

BORJA THERM[®]

Insulation System for Energy
Efficient Roofs

TECHNICAL BROCHURE



TEJAS BORJA
Since 1899

ROOFS FOR A BETTER FUTURE

The BORJATHERM system is a complete technical solution for the installation of lightweight highly energy-efficient roofs using roof tiles.

- ✔ INTUITIVE, SIMPLE AND FAST TO INSTALL.
- ✔ COMPLETE TECHNICAL SYSTEM FOR LIGHTWEIGHT ROOFS.
- ✔ SIGNIFICANT SAVINGS IN STRUCTURAL AND LABOUR COSTS.
- ✔ MAXIMUM INSULATION WITH NO THERMAL BRIDGES.
- ✔ EXCELLENT UNDER-TILE VENTILATION.
- ✔ ROOF INSULATION WITHOUT INTERNAL SPACE LOSS.



BORJATHERM prefabricated panels are made of a core of closed-cell polyurethane foam with excellent dimensional stability and high breaking strength, surrounded on all four sides by a protective layer of aluminium foil. Thanks to this combination of materials the panels have one of the best thermal insulation coefficients on the market, making them ideal for use in both cold and hot climates.

Each panel has its own integrated **Aluzinc ventilated batten** and is **self-supporting**, as long as the minimum spacing between battens (according to the thickness) is used. These features make the panels ideal both for refurbishment projects and new builds.

BORJATHERM panels are supplied ready for the installation of all roof tile models available. This means there is no need to make adjustments or take measurements on site, generating a **notable saving in time and labour.**

By following the simple instructions when installing the system, you will **avoid the main problems which affect sloping roofs**, such as condensation, which is limited thanks to the large, uniform ventilated cavity between the tiles and the insulation panels which also facilitates the drying of the ceramic tiles to prevent breakages caused by ice in critical climate areas.



SYSTEM FEATURES

The main component which gives its name to the roof system is the **BORJATHERM** prefabricated panel. These prefabricated panels, which arrive to the build site ready to be installed, are made of:

- **An exterior coating of embossed aluminium** which covers the insulation on all four sides, acting as a protective and watertight barrier.
- **A thermal insulation made from rigid expanded polyurethane foam** with a density of 39 kg/m³ and a thermal conductivity coefficient of $\lambda = 0,022 \text{ W/mk}$.
- **An Aluzinc ventilated profile**, 41 mm high, designed to facilitate the support and fixing of the roof components. The large holes in the profile guarantee under-roof ventilation with a flow greater than 200 cm² per ml of batten.



EVERYTHING IN JUST ONE PRODUCT

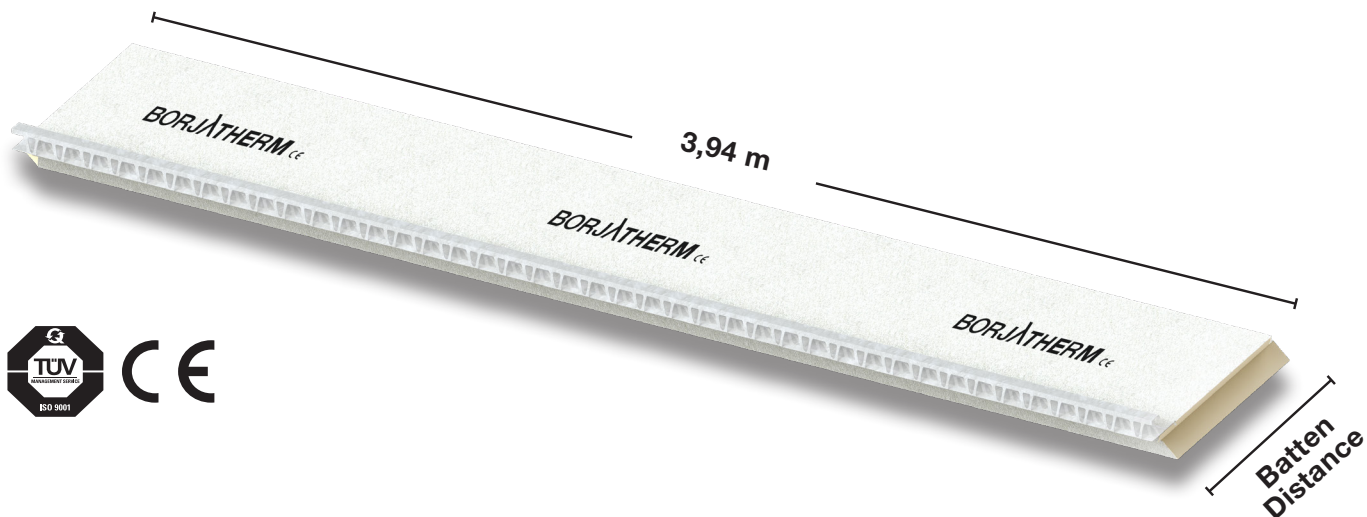
An installation of **BORJATHERM** panels on the roof structure fulfils, using just one product, all the functions of the 6 basic components of traditional ventilated roofs:

- ✓ **SELF-SUPPORTING ROOF STRUCTURE** ¹
- ✓ **VAPOUR BARRIER**
- ✓ **LOW TRANSMITTANCE THERMAL INSULATION**
- ✓ **UNDER-ROOF WATERPROOFING** ²
- ✓ **PRIMARY BATTEN TO CREATE VENTILATION**
- ✓ **COUNTER BATTENS**

¹ The resistance of the panels according to their thickness is shown in the table on page 6.

² Complementary waterproofing. The system is watertight once the panels are sealed and the tiles and finishing pieces are positioned, respecting the minimum slopes as indicated.

The panels are available with two batten spacing distances, to enable the installation of the main ceramic tile models.

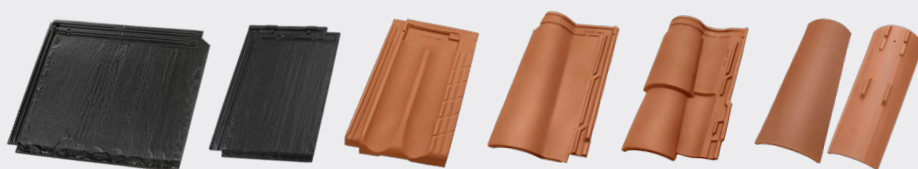


Batten Distance 395 mm



TECHNICA-10 TB-10 Tech FLAT-10

Batten Distance 370 mm



FLAT-5XL® FLAT-10 ALICANTINA-12 TB-12® TB-4® C-50.21 Celler®

The Flat-10 tile can be installed on both models, thanks to its variable batten spacing. With slopes under 35%, we recommend the tiles are installed 370 mm apart.

Upon request, panels with other batten spacing measurements can be made for the installation of other tile formats, such as the ATLAS concrete model by Tejas Borja. Please consult our technical-sales department for more information.

BORJATHERM panels meet the specifications of Standard **EN 13165:2015 - Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products.**

BORJATHERM TECHNICAL DATA	VALUE
Density	39 Kg/m ³
Declared thermal conductivity coefficient λ_D Conductivity after ageing over 25 years of use	0.022 W/mk
Thermal stability	-50°C / + 100°C
Dimensional stability DS(TH)	Class 8
Compressive strength at 10% deformation CS(10)	130 kpa
Resistance to water vapour diffusion MU	2,000,000 μ
Long term water absorption WL(T)	0,7 %
Emission of dangerous substances	Complies
Reaction to fire	Class F
Sound-insulating power	22 dB
Weight (panel spacing 370 mm) - 60 mm	4.20 kg/m ²
Weight (panel spacing 370 mm) - 80 mm	5.00 kg/m ²
Weight (panel spacing 370 mm) - 100 mm	5.80 kg/m ²
Weight (panel spacing 370 mm) - 120 mm	6.60 kg/m ²
Weight (panel spacing 370 mm) - 140 mm	7.40 kg/m ²
Weight (panel spacing 370 mm) - 160 mm	8.10 kg/m ²

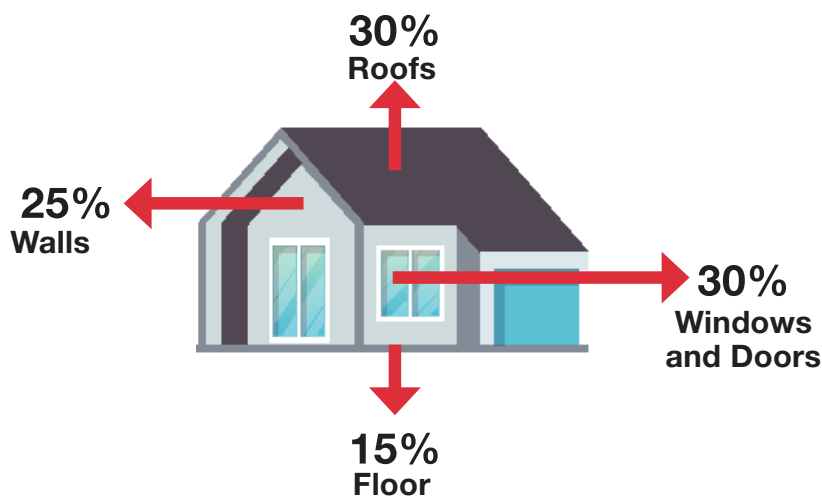
REDUCING ENERGY CONSUMPTION

The use of high performance insulation systems in a refurbishment project or a new build is a direct and immediate way of achieving significant savings in energy consumption.

A lower level of energy consumption results in lower CO2 emissions, which are responsible for global warming, thereby making a positive contribution to caring for the environment.

Homes are responsible for a significant part of global energy consumption. As a result, particular effort must be made to design them to reduce energy loss as much as possible. Of all the energy lost from homes, approximately 30% is lost through the roof.

ENERGY LOSS FROM HOMES

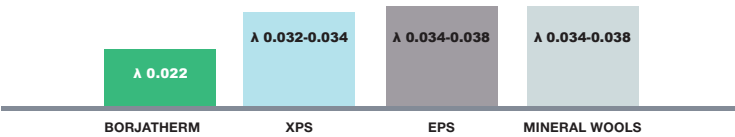


Installing the **BORJATHERM** system in the roof results in significant reductions in heating and air-conditioning bills.



ROOFS WITH MAXIMUM ENERGY EFFICIENCY

BORJATHERM has a thermal conductivity coefficient of $\lambda=0,022 \text{ W/m}\cdot\text{K}$, the lowest compared to other roof insulating materials::



This means that thinner layers of BORJATHERM can provide the levels of insulation required for each project, as the lower the λ coefficient, the greater the insulation.

BORJATHERM Panel Thickness	Heat Transfer U	Heat Resistance R
60 mm	0.37 W/m²k	2.72 m²k/W
80 mm	0.27 W/m²k	3.63 m²k/W
100 mm	0.22 W/m²k	4.54 m²k/W
120 mm	0.18 W/m²k	5.45 m²k/W
140 mm	0.16 W/m²k	6.3 m²k/W
160 mm	0.14 W/m²k	7.2 m²k/W

The new HE Energy Saving document from the Spanish Building Code specifies the thermal transmittance limits (U values) for roofs, defining some minimum values depending on the climate zone.

α	A	B	C	D	E
0.55	0.50	0.44	0.40	0.35	0.33

The minimum thickness of a BORJATHERM panel (60 mm) meets requirements for zones A, B and C. The other panel thicknesses from 80 mm and above meet requirements for all climate zones.

In comparison to other insulating materials, a BORJATHERM panel only needs to be 6 cm thick to achieve a thermal transmittance of $U=0,37 \text{ W/m}^2\text{k}$. To achieve the same transmittance with EPS, XPS or Rock Wool insulation, between 10 and 12 cm thickness is required.

BORJATHERM is highly resistant to humidity due to the very low water absorption properties of the insulating material and the external barrier formed by the aluminium. These features prevent the growth of mould and rot and guarantee the maintenance of high thermal insulation values over time.



SYSTEM INSTALLATION

The BORJATHERM system is ideal for use in both refurbishment projects and new builds. Its high resistance and low weight mean it can be installed onto most roof support structures: wooden beams, prestressed concrete joists, metal profiles, ceramic brick partitions, concrete slabs, metal sheets or wooden panels.



The following table contains values for breaking stress and bending load depending on the panel thickness and the distance between supports.

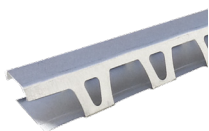
Panel Thickness	Supports at 600 mm	Supports at 800 mm	Supports at 1.100 mm	Supports at 1.300 mm
60 mm	278 kg	245 kg	167 kg	152 kg
80 mm	331 kg	298 kg	187 kg	168 kg
100 mm	515 kg	384 kg	302 kg	282 kg
120 mm	559 kg	500 kg	346 kg	300 kg

To reduce waste from cutting material to a minimum, the recommended distance between supports will be 66.70 cm between fixings for 6 panel supports; 78.80 cm between fixings for 5 panel supports and 98.5 cm between fixings for 4 panel supports.

For panel thicknesses under 100 mm a minimum of 5 supports per panel are recommended.



SYSTEM COMPONENTS



BORJATHERM Additional
Metallic Batten



BORJATHERM 100 mm
Butyl Tape



BORJATHERM Treated
Starting Batten



Ridge Batten Support



Adhesive Sealant and
PU Foam



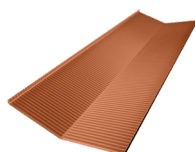
BORJATHERM System
Screws



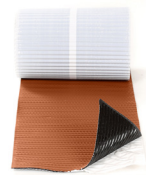
Ventilation Combs



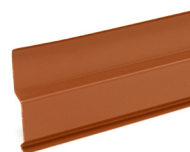
Ridge Tapes



Roof Valley Alu Flashing



Multi-use Flashing Tape



Counter Flashing Profile

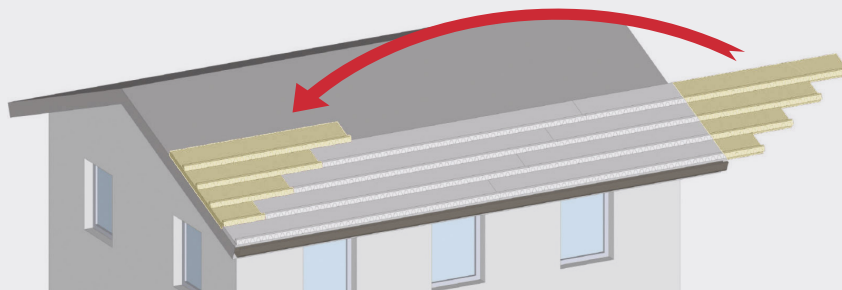


Waterproof Breathable
Membrane

NOTE: View all our available components in the current Tejas Borja price list or at www.tejasborja.com

ROOF SLOPES AND WATERPROOFING

The BORJATHERM system is made up of overlapping panels which are installed in horizontal rows, row by row, starting at the eaves and moving upward to the ridge. The joints between panels must never line up with those in a neighbouring row. We recommend using any excess panel pieces from a row to start the next row up, both to get the most out of the material and to preserve the tongue and groove joints between panels.



A top layer of roof tiles is easily installed over the panels. This upper layer of tiles must comply with the minimum roof gradient specifications for each tile model. **The roof is made watertight after both the panel and tile layers have been installed, always following the instructions in this installation guide.**

SEALING JOINTS

To ensure the system is correctly waterproofed, all the tongue and groove joints between successive panels - laterally and longitudinally - must be properly joined.



The lateral joints between panels must always be sealed by applying a continuous line of PU Sealant along the edge of the tongue and groove joint before adjusting the position of panel. Then BORJATHERM butyl adhesive tape is applied along the joint over the aluminium coating.

This sealing must be carried out row by row so that the upper panels cover the joint once it has been sealed, preventing water filtration.



If the roof slope is less than 30% (17°) a waterproof membrane must be fitted between the supporting structure and the insulation panel to ensure greater watertightness. Moreover, in roofs with low slopes, we recommend the longitudinal joints between panels are also sealed by applying a continuous line of PU Putty to the notch of the tongue and groove joint.

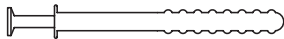


FIXING

BORJATHERM is an insulation system for ventilated roofs and consequently the joints in the roof must be made in a way that allows the circulation of air between the tiles and the supporting structure. It is also a dry and lightweight system and so the appropriate fixing methods will always be mechanical and/or special tile adhesives. Mortar should not be used.

Any type of roof tile may be installed: S-Interlocking, flat, curved or concrete tiles. The fixings used for these tiles must comply with the requirements of current regulations.

The type of mechanical fixings used will depend on the roof support structure to which the panels will be installed.

Each panel must be fixed to the roof structure using at least one screw per linear metre. The fixing must always be applied to the reverse of the integrated metallic batten and the screw must be a minimum of 4 cm longer than the thickness of the panel.

Concrete structure	Wooden structure	Metallic structure
		
Screws and anchors (after drilling)	Wood screws	Self-tapping screws



When fixings are used on concrete slabs, pre-drilling will be required. We recommend applying some drops of polyurethane sealant to these perforations before positioning and fixing the anchors.

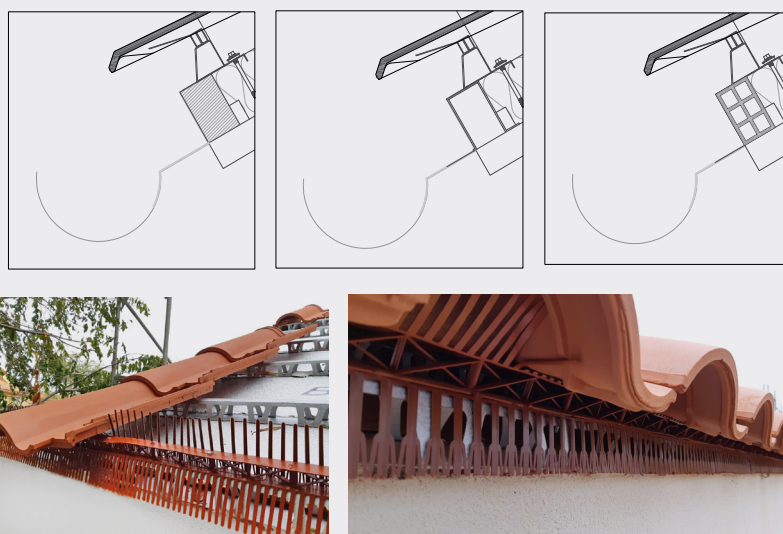
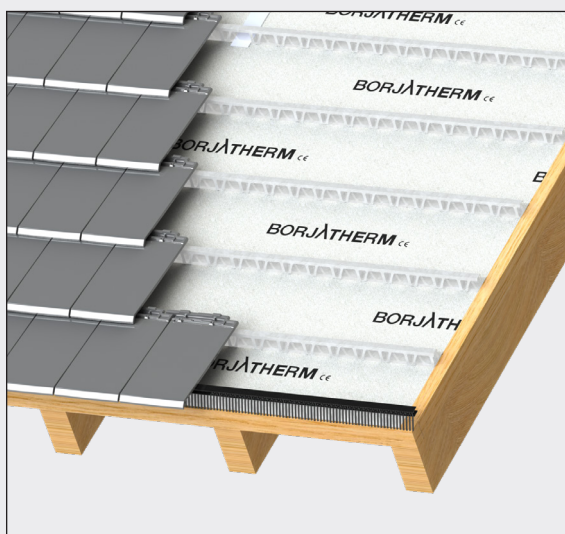
For greater watertightness, a neoprene washer must always be used on the head of the screws used to fix the BORJATHERM panels in place.

ARRANQUE Y ALERO

First, a starter batten must be fixed to the supporting structure in line with the eaves. This starter batten must be the same height as the thickness of the panels to be used. This batten can be wood, metallic or brick made. Cladding the starter batten should be planned as part of the final finishing of the facade so that it does not affect the aesthetic appearance of the building.

The first panels installed in line with the eaves must not be as wide as the rest of the panels to provide an overhang for the first row of tiles. After reassessing in situ the overhang required, the panel should be cut on the reverse, preserving the integrated metallic batten on the front side.

The ventilation combs will be positioned on the first batten. We recommend the installation of the eaves comb profile in an inverted position (with the points facing downwards) to cover the gaps in the metallic profile. For mixed tile or curved tile roofs, this initial eaves comb profile must be supplemented with an additional ventilation comb pointing upwards.

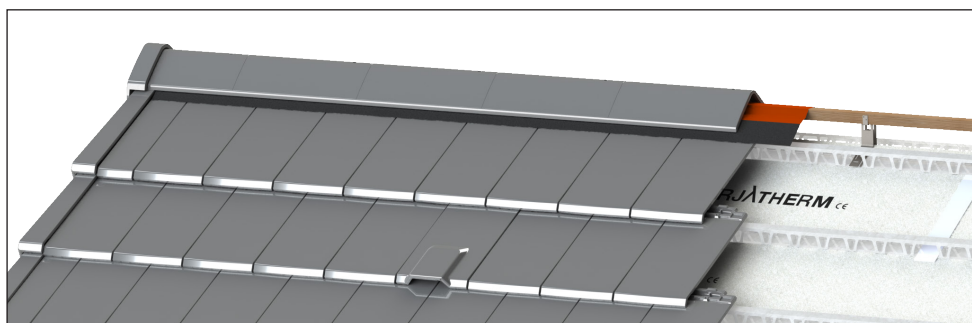
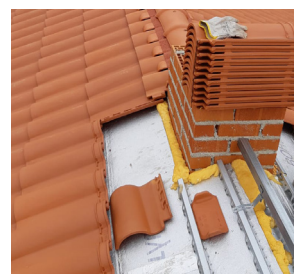


RIDGES AND HIP

Along the ridge line and hips, the panels on each of the coinciding roof slopes must be adjusted to leave a minimal space between them. This gap will be filled with PU foam and, once dry, covered with BORJATHERM butyl tape.

The BORJATHERM auxiliary batten must be installed on the upper line of both of the roof slopes. It is a support for the final row of tiles which will be fixed to it. This additional batten must be nailed directly to the roof support structure in the same way as the standard panels.

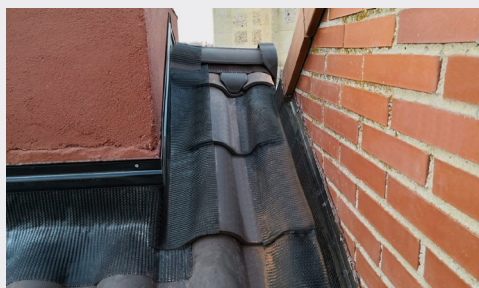
Finally, the ventilated ridge components are installed onto the battens: adjustable ridge batten support, ridge batten, under-ridge tape and ridge tiles.



EDGES

The edges of the panels must always be protected from UV rays. To this end, installers must plan edge closures which cover the thickness of the panel (wooden batten or cover, metal sheet, cement cladding, etc.). This will also contribute to the final finishing of the facade. Indeed, cladding the exterior facade of the building should be planned so that its aesthetic appearance is unaffected by roof components.

To facilitate the installation of ceramic edge pieces, we recommend attaching another batten to the edge of the roof. The edge finishing pieces corresponding to the chosen tile format will be fixed to this additional batten.



JOINS IN THE ROOF

At chimneys or points where the roof slope meets vertical walls, the BORJATHERM panels will be cut in situ to adjust, as far as possible, to these elements. The join between the panels and the vertical wall will be filled with polyurethane foam to prevent thermal bridges. Once the foam has dried, the join will be covered with BORJATHERM butyl adhesive tape to ensure the under-tile system is watertight.

Moreover, once the tiles are installed over the panel, the join between the tiles and the vertical walls will be made watertight with the usual technique: using self-adhesive multi-use flashing tape and the counter flashing profile (or similar solutions with folded metal plates).

VALLEYS

The procedure where the panels meet at a valley is similar to that used for other joints. First, the coinciding panels must be adjusted as much as possible along the valley line. The joint between them must later be filled with PU foam and sealed with BORJATHERM butyl tape.

The aluminium valley flashing sheet will be fitted between the battens of the panels on both of the coinciding roof slopes. To ensure a good fit for the sheet, a slice of the panels' preinstalled metallic batten must be cut away on each side.



BORJATHERM PROJECTS

Currently in Spain there are more than 40,000 m² of roofs which have been installed using the BORJATHERM system, in addition to many others throughout the rest of Europe. Single-family dwellings, nearly zero-energy buildings, residential developments, historic building conservation projects and educational centres are just a few examples of where the system has been an ideal fit.

Refurbishment of a housing community in Granada

BORJATHERM 60 MM SPACING 370 - CURVED TILE C-50.21 CENTENARIA SAND WITH STEP TILE



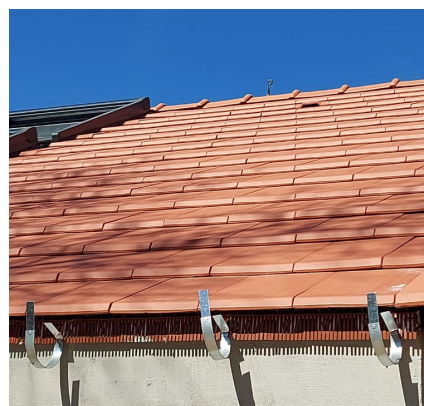
Algimia de Alfara Secondary School

BORJATHERM 120 MM SPACING 370 - FLAT-10 TILE MOSS RED



Nearly zero-energy dwelling in Madrid

BORJATHERM 160 MM SPACING 370 - FLAT-10 TILE RED



Multi-family residential building in Valencia

BORJATHERM 80 MM SPACING 370 - FLAT-10 TILE MID GREY



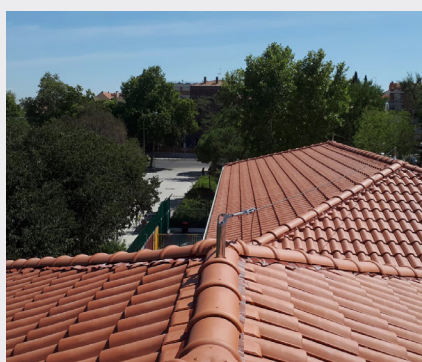
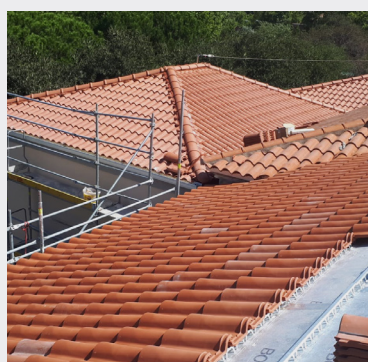
Isolated single-family villa in Jávea

BORJATHERM 60 MM SPACING 370 - FLAT-10 TILE MID GREY



Refurbishment of a public school in Madrid

BORJATHERM 60 MM SPACING 370 - TB-12 TILE RED



Prefabricated Steel Frame single-family house in Madrid

BORJATHERM 80 MM SPACING 370 - FLAT-10 TILE GRAPHITE



Farmhouse refurbishment in Zamora

BORJATHERM 60 MM SPACING 370 - CURVED STEP TILE WITH OLD RECOVERED TILES



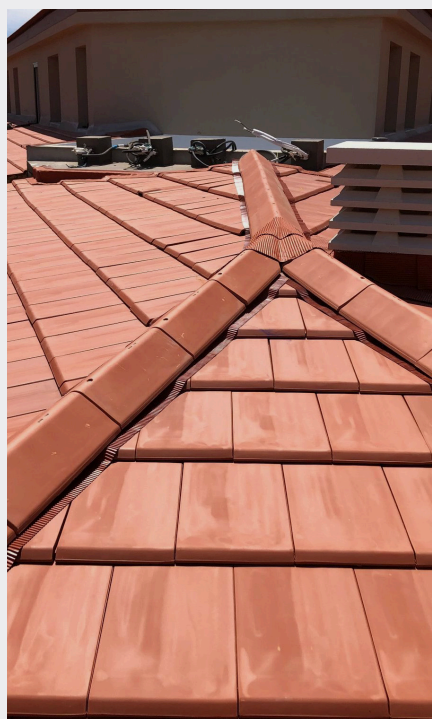
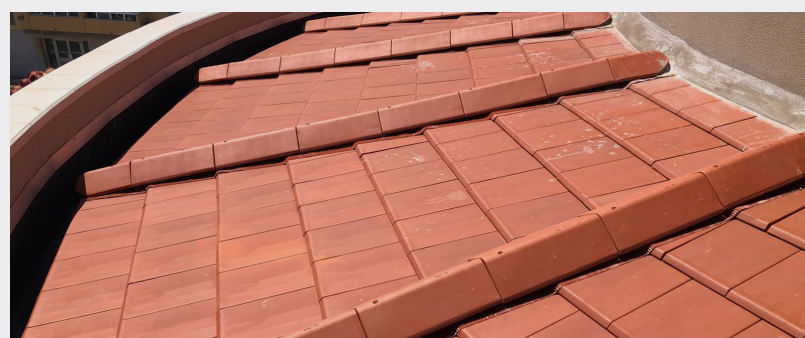
Prefabricated concrete single-family villa in Mallorca

BORJATHERM 60 MM SPACING 370 - CURVED TILE C-50.21 JASP. WHITE WITH STEP TILE



Multi-family residential building in Tenerife

BORJATHERM 60 MM SPACING 370 - FLAT-10 TILE RED



IMPORTANT INFORMATION

- When a chimney pipe passes through a BORJATHERM panel, said pipe must have the adequate flame-retardant insulation so as not to transmit high temperatures to the polyurethane panel.
- To keep them in optimum condition, panels must be stored under cover and protected from direct sunlight until they are installed on the building.
- Delivery time for thicknesses from 100 to 160 mm is between 3 and 5 weeks (availability date given after order confirmation).
- For panels with other batten spacing, ask us for prices and delivery times.
- Option of manufacture to special dimensions for shipping in containers with 2,150 mm in length. Contact us for prices and delivery times.
- Due to their dimensions and volume, BORJATHERM panels cannot be returned once they have been shipped to their destination.
- Use a harness, helmet, gloves and other safety equipment when installing and cutting the tiles and panels.
- The displacement or movement of panels along the roof due to high winds must be prevented and we recommend stopping installation work if there is any risk to worker safety.



Get in touch with our technical
department by emailing
departamentotecnico@tejasborja.com
so they can calculate all the material
for your BORJATHERM project or
use the contact form on
www.tejasborja.com



Prizes:

13 PREMIOS
nan
medios de comunicación
arquitectura y construcción




TEJAS BORJA
Since 1899

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