



THE SAGRADA FAMILIA

KNOWN ALL AROUND THE WORLD AND A SYMBOL OF BARCELONA, THE SAGRADA FAMILIA SHOULD FINALLY BE COMPLETED IN 2025

It all started in 1866 when Josep M. Bocabella i Verdaguer founded the spiritual Association of Devotees of San José, with a commitment to build a church dedicated to the Holy Family, and specific instructions that all the funds required should come from donations made by its followers. A few years later, in 1881, the association managed to purchase a plot of land where the sacred building would later be built. It was the architect Francisco de Paula del Villar y Lozano who initially presented the first design, which included three aisles, seven chapels and a spire. On the 19th of March 1882 Bishop Urquinaona laid the first stone of the Sagrada Familia Temple. A few years later a row broke out between Villar and the benefactors and, in 1883, its construction was entrusted to the architect Antonio Gaudí who decided to completely modify the previous design.

The Catalan architect redesigned a new layout for the basilica, this time based on five aisles, and made the entire structure more vertical and dominant. The intention of Gaudí was to make the Sagrada Familia visible from every part of Barcelona, which is why he chose to design a temple with a predominantly vertical aspect that would instantly

stand out from the other civil and religious buildings in the capital of Catalonia. According to the original design, the Sagrada Familia was to have 18 towers between 90 and 170 m tall, with the last one intended to be the tallest tower ever built for a church.

From 1914, Gaudí decided to dedicate all his time working on the Sagrada Familia project and even had a small house built on the site itself so that he could always be present. On the 7th of June 1926 he was hit by a tram and died three days later. The whole of Barcelona was in mourning and the Pope agreed to Gaudí being buried in the crypt of the yet to be completed Sagrada Familia: the architect had forecast that the church would have been completed within 200 years but, unfortunately, he did not leave any complete construction drawings.

Various architects worked on the monument following his death and, since then, construction work has never been interrupted, not even during the difficult years of the Spanish Civil War. The forecast now is for construction of the Sagrada Familia, financed entirely by donations and money raised by selling entrance tickets, to be completed in 2025.

INSTALLING STONE OVER UNDERFLOOR HEATING

The Sagrada Familia has five main aisles and three transversal aisles which together form a Latin cross. The five main aisles are 90 m long while the transversal aisles are 60 m long. The roof is still being built and the doors remain open during the day to allow visitors to enter. All this means that inside it is very cold,

especially during winter. This is the reason why the architecture studio commissioned to follow the construction of the remaining parts of the church proposed installing a heated floor to heat the inside, thereby making the environment more comfortable for the workers and visitors.

In February, 2016 the architects commissioned to carry out a feasibility study, also invited the Technical Department from Rehau, the company supplying the heating system, and Mapei Technical Services to a series of meetings to study the possibility of installing a floor incorporating a heating system in the presbytery, which would then be extended at a later date to the other areas. After carrying out a series of site surveys, Mapei Technical Services presented a proposal for a complete installation system

LEFT. An external view of the church, whose design project first started in 1886.

PHOTO 1. Positioning the heating elements on the floor before preparing the screed.

PHOTO 2. The reinforced screed was primed with PRIMER G.

PHOTO 3. A layer of NOVOPLAN MAXI mortar was then applied on the screed, a product specific for compact underfloor heating systems with high thermal conductivity.





4



5



6

PHOTO 4. The heated floor ready for installation of the flooring.

PHOTOS 5 and 6. The stone slabs were installed with KERAQUICK S1.

PHOTO 7. The floor joints were grouted with ULTRACOLOR PLUS.

PHOTO 8. View of the interiors of the church upon completion of works.

incorporating the supplied underfloor heating circuit.

The initial phase was to apply a new coating over a reinforced concrete substrate. The first part of the intervention was to lay the heating elements on the concrete substrate, followed by a screed covering the heating system.

After laying a metal mesh, the substrate was treated with PRIMER G in water dispersion diluted 1:1 with water. This product is an adhesion promoter that also anchors any residues of dust in place and has the capacity to prevent over-rapid absorption of water by the substrate before bonding.

At this point it was time to apply NOVOPLAN MAXI cementitious levelling mortar with a pump. This particular type of mortar contains fibre reinforcement, is free-flowing, hardens quickly and has been specifically developed to install compact underfloor heating systems with high thermal conductivity (1.727 W/mK). NOVOPLAN MAXI may be applied in layers from 3 mm to 40 mm thick and the resulting surface is suitable for installing ceramic tiles, natural stone and pre-finished wooden flooring.

Once the substrate was dry, natural stone slabs were installed using KERAQUICK S1 fast-setting cementitious adhesive with very low emission of volatile organic compounds (VOC). The joints were then grouted with ULTRACOLOR PLUS anti-efflorescence, quick setting and drying, polymer-modified mortar with BioBlock® technology to block the formation of mould and Drop Effect® technology to make joints water-repellent.

Once the intervention had been completed, the expansion joints were sealed by inserting MAPEFOAM closed-cell polyethylene foam cord along the bottom of the joints and then filling the remaining part of the joints with MAPESIL AC silicone sealant. The system proposed by Mapei was then tested to make sure it could withstand the weight of the forklifts used to carry out maintenance work in the Sagrada Familia.

CURRENT SITUATION AND ONGOING WORKS

Mapei Technical Services is also involved on a second intervention currently being carried out inside the Sagrada Familia to install the rest of the flooring. The stone type chosen in this case is considerably heavier than the previous one, which is why a different installation system was proposed.

After testing the stone in Mapei Research Laboratories to evaluate the risk

of deformability and stain related to the bonding system, it was recommended to use MAPESTONE 3 PRIMER cementitious bonding slurry to prime the surface of the substrate treated with NOVOPLAN MAXI cementitious mortar. MAPESTONE 3 PRIMER has the capacity to improve adhesion of the following layer of natural stone.

While the surface was still wet, a layer of MAPESTONE 2 fibre-reinforced cementitious mortar was applied.

A coat of MAPESTONE 3 PRIMER was applied on the backs so they would form a monolithic bond once installed.

As far as the external areas of the Sagrada Familia are concerned, Mapei Technical Services recommended using MAPESTONE TFB 60, a pre-blended mortar which is used to form screeds for architectural stone flooring with high compressive strength and good resistance to de-icing salts, freeze-thaw cycles and seawater.

Other products used to install ceramic tiles and trencadis (a type of mosaic used in Catalan modernism) in a hyperboloid tower were ELASTORAPID adhesive and KERACOLOR GG grout for joints mixed with FUGOLASTIC, while the roof was waterproofed with MAPELASTIC SMART two-component, high flexibility, cementitious mortar.

We will be sure to update you on how work is progressing in the next editions of our magazine!



7

IN THE SPOTLIGHT

KERAQUICK S1

It is a high-performance, deformable, fast setting cementitious adhesive with no vertical slip (class C2FT S1 according to EN 12004 standard), with very low emission of organic volatile compounds (VOC), for ceramic tiles and stone material.

KERAQUICK S1 is a powder composed of special cements, selectively-graded aggregates, synthetic resins and setting accelerators that develop high bonding strength only 2-3 hours after installation. For this reason, floors and walls installed with this adhesive can be used very quickly.



8

TECHNICAL DATA

Sagrada Família, Barcelona (Spain)

Original design: Antoni Gaudí

Period of construction:

1881- on-going; forecast completion date: 2025

Year of the Mapei

intervention: 2016

Intervention by Mapei:

supply of products to prepare

heated substrates and install stone slabs in interiors and exteriors

Client: Fundació Junta Constructora del Temple Expiatori de la Sagrada Família

Mapei distributor: Siesmo
Mapei coordinators: Sergi Sánchez, Joan Lleal, and Antoni Cattlà, Mapei Spain SA (Spain)

MAPEI PRODUCTS

Substrate preparation: Primer G, Novoplan Maxi

Ceramic tiles installation:

Keraquick S1, Elastorapid

Grouting and sealing joints:

Fugolastic+Keracolor GG, Ultracolor Plus, Mapefoam, Mapesil AC

Installation of stone floorings:

Mapestone 2*, Mapestone 3

Primer*, Mapestone TFB 60, Waterproofing the roof: Mapelastic Smart

*These products are distributed in Spain by Mapei Spain SA

For further information see www.mapei.es and www.mapei.com