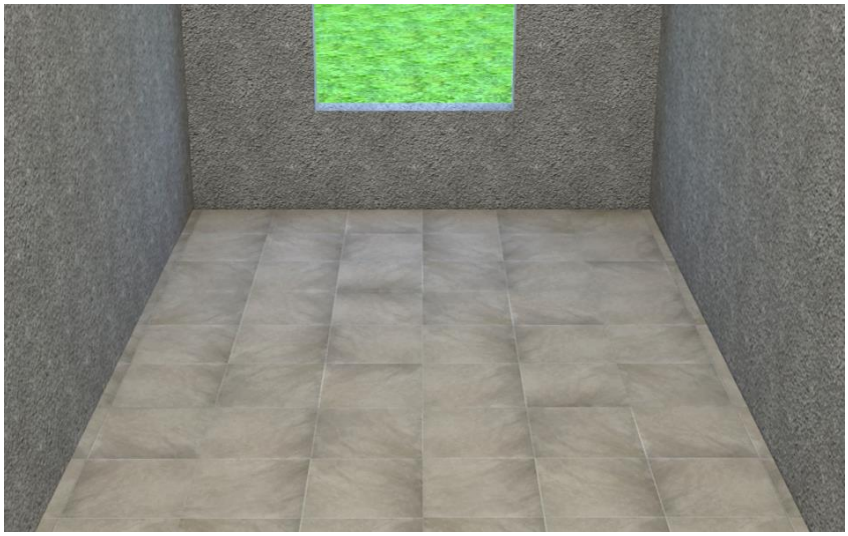
Source: YouTube.

7. Completion of the installation.

In the same way that the first four supports have been placed, the installation of the rest of the supports and crosspieces that make up the framework of the structure to cover the entire surface of the room will be carried out.

Source: YouTube.

At the same time as the supporting structure is installed, the ceramic tiles will be placed on top, thus leaving the installation process of the technical floor finished.



Source: YouTube.

In this way, a floor is installed that provides easy access to the registers and installations located under it.

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

TECHNICAL OR FLOATING FLOOR INSTALLATION PROCESS:

1. Layout of the first tile.
2. Application of the fixation.
3. Installation of the vertical supports.
4. Laying of the crossbars.
5. Laying the ceramic tiles.
6. Levelling of the tiles.
7. Completion of the installation.

6. REFERENCES

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