



# MODERN ROAD SURFACES IN STONE

Mapei solutions for sustainable street furniture





**THE SYSTEM OF EXCELLENCE  
FOR INSTALLING ARCHITECTURAL STONE ROAD  
SURFACES THAT ADD VALUE  
AND LONG-LASTING BEAUTY**



# MODERN ROAD SURFACES IN STONE

Mortars for stone road surfaces.....2

The causes of deterioration .....5

Mapei solutions .....6

 **Mapestone System**  
Waterproof monolithic paving.....6

 **Mapestone Calcix System**  
Architectural paving  
also of historical value .....10

 **Mapestone Drain**  
Pervious cementitious paving .....12

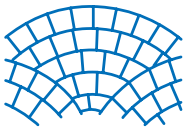
 **Mapestone Joint Range**  
Flexible and pervious paving .....14

 **Mapestone GR-ECO Range**  
Architectural paving  
with filtering properties.....18

Project references.....22





# Mortars for stone road surfaces



## YOU NEED LOCKING UP

### The mortar point of view

*"They say that I am seven times stronger than the concrete used to make pillars that hold up buildings. They say I have a formidable resistance to aggressive salts and freezing weather. This all makes me seem like matter from another planet; as if I were that stuff that melts and then recombines that you can see in the movie Terminator. But all I am is mortar; okay, I am **Mapestone TFB 60** ultra high-strength supermortar, but I am still only mortar, something that locks stone together. And you'd better not forget it. Anyway, if the ancient Romans had been able to use me to build their roads, nobody else would have got a look in. They have used me on the Bobo (Bologna for Bologna) construction site to get the maximum cohesion possible between one flagstone and another in Strada Maggiore, and I can hear the antique flagstones now as they whisper: "you make everything look so simple, little mortar", "your masters don't work as well as the Romans", "they manage to get by thanks to you", end even "of course it was all so different in the good old days, shame on you, it's a sacrilege...". Nasty little flagstones, ungrateful masochists, don't you remember how badly those Roman chisels treated you, strike after strike, pushing one stone against the other, with just really tight, narrow joints to create a solid mass effect, forcing you to match as close as possible? Sand and river gravel were the weak points. The binder was the weak point. The Romans didn't have a really sound binder but, let's get to the point; the Italians are still the best in the world at constructing roads. And if today they can count on me, it means we have always been at the forefront, right back since ancient Roman times. The mallet blows will make you sink into the support of my cradle, my gums will rise up, the wheelbarrows will pour me into the gaps until they are filled, when the bonding slurry has dried out you will be tied to me forever, I will hold you tight in the heat and in the cold, in the rain and snow, even under the weight of the wheels of the trolleybuses and cars, from here you will never move again. **I am a super-mortar because you need locking up.**"*





## Standard approved

The UNI 11714-1:2018 standard introduces the classification of outdoor paving according to the types of traffic loads and, for each class (P4, P5, P6, P7, P8 and P9), identifies the main design conditions.



### PEDESTRIAN USE ONLY

Balconies, terraces, patios, courtyards, domestic paths and pavements



### PEDESTRIAN AND LIGHT VEHICLE USE

Pavements suitable for parking, car parks or ramps/garage pathways, courtyards, adjacent lots and pathways for the connection between buildings and their parking lots



### PEDESTRIAN AND LIGHT VEHICLE USE

Areas with a 30 km/h speed limit, streets or squares with limited access to vehicles, public car parks and public access ramps



### PEDESTRIAN USE ONLY

Outdoor terraces of restaurants/bars, pavements for pedestrian and cycle use only



### PEDESTRIAN AND LIGHT VEHICLE USE

Squares used occasionally by slow-moving vehicles, including heavy vehicles (parvises, cemeteries, etc.), market squares, loading/offloading areas, and squares for events, town festivals, etc.



### HEAVY VEHICLE USE

Streets, streets with lanes for public transport or prescribed lanes, high-traffic roads, roundabouts and speed bumps









# The causes of deterioration

Weather, extreme temperatures, and road traffic: architectural stone paving must withstand various types of stresses. For this reason, a thoughtful approach to design and restoration that accounts for all potential factors of degradation is essential.

## Mechanical stresses

**Road traffic** due to the continuous passage of cars and heavy vehicles results in compressive (weight) and tensile (steering) stresses that cause the **failure of weak and irregular substrates** on which the flagstones of the paving are installed.

## Freeze-thaw cycles, de-icing salts and sea salt

The intense heat generated by the use of **de-icing salts** (calcium and sodium chloride) is countered by the sudden cooling caused by **low atmospheric temperatures**. This alternation, combined with freeze-thaw cycles (stresses created by the cooling of water turned into ice), leads to contractions, expansions, and flaking that deteriorate the joints and substrate. The action of chlorides in sea salt accelerates the degradation process of porous cement matrices.

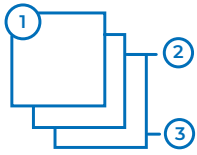
## Design and installation

Modern stone road surfaces must be conceived and designed as **durable over time**, similar to any vertical construction.

The **choice of the installation system** is crucial to ensuring this durability. At the same time, the expertise of qualified stone-laying workers is essential for the proper execution of these projects.

Unsuitable system choices and incorrect installation methods shorten the service life of our stone paving.





# Mapei solutions

## MAPESTONE SYSTEM. WATERPROOF MONOLITHIC PAVING

HIGH-PERFORMANCE MORTARS FOR BEDDING AND GROUTING STONE ROAD SURFACES



## Mapestone System

The monolithic **Mapestone System** offers a turnkey solution compliant to UNI 11714-1:2018 standard for the installation of **long-lasting** paving resistant to freeze-thaw cycles, de-icing salts and seawater.

**Mapei** provides specific products, such as ready-mixed cements with exceptional physical and chemical characteristics suitable for cyclically dry and wet environments, as described in exposure class XF4. These products, which only require the addition of water, are made with special binders and selected aggregates for constructing architectural stone paving suitable for vehicular traffic.

The System includes: **Mapestone TFB 60**, ready-mixed powder mortar especially suitable for screeds and bedding stones; **Mapestone PFS**, **Mapestone PFS 2 Flex**, **Mapestone PFS 2 Visco** and **Mapestone PFS PCC 2**, ready-mixed powder mortars designed for grouting joints.

**The combined use of the products results in a long-lasting monolithic structure.**







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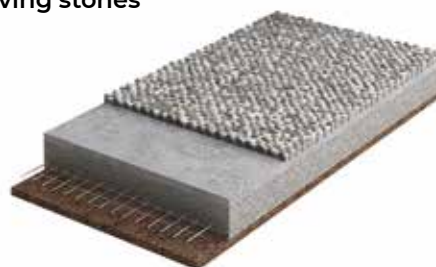
## Applications

The monolithic **Mapestone System** is used for constructing **architectural paving in stone** (setts, smolleri, cobblestones, slabs and blocks). If achieving exposure class XF3, XF4, or XS3 is not required, joints can be quickly grouted with **Keracolor PPN**.



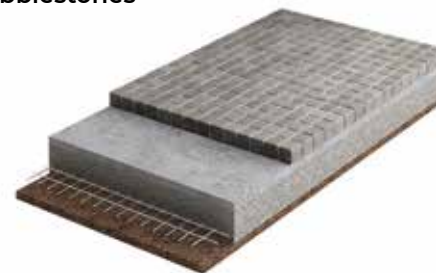
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Paving stones



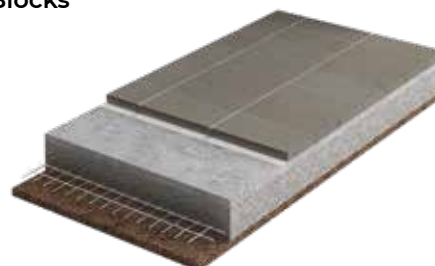
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Cobblestones



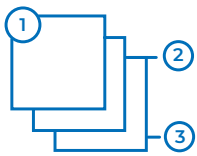
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Blocks



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Low-thickness slabs



# Mapei solutions



## Technical advantages

- High mechanical strength
- Homogenous, uniform product
- Resistance to frost and de-icing salts
- Resistance to sea salt that means long-lasting paving

## Logistical advantages

- Reduction of waste and obstacles due to road works
- Low environmental impact
- Simple cleaning

## Social advantages

- Lower maintenance costs
- Noise reduction
- Reduction of disruptions to the public
- Reduction of accidents (falls from bikes, mopeds, heels)

## Economic advantages

- High durability of the finished work
- Reduction of maintenance or repair works
- No waste of material
- Reduction of construction time





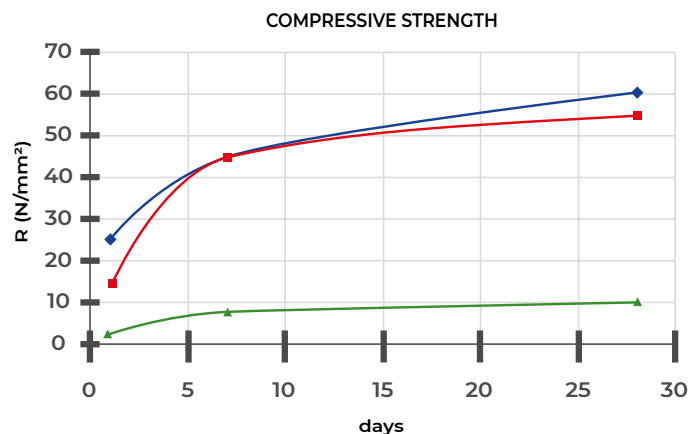
CROSS SECTION OF PORPHYRY AND FLAGSTONE INSTALLED WITH THE MAPESTONE SYSTEM

- 1** Concrete
- 2** Non-woven fabric or PVC sheets
- 3** **Mapestone TFB 60**
- 4** Porphyry and flagstones
- 5** **Mapestone PFS 2** or **Mapestone PFS 2 Flex** or **Mapestone PFS 2 Visco** or **Mapestone PFS PCC 2**

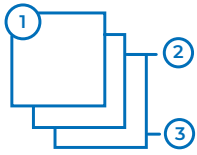


Colors available for  
**Mapestone PFS 2,**  
**Mapestone PFS 2 Flex**  
**and Mapestone PFS 2 Visco**

Due to the printing process involved,  
the colours shown are merely indicative



— **Mapestone TFB 60** — **Mapestone PFS2 and PFS2 Visco** — **sabbia/cemento**



# Mapei Solutions

## MAPESTONE CALCIX SYSTEM. ARCHITECTURAL PAVING, ALSO OF HISTORICAL INTEREST

READY-MIXED MORTARS WITH HIGH  
CONTENT OF RECYCLED MATERIAL



## Mapestone Calcix System

Ready-mixed mortars for screeds and grouting joints, **based on lime and inorganic pozzolanic materials**, rich in amorphous silica, selected aggregates and specific admixtures. These mortars are specific for installing architectural stone paving in areas subject to light pedestrian and vehicular traffic (classes P4, P5, P6 and P7) according to UNI 11714-1:2018. They feature good mechanical strength and resistance to frost. The System includes screed for bedding the flagstones **Mapestone TFB Calcix** and the grouts for joints **Mapestone PFS Calcix** (light color) and **Mapestone PFS Tenebris** (dark color).

The combined use of the products enables the creation of architectural paving **not subject to heavy traffic**, such as squares, streets and pavements in the historic centres of towns and cities. Ideal for laying, cobblestones, setts, smollerì, low-thickness slabs and blocks.

## Sustainability

The high percentage of **recycled material** in **Calcix** products contributes to Italian national **CAM** (Minimum Environmental Criteria) and international eco-sustainability protocols, such as **LEED** and **BREEAM**. The special formulation of the products reduces greenhouse gas emissions and consumes fewer mineral resources, while maintaining durability and high-quality performance.







## Technical advantages

- Good mechanical strength
- Homogenous, uniform product
- Resistance to frost and de-icing salts
- Good adhesion to stone material

## Logistical advantages

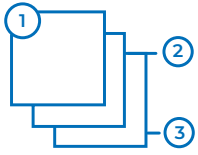
- Low environmental impact
- Simple cleaning

## Social advantages

- Lower maintenance costs
- Noise reduction
- Reduction of accidents (falls from bikes, mopeds, heels)
- Sustainable product, thanks to its special formulation

## Economic advantages

- High durability of the finished work
- Reduction of maintenance or repair works
- No waste of material
- Reduction of construction time



# Mapei Solutions

## MAPESTONE DRAIN. PERVIOUS CEMENTITIOUS PAVING

MORTAR FOR LAYING AND GROUTING FLOORING  
ARCHITECTURAL SUBJECTED TO LIGHT TRAFFIC



### Mapestone Drain

Ready-to-use, cement-based dry mortar with aggregates of maximum grain size of 3 mm, with **high mechanical performance (25 MPa)** for laying outdoor drainage screeds subject to **moderate vehicle traffic**. **Mapestone Drain** is used as a **pervious mortar** for screeds (at least 5 cm thick) for laying natural stone, porcelain tiles, terracotta and cementitious interlocking tiles in exterior. It is ideal for architectural paving subject to light traffic (entrances to houses, hotels, parking lots, pedestrian areas) and complies with UNI 11714-1:2018 for **class P7** (pedestrian and light vehicular use). The product is suitable for humid areas with frequent rainfall and **thermal shocks**, as it prevents efflorescence, cracking and freeze/thaw damage. **Mapestone Drain** is easy to use, as it is mixed only with water, and provides durability, avoiding dosing errors that could compromise the drainage and strength of the paving system.







## INSTALLATION ON MAPESTONE DRAIN

Low-thickness slabs

Mapestone Drain

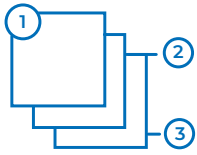
Cementitious bonding slurry

Mapestone Drain

Compacted soil







# Solutions Mapei

## MAPESTONE JOINT RANGE. FLEXIBLE AND PERVIOUS PAVING

SOLVENT-FREE POLYURETHANE BINDERS,  
FOR SEALING JOINTS.



### Mapestone Joint

**Mapestone Joint** is a **single-component, solvent-free, non-flammable, polyurethane** binder with characteristic odor, for the construction of pervious and elastic architectural paving that is particularly resistant to deicing salts, thermal stresses and acids. The surfaces are sound-absorbent and allow **opening to traffic in a short time**, within 48 hours after laying at +20° C. Available in 25 kg canisters, 200 kg drums and 1000 kg tanks.



### Mapestone Joint Ghost

**Mapestone Joint Ghost** is a **one-component**, solvent-free, rapid-curing and drying silane-terminated **polymer-based binder**, designed for sealing grouts in paving blocks, setts and cobblestones. It creates elastic, pervious architectural paving that is quickly ready for use. Available in 25 kg tanks.

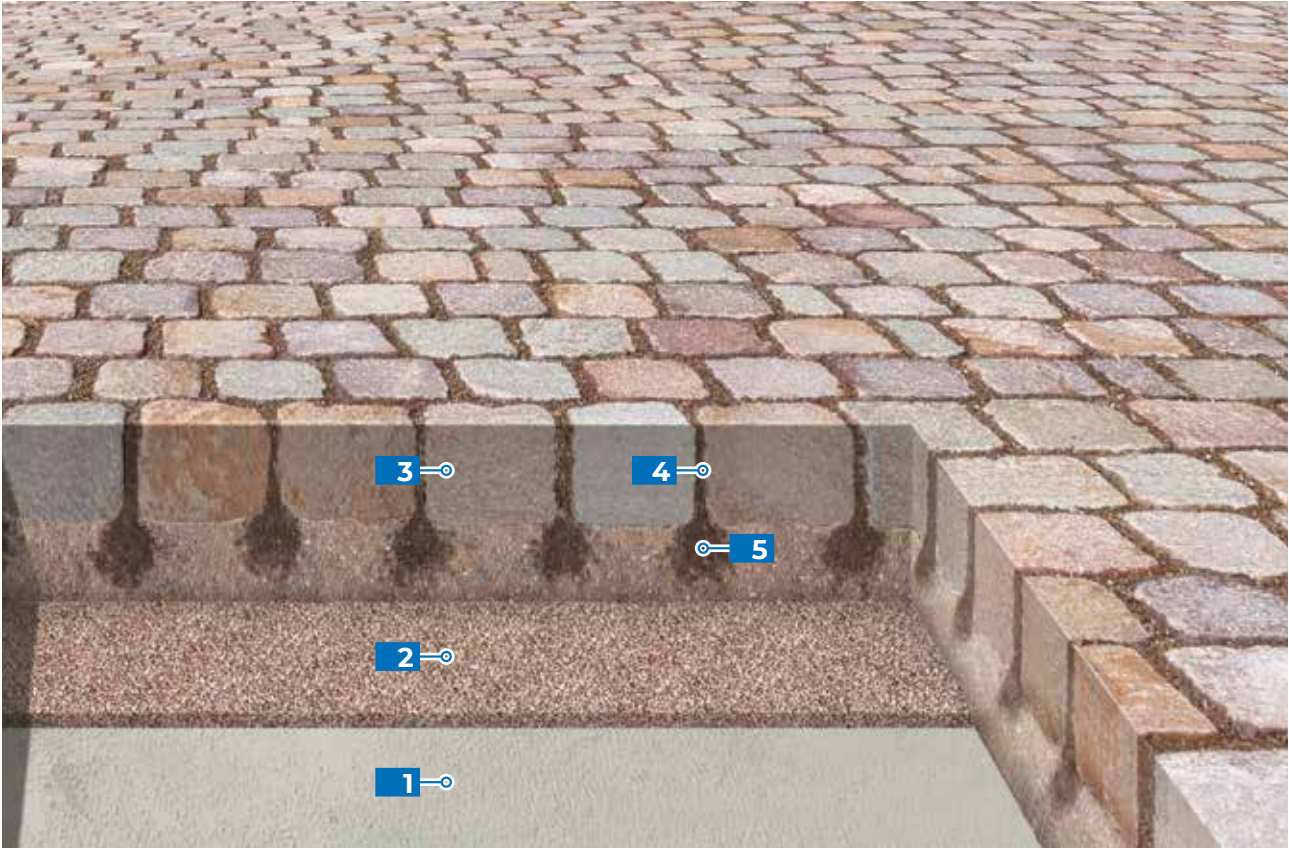


### Mapestone Joint Ghost Plus

**Mapestone Joint Ghost Plus** is a one-component, solvent-free, rapid-curing and drying silane-terminated **polymer-based binder**, with **high mechanical strength** designed for sealing grouts in paving blocks, setts and cobblestones. It creates elastic, pervious architectural paving that is quickly ready for use. Available in 25 kg canisters.







TYPICAL SECTION OF SETTS PAVING GROUTED WITH MAPESTONE JOINT, MAPESTONE JOINT GHOST OR MAPESTONE JOINT GHOST PLUS

- |   |   |  |
|---|---|--|
| <p><b>1</b> Concrete</p> <p><b>2</b> 5/8 cm thick installation bed of 4/8 mm or 3/6 mm coarse stone chippings</p> | <p><b>3</b> Porphyry cubes or other stone material</p> <p><b>4</b> 3/6 mm gravel infill</p> | <p><b>5</b> Mapestone Joint or Mapestone Joint Ghost or Mapestone Joint Ghost Plus</p> |
|---|---|--|

### Technical advantages

- Flexible system
- Pervious capacity
- Resistant to frost, de-icing salts, sea salt and sea spray

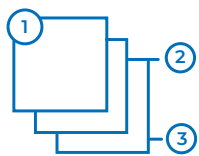
### Economic advantages

- High durability of the finished work
- High resistance to the cleaning action of power sweepers
- No waste of material
- Reduction of construction time

### Social advantages

- Lower maintenance costs
- Noise reduction
- Reduction of disruptions to the public
- Reduction of accidents (falls from bikes, mopeds, heels)





# Mapei Solutions



## Mapestone Joint System and Mapestone Joint Ghost *Block*

System for creating flexible and pervious architectural stone paving using **Mapestone Joint** or **Mapestone Joint Ghost**. It is applied to **blocks**, **setts** and **cobblestones** for class P4, P5, P6, P7, P8 and P9 paving.





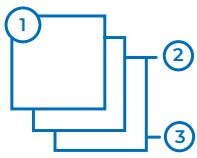


## Mapestone Joint *Slab*

System for creating flexible and pervious architectural stone paving using **Mapestone Joint**. It applies to **slab** for class P4, P5 and P6 paving.







# Mapei Solutions

## MAPESTONE GR-ECO RANGE. ARCHITECTURAL PAVING WITH FILTERING PROPERTIES

RANGE OF MORTARS BASED ON NATURAL FIBRES OF PLANT ORIGIN (APPLE FIBRES) AND SPECIFIC AGGREGATES



## Mapestone GR-ECO

**Mapestone GR-ECO** is a ready-mixed, cement and lime-free mortar made with natural fibres (apple fibres) and specific aggregates for grouting architectural stone, interlocking cement blocks, porcelain, or terracotta bricks paving subject to light pedestrian and vehicular traffic in classes P4, P5, and P6, in accordance with UNI 11714-1:2018.

**Mapestone GR-ECO** enables the filtration of architectural stone paving, thanks to a binder featuring self-healing properties: the fibres retain water and release it as vapour, like a sponge.

### Applications

**Mapestone GR-ECO** is used for grouting architectural paving subject to mild stress, such as entrance areas of houses, hotels, car parks subject to light vehicular traffic, pedestrian areas, pavements, and porches.

### Sustainability

Thanks to its special formulation, **Mapestone GR-ECO** reduces CO<sub>2</sub> emissions, which contribute to climate change, by up to 95% compared to traditional slurries. For example, using **Mapestone GR-ECO** instead of a traditional cementitious slurry to restore a 500 m<sup>2</sup> square can save nearly 10 tonnes of CO<sub>2</sub>, equivalent to avoiding driving about 100 trips between Milan and Rome (approximately 65,000 kilometers), or the benefit of planting 130 trees which absorb CO<sub>2</sub>. **Mapestone GR-ECO** is a highly sustainable product, since its reduced environmental impact, safeguards our planet, and the absence of harmful substances protects the health of the end users.





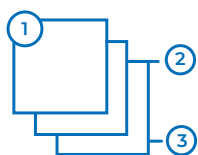
GIORNATA MONDIALE  
DEL DONATORE DI SANGUE



CITTÀ DI IRADATE







# Mapei Solutions



## Mapestone GR-7

**Mapestone GR-7** is a ready-mixed mortar with **natural fibers of plant origin** (apple fibers), pozzolanic materials, specific aggregates, and it is free from lime and cement. It is designed for grouting architectural stone, interlocking cementitious blocks, porcelain, brick or terracotta elements subject to **pedestrian and light vehicular traffic** in classes P4, P5 and P6, in compliance with UNI 11714-1:2018.

Its special composition enables it to achieve a mechanical strength of 7 MPa, which makes it particularly suitable for paving in class P6.



## Mapestone GR-ECO Fill

**Mapestone GR-ECO Fill** is a ready-mixed grout with **natural fibers**, specific aggregates and **recycled materials** (blast furnace slag, silica fume) designed specifically for grouting architectural paving with interlocking blocks, terracotta bricks, porcelain or butt-jointed natural stone, subject to **pedestrian and light vehicular traffic** in classes P4, P5 and P6, in compliance with UNI 11714-1:2018.





## Types of installation

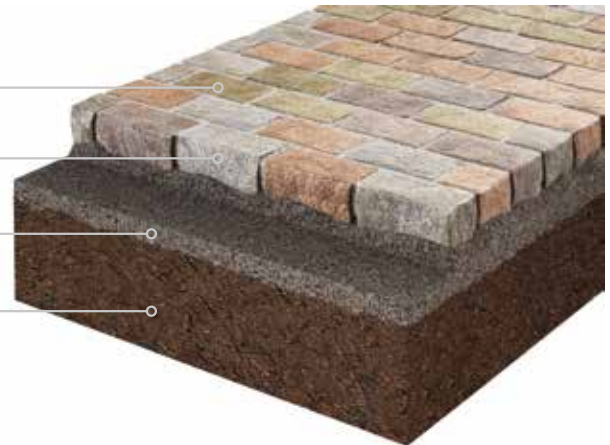
### LOOSE-BED INSTALLATION

**Mapestone GR-ECO** range

Porphyry blocks

Compacted 4/8 gravel, thickness 5 cm

Soil



### LOOSE-BED INSTALLATION BROADCASTED WITH CEMENT

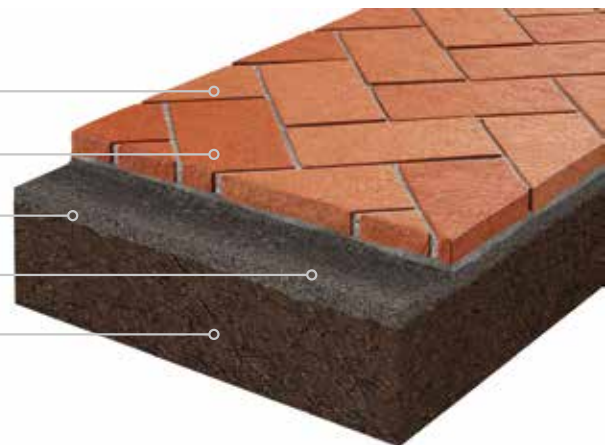
**Mapestone GR-ECO** range

Terracotta bricks

Compacted 4/8 gravel, thickness 5 cm

Cement broadcast

Soil



### INSTALLATION ON MAPESTONE TFB

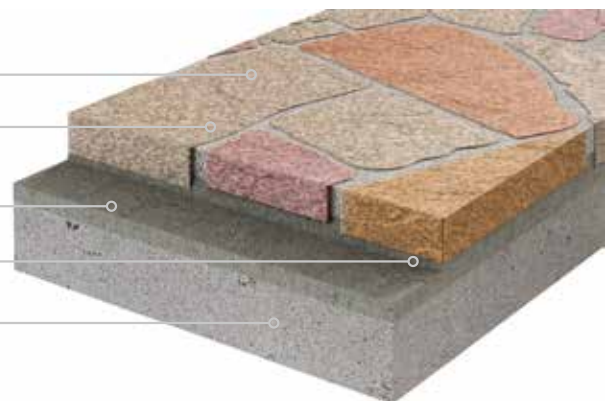
Low-thickness slabs

**Mapestone GR-ECO** range

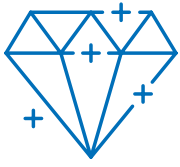
**Mapestone TFB**  
(plastic consistency) thickness 5 cm

Cementitious bonding slurry

Mixed concrete or concrete slab







# Reference projects

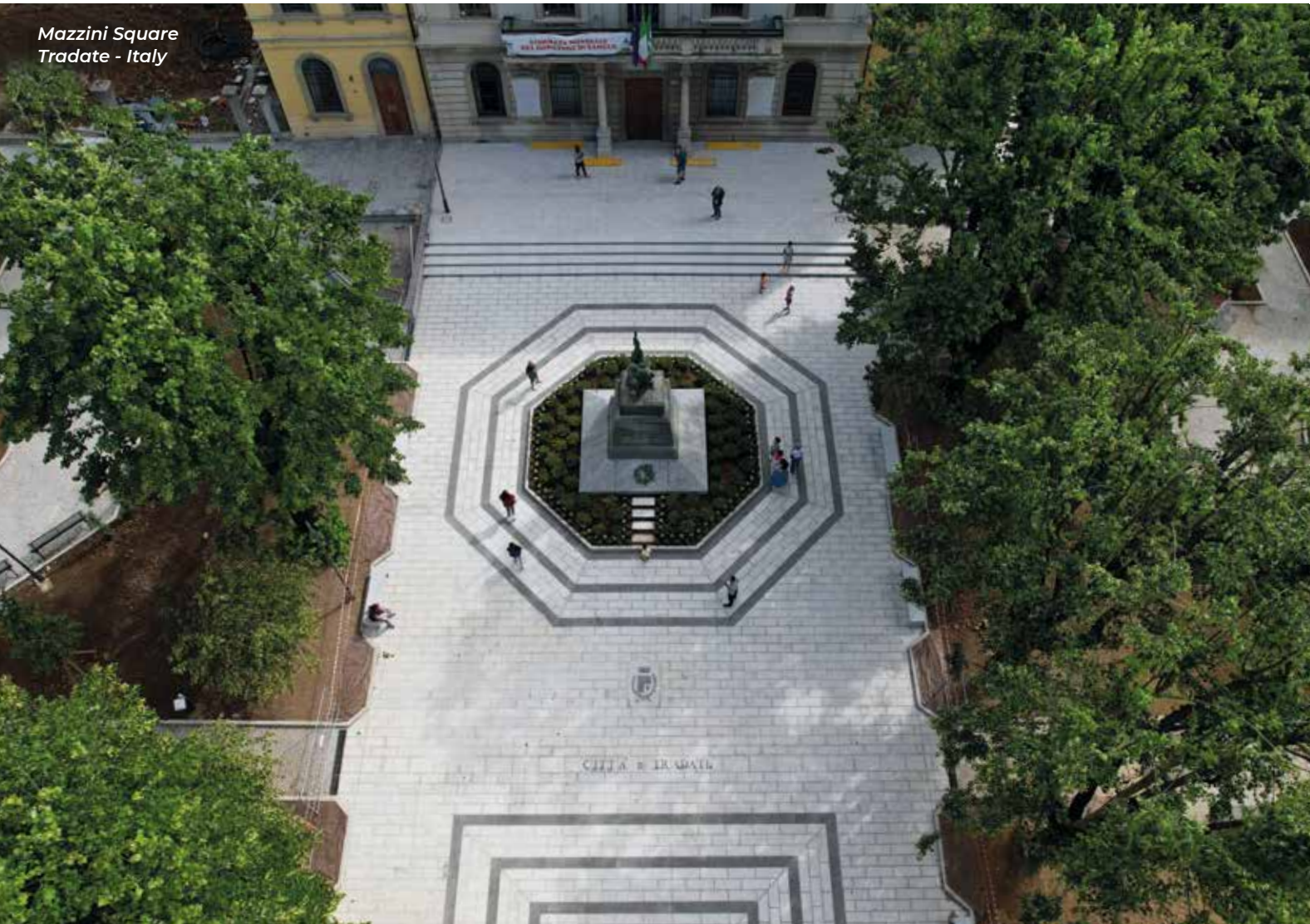
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*Hôtel de Ville  
Vincennes, Paris - France*



*Sant'Oronzo Square  
Lecce - Italy*



*Mazzini Square  
Tradate - Italy*



The "new" road  
of St. Francis  
Assisi - Italy



Historical center  
of Matera - Italy



Palazzo del Cinema  
Venice Lido - Italy



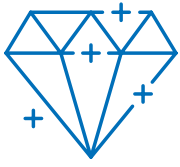
Historical center  
of Amelia - Italy



Parisian Hotel  
Macau - China







# Reference projects

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*Largo Magnanapoli  
Rome - Italy*



*Unità d'Italia Square,  
Tradate - Italy*



*Via De' Cerretani  
Florence - Italy*



*Downtown pedestrian area  
of Košice - Slovakia*



*Via Mercatovecchio  
Udine - Italy*





# EVERYTHING'S OK, WITH MAPEI



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