



# MODERN ROAD SURFACES IN STONE

IN COMPLIANCE WITH UNI 11714-1:2018

**MAPESTONE GR-ECO**

**MAPESTONE JOINT**

**SISTEMA MAPESTONE**

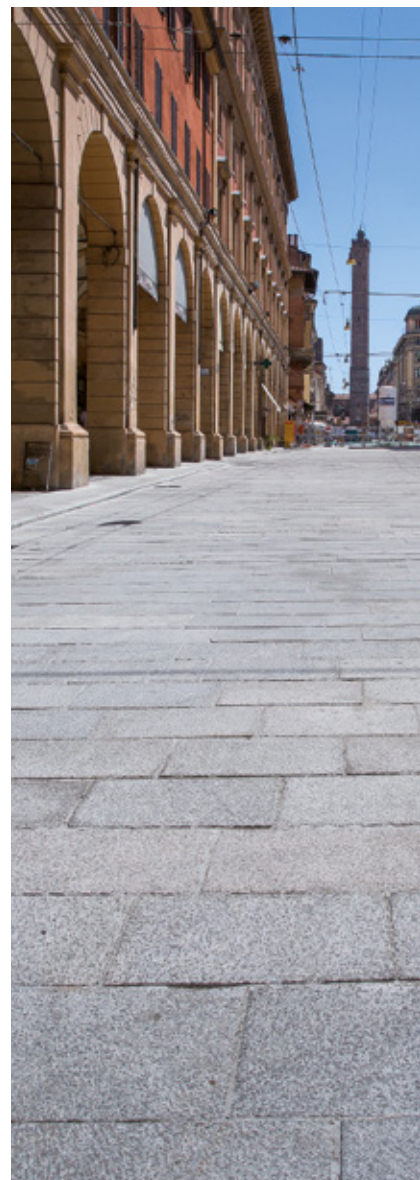
**SISTEMA MAPESTONE CALCIX**



# YOU NEED LOCKING UP

## A MORTAR'S POINT OF VIEW

“They say that I am seven times stronger than the concrete used to make pillars that hold up buildings. They say that I have 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”, and 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.**”





# MODERN ROAD SURFACES IN STONE

IN COMPLIANCE WITH UNI 11714-1:2018

The new UNI 11714-1:2018 standard introduces the classification of external paving according to the type 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 USE ONLY

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



#### PEDESTRIAN AND LIGHT VEHICLE USE

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



#### 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.



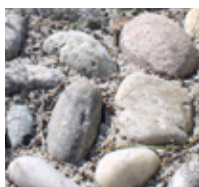
#### PEDESTRIAN AND LIGHT VEHICLE USE

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



#### HEAVY VEHICLE USE

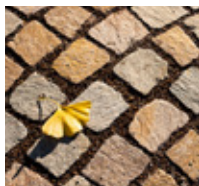
Streets, streets with lanes for public transport or prescribed lanes, high-traffic roads, roundabouts and speed bumps



## MAPESTONE GR-ECO

Architectural paving with filtering properties

**NEW**



## MAPESTONE JOINT

Flexible and pervious paving



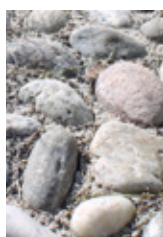
## SISTEMA MAPESTONE

Monolithic waterproofing paving



## SISTEMA MAPESTONE CALCIX

Architectural paving even of historical interest



# MAPESTONE GR-ECO

**Mapestone GR-ECO** is a pre-blended, cement and lime-free grouting mortar made from natural fibres (apple fibres) and specific aggregates for grouting architectural stone, self-locking cementitious block, porcelain or terracotta brick paving subjected to light stresses and loads from pedestrians and light vehicles in classes P4, P5 and P6; complies with UNI 11714-1:2018.

**Mapestone GR-ECO** can be used to create architectural stone paving with **filtering properties**, and the binder component of **Mapestone GR-ECO** has **self-generating properties**: the fibres hold the water and then release it in the form of vapour, just like a sponge.







**PRE-BLENDED MORTAR  
MADE FROM NATURAL FIBRES  
(APPLE FIBRES) AND SPECIFIC  
AGGREGATES**

## AREAS OF USE

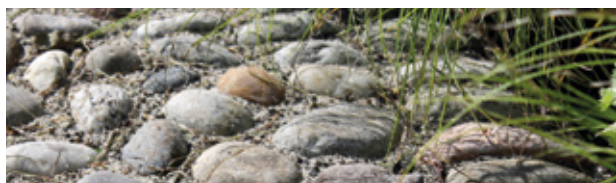
**Mapestone GR-ECO** is used for filling grouts in architectural paving subjected to light loads, such as access areas to homes, hotels and car parks subjected to modest use by vehicles and for pedestrian zones, pavements and porticoes.

## MAPESTONE GR-ECO AND SUSTAINABILITY

Thanks to its special formulation, **Mapestone GR-ECO** reduces the level of CO<sub>2</sub> emissions responsible for climate change by up to 95% compared with traditional slurry. For example, if used to renovate a piazza with an area of around 500 m<sup>2</sup>, using **Mapestone GR-ECO** instead of traditional slurry saves almost 10,000 tonnes of CO<sub>2</sub>, the equivalent of 100 fewer car journeys from Milan to Rome or the planting of 130 trees.

**Mapestone GR-ECO** is a highly sustainable product, in that its reduced impact on the environment safeguards our planet and the absence of harmful substances guarantees the health of end users.





## MAPESTONE GR-7

**Mapestone GR-7** is a pre-blended, cement and lime-free mortar made from natural fibres (apple fibres), Pozzolan-reaction materials and specific aggregates for grouting architectural stone, self-locking cementitious block, porcelain or terracotta brick paving subjected to light stresses and loads from pedestrians and light vehicles in classes P4, P5 and P6; complies with UNI 11714-1:2018.

Thanks to its particular composition, its mechanical strength reaches 7 MPa which makes it particularly suitable for paving class P6.



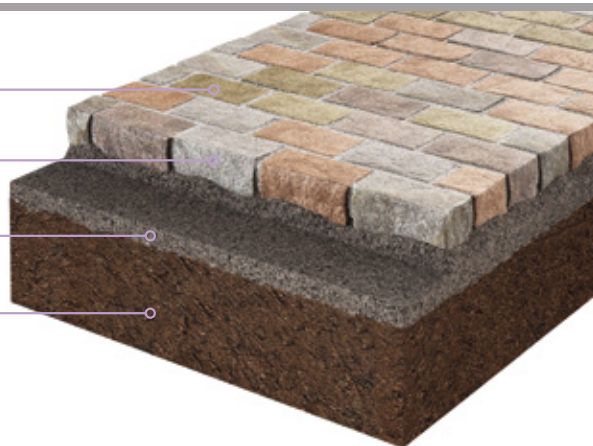
## LOOSE-BED INSTALLATION

### MAPESTONE GR-ECO

Porphyry binderi block

Compacted 4/8 gravel, thickness 5 cm

Ground



## LOOSE-BED INSTALLATION WITH A BROADCAST OF CEMENT

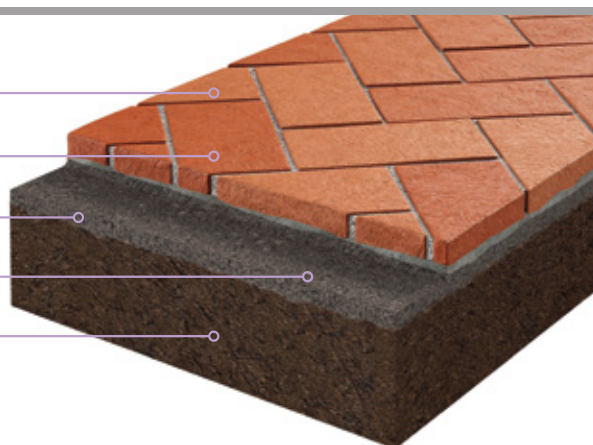
### MAPESTONE GR-ECO

Terracotta bricks

Compacted 4/8 gravel, thickness 5 cm

Light layer of wet cement

Ground



## INSTALLATION ON MAPESTONE TFB

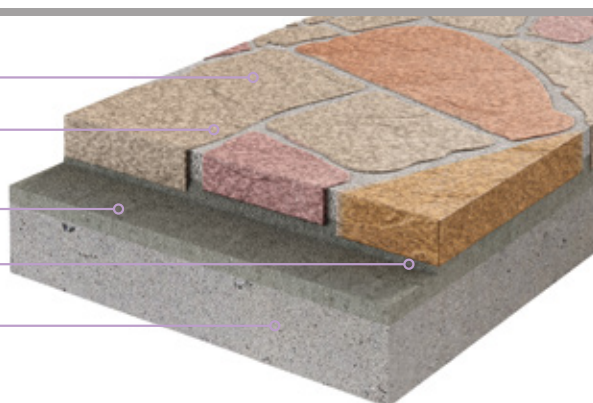
Thin slabs

### MAPESTONE GR-ECO

**MAPESTONE TFB**  
(plastic consistency), thickness 5 cm

Cementitious bonding slurry

Mixed concrete or concrete slab







# THE CAUSES OF DETERIORATION







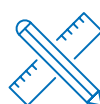
## MECHANICAL STRESSES

The constant passage of cars and heavy vehicles generates compressive stress (the weight of the vehicles themselves) and tensile stress (manoeuvres carried out by vehicles) that cause failure in weak and irregular substrates on which the blocks of stone that make up the road surface have been installed.



## FREEZE/THAW CYCLES, DE-ICING SALTS AND SEA-SALTS

There is a contrast between the high amount of heat generated when using de-icing salts (calcium and sodium chloride) and brusque cooling down due to low surrounding temperatures. This alternation in temperatures, combined with freeze/thaw cycles (with stresses caused by water cooling down and turning into ice), causes contraction, expansion and crumbling, which in turn deteriorate the joints and substrate. The action of chlorides in the sea-salts accelerates deterioration in porous cementitious matrixes.



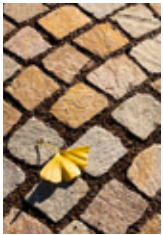
## DESIGN AND INSTALLATION

Modern stone road surfaces must be developed and then designed as structures that are meant TO LAST over the years, similar to any other vertical structure. With this in mind, choosing the most suitable installation system is fundamental. Also, using only expert workers qualified in the installation of stone is a key factor to ensure that this type of system is installed correctly. If unsuitable installation systems or methods are chosen, the service life of stone road surfaces will be shortened.





# MAPEI SOLUTIONS



## MAPESTONE JOINT

**Mapestone Joint** is a one-component, solvent-free, non-flammable, sound absorbing, polyurethane binder with a characteristic odour, used for grouting joints for flexible and pervious architectural stone paving, particularly resistant to de-icing salts, to thermal shock and to acids; it allows opening to vehicular traffic in short times (48 hours after placing at +20° C). **Mapestone Joint** is available in 25 kg tanks, 200 kg drums and 1000 kg IBC containers.

**Mapestone Joint Cleaner** is the new specific cleaner and thinner for **Mapestone Joint**. It is used to remove resin residues that deposit on stone architectural paving during joint grouting made with **Mapestone Joint**. It is also efficient for cleaning the tools after **Mapestone Joint** application. It is preferable to use **Mapestone Joint Cleaner** before the residues harden. **Mapestone Joint Cleaner** is available in 5 l tanks.



Fill the grouts with **Mapestone Joint** resin



Clean product residues with **Mapestone Joint Cleaner**



Resin-grouted blocks





CROSS SECTION OF A BLOCK PAVING GROUTED WITH MAPESTONE JOINT

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



## TECHNICAL ADVANTAGES

- FLEXIBLE SYSTEM
- PERVIOUS CAPACITY
- RESISTANT TO FREEZING WEATHER, DE-ICING SALTS, SEA-SALTS AND SEA SPRAY

## ECONOMIC ADVANTAGES

- HIGHLY DURABLE FINISHED WORK
- HIGH RESISTANCE TO THE CLEANING ACTION OF POWER SWEEPERS
- NO WASTE OF MATERIAL
- LESS TIME REQUIRED FOR ROAD WORKS

## SOCIAL ADVANTAGES

- LOWER MAINTENANCE COSTS
- LESS NOISE
- LESS DISRUPTION FOR INHABITANTS
- FEWER ACCIDENTS (DUE TO FALLS FROM BIKES, MOPEDS AND HIGH HEELS)





## MAPESTONE JOINT BLOCK



System to create elastic and pervious architectural stone paving by applying **Mapestone Joint**.  
For use with **block**, **sett** and **pebble** paving in class P4, P5, P6, P7, P8 and P9.



Install the stone blocks on a bed of 4/8 mm or 3/6 mm coarse stone chippings



After wetting the surface, use a vibrating plate compactor



Fill the grout lines with 3/6 mm stone chippings



Fill the grout lines with **Mapestone Joint**

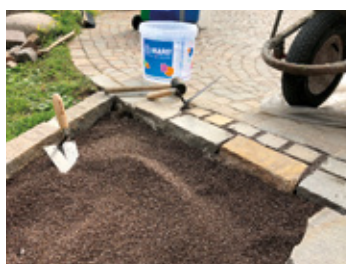




## MAPESTONE JOINT SLAB



System to create elastic and pervious architectural stone paving by applying **Mapestone Joint**. For use with **slab** paving in class P4, P5 and P6.



Prepare and apply the mix made up of 3/6 mm coarse stone chippings and **Mapestone Joint**



Apply **Mapestone Joint** on the back of the slabs



Install and tap down the slabs



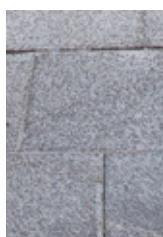
Fill the grouts with 3/6 mm coarse stone chippings and **Mapestone Joint**







# MAPEI SOLUTIONS



## MAPESTONE SYSTEM



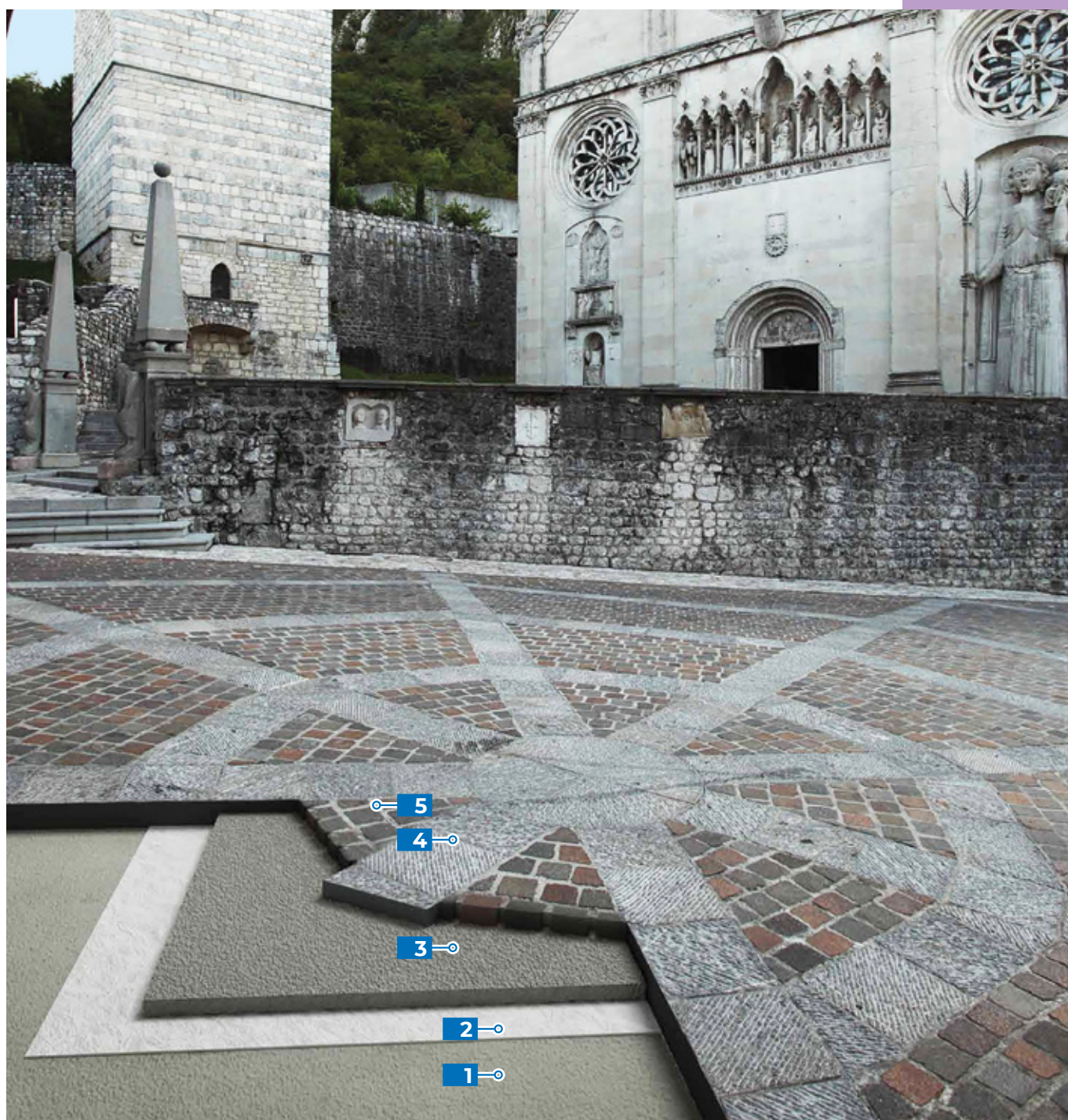
The monolithic **Mapestone System** represents a “turnkey” solution in compliance with UNI 11714-1:2018 standard to obtain durable, long-lasting work resistant to freeze-thaw cycles, de-icing salts and to sea water. Mapei has specifically developed pre-blended cementitious products with exceptional physical-chemical characteristics suitable for areas exposed cyclically to wet and dry periods, as described in exposure class XF4 cementitious products which need only to be mixed with water, made from special binders and selected aggregates, to make architectonic stone paving which is suitable for vehicles. The System includes: **Mapestone TFB 60**, a pre-blended powder mortar, particularly suitable for making screeds and installing stone; **Mapestone PFS**, **Mapestone PFS 2 Flex**, **Mapestone PFS 2 Visco** and **Mapestone PFS PCC 2**, pre-blended powder mortars for grouting joints. **The combined use of these products creates a long-lasting monolithic structure.**





- 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**







# MAPESTONE SYSTEM



## WHERE TO USE

The monolithic **Mapestone System** is used to make architectural stone paving (made from setts, smoller, pebbles, slabs and blocks).

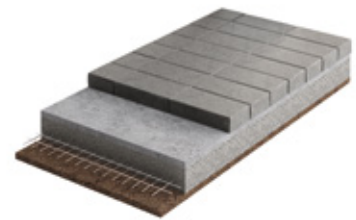
When it is not necessary to meet the requirements for exposure classes XF3, XF4 and XS3, joints may be quickly grouted with **Keracolor PPN**.



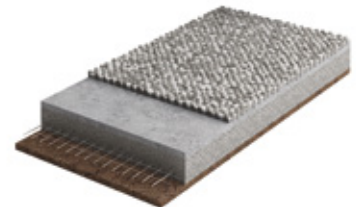
**SAFETY**  
Prevents wear and tear, often the cause of accidents.



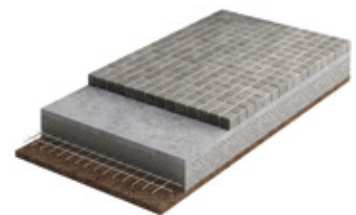
**DURABILITY**  
Withstands the rigours of the most intense road traffic.



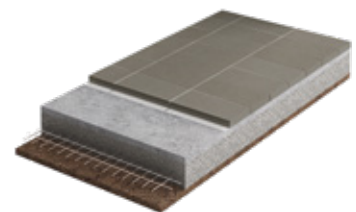
Paving stones



Pebbles



Blocks



Low-thickness slabs







## TECHNICAL ADVANTAGES

- HIGH MECHANICAL STRENGTH
- HOMOGENOUS, UNIFORM PRODUCT
- RESISTANT TO FREEZING WEATHER AND DE-ICING SALTS
- RESISTANT TO SEA SALTS, THAT MEANS DURABLE, LONG-LASTING WORK

## LOGISTIC ADVANTAGES

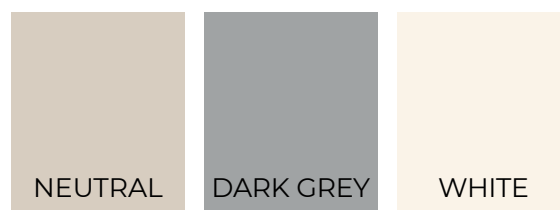
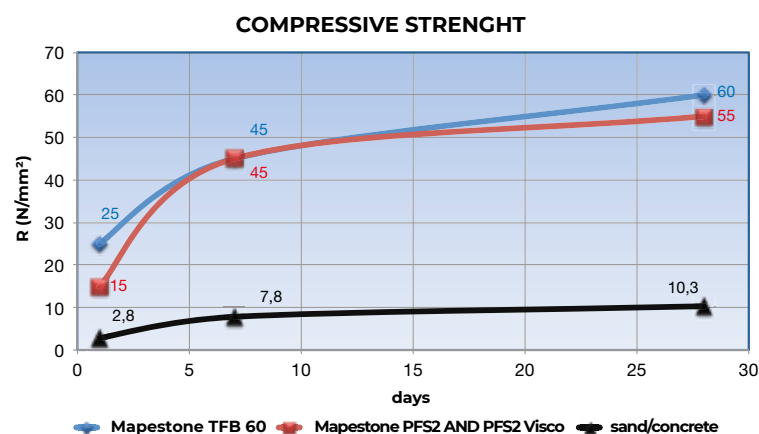
- REDUCTION IN AMOUNT OF WASTE AND OBSTACLES DUE TO ROAD-WORKS
- LOW IMPACT ON THE ENVIRONMENT
- EASY TO CLEAN

## SOCIAL ADVANTAGES

- LOWER MAINTENANCE COSTS
- LESS NOISE
- LESS DISRUPTION FOR INHABITANTS
- FEWER ACCIDENTS (DUE TO FALLS FROM BIKES, MOPEDS AND HIGH HEELS)

## ECONOMIC ADVANTAGES

- HIGHLY DURABLE FINISHED WORK
- REDUCTION IN MAINTENANCE AND/OR REPAIR WORKS
- NO WASTE OF MATERIAL
- LESS TIME REQUIRED FOR ROAD WORKS



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

Due to the printing processes involved, the colours should be taken as merely indicative of the shades of the actual products



# MAPEI SOLUTIONS



## MAPESTONE CALCIX SYSTEM



Pre-blended mortars for screeds and grouting, made from natural hydraulic lime (NHL), inorganic Pozzolanic materials rich in amorphous silica, selected aggregates and specific additives for laying stone paving in areas subject to high pedestrian and light traffic; class P4, P5, P6 and P7 according to UNI 11714-1:2018, with good mechanical strength and resistance to frost. The system is made up of **Mapestone TFB Calcix** bedding screed for stones and grouting mortars **Mapestone PFS Calcix** (light colour) and **Mapestone PFS Tenebris** (dark colour), for their grouting. The combined use of the products makes it possible to realise architectural pavements NOT subject to heavy traffic, in squares, roads and sidewalks in Old Towns present in our countries and cities. The system is ideal for laying pebbles, blocks, smollerli and low-thickness slabs.











## MAPESTONE CALCIX AND SUSTAINABILITY

The high percentage of recycled material allows **Calcix** products to contribute to CAM national sustainability protocols (MEC – Minimum Environmental Criteria) and international protocols such as LEED and BREEAM. The special formulation of the products allows the reduction of greenhouse gas emissions and a lower consumption of mineral resources, while maintaining durability and quality performances intact.







## TECHNICAL ADVANTAGES

- GOOD MECHANICAL STRENGTH
- HOMOGENOUS, UNIFORM PRODUCT
- RESISTANT TO FREEZING WEATHER AND DE-ICING SALTS
- GOOD ADHESION TO STONE MATERIAL

## LOGISTIC ADVANTAGES

- LOW IMPACT ON THE ENVIRONMENT
- EASY TO CLEAN

## SOCIAL ADVANTAGES

- LOWER MAINTENANCE COSTS
- LESS NOISE
- FEWER ACCIDENTS (DUE TO FALLS FROM BIKES, MOPEDS AND HIGH HEELS)
- SUSTAINABLE PRODUCT, THANKS TO ITS SPECIAL FORMULATION

## ECONOMIC ADVANTAGES

- HIGHLY DURABLE FINISHED WORK
- REDUCTION IN MAINTENANCE AND/OR REPAIR WORKS
- NO WASTE OF MATERIAL
- LESS TIME REQUIRED FOR ROAD WORKS

# SOME WORKS CARRIED OUT WITH MAPESTONE SYSTEM

Via Aquileia,  
Udine (Italy)



San Giovanni  
in Persiceto (Italy)



Assisi (Italy)



Old town of Orte  
(Italy)



Pedestrian zone in  
the old town of Košice  
(Slovakia)







◀ Old town of Matera  
(Italy)

Parisian Hotel,  
Macau (China)



Largo Magnanapoli  
Rome (Italy)



▲ Hôtel de Ville  
Vincennes,  
Paris  
(France)

◀ Piazza Palazzo del Cinema,  
Lido di Venezia (Italy)



◀ Via De' Cerretani  
Florence (Italy)

▲ Piazza Unità d'Italia,  
Tradate (Italy)

# EVERYTHING'S OK, WITH MAPEI

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