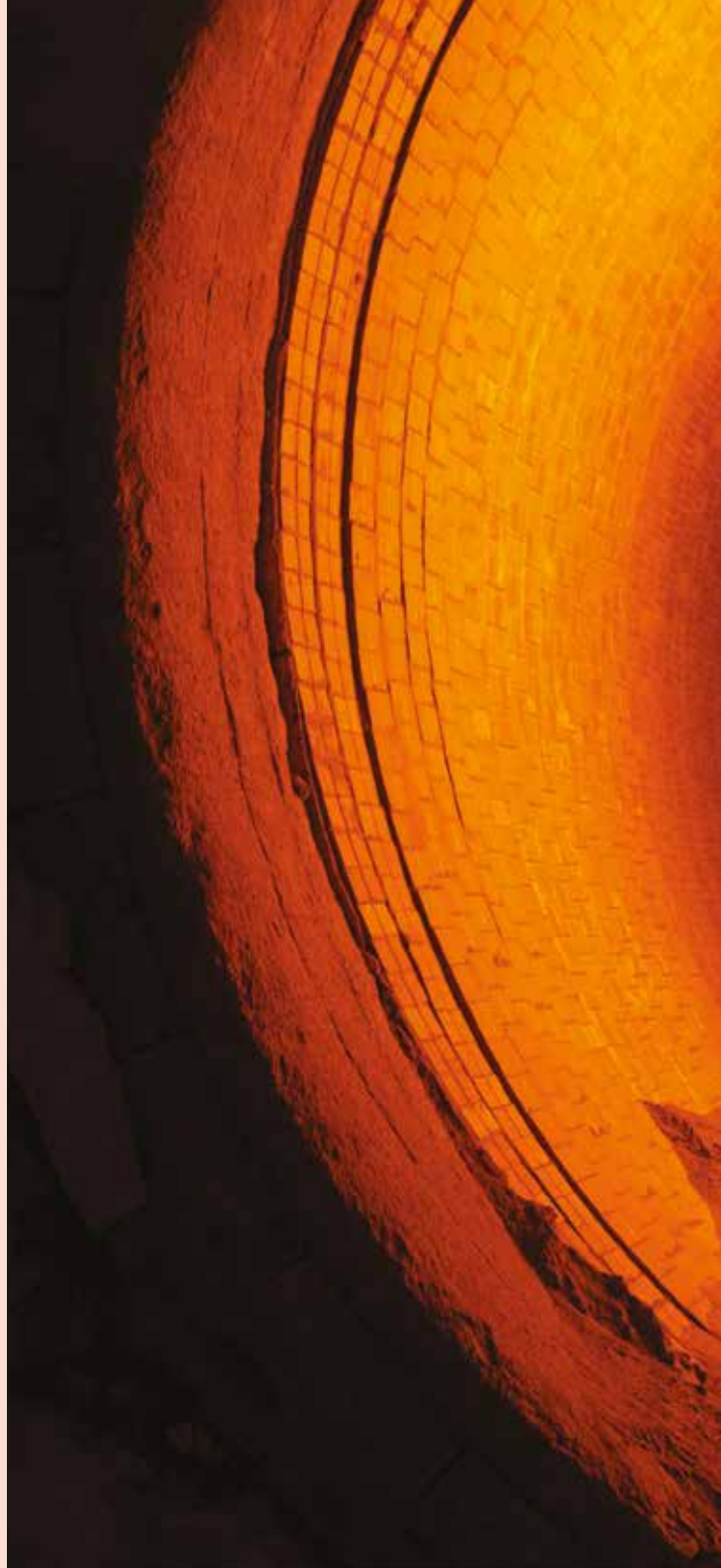




RESTORATION, RENOVATION AND CONSOLIDATION

Pure natural lime-based mortar and technical solutions for historic buildings





There is something magical in picking a stone from the Earth, demolishing it with fire, shaping it with water according to art and ingenuity, and regaining it solid and tenacious as originally under the influence of air: a constructive practice and a philosophy as old as man.

Empedocle (482-426 BC)
The lime processing cycle
Taken from *Sulla Natura*

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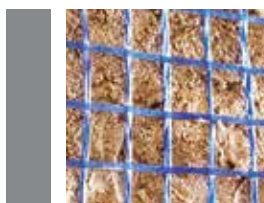
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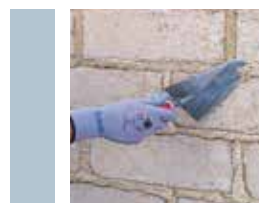
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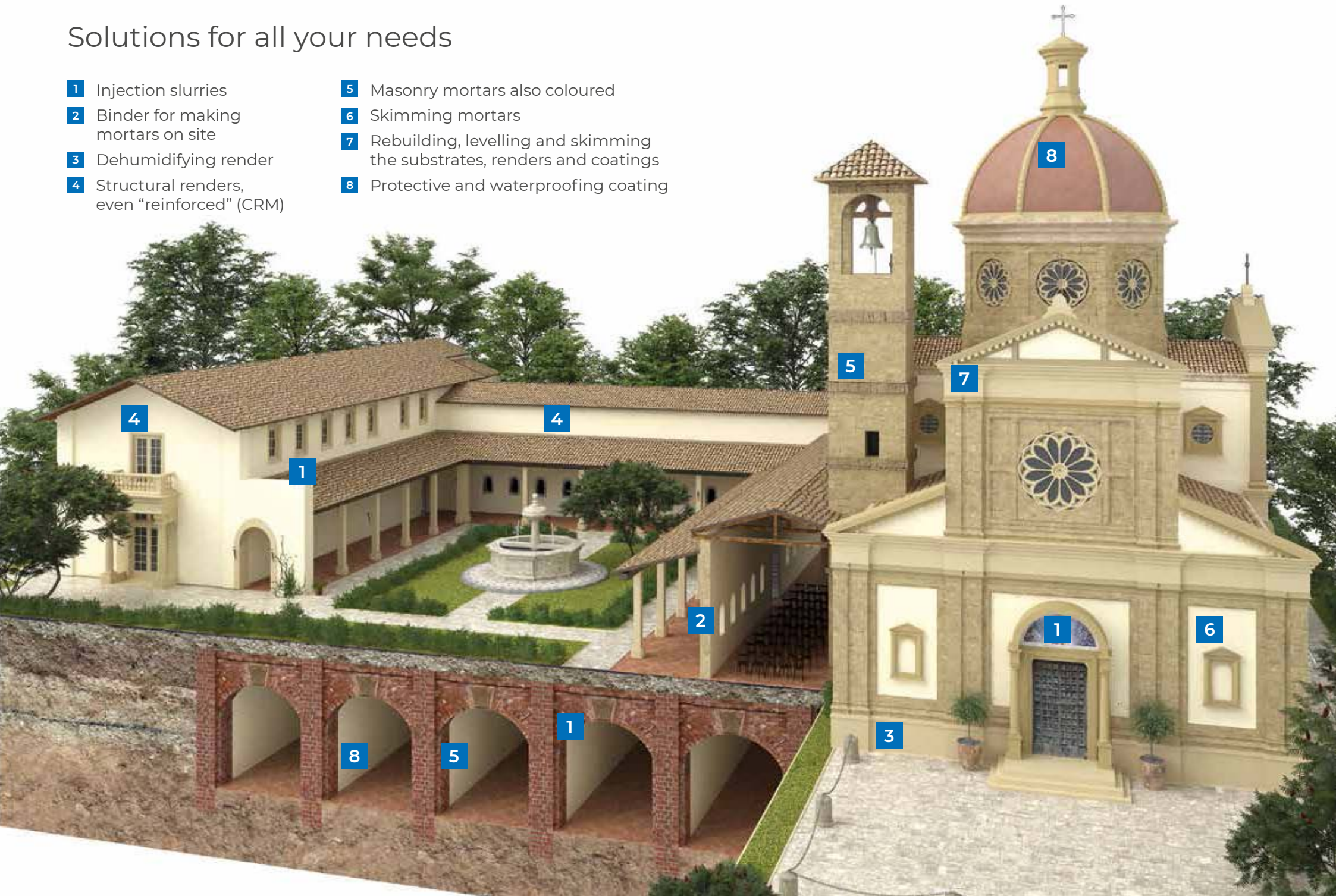


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Solutions for all your needs

- 1 Injection slurries
- 2 Binder for making mortars on site
- 3 Dehumidifying render
- 4 Structural renders, even "reinforced" (CRM)
- 5 Masonry mortars also coloured
- 6 Skimming mortars
- 7 Rebuilding, levelling and skimming the substrates, renders and coatings
- 8 Protective and waterproofing coating



Recover an ancient knowledge

Lime and Pozzolan

The first documented evidence of the production and application of lime dates back to the Roman era. It is thanks to the publication of *De Architectura* by Vitruvius, around 13 B.C., that details have been passed down through the ages about not only the amount of lime and sand to be mixed together, but also on the preparation of hydraulic lime made by combining aerated lime with sand and purple-red volcanic tuffs; these ones have been taken from the Naples area, mainly Pozzuoli, from which the name “**pozzolan**” is derived (from its Latin name pulvis puteolana).

Pozzolan is a type of sand which seems to come from crushed pumice and porous lava spewed out by Vesuvius and other volcanic eruptions, and then spread by the winds over a considerable distance. This material took its name from the city of Pozzuoli, from where it would seem the Romans took the first batches and used it for the first time.

(Vitruvius, Book II, Chapter VI)

Lime production

Today, apart from the different types of oven used and the way it is “slaked”, the production of lime is not different from the system used in the past. In fact, the **production of lime** consists in breaking up selected limestone into rough chunks and then baking it at a high temperature (calcination takes place at around +900°C).

This type of stone is extremely common and has a high calcium carbonate (CaCO_3) content, around 95%, and less than 5% of impurities (mainly clay, as well as smaller traces of silica, iron oxide, magnesium carbonate, etc.), in particular, the clayey one.

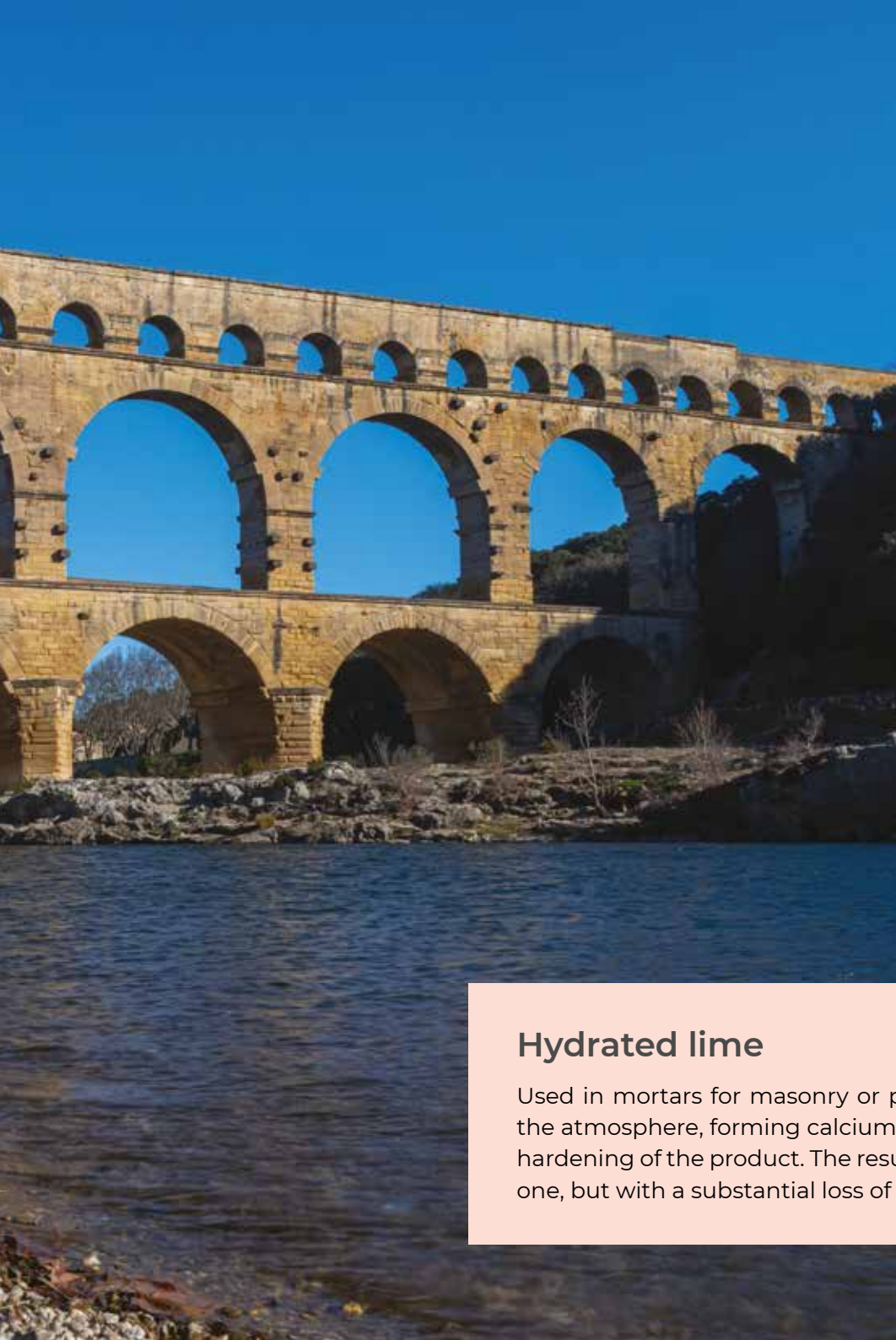
This process forms calcium oxide (CaO), also known as **quicklime**, and carbon dioxide. The **quicklime** is then made to react with water through a hydration process which generates a large amount of heat.

This process is known as **slaking the quicklime**. The material resulting from



A bit of history

The preparation of mortar using aerated lime and volcanic sand, however, dates back to the **Phoenicians**, who were known as a highly advanced civilisation, and to which the melting and smelting of metals is attributed. The knowledge about the production processes and use of lime binders was passed down to the Cretans and Etruscans and then to the Romans, who made wide use of it. It was the Romans who made improvements to the application phases and techniques of mortar, as well as to the various mixing ratios of the ingredients of mortar.



this process, known as **slaked lime**, is nothing more than hydrated lime [$\text{Ca}(\text{OH})_2$ – calcium hydroxide].

Pozzolanic reactivity

When hydrated lime is mixed with volcanic sand, pumice, fossil fragments and tuff (natural pozzolan), or pottery (artificial pozzolan) or flying ashes, silica fumes and blast furnace slags (synthetic pozzolan), it develops **hydraulic properties** and, therefore, it has the capacity to set and harden in water. This process consists of a chemical reaction between **calcium hydroxide** $\text{Ca}(\text{OH})_2$ and **silica** (SiO_2) or **alumina** (Al_2O_3), if required, which are present in the pozzolan, and with **water**, to form **calcium silicate hydrates** (C-S-H) and **calcium alumina hydrates** (C-A-H) which are stable in water. This reaction named **pozzolanic activity** or pozzolanic behaviour, is rather slow, and determines both the hardness of the mortar and higher **mechanical strength**, higher than the one of the lime itself. The combined use of lime and pozzolan or terracotta guaranteed, therefore, that the mortar used in the past became particularly hard, so that today we can still admire imposing infrastructures which are still **standing after so many centuries**, such as roads, bridges and aqueducts, along with villas and monuments, all constructed during the period of the **Roman Empire**.

Hydrated lime

Used in mortars for masonry or plaster, paints or coatings, hydrated lime reacts with carbon dioxide, present in the atmosphere, forming calcium carbonate again. This process, the **carbonation of lime**, is very slow and leads to hardening of the product. The result, from the chemical-physical point of view, is a compound similar to the original one, but with a substantial loss of volume, due to the evaporation of water.

Eco-Pozzolan

From tradition to innovation

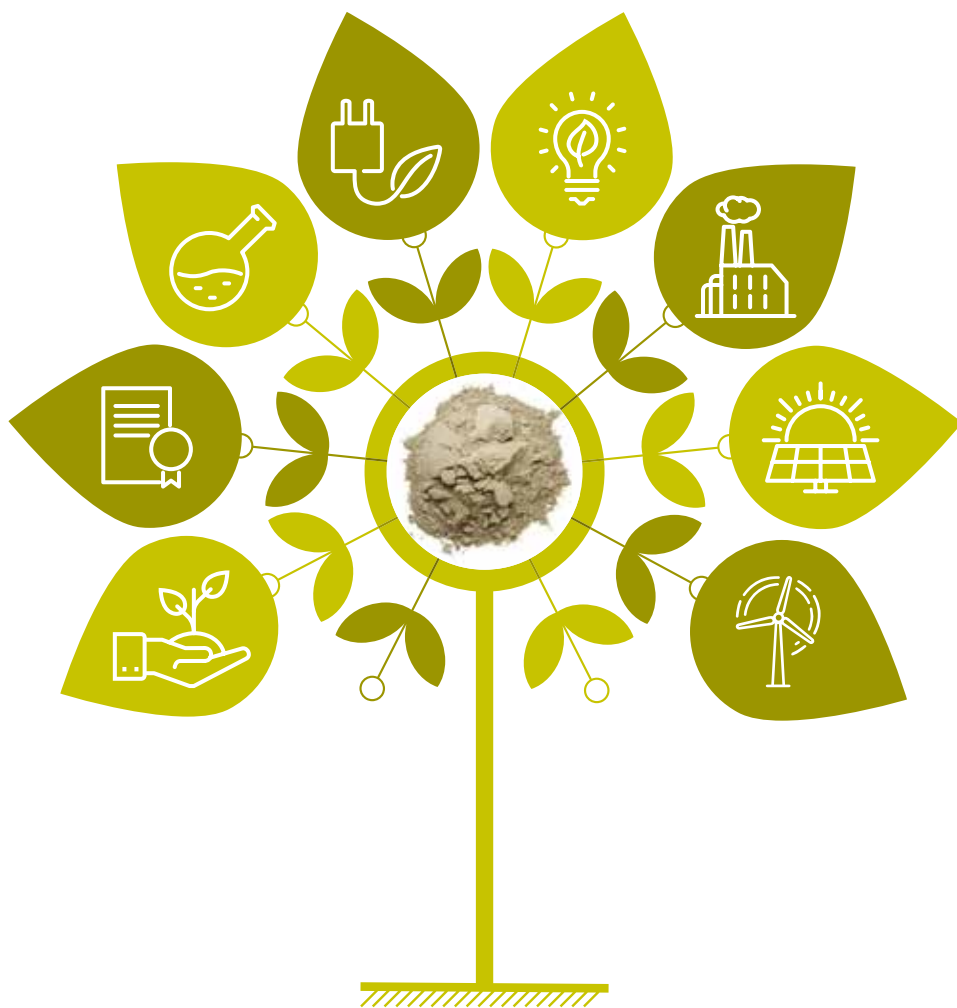
The extraordinary performance characteristics of lime combined with natural pozzolan or terracotta has inspired the **Mapei Research & Development Laboratories** into developing innovative products and systems for the restoration of buildings, including those of historical and artistic interest, using “modern” pozzolanic materials. The result of the research work carried out is the use of a special product with a pozzolanic reaction, Eco-Pozzolan; a very light coloured inorganic material particularly rich in amorphous silica, with a highly-reactive, large specific surface area. Thanks to these characteristics, **Eco-Pozzolan** has the capacity to set off the hardening process of the lime after a very short time, unlike in the past when the process was extremely slow, so that restoration mortar and injection slurries are **highly resistant to soluble salts** just a few days after application.



Bio-construction

Used for the first time in Germany - Baubiologie - and then introduced in Italy at the beginning of the Nineties, it identifies a process whereby the attention is no longer on the building itself, but rather on its intended use. Bio-construction is based on the concept that man, buildings and the environment must live in perfect synergy and harmony. In fact, the suffix bio means “in favor of life” and, therefore, the term bio-construction in the everyday language means the use of technology and materials that respect people and their health, along with the environment in which new constructions are localized.





Two other words go hand in hand with bio-construction:

- **eco-sustainability** (which refers to the environment)
- **bio-compatibility** (which refers to our health).

It is precisely with their attention towards the environment on the one hand and the requirements of the modern building industry on the other, and particularly to improving living comfort, that the **Mapei** Research & Development Laboratories have evaluated the characteristics of an eco-sustainable material to construct by limiting the consumption of non-renewable resources, reduce its impact on the environment to a minimum and, at the same time, be bio-compatible by containing no volatile organic compounds (VOC). The product is Eco-Pozzolan.

Eco-Pozzolan characteristics

Eco-Pozzolan is an eco-sustainable material, in that “its sustainability” is inversely proportional to the amount of energy consumed. In fact, it is a product which is already present on the market and is the result of previous processes. As a result, it may be used without consuming any more energy either to produce it or make it suitable for use.

Also, **Eco-Pozzolan**, as volcanic sand and terracotta, has all the right properties to make a system based on lime, which we know is an aerated binder, into a hydraulic system. If combined with lime, this light-coloured product, particularly rich in amorphous silica with a highly-reactive large specific surface area, has the capacity of setting off the hardening process of the material after a very short time, reacting with the “free” lime present and completely “consuming” it after just a few days.

Apart from the hardness of the mortar, this reaction also makes the mortar stronger, homogenizes its chemical and physical characteristics, makes it insensitive to the leaching action of rain and gives it **high chemical resistance** to both aggressive atmospheric agents and soluble salts.

Safety and sustainability

The importance of Safety Data Sheets

The safety data sheet is a **legal document** that has the fundamental purpose of providing information necessary to protect the environment and the health of operators. In addition, it provides information such as the presence of Portland cement or the type of aggregates used, useful to the designer and restorer to know and consequently choose the most suitable product compatible with the characteristics of the support, as well as consistent with the application to be performed. Safety data sheet should not be confused with the technical data sheet. Provided by the companies, the **technical data sheet** describes the performance characteristics of the product, offers indications on how to apply the product and commercial information.



Lime: a sustainable material

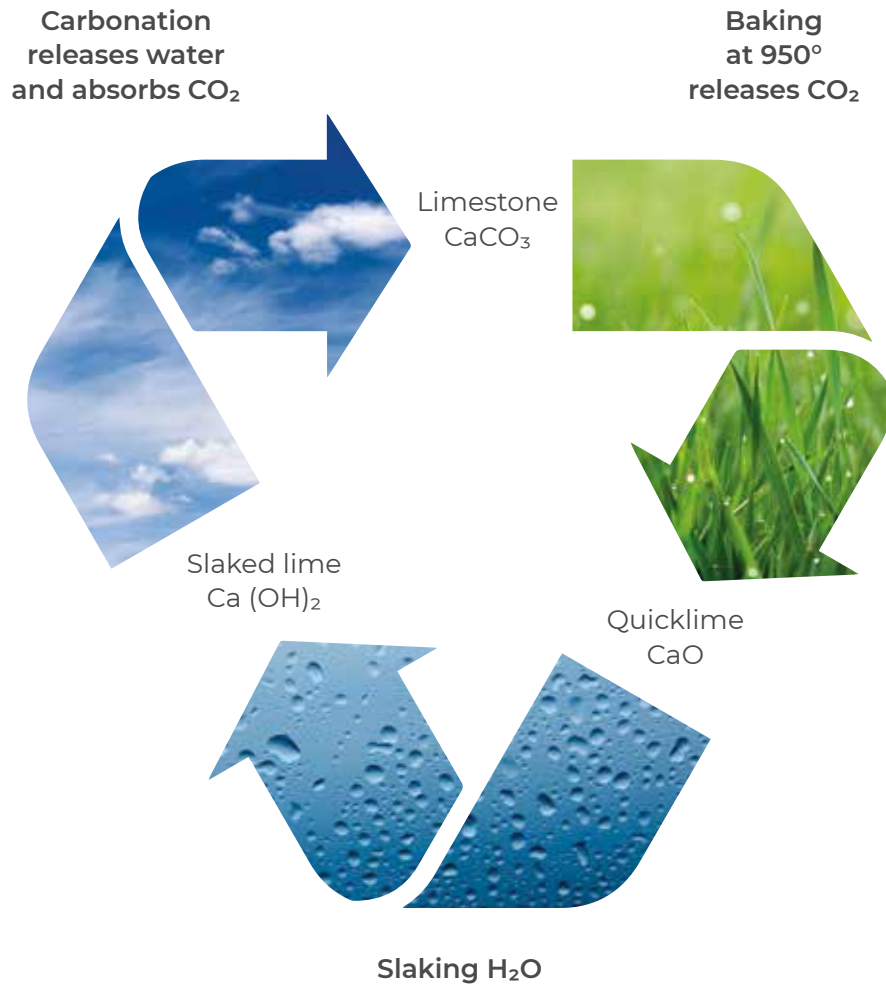
Lime is a material that fully respects the principle on which the concept of sustainability is based: the amount of resource used must not exceed the amount of regeneration of the same. The raw material, **limestone**, is easy to find among the most widespread lithologies that make up the earth's crust.

The estimated amount in nature of this sedimentary rock is about 875 million billion tons, and its natural regeneration is in the order of about 500 million tons per year.

The **world's annual lime production** is estimated at about 117 million tons, and 209 million tons are consumed per year.

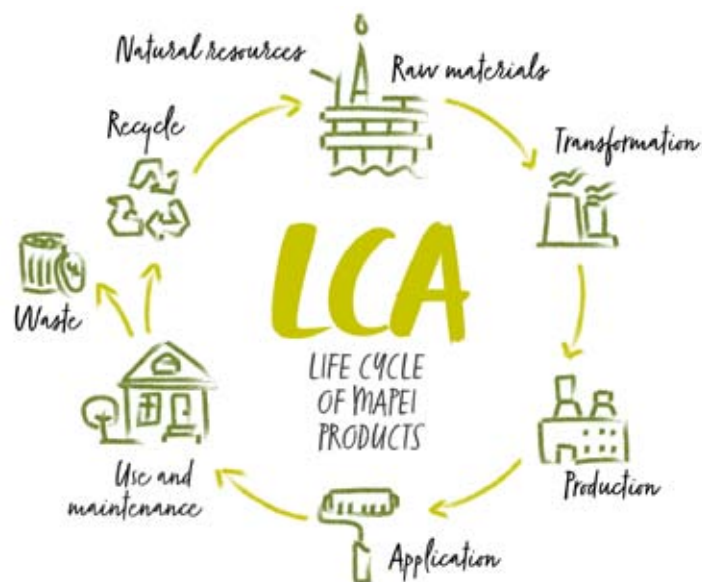
Lime is an inexhaustible source of matter for sustainable architecture. A further interesting contribution to the balance of the ecosystem is made in the last step of the «lime cycle».

During the carbonation process the lime, in the form of render, mortar, and paint, this material has the ability to **reabsorb a good part of the carbon dioxide released** in the production phases, thus reducing the emission of pollutants into the atmosphere.



EPDs and minimum environmental criteria

EPDs (Environmental Product Declaration) are used to document the effects a product has on the environment throughout its entire life cycle and **Mapei** is in possession of this type of certification for many of its solutions. Its main purpose is the transmission of complete, verifiable, accurate, and non-misleading information regarding the environmental aspects of construction products. EPDs are voluntary and provide useful information for the design, and evaluation of construction products and for making comparisons between different references when subjected to the same conditions. They are needed, for example, in the design, construction, and management phases of a green building. The EPD provides quantitative data on the environmental profile of a product, calculated according to **Life Cycle Assessment** procedures. Verified by an independent body, these labels are essential because they facilitate the comparison between different products since they require compliance with a certain format in the communication of data.





EPDs are also required in all green ratings worldwide, such as LEED and BREEAM.

The healthiness of indoor environments

All **Mapei** materials are also studied according to their interactions with the external environment and many are marked GEV EMICODE®. Issued by GEV (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte), **GEV EMICODE®** is a voluntary label related to **emissions of volatile and semi-volatile organic compounds** (VOCs and SVOCs). In particular, VOCs, (Volatile Organic Compounds), are volatile organic substances that, at room temperature and normal pressure, can pass from the liquid to the gaseous state. VOCs can be released in the building by different materials:

- furnishing elements containing organic substances (chipboard panels, fabrics, plastics, wood, wool, perfumes, scented candles, room sprays);
- building materials.

By means of mass spectrometry (MS) and gas chromatography (GC), high-sensitivity laboratory analytical procedures, even minimal traces of VOCs in the air can be identified and quantitatively determined. Emissions of materials are measured in special test chambers from which, after a predetermined period of time, air samples are taken and analyzed. From the sum of the individual concentrations of VOC the **TVOC** value (total concentration of VOC) is obtained. By measuring this parameter, **Mapei** promotes the safety of consumers, installers and the environment also in the field of restoration and renovation mortars.

Mape-Antique range

Technology that respects tradition

The combined use of lime and Eco-Pozzolan has led Mapei to formulate a specific range of dedicated products called **Mape-Antique, cement-free**, for the consolidation and restoration of brick, stone, tuff and mixed masonries, including the masonries of buildings of historical or artistic interest.

The products in the **Mape-Antique** range have physical and mechanical characteristics similar to masonry and render mortars used in the past and, as such, they are more compatible with any type of original structure. At the same time, they have high mechanical strength and resistance to the aggressive chemical action from both the environment, such as acid rain, freeze-thaw cycles and pollutant gases and from within the masonries themselves, such as soluble salts and damp.

Most of the products in the **Mape-Antique** range are highly transpirant and porous. Thanks to their **macroporous structure** (Picture 1) they encourage the evaporation of water from the masonries compared with traditional cementitious or lime-cement render mortars. This process allows damp structures to dry off and provide **healthier, more comfortable surroundings**. Also, if soluble salts are present in the masonries, they crystallize in the macropores (Picture 2) without generating stresses which could potentially deteriorate the renders.



Picture 1

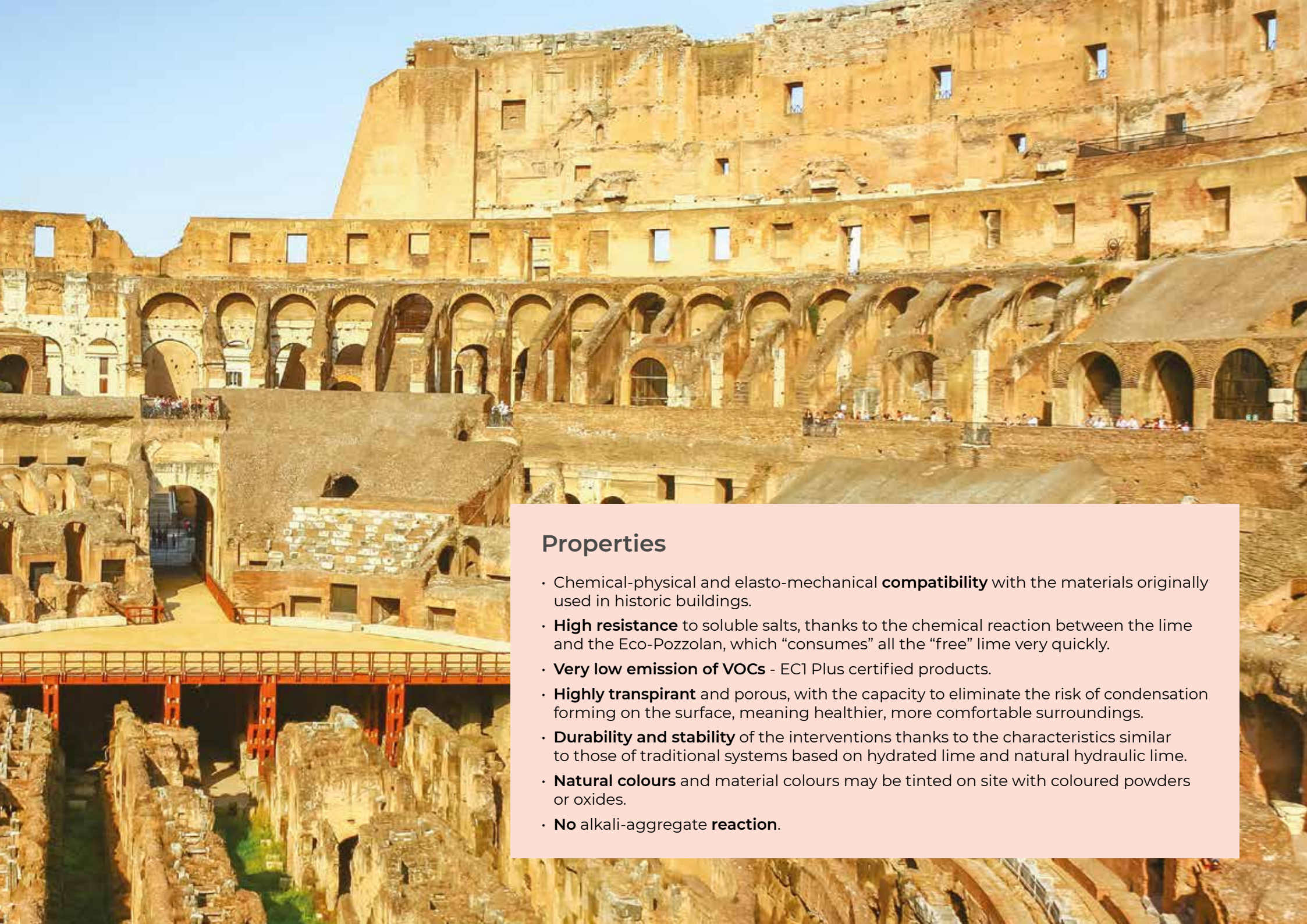
Macropores in dehumidifying mortar from the **Mape-Antique** range.



Picture 2

Crystallisation of salts in the macropores of dehumidifying mortar from the **Mape-Antique** range.





Properties

- Chemical-physical and elasto-mechanical **compatibility** with the materials originally used in historic buildings.
- **High resistance** to soluble salts, thanks to the chemical reaction between the lime and the Eco-Pozzolan, which “consumes” all the “free” lime very quickly.
- **Very low emission of VOCs** - EC1 Plus certified products.
- **Highly transpirant** and porous, with the capacity to eliminate the risk of condensation forming on the surface, meaning healthier, more comfortable surroundings.
- **Durability and stability** of the interventions thanks to the characteristics similar to those of traditional systems based on hydrated lime and natural hydraulic lime.
- **Natural colours** and material colours may be tinted on site with coloured powders or oxides.
- **No alkali-aggregate reaction.**





Picture 3

Micrograph of ancient mortar. Notice how the amorphous mass is completely carbonated.



Picture 4

Micrograph of **Mape-Antique** mortar after 8 days of "ageing". Notice the rounded structure typical of a stabilised system.

Repair works

Unlike mortars normally used for repair work, such as those made from hydraulic lime and natural hydraulic lime which has levels of residual "free lime" for longer, and which also harden through a process of carbonation (see EN 459-1), the reaction between lime and Eco-Pozzolan forms silica-alumina compounds whereby the "free" lime is completely "consumed" after just a few days, so that restoration mortar and injected slurries are completely resistant to soluble salts usually present in the masonries. The mortars mentioned previously, however, even if they are sufficiently porous and mechanically compatible with the materials originally used, are not immune to the risk of aggression from chemicals.

In fact, the "free" lime contained in these materials may chemically react with the sulphates in the masonries and with C-A-H (calcium alumina hydrates) and C-S-H (calcium silica hydrates) in the original mortar or in mortar used for repair, to produce compounds called ettringite and thaumasite, which then expand and cause the renders to crack and/or crumble.

With the products in the **Mape-Antique** range, on the other hand, this phenomenon does not occur because there is absolutely no "free" lime after just a few days. From a morphological point of view, it is thanks to this particular characteristic that the structure of the products from the **Mape-Antique** range is similar to that of "historical mortar" made from aerated lime and pozzolan, but which only forms after a number of years (Pictures 3 and 4).

Mape-Antique NHL ECO range

The innovation of restoration

Mape-Antique NHL ECO is a range of materials based on natural hydraulic lime, **cement-free** designed to give lasting solutions to the problems that affect all masonry buildings, even those of value and constrained.

Mape-Antique NHL ECO fully embodies the concepts of eco-friendliness and sustainability as it is composed of materials with very low emissions of volatile organic compounds and has a high recycled content. Furthermore, mortars of which it is composed are produced in efficient plants, with low environmental impact and that exploit renewable energy.

Natural hydraulic lime

Natural hydraulic lime (by regulation marked by the acronym NHL - Natural Hydraulic Lime) is a binder with hydraulic properties, which is produced by cooking marl (impure calcareous rock more or less clayey or siliceous) at low temperature (about 1000° C). At the exit of the oven, it is “turned off” to ambient humidity and then ground.

With this process a powder rich in calcium hydroxide (hydrated lime) and calcium silicates is obtained, the reaction of which determines the hydraulicity of the product. The dicalcium silicates present inside the natural hydraulic lime, in addition to determining its mechanical performance, are able to guarantee total chemical inertia, so as to make this binder similar and compatible with the original structures.

Compatibility is not only chemical but also mechanical, as **Mapei** mortars are formulated to have a low elastic modulus and a gradual hardening process that avoids microcracks, cracks, disintegration and detachment of mortars.



The European standard **EN 459-1:2010** identifies three classes for Natural Hydraulic Lime, depending on the characteristic values obtained of mechanical resistance to compression at 28 days:

- NHL 2 ≥ 2 to ≤ 7
- NHL 3.5 ≥ 3.5 to ≤ 10
- NHL 5 ≥ 5 to ≤ 15

Natural Hydraulic Lime and cement: the differences

Materials that use natural hydraulic lime as a binder offer several advantages:

- **absence** of harmful **water-soluble salts**;
- **excellent compatibility** with historic buildings, with a guarantee of stability and durability;
- **natural raw materials** with low environmental impact;
- **high breathability aimed at avoiding the formation of condensation, mould or bacteria**;
- **free of substances harmful** to health and the environment;
- **very low emission of VOC** (volatile organic compounds).

A sustainable bag

The philosophy of sustainability is also pursued by **Mapei** in the choice to use recyclable paper and cardboard packaging, certified by the **Aticelca** logo on the bags (valid for Italy).

The **Aticelca 501/19** system is the only one recognized by the Italian paper and cardboard supply chain, is an evaluation method capable of determining the level of recyclability of mainly cellulosic materials and products (paper and cardboard). It is based on a laboratory analysis, developed by Aticelca starting from 2011 and which became UNI 11743: 2019 standard in April 2019.

The analysis simulates the main phases of the industrial process of processing the paper to be recycled until a new sheet of paper is produced. The result of the laboratory test, which analyzes the main elements that characterize the recyclability of paper and cardboard and the products obtained with them, thanks to the Aticelca evaluation system is summarized by an index expressed by the letters A +, A, B and C, being A + the highest level of recyclability.

An important element for eco-sustainability, this packaging also allows to reduce the costs of disposal of the packages and therefore in general the expenses for the construction of the entire project.



A history of construction sites

1992

Rocca
di San Floriano
San Floriano
(Gorizia) - Italy



1993

Ancient building
in Bagnacavallo
(Ravenna) - Italy



Ancient
apartment block
in Pisa - Italy

1994



1995



Church of Santa
Giulia, Livorno
Italy

San Paternian
Bridge, Venice
Italy



Cathedral of
Santa Margherita
Montefiascone
(Viterbo) - Italy

1996



Basilica
of Saint Francis
of Assisi - Italy

Spilberk Brno
Castle
Czech
Republic

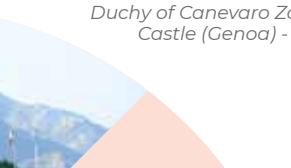
1997



1998



1999



Duchy of Canevaro Zoagli
Castle (Genoa) - Italy

2000



Palazzo Bonini
Massa Carrara
Italy

2001



Ancient building
in Florence
Italy

Mirò Hotel
Rapallo (Genoa)
Italy

Acaya Castle
Venerole (Lecce)
Italy

2002



National School
of the Arts
Havana - Cuba

2003



Basilica of
Sant'Ambrogio,
the Passion
Oratory
Milan - Italy

2004



Cambrai
Railway
station
France

2005



Palazzo
Zaccagna
Carrara
(Messina) - Italy

2006



Palazzo dei
Normanni
Palermo - Italy

2022





*Rialto Bridge Venice
Italy*

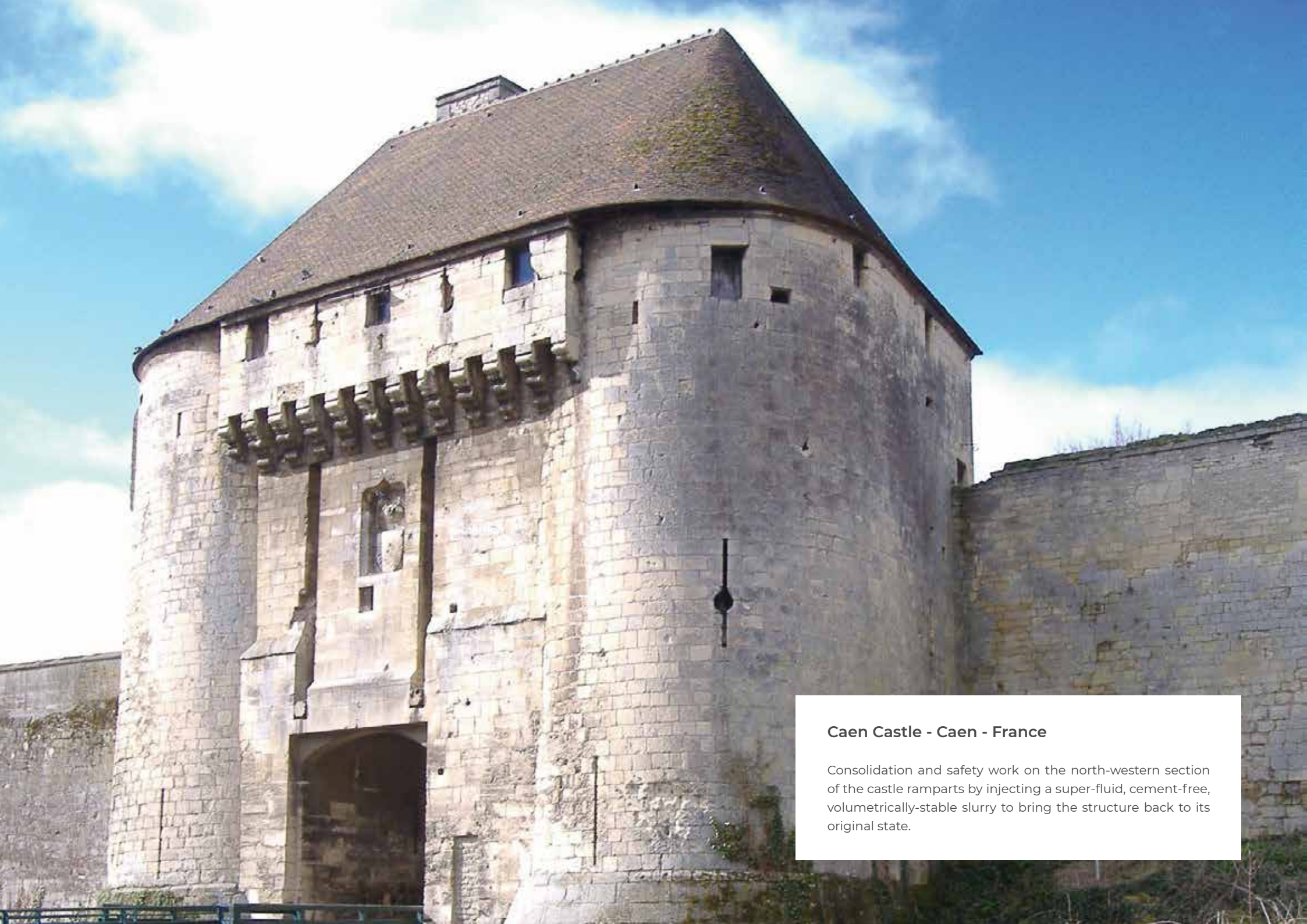
INJECTION SLURRIES



Volumetrically-stable injection slurries allow gaps in masonry, including frescoed substrates, to be filled and to re-bond the layers that form the masonry.

Consolidation of an injured vault

- 1 Brick vault
- 2 Mape-Antique Allettamento
- 3 Mape-Antique F21
- 4 Mape-Antique Intonaco NHL
- 5 Silancolor Base Coat
- 6 Silancolor Tonachino



Caen Castle - Caen - France

Consolidation and safety work on the north-western section of the castle ramparts by injecting a super-fluid, cement-free, volumetrically-stable slurry to bring the structure back to its original state.

Mape-Antique I

HYDRATED LIME

DESCRIPTION

Super-fluid, salt-resistant, **cement-free**, fillerized hydraulic binder, **based on lime and Eco-Pozzolan**, for making injection slurries for consolidating masonry.

AREAS OF USE

Super-fluid, **volumetrically-stable** injection slurry with **high resistance to soluble salts for consolidating**:

- foundations, pillars, vaulted roofs and archways;
- rubble masonries;
- stone, brick, tuff and mixed masonries in general of existing buildings with cracks, voids and internal cavities, including buildings with a national heritage protection order and listed buildings;
- masonries with capillary rising damp and soluble salts.

PERFORMANCE DATA

Maximum size of aggregate	100 µm (EN 1015-1)
Bulk density of fresh mortar	1.900 kg/m ³ (EN 1015-6)
Consistency of mix	Super-fluid
Bleeding	Absent (NorMaL M33-87)
Fluidity of mix	< 30 s (initial) (EN 445) < 30 s (after 60 min.)
Compressive strength (after 28 days)	18 N/mm ² (EN 196-1)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence: (after semi-immersion in water)	Absent



Consolidation of "rubble masonry" stone masonry.



Consolidation of a brick parapet wall.

PACKAGING

20 kg bag.

CONSUMPTION

Approx. 1.40 kg/dm³
(of the cavity to be filled).

COLOUR

White.

APPLICATION

Injecting with low pressure pump or pouring.

CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE

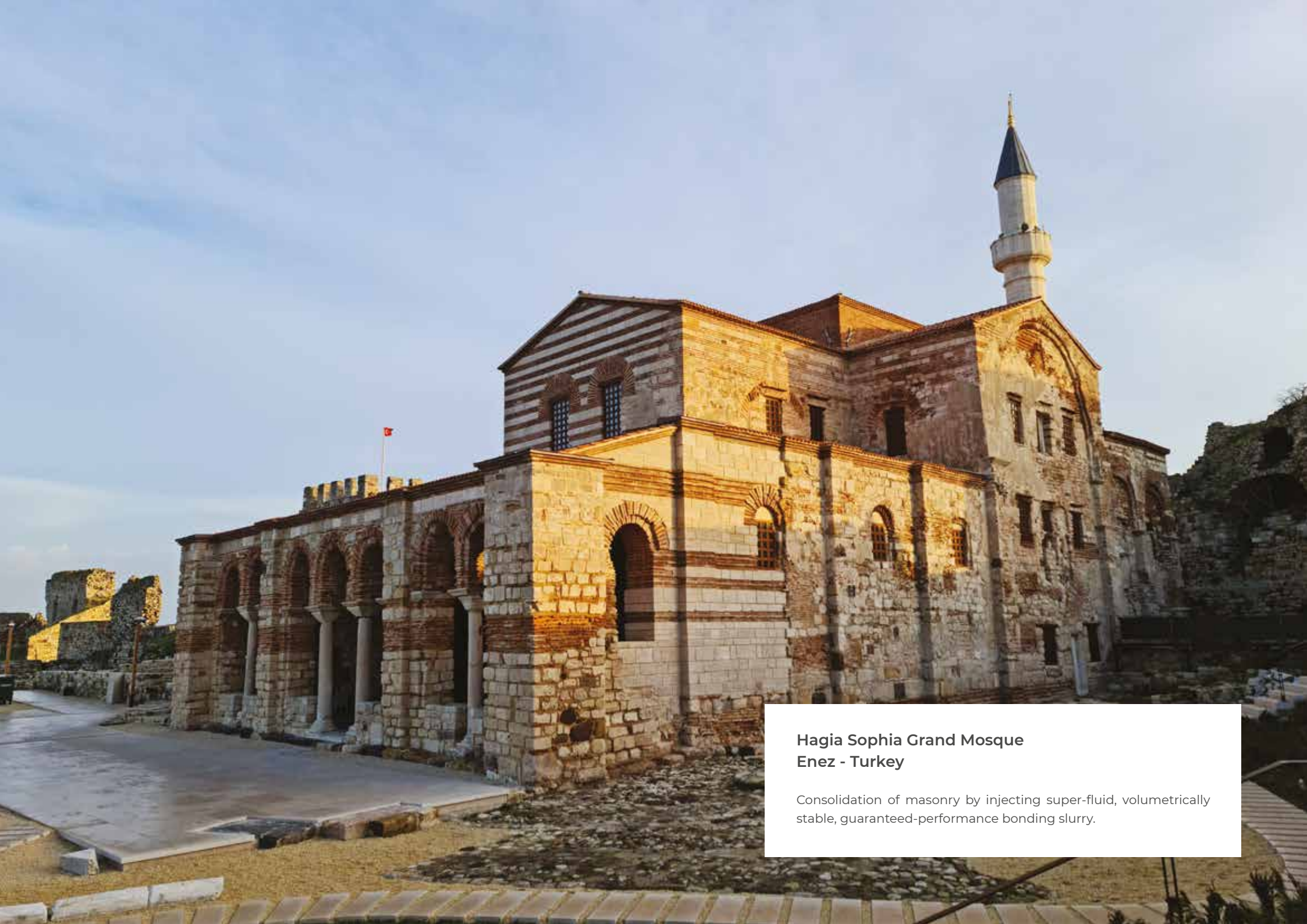


LIME
BASED



EPDs





**Hagia Sophia Grand Mosque
Enez - Turkey**

Consolidation of masonry by injecting super-fluid, volumetrically stable, guaranteed-performance bonding slurry.

Mape-Antique I-15

HYDRATED LIME

DESCRIPTION

Salt-resistant, **cement-free**, fillerized hydraulic binder, **based on lime and Eco-Pozzolan**, for making injection slurries for consolidating masonry.

AREAS OF USE

Super-fluid, **volumetrically-stable** injection slurry with **high resistance to soluble salts** for consolidating:

- foundations, pillars, vaulted roofs and archways;
- rubble masonries;
- masonry in general made from stone, bricks, tuff and mixed materials where cracks, gaps and internal cavities in existing buildings are present, including buildings with a national heritage protection order and listed buildings;
- masonries with capillary rising damp and soluble salts.

PERFORMANCE DATA

Maximum size of aggregate	100 µm (EN 1015-1)
Bulk density of fresh mortar	1.950 kg/m ³ (EN 1015-6)
Consistency of mix	Super-fluid
Bleeding	Absent (NorMaL M33-87)
Fluidity of mix	< 30 s (initial) (EN 445) < 30 s (after 60 min.)
Compressive strength (after 28 days)	15 N/mm ² (EN 196-1)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Fastening the small rubber injection tubes in place with **Mape-Antique Allettamento**.



Injecting with low-pressure pump.

PACKAGING

20 kg bag.

CONSUMPTION

Approx. 1.50 kg/dm³
(of the cavity to be filled).

COLOUR

White.

APPLICATION

Injecting with low pressure pump or pouring.

CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE

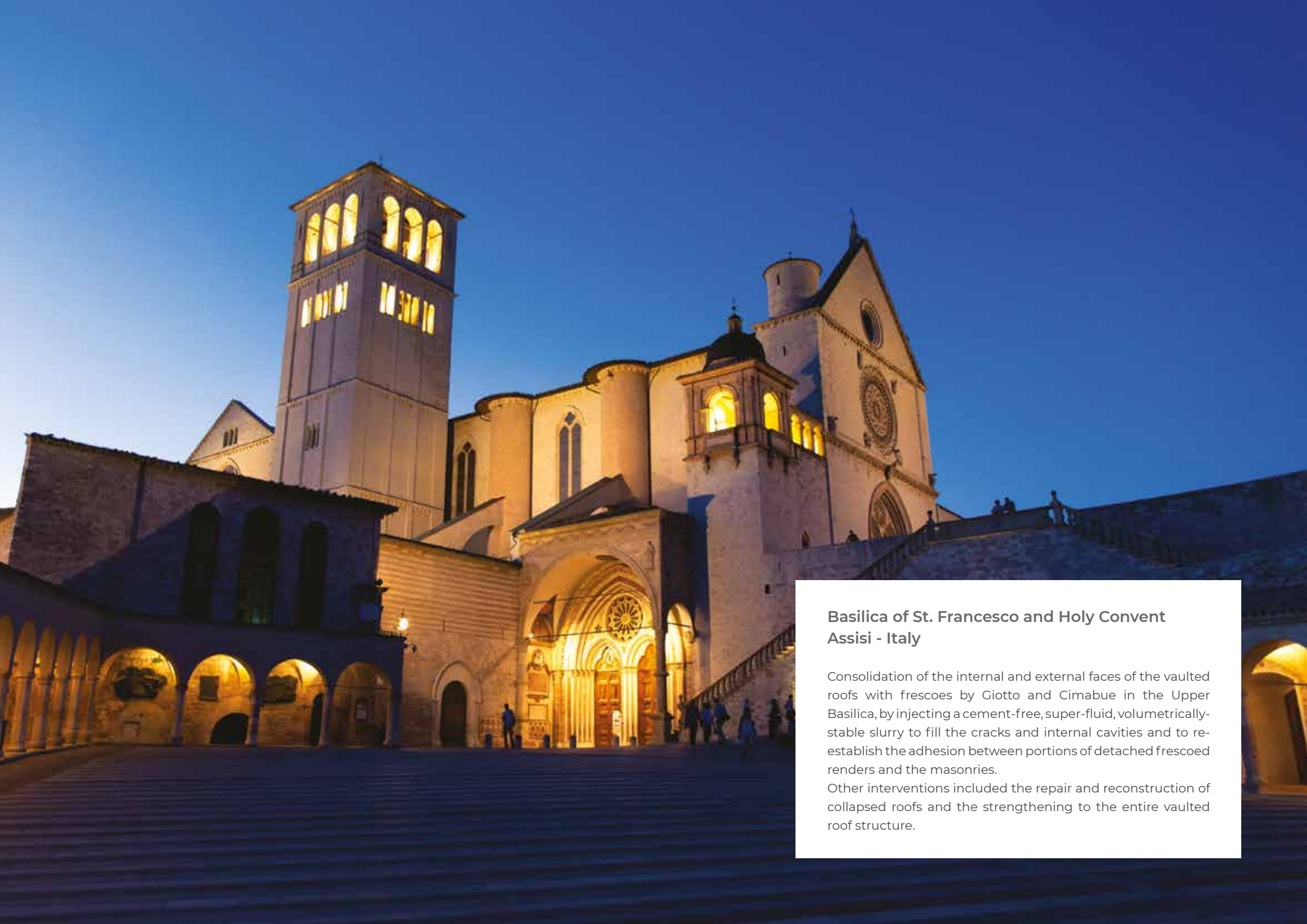


LIME
BASED



EPDs





Basilica of St. Francesco and Holy Convent Assisi - Italy

Consolidation of the internal and external faces of the vaulted roofs with frescoes by Giotto and Cimabue in the Upper Basilica, by injecting a cement-free, super-fluid, volumetrically-stable slurry to fill the cracks and internal cavities and to re-establish the adhesion between portions of detached frescoed renders and the masonries.

Other interventions included the repair and reconstruction of collapsed roofs and the strengthening to the entire vaulted roof structure.

Mape-Antique F21

HYDRATED LIME

DESCRIPTION

Super-fluid, salt-resistant, **cement-free**, fillerized hydraulic binder, **based on lime and Eco-Pozzolan**, for making injection slurries for consolidating masonry and render, including the frescoed one.

AREAS OF USE

Super-fluid, **volumetrically-stable** injection slurry with **high resistance to soluble salts** for consolidating:

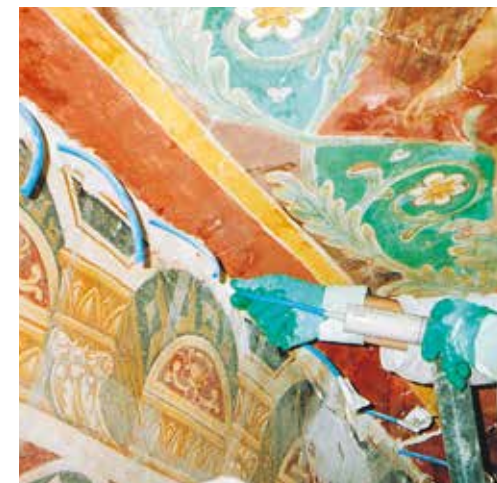
- foundations, pillars, vaulted roofs and archways;
- rubble masonries;
- masonry in general made from stone, bricks, tuff and mixed materials where cracks, gaps and internal cavities in existing buildings are present, including buildings with a national heritage protection order and listed buildings;
- masonries with capillary rising damp and soluble salts.

PERFORMANCE DATA

Maximum size of aggregate	100 µm (EN 1015-1)
Bulk density of fresh mortar	1.650 kg/m ³ (EN 1015-6)
Consistency of mix	Super-fluid
Bleeding	Absent (NorMaL M33-87)
Fluidity of mix	< 30 s (initial) (EN 445) < 30 s (after 60 min.)
Compressive strength (after 28 days)	10 N/mm ² (EN 196-1)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Injection of **Mape-Antique F21** to re-establish the adhesion of decorated render.



Injection of **Mape-Antique F21** to consolidate the adhesion of decorated render.

PACKAGING

17 kg bag.

CONSUMPTION

Approx. 1.04 kg/dm³
(of the cavity to be filled).

COLOUR

White.

APPLICATION

Injecting with low pressure pump or pouring.

CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



LIME
BASED



EPDs



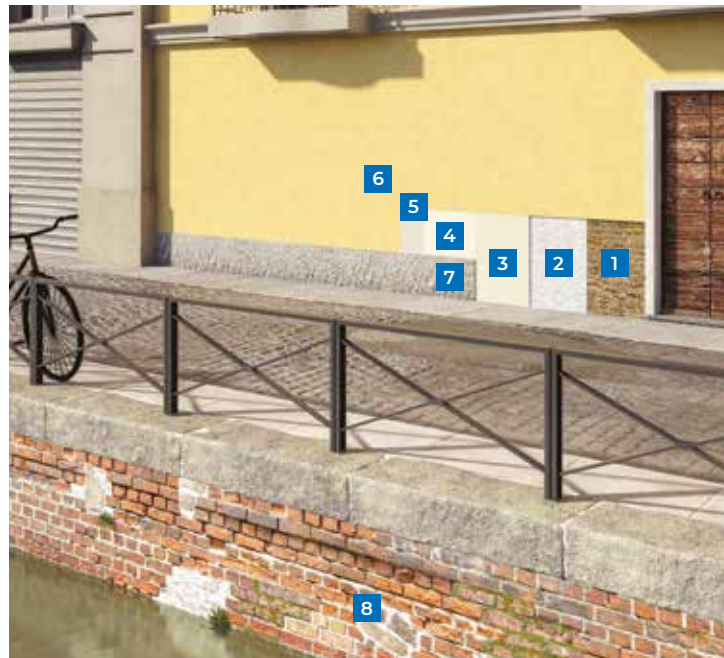


Navigli
Milan - Italy



BINDER

FOR MAKING MORTARS ON SITE



Salt-resistant, hydraulic binder based on lime and Eco-Pozzolan, cement-free, to be mixed with aggregates in various grain sizes to make dehumidifying renders and masonry mortars.

Dehumidifying plastering with strollatura, reconstruction and styling of masonry, also mixed

- 1** Brick masonry
- 2** **Mape-Antique Rinzafo**
- 3** Dehumidifying render with **Mape-Antique LC** and aggregates
- 4** **Mape-Antique FC Civile**
- 5** **Silexcolor Primer**
- 6** **Silexcolor Paint**
- 7** Strollatura with **Mape-Antique LC** and aggregates
- 8** Pointing and reconstructing with **Mape-Antique LC** and selected aggregates



Villa della Porta Bozzolo - Casalzuigno - Italy

Conservative recovery of the stone bleachers with hydrated lime mortars packaged on-site and high-performance fibre-reinforced mortar, based on natural hydraulic lime.

Mape-Antique LC

HYDRATED LIME

DESCRIPTION

Salt-resistant, hydraulic binder **based on lime and Eco-Pozzolan, cement-free**, to be mixed with aggregates in various grain sizes to make dehumidifying renders and masonry mortars.

AREAS OF USE

- **Macroporous, dehumidifying** mortars for the restoration of masonries deteriorated by capillary rising damp and soluble salts on existing buildings, including buildings with a national heritage protection order and listed buildings.
- Masonries **mortars for building** and/or reconstructing stone, brick, tuff and mixed-facing wall.
- Masonries mortars for **pointing between stone**, brick, tuff and mixed “exposed” masonries on **facing walls**.
- Masonries mortar for **touching-up** and **plumbing** facing walls with gaps and/or uneven surfaces.

PERFORMANCE DATA

Mape-Antique LC	500 kg/m ³ Fine sand 0.5-2.5 mm	450 kg/m ³ Coarse sand 0.5-5 mm	400 kg/m ³ Gravel 0-8 mm
Aggregate	1.000 kg/m ³	1.150 kg/m ³	1.300 kg/m ³
Mixing water	225 l/m ³	210 l/m ³	200 l/m ³
Compressive strength (after 28 days)	4 N/mm ²	5 N/mm ²	7 N/mm ²
Adhesion to the substrate (brick)	> 0.3 Fracture pattern (FP) = B (EN 1015-12)		
Reaction to fire	Class A1 (EN 13501-1)		
Resistance to sulphates	High (Anstett test method)		
Saline efflorescence (after semi-immersion in water)	Absent		



Pointing brick masonry.



Application as render on mixed masonry.

PACKAGING

20 kg bag.

COLOUR

White.

APPLICATION

By trowel or by pouring into formwork.

CONSUMPTION

According to the type of mortar to be prepared. Approximate consumption (per cm of thickness): 5.0 kg/m² (with fine sand 0.5-2.5 mm) or 4.5 kg/m² (with coarse sand 0.5-5 mm) or 4.0 kg/m² (with gravel 0-8 mm).

CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



LIME
BASED



EPDs





Villa Pliniana
Como - Italy



DEHUMIDIFYING RENDER



Single-layer render based on pure natural hydraulic lime and traditional dehumidifying system based on hydrated lime, both cement-free, ideal for the dehumidification of buildings, also of historical and architectural value.

Rebuilding existing masonry subject to rising damp

- 1 Mixed-masonry substrate
- 2 Mape-Antique Rinzafo
- 3 Mape-Antique MC
- 4 Mape-Antique FC Civile
- 5 Silexcolor Primer
- 6 Silexcolor Paint



Punta Sottile Lighthouse - Favignana - Italy

Installation of macroporous dehumidifying system based on hydrated lime, highly resistant to aggressive environments and subsequent application of water-repellent breathable coloured coating.

Mape-Antique Rinzafo

HYDRATED LIME

DESCRIPTION

Salt-resistant, transpirant scratch-coat mortar, **based on lime and Eco-Pozzolan, cement-free**, used as first layer when applying dehumidifying, transpirant and “structural” renders. Must be applied as the first layer for installing dehumidifying, transpirant and “structural” renders.

AREAS OF USE

Must be applied as the first layer for:

- internal and/or external macro-porous, dehumidifying renders on existing masonries with capillary rising damp;
- internal and/or external macroporous, dehumidifying renders on stone, brick, tuff or mixed masonries with saline efflorescence;
- dehumidifying renders on masonries in lagoon areas or close to the sea;
- new de-humidifying renders or reconstruction of old lime-based renders on stone, brick, tuff and mixed masonries, including on buildings with a national heritage protection order and listed buildings;
- new transpirant and “structural” renders on particularly difficult masonries, such as in stone or mixed material, or on porous or weak masonries.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	1.850 kg/m ³ (EN 1015-6)
Consistency of mix	Semi-fluid
Porosity of fresh mix	6% (EN 1015-7)
Compressive strength (after 28 days)	> 10 N/mm ² (EN 1015-11) Cat. CSIV
Adhesion to substrate (brick)	≥ 0.7 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Water absorption due to capillary action	Category W1 (EN 1015-18)
Water-vapour permeability coefficient	≤ 30 μ (EN 1015-18)
Reaction to fire	Class E (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Application by trowel on brick masonry.



Application with rendering machine.

PACKAGING

20 kg bag.

CONSUMPTION

Approx. 7.5 kg/m²
(for 5 mm thick layer).

COLOUR

White.

APPLICATION

By trowel or continuous mixing rendering machine.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED MATERIAL



CEMENT FREE



LIME BASED



EPDs





Sacrestia Aquilonare del Duomo - Milan - Italy

The restoration involved the frescoed vaults, all the cracked supports, the grouting of the joints between the ashlar and the remaking of some portions of render degraded by the presence of high levels of soluble salts and the presence of rising damp.

Mape-Antique MC

HYDRATED LIME

DESCRIPTION

Macroporous, salt-resistant dehumidifying render, **based on lime and Eco-Pozzolan, cement-free**, for restoring old masonry, including on buildings of historical interest.

AREAS OF USE

- Internal and/or external macro-porous, de-humidifying render on existing masonries with capillary rising damp.
- Internal and/or external macroporous, dehumidifying renders on existing stone, brick, tuff or mixed masonries with saline efflorescence.
- Dehumidifying render for masonry in lagoon areas or close to the sea.
- New dehumidifying renders or reconstructing old lime-based renders on stone, brick, tuff and mixed masonries, including buildings with a national heritage protection order and listed buildings.
- "Plumbing" and "touching up" facing walls with gaps and uneven surfaces.
- Pointing between rows of stone, brick and tuff on "exposed" masonries.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	1.700 kg/m ³ (EN 1015-6)
Consistency of mix	Plastic-thixotropic
Porosity of fresh mix	> 20% (EN 1015-7)
Compressive strength (after 28 days)	Category CSII (EN 1015-11)
Adhesion to substrate (brick)	≥ 0.4 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Water absorption due to capillary action	3.5 kg/m ² (EN 1015-18)
Water-vapour permeability coefficient	≤ 10 μ (EN 1015-18)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Application by trowel on brick masonry.



Compacting the dehumidifying render with a straightedge.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 15 kg/m²
(for cm thick layer).

COLOUR

White.

APPLICATION

By trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



LIME
BASED



EPDs





Porticoes of the Sanctuary of Caravaggio Caravaggio - Italy

Realisation of macroporous dehumidifying renders, in all the lower areas of the buildings affected by the presence of capillary rising damp, and breathable plasters, on the remaining surfaces. Subsequent application of coating, pigmented on site, low thickness, based on hydrated lime, cement free.

Mape-Antique MC Macchina

HYDRATED LIME

DESCRIPTION

Macroporous, salt-resistant dehumidifying render, **based on lime and Eco-Pozzolan, cement-free**, for restoring old masonry, including on buildings of historical interest.

AREAS OF USE

- Internal and/or external macroporous, dehumidifying renders on existing masonries with capillary rising damp.
- Internal and/or external macroporous, dehumidifying renders on existing stone, brick, tuff or mixed masonries with saline efflorescence.
- Dehumidifying render for masonry in lagoon areas or close to the sea.
- New dehumidifying renders or reconstructing old lime-based renders on stone, brick, tuff and mixed masonries, including buildings with a national heritage protection order and listed buildings.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	1.700 kg/m ³ (EN 1015-6)
Consistency of mix	Plastic-thixotropic
Porosity of fresh mix	> 20% (EN 1015-7)
Compressive strength (after 28 days)	Category CSII (EN 1015-11)
Adhesion to substrate (brick)	≥ 0.4 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Water absorption due to capillary action	3.5 kg/m ² (EN 1015-18)
Water-vapour permeability coefficient	≤ 10 μ (EN 1015-18)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Application by trowel on brick masonry.



Compacting the dehumidifying render with a straightedge.

PACKAGING

25 kg bag.

COLOUR

White.

APPLICATION

Continuous feed rendering machine.

CONSUMPTION

Approx. 16 kg/m² (for cm thick layer).

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED MATERIAL



CEMENT FREE

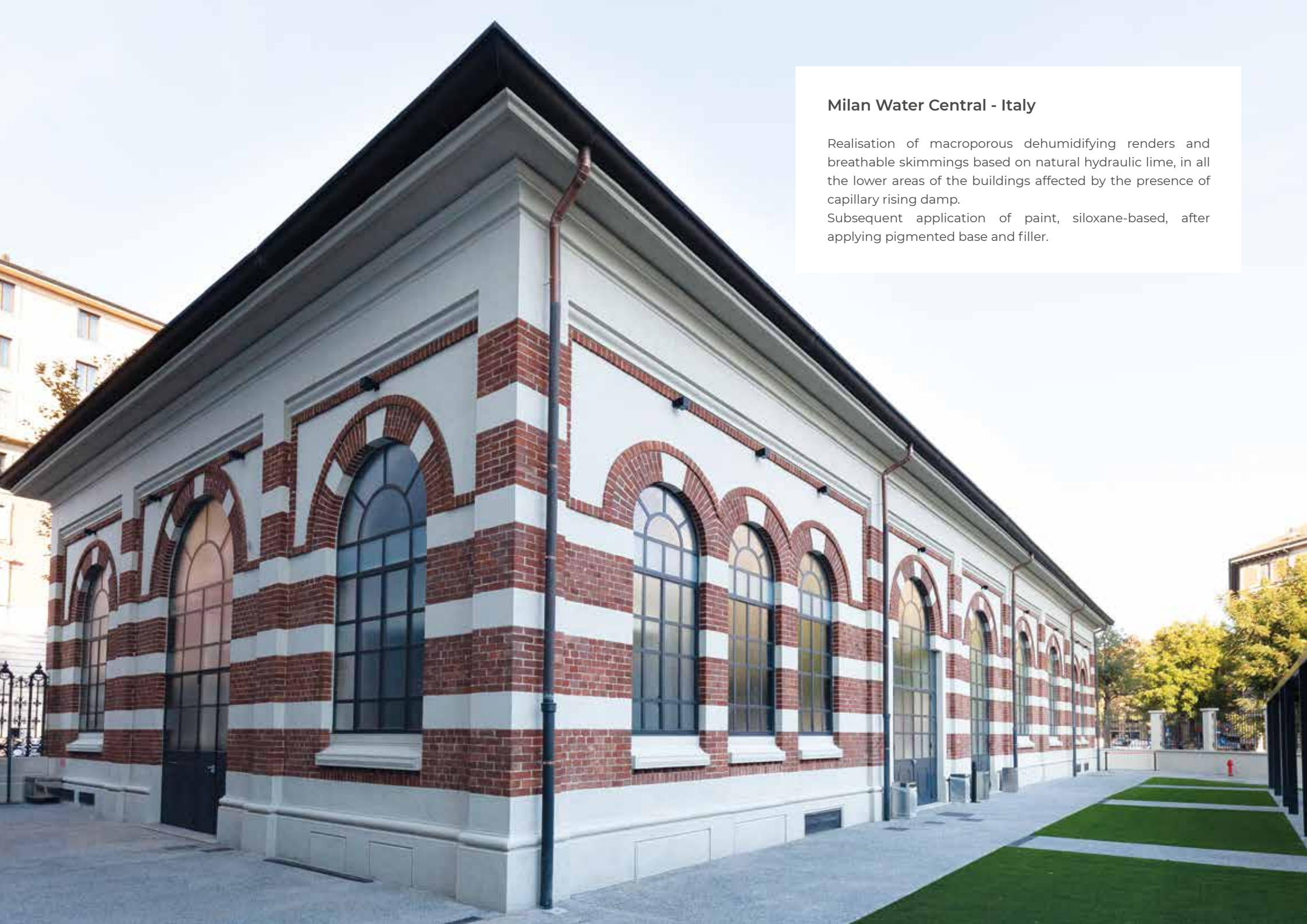


LIME BASED



EPDs





Milan Water Central - Italy

Realisation of macroporous dehumidifying renders and breathable skimmings based on natural hydraulic lime, in all the lower areas of the buildings affected by the presence of capillary rising damp.

Subsequent application of paint, siloxane-based, after applying pigmented base and filler.

Mape-Antique NHL ECO Risana

NATURAL HYDRAULIC LIME

DESCRIPTION

One-component, **cement-free**, salt-resistant, dehumidifying eco-render **made from pure natural hydraulic lime**, with recycled materials for restoring old masonry with rising damp, including masonry of buildings of historical interest.

AREAS OF USE

- Internal and/or external macro-porous, dehumidifying renders on masonries, including recent buildings, with capillary rising damp and saline efflorescence.
- New de-humidifying render or reintegrating old lime and natural hydraulic lime-based render on stone, brick, tuff and mixed masonry, including on buildings of historical and artistic interest and listed buildings.
- Dehumidifying render for masonry in lagoon areas or close to the sea.
- Restoring damaged render on buildings built using low performance mortar.
- Pointing between rows of stone, brick and tuff on “exposed” masonries.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	1.350 kg/m ³ (EN 1015-6)
Consistency of mix	Plastic-thixotropic
Porosity of fresh mix	20% (EN 1015-7)
Compressive strength (after 28 days)	Category CSII (EN 1015-11)
Adhesion to substrate (brick)	≥ 0.2 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Water absorption due to capillary action	0.3 kg/m ² (EN 1015-18)
Water-vapour permeability coefficient	≤ 15 μ (EN 1015-18)
Reaction to fire	Class A1 (EN 13501-1)



Application by trowel of single-layer dehumidifying plaster on tuff masonry.



Application by trowel of single-layer dehumidifying plaster on brick masonry.

PACKAGING

20 kg bag.

CONSUMPTION

Approx. 11 kg/m²
(for cm thick layer).

COLOUR

Ivory.

APPLICATION

Trowel or continuous mixing rendering machine.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED MATERIAL



CEMENT FREE



NHL BASED



EPDs



LOW EMISSION OF VOC IN INNER ENVIRONMENTS





Apollo Theatre
Lecce - Italy

TRANSPIRANT RENDERS



Transpirant, cement-free base render based on natural hydraulic lime.

Transpirant rendering

- 1 Substrate in tuff blocks
- 2 Mape-Antique Intonaco NHL
- 3 Mape-Antique NHL ECO Rasante Grosso
- 4 Silexcolor Base Coat
- 5 Silexcolor Paint



Antonio Salinas Museum - Palermo- Italy

The restoration, which involved the external walls, involved the creation of dehumidifying plasters based on hydrated lime and the application of breathable plasters based on natural hydraulic lime. After the curing of the mortars, a breathable skimming coat and a coloured finish based on siloxanes were made.

Mape-Antique Intonaco NHL

NATURAL HYDRAULIC LIME

DESCRIPTION

Breathable base render made from **natural hydraulic lime and Eco-Pozzolan, cement-free**, for application on existing masonry work, including those of historical interest, and on new constructions.

AREAS OF USE

- New internal and external high-performance transpirant renders on stone, brick, tuff and mixed masonries without capillary rising damp.
- New de-humidifying render or rebuilding old lime and natural hydraulic lime-based render on stone, brick, tuff and mixed masonry, including on buildings of historical and artistic interest and listed buildings.
- “Plumbing” and “touching up” facing walls with gaps and uneven surfaces.
- Pointing between rows of stone, brick and tuff on “exposed” masonries.

PERFORMANCE DATA

Maximum size of aggregate	1.4 mm (EN 1015-1)
Bulk density of fresh mortar	1.750 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic
Porosity of fresh mix	20% (EN 1015-7)
Compressive strength (after 28 days)	Category CSII (EN 1015-11)
Adhesion to substrate (brick)	≥ 0.3 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Water absorption due to capillary action	Category W0 (EN 1015-18)
Reaction to fire	Class A1 (EN 13501-1)
Thermal conductivity	0.57 W/m·K (EN 1745)



Application by trowel on brick masonry.



Compacting the transpirant render with a straightedge.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 14.5 kg/m²
(for cm thick layer).

COLOUR

Light hazelnut.

APPLICATION

Trowel or continuous
mixing rendering
machine.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



NHL
BASED



EPDs



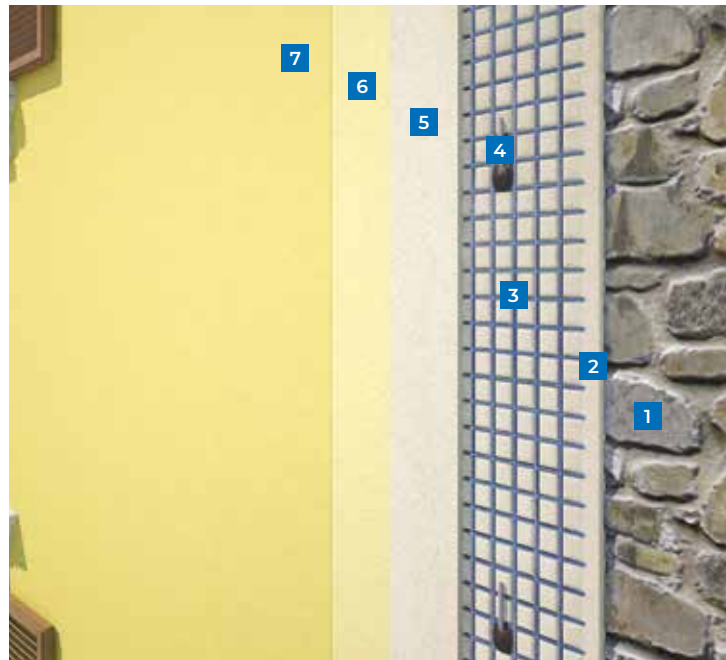
LOW EMISSION OF VOC
IN INNER ENVIRONMENTS



Pisa Baptistry
Italy



BREATHABLE AND STRUCTURAL RENDER, ALSO “REINFORCED”



Reinforcement with fibre-reinforced mortar of pure natural hydraulic lime, cement-free high-performance in combination with composite mesh.

Consolidation and reinforcement of mechanically weak masonry

- 1 Stone masonries
- 2 Mape-Antique Strutturale NHL
- 3 Mapenet EM 40
- 4 Mapenet EM Connector
- 5 Mape-Antique Strutturale NHL
- 6 Silexcolor Base Coat
- 7 Silexcolor Tonachino



Duca degli Abruzzi Complex (IACP) - Bari - Italy

The intervention consisted of re-doing all the external masonry with high-strength rendering mortar reinforced with glass fibres and then applying a thin layer of coloured siloxane-based coating paste to protect the new renders.

Other interventions included repairing deteriorated concrete elements, work on some parts of the structure to increase its static load-bearing capacity and a waterproofing treatment for the flat roofs.

Mape-Antique Strutturale NHL

NATURAL HYDRAULIC LIME

DESCRIPTION

High-performance mortar for transpirant render and masonry work, **based on natural hydraulic lime and Eco-Pozzolan, cement-free**, particularly suitable for making “reinforced” and installation mortar.

AREAS OF USE

- New internal and external high-performance transpirant renders on stone, brick, tuff and mixed masonries without capillary rising damp.
- New renders or rebuilding existing renders on masonries, including buildings with a national heritage protection order and listed buildings.
- New mortar “reinforced” with electro-welded zinc-plated or composite mesh on weak masonries without capillary rising damp.
- “Reinforced capping” with strengthening metal or composite mesh on the outer face of vaulted roofs.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	2.000 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic
Porosity of fresh mix	7% (EN 1015-7)
Compressive strength (after 28 days)	>15 N/mm ² (EN 1015-11) Category CSIV Category M15
Adhesion to substrate (brick)	≥ 0.7 N/mm ² Fracture pattern (FP) = A/C (EN 1015-12)
Initial shear strength (f_{vk})	0,15 N/mm ² (EN 998-2 Appendix C)
Chloride content	< 0.05% (EN 1015-17)
Water absorption due to capillary action	< 0,2 [kg/(m ² ·min ^{0.5})] Category W 2 (EN 1015-18)
Water-vapour permeability coefficient	≤ 60 μ (EN 1015-18)
Reaction to fire	Class B - s1, d 0 (EN 13501-1)



“Reinforced” render with glass fibre mesh.



Compacting the transpirant render with a straightedge.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 17 kg/m²
(for cm thick layer).

COLOUR

Light hazelnut .

APPLICATION

Trowel or
continuous
mixing rendering
machine.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



NHL
BASED



EPDs



*Dalt Vila defensive walls
Ibiza - Spain*





MASONRY MORTARS ALSO COLOURED



Masonry mortars are based on pure natural hydraulic lime, compatible with all types of masonry.

Available in different colours, grain sizes and performance, they are suitable for all types of reconstruction and also for casting in formwork.

Rebuilding and pointing “exposed” masonry

- 1** Stone and brick masonry
- 2** Mape-Antique Allettamento
- 3** Mape-Antique Strutturale NHL
- 4** Mape-Antique Colabile



Church of San Bernardino - L'Aquila - Italy

The interventions involved the consolidation of masonry, repairs to areas of deteriorated render, reconditioning the masonry for the bell tower and repairs and conservative renovation of all the internal surfaces.

Mape-Antique Colabile

NATURAL HYDRAULIC LIME

DESCRIPTION Salt-resistant, **cement-free**, hi-flow **natural hydraulic lime** and **Eco-Pozzolan-based** masonry mortar for reconditioning and consolidating masonry.

AREAS OF USE Mixing free-flowing, volumetrically stable masonry mortar with high resistance to soluble salts for filling large internal cracks, gaps and cavities when reconditioning and consolidating structures such as:

- foundations, pillars, vaulted roofs and archways;
- stone, brick, tuff and mixed masonries in general of existing buildings with cracks, voids and internal cavities, including those with a national heritage protection order and listed.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	2.050 kg/m ³ (EN 1015-6)
Consistency of mix	Fluid – free-flowing
Porosity of fresh mix	7% (EN 1015-7)
Compressive strength (after 28 days)	Category M15 (EN 1015-11)
Adhesion to substrate (brick)	1.0 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Slip-resistance of rebar (Ø 16 mm) Maximum adhesion stress	8 N/mm ² (EN 1881 mod.)
Slip-resistance of glass rods (Maperod G 40/10) Maximum adhesion stress	8 N/mm ² (EN 1881 mod.)
Initial shear strength (f_{vok})	0.15 N/mm ² (EN 998-2 Appendix C)
Chloride content	< 0.05% (EN 1015-17)
Water absorption due to capillary action	< 0.1 [kg/(m ² ·min ^{0.5})] Cat. W 2 (EN 1015-18)
Water-vapour permeability coefficient	15/35 µ (EN 1015-19)
Modulus of elasticity	10.000 N/mm ² (EN 13412)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Red brick pinnacle reinforcement castings.



Pillar redoubling.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 1,83 kg/dm³
(of the cavity to be filled).

COLOUR

White.

APPLICATION

By pouring or pumping.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE

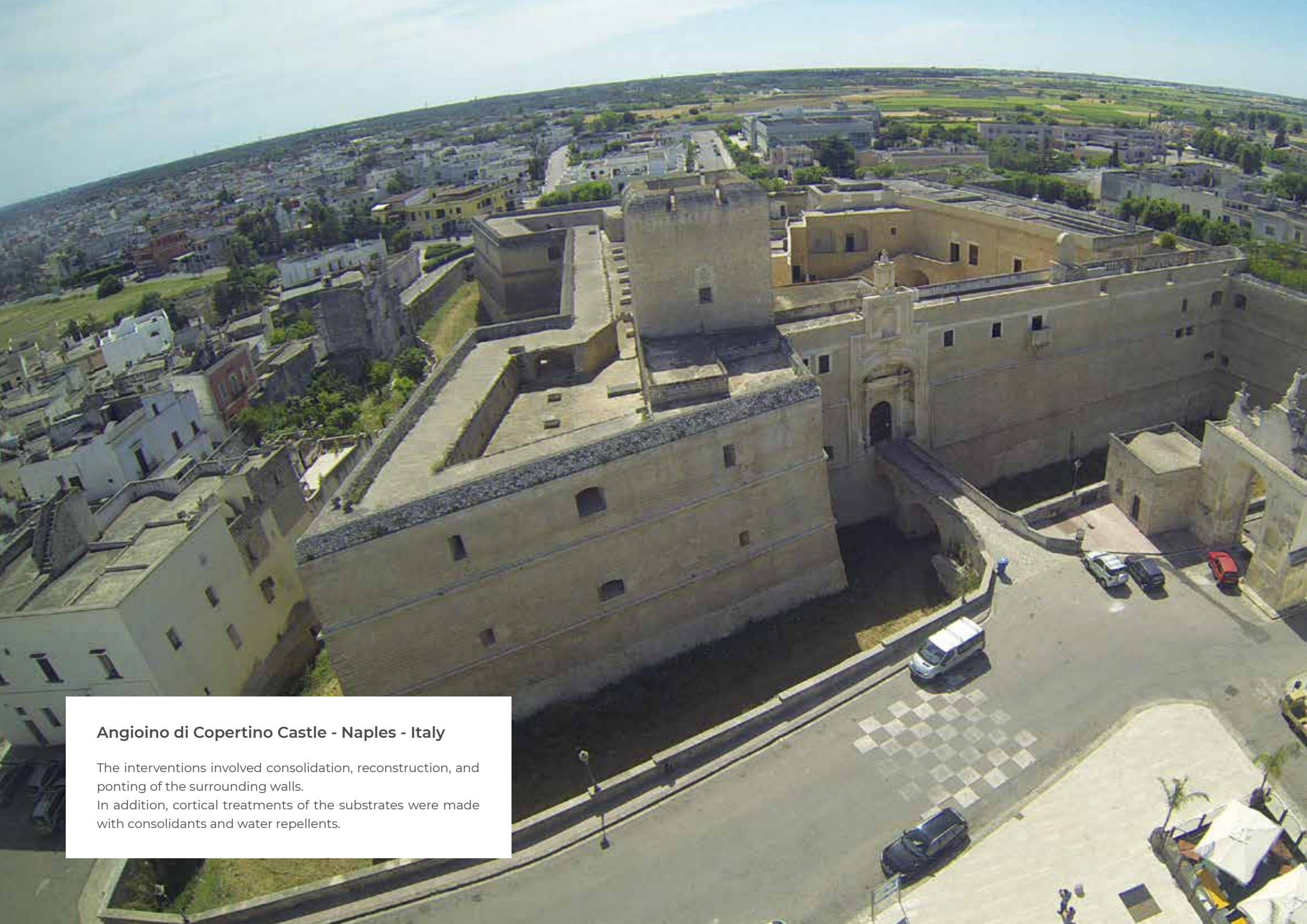


NHL
BASED



LOW EMISSION OF VOC
IN INNER ENVIRONMENTS





Angioino di Copertino Castle - Naples - Italy

The interventions involved consolidation, reconstruction, and pointing of the surrounding walls.

In addition, cortical treatments of the substrates were made with consolidants and water repellents.

Mape-Antique Allettamento

NATURAL HYDRAULIC LIME

DESCRIPTION

Salt-resistant, **cement-free**, hi-flow **natural hydraulic lime** and **Eco-Pozzolan-based** masonry mortar for installation layers and pointing on “natural finish” masonry.

AREAS OF USE

- Building new masonries and restoration of existing masonries, including masonries of buildings with a national heritage protection order and listed buildings.
- Pointing between rows of stone, brick and tuff on “exposed” masonries.
- Installation joints, including joints “reinforced” with rebar or composites (such as **Maperod**).
- Building facing walls using masonry mortar with guaranteed-performance characteristics.
- “Plumbing” and “touching up” facing walls with gaps and uneven surfaces.

PERFORMANCE DATA

Maximum size of aggregate	1.5 mm (EN 1015-1)
Bulk density of fresh mortar	1.950 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic
Porosity of fresh mix	6% (EN 1015-7)
Compressive strength (after 28 days)	Category M5 (EN 1015-11)
Adhesion to substrate (brick)	≥ 0.5 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Initial shear strength (f_{vok})	0.15 N/mm ² (EN 998-2 Appendix C)
Chloride content	< 0.05% (EN 1015-17)
Water absorption due to capillary action	< 0.3 [kg/(m ² ·min ^{0,5})] Category W 2 (EN 1015-18)
Water-vapour permeability coefficient	15/35 μ (EN 1015-19)
Reaction to fire	Class A1 (EN 13501-1)
Resistance to sulphates	< 0.02% (ASTM C 1012 mod.)
Saline efflorescence (after semi-immersion in water)	Absent



Pointing tuff masonry.



Finishing off **Mape-Antique Allettamento** with sponge.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 16,5 kg/m²
(for cm thick layer).

COLORI (mixable with each other)



APPLICATION

By trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED MATERIAL



CEMENT FREE

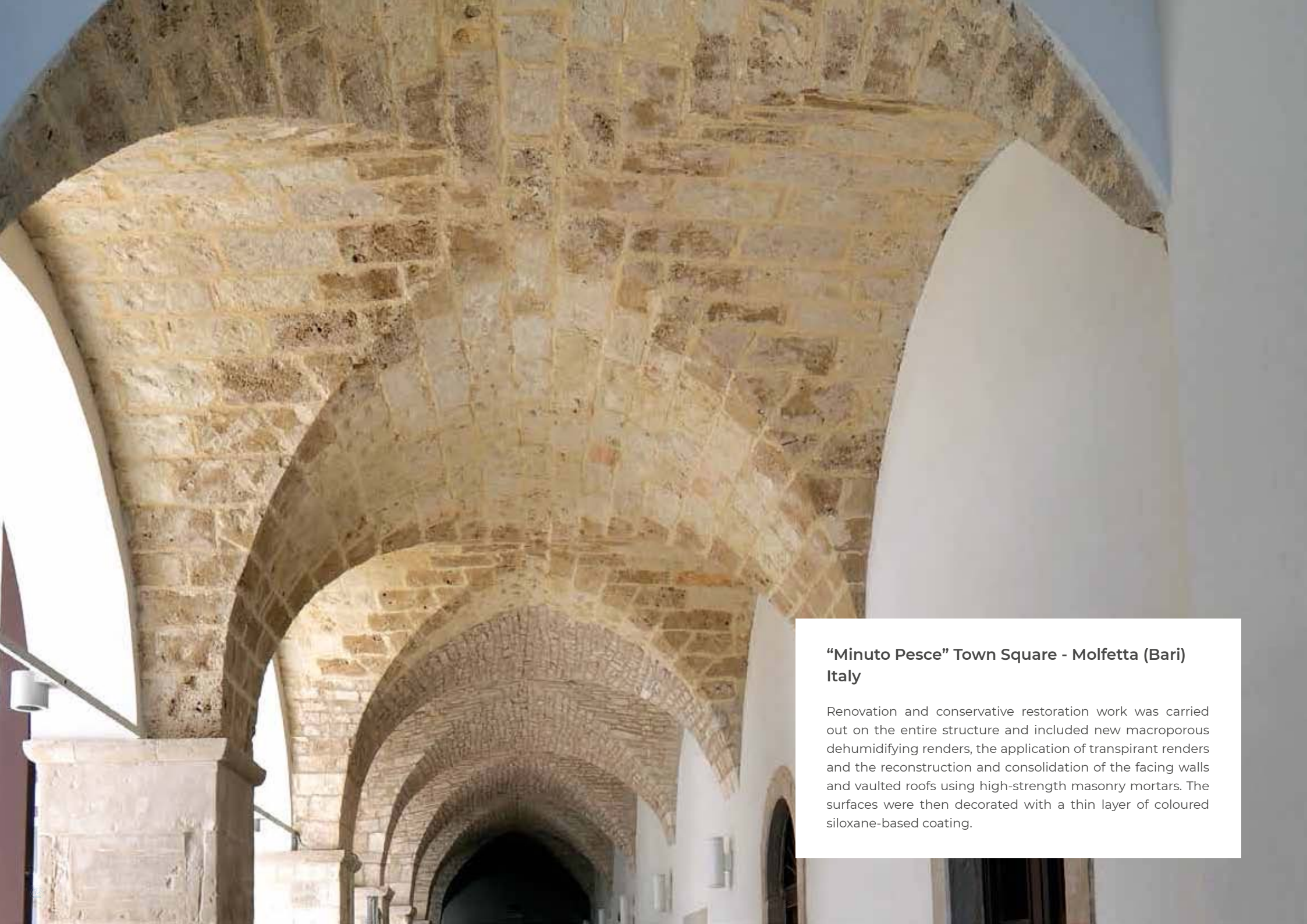


NHL BASED



EPDs





**“Minuto Pesce” Town Square - Molfetta (Bari)
Italy**

Renovation and conservative restoration work was carried out on the entire structure and included new macroporous dehumidifying renders, the application of transpirant renders and the reconstruction and consolidation of the facing walls and vaulted roofs using high-strength masonry mortars. The surfaces were then decorated with a thin layer of coloured siloxane-based coating.

Mape-Antique Strutturale NHL

NATURAL HYDRAULIC LIME

DESCRIPTION

High-performance, **cement-free**, mortar for transpirant render and masonry work, based on **natural hydraulic lime and Eco-Pozzolan**, particularly suitable for making “reinforced” and installation mortar.

AREAS OF USE

- Building new masonries and restoration of existing masonries, including masonries of buildings with a national heritage protection order and listed buildings.
- Levelling off the outer face of vaulted roofs with an uneven surface.
- Pointing between rows of stone, brick and tuff on “exposed” masonries.
- Installation joints, including joints “reinforced” with rebar or composites (such as **Maperod**).
- Building facing walls using a mortar with better mechanical characteristics than conventional lime mortar.
- “Plumbing” and “touching up” facing walls with gaps and uneven surfaces.

PERFORMANCE DATA

Maximum size of aggregate	2.5 mm (EN 1015-1)
Bulk density of fresh mortar	2.000 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic
Porosity of fresh mix	7% (EN 1015-7)
Compressive strength (after 28 days)	>15 N/mm ² (EN 1015-11) Category CSIV Category M15
Adhesion to substrate (brick)	≥ 0.7 N/mm ² Fracture pattern (FP) = A/C (EN 1015-12)
Initial shear strength (f_{vok})	0.15 N/mm ² (EN 998-2 Appendix C)
Chloride content	< 0.05% (EN 1015-17)
Water absorption due to capillary action	< 0.2 [kg/(m ² ·min ^{0.5})] Category W 2 (EN 1015-18)
Water-vapour permeability coefficient	≤ 60 μ (EN 1015-18)
Reaction to fire	Class B - s1, d 0 (EN 13501-1)



Pointing tuff masonry.



Stage of installing stone blocks.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 17 kg/m²
(for cm thick layer).

COLOUR

Light hazelnut .

APPLICATION

By trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



NHL
BASED



EPDs





Casa Batlló
Barcelona - Spain

SKIMMING MORTARS



Breathable skimming coats based on hydrated lime or natural hydraulic lime, of different grain sizes, can also be combined with reinforcing mesh. Suitable also for existing or new renders of any type: dehumidifying, transpirant or structural.

Breathable skimming coat of lime-based renders

- 1 Brick masonry
- 2 Mape-Antique Intonaco NHL
- 3 Mape-Antique NHL ECO Rasante Civile
- 4 Silexcolor Primer
- 5 Silexcolor Paint



Villa Mazzanti - Rome - Italy

Reconstruction of the removed renders using transpirant rendering mortar and skim coats on some of the surfaces using ultra-fine texture mortar to create a smooth finish. Skim coats on the remaining surfaces using smooth texture mortar to create a natural finish. The surfaces were then decorated with siloxane-based coating paste after applying a base layer of coloured filler.

Mape-Antique FC Ultrafine

HYDRATED LIME

DESCRIPTION

Salt-resistant, **cement-free**, transpirant ultrafine-texture skimming mortar, **based on lime and Eco-Pozzolan**, for a smooth finish on render.

AREAS OF USE

- Smooth finish for internal/external coarse texture, dehumidifying, macroporous renders when repairing masonries deteriorated by capillary rising damp and soluble salts.
- Smooth finish for coarse texture dehumidifying renders on masonries in lagoon areas or close to the sea.
- Smooth finish for new dehumidifying renders or existing lime-based renders on stone, brick, tuff and mixed masonries, including buildings with a national heritage protection order and listed buildings.
- Smooth finish for coarse texture transpirant or "structural" base renders.

PERFORMANCE DATA

Maximum size of aggregate	100 µm (EN 1015-1)
Bulk density of fresh mortar	1.700 kg/m ³ (EN 1015-6)
Consistency of mix	Plastic
Compressive strength (after 28 days)	2.5 N/mm ² (EN 1015-11) Category CS II
Adhesion to the substrate	≥ 0.8 N/mm ² Fracture pattern (FB) = B (EN 1015-12)
Water absorption due to capillary action	Category W 0 (EN 1015-18)
Water-vapour permeability coefficient	≤ 20 µ (EN 1015-19)
Thermal conductivity ($\lambda_{10,dry}$)	0.39 W/m·K (EN 1745)
Reaction to fire	Class E
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Application of the first layer of **Mape-Antique FC Ultrafine**.



Application of the second layer of **Mape-Antique FC Ultrafine**.

PACKAGING

20 kg bag.

CONSUMPTION

Approx. 1.30 kg/m² (for mm thick layer).

COLOUR

White.

APPLICATION

Flat metal trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED MATERIAL



CEMENT FREE



LIME BASED

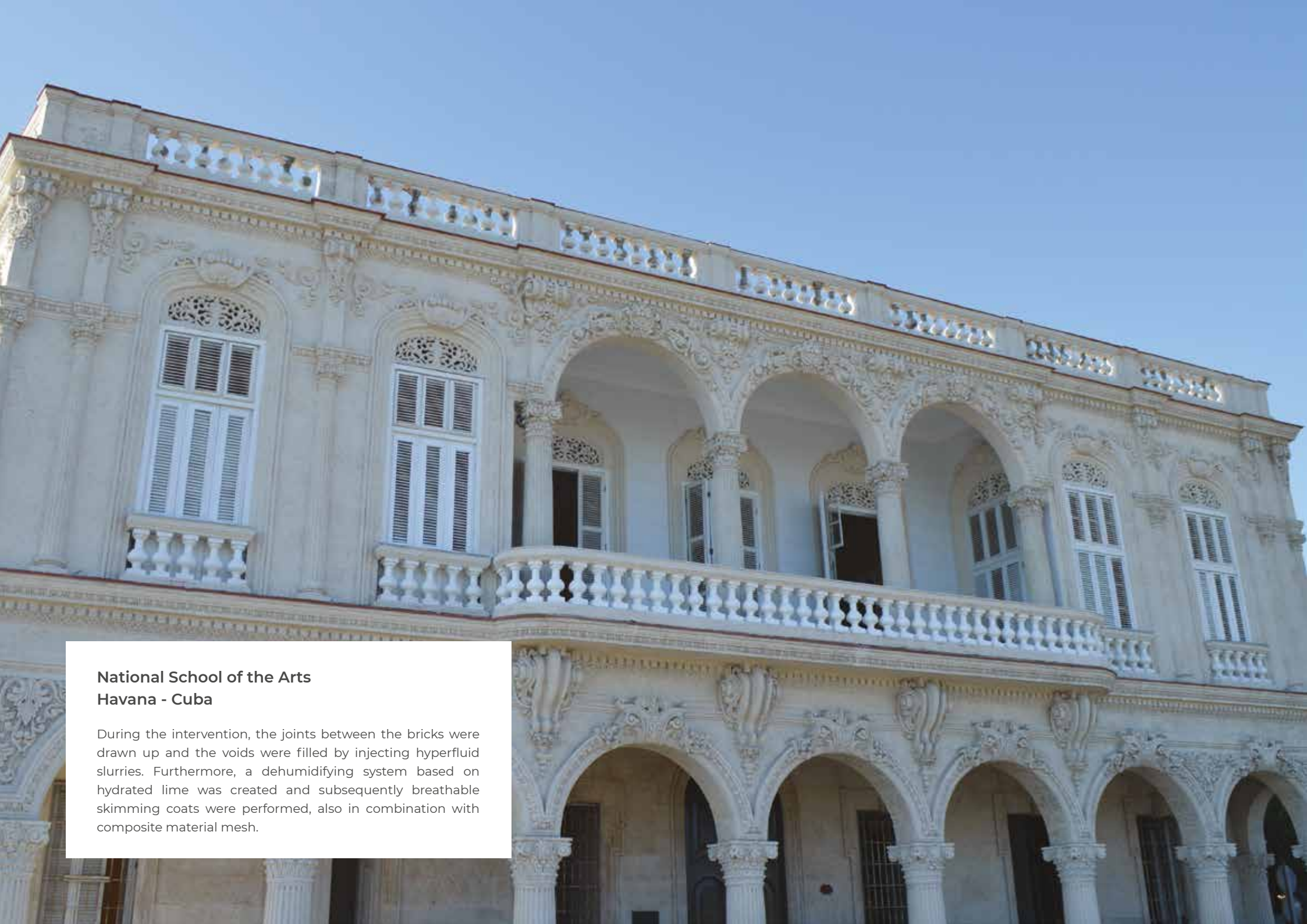


EPDs



LOW EMISSION OF VOC IN INNER ENVIRONMENTS





National School of the Arts Havana - Cuba

During the intervention, the joints between the bricks were drawn up and the voids were filled by injecting hyperfluid slurries. Furthermore, a dehumidifying system based on hydrated lime was created and subsequently breathable skimming coats were performed, also in combination with composite material mesh.

Mape-Antique FC Civile

HYDRATED LIME

DESCRIPTION Salt-resistant, **cement-free**, transpirant ultrafine-texture skimming mortar, **based on lime and Eco-Pozzolan**, for a smooth finish on render.

- AREAS OF USE**
- Smooth finish for internal/external coarse texture, dehumidifying, macroporous renders when repairing masonries deteriorated by capillary rising damp and soluble salts.
 - Smooth finish for coarse texture dehumidifying renders on masonries in lagoon areas or close to the sea.
 - Smooth finish for new dehumidifying renders or existing lime-based renders on stone, brick, tuff and mixed masonries, including buildings with a national heritage protection order and listed buildings.
 - Smooth finish for coarse texture transpirant or "structural" base renders.

PERFORMANCE DATA

Maximum size of aggregate	400 µm (EN 1015-1)
Bulk density of fresh mortar	1.800 kg/m ³ (EN 1015-6)
Consistency of mix	Plastic
Compressive strength (after 28 days)	10 N/mm ² (EN 1015-11) Category CS IV
Adhesion to the substrate	≥ 0.6 N/mm ² Fracture pattern (FB) = B (EN 1015-12)
Water absorption due to capillary action	Category W 2 (EN 1015-18)
Water-vapour permeability coefficient	≤ 15 µ (EN 1015-19)
Thermal conductivity ($\lambda_{10,dry}$)	0.67 W/m·K (EN 1745)
Reaction to fire	Class E
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Smooth texture skimming mortar on existing render.



Smoothing over the surface with a sponge trowel.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 1.40 kg/m²
(for mm thick layer).

COLOUR

White and
Brick-coloured

APPLICATION

Flat metal trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



LIME
BASED



EPDs



LOW EMISSION OF VOC
IN INNER ENVIRONMENTS





Princes of Cutò's Filangeri Palace Palermo - Italy

Cleaning of all substrates and application of biocidal hygienizing solution. Reconstruction of the portions in the detachment phase with fibre-reinforced mortar and subsequent breathable skimming coat of the substrates with coarse-textured mortar. Application of siloxane paint, after applying pigmented base and filler.

Mape-Antique FC Grosso

HYDRATED LIME

DESCRIPTION

Salt-resistant, **cement-free**, transpirant large-texture skimming mortar, **based on lime and Eco-Pozzolan**, for a rough finish on render.

AREAS OF USE

- Rough finishing for internal/external macroporous, dehumidifying renders when repairing masonries deteriorated by capillary rising damp and soluble salts.
- Rough finishing for dehumidifying renders on masonries in lagoon areas or close to the sea.
- Rough finishing on new dehumidifying renders or existing lime-based renders on stone, brick, tuff and mixed masonries, including buildings with a national heritage protection order and listed buildings.
- Rough finishing for transpirant or "structural" base renders.

PERFORMANCE DATA

Maximum size of aggregate	700 µm (EN 1015-1)
Bulk density of fresh mortar	1.700 kg/m ³ (EN 1015-6)
Consistency of mix	Plastic
Compressive strength (after 28 days)	6 N/mm ² (EN 1015-11) Category CS IV
Adhesion to the substrate	≥ 0.5 N/mm ² Fracture pattern (FB) = B (EN 1015-12)
Water absorption due to capillary action	Category W 2 (EN 1015-18)
Water-vapour permeability coefficient	≤ 15 µ (EN 1015-19)
Thermal conductivity ($\lambda_{10,dry}$)	0.45 W/m·K (EN 1745)
Reaction to fire	Class E
Resistance to sulphates	High (Anstett test method)
Saline efflorescence (after semi-immersion in water)	Absent



Coarse texture skimming mortar on existing render.



Finishing off **Mape-Antique FC Grosso** with a sponge float.

PACKAGING

25 kg bag.

COLOUR

White.

CONSUMPTION

Approx. 1.40 kg/m²
(for mm thick layer).

APPLICATION

Flat metal trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED MATERIAL



CEMENT FREE



LIME BASED

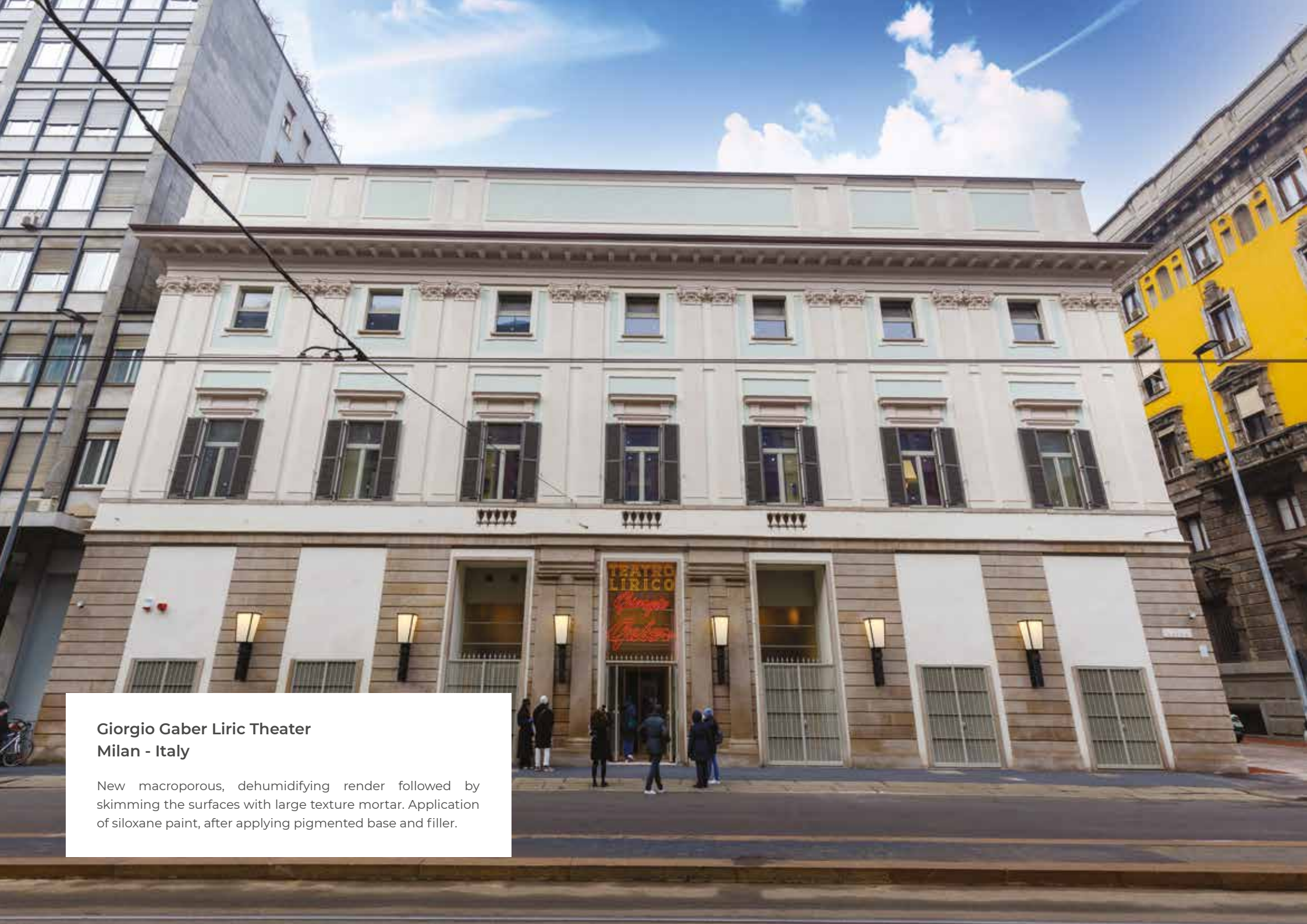


EPDs



LOW EMISSION OF VOC IN INNER ENVIRONMENTS





Giorgio Gaber Liric Theater
Milan - Italy

New macroporous, dehumidifying render followed by skimming the surfaces with large texture mortar. Application of siloxane paint, after applying pigmented base and filler.

Mape-Antique NHL ECO Rasante Civile

NATURAL HYDRAULIC LIME

DESCRIPTION

Fine-grained, breathable, **cement-free, pure natural hydraulic lime** smoothing and levelling eco-mortar for a natural finish on render.

AREAS OF USE

- Natural finish on internal/external coarse texture, dehumidifying, macroporous renders.
- Natural finish on new render or old lime-based render on stone, brick, tuff and mixed masonry, including on buildings of historical and artistic interest and listed buildings.
- Smooth finish for coarse texture transpirant or "structural" base renders.

PERFORMANCE DATA

Maximum size of aggregate	400 µm
Bulk density of fresh mortar	1.700 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic-spreadable
Compressive strength (after 28 days)	Category CS II (EN 1015-11)
Adhesion to the substrate	≥ 0.5 N/mm ² Fracture pattern (FB) = B (EN 1015-12)
Water absorption due to capillary action	Category Wc 2 (EN 1015-18)
Water-vapour permeability coefficient	≤ 15 µ (EN 1015-19)
Reaction to fire	Class E



Smooth texture skimming mortar on transpirant render.



Finishing off Mape-Antique NHL ECO Rasante Civile with a sponge float.

PACKAGING

25 kg bag.

COLOUR

Hazelnut.

CONSUMPTION

Approx. 1.40 kg/m²
(for mm thick layer).

APPLICATION

Flat metal trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



CEMENT
FREE

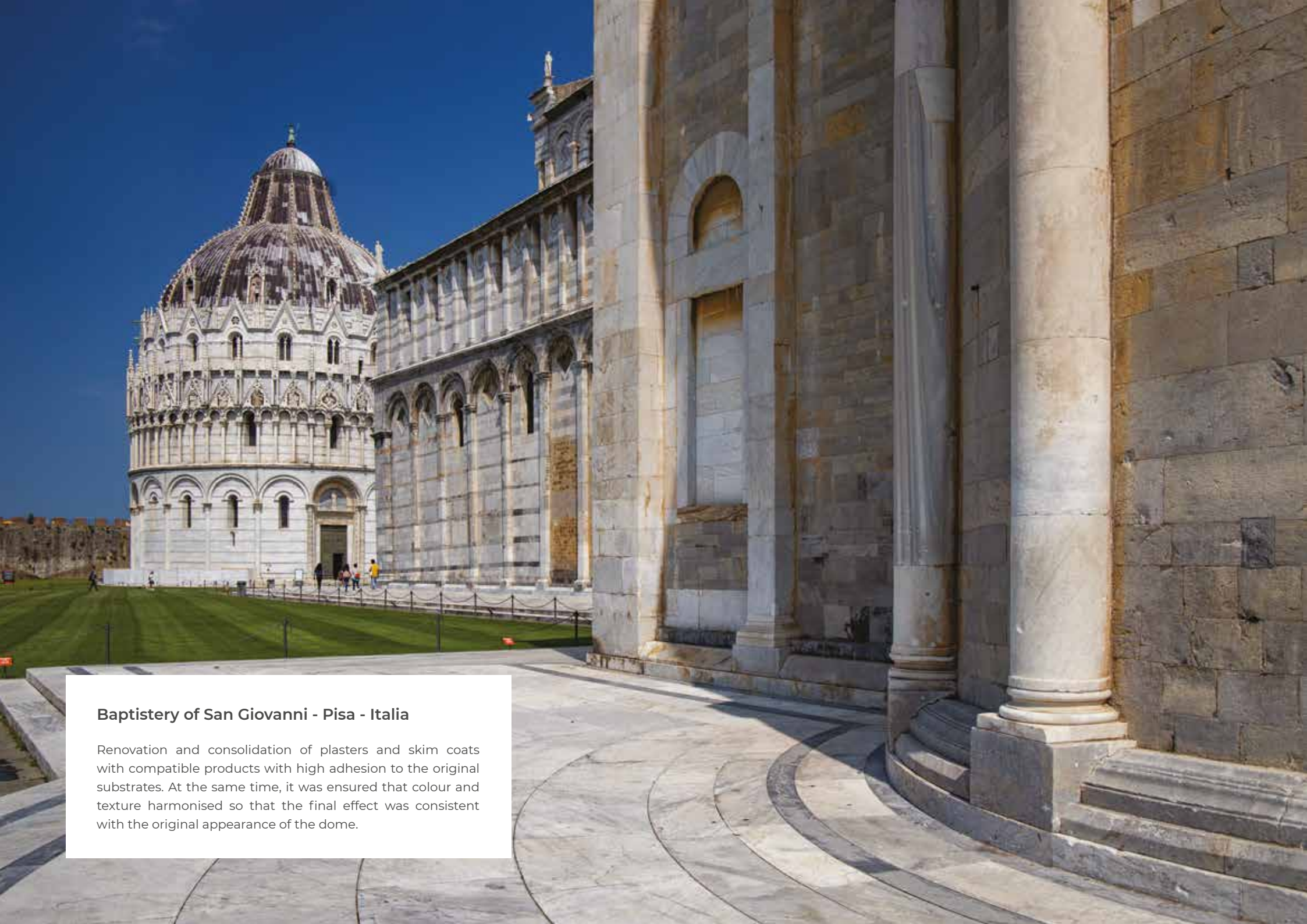


NHL
BASED



LOW EMISSION OF VOC
IN INNER ENVIRONMENTS





Baptistry of San Giovanni - Pisa - Italia

Renovation and consolidation of plasters and skim coats with compatible products with high adhesion to the original substrates. At the same time, it was ensured that colour and texture harmonised so that the final effect was consistent with the original appearance of the dome.

Mape-Antique NHL ECO Rasante Grosso

NATURAL HYDRAULIC LIME

DESCRIPTION

Coarse-grained, breathable, **pure natural hydraulic lime** smoothing and levelling eco-mortar, **cement-free**, for a textured finish on render.

AREAS OF USE

- Rough finish for internal/external macro-porous, dehumidifying render with a rough finish.
- Rough finish on new render or old lime-based render on stone, brick, tuff and mixed masonry, including on buildings of historical and artistic interest and listed buildings.
- Rough finish of breathable and "structural" lime-based render.

PERFORMANCE DATA

Maximum size of aggregate	700 µm (EN 1015-1)
Bulk density of fresh mortar	1.700 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic-spreadable
Compressive strength (after 28 days)	Category CS II (EN 1015-11)
Adhesion to the substrate	≥ 0.5 N/mm ² Fracture pattern (FB) = B (EN 1015-12)
Water absorption due to capillary action	Category W 2 (EN 1015-18)
Water-vapour permeability coefficient	≤ 12 µ (EN 1015-19)
Thermal conductivity (f _{vok})	0.45 W/m·K (EN 1745)
Reaction to fire	Class E



Coarse texture skimming mortar on dehumidifying render.



Finishing off **Mape-Antique NHL ECO Rasante Grosso** with a sponge float.

PACKAGING

25 kg bag.

COLOUR

White.

CONSUMPTION

Approx. 1.40 kg/m²
(for mm thick layer).

APPLICATION

Flat metal trowel.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



CEMENT
FREE



NHL
BASED



LOW EMISSION OF VOC
IN INNER ENVIRONMENTS





*Villa Reale di Monza
Monza - Italy*

REBUILDING, LEVELLING AND SKIMMING THE SUBSTRATES, RENDERS AND COATINGS



Masonry, plastering and smoothing mortar for reconstructing and levelling all types of substrates, even with old paintwork.

Breathable plastering and skimming

- 1 Plastering** with **Mape-Antique NHL ECO Restaura** in thickness up to 30 mm per layer
- 2 Skimming** with **Mape-Antique NHL ECO Restaura** on existing render and paints in a minimum thickness of 3 mm
- 3 Pointing mortar joints** with **Mape-Antique NHL ECO Restaura**, which can also be supplemented with **Mapei Steel Bars**
- 4 Rebuilding** of construction elements and decorations
- 5 Silexcolor Primer**
- 6 Silexcolor Paint**



Historical Building Gaeta - Cosenza - Italy

Restoration of façades and projecting elements with mortar based on pure natural hydraulic lime, cement-free, applicable both as plaster and as a skim coat. The realisation of siloxane-based, breathable, water-repellent and hygienic coloured coating.

Mape-Antique NHL ECO Restaura

NATURAL HYDRAULIC LIME

DESCRIPTION

Cement-free, pure natural hydraulic lime-based breathable multi-purpose mortar applied in layers 3 to 30 mm thick for restoring and levelling off substrates, render and coated surfaces.

AREAS OF USE

- Breathable levelling layers and skim coats on particularly strong lime or lime/cement render before painting.
- Finish natural finish on internal/external macro-porous, dehumidifying render with a rough finish.
- Smoothing over walls, including walls painted with washable acrylic and quartz-based paint, plastic coatings, etc., as long as they are sound, clean and well-bonded, and in combination with **Mapenet 150** or **Mapetherm Net** reinforcing mesh.
- Refurbishing and restoring construction features and elements (friezes, column capitals, stringcourses, gables, etc.), also of historical and architectural value.
- Pointing "exposed-finish" stone, brick and tuff masonry.
- Patching and plumbing facing walls with gaps and/or uneven surfaces.

PERFORMANCE DATA

Maximum size of aggregate	900 µm (EN 1015-1)
Bulk density of fresh mortar	1.600 kg/m ³ (EN 1015-6)
Consistency of mix	Thixotropic
Compressive strength (after 28 days)	Category CSII (EN 1015-11) M 2,5
Adhesion to substrate (brick)	≥ 0.40 N/mm ² Fracture pattern (FP) = B (EN 1015-12)
Water absorption due to capillary action	Category W _c 0 (EN 1015-18)
Water-vapour permeability coefficient	≤ 15 µ (EN 1015-18)
Thermal conductivity ($\lambda_{10,dry}$)	0.45 W/m·K (EN 1745)
Modulus of elasticity	< 3.000
Reaction to fire	Class A1 (EN 13501-1)
Thermal conductivity	0.18 W/m·K (EN 1745)



Levelling off an existing skimming coat.



Rebuilding an existing render.

PACKAGING

25 kg bag.

CONSUMPTION

Approx. 1.40 kg/m²
(for mm thick layer).

COLOUR

White.

APPLICATION

By trowel,
flat metal trowel
or continuous
mixing rendering
machine.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



NHL
BASED





*Santa Maria delle Stelle Church
Comiso (Ragusa) - Italy*

PROTECTIVE AND WATERPROOFING COVERING



The solution for long-lasting and effective protection and waterproofing of construction elements and structures in buildings of historical and architectural value.

Protecting and waterproofing with lime

- 1 Tuff masonry
- 2 Mape-Antique Strutturale NHL
- 3 Mape-Antique Ecolastic
- 4 Stone frame
- 5 Mape-Antique NHL ECO Restaura
- 6 Mape-Antique Ecolastic



**Historic fountain Capo di Ponte Val Camonica
(Bergamo) - Italy**

Rebuilding and levelling off the substrates and subsequent coating to protect and waterproof.

Mape-Antique Ecolastic

HYDRATED LIME

DESCRIPTION

Two-component, **cement-free, lime and Eco-Pozzolan-based**, elastic coating resistant to salts. Ideal for waterproofing and protecting building elements, also of historical and architectural value.

AREAS OF USE

- Waterproofing and protecting irregularly shaped surfaces, brick vaulted roofs, screeds, roofs, storage tanks, fountains and features such as cornices, string courses, small columns, etc. on existing structures, including buildings with a National Heritage protection order and listed buildings.
- Waterproofing and protecting important structures below ground level subjected to a positive or negative hydraulic lift.
- Protecting rendered masonry exposed to atmospheric agents.
- Protecting the surface of rendered masonries from the risk of coming into contact with seawater, de-icing salts or soluble salts in general.
- Elastic protective layer for new and repaired rendered masonry structures with small cracks caused by deformations, temperature variations or stress loads.

PERFORMANCE DATA

Mixing ratio	Component A: Component B = 2:1
Applicable thickness per coat	2 mm
Adhesion to Mape-Antique Strutturale NHL	1.24 N/mm ²
Brick adhesion	0.8 N/mm ²
Crack-bridging ability a +23°C	2.62 mm (EN 14891-A.8.2)
Crack-bridging ability a -5°C	1.16 mm (EN 14891-A.8.3)
Impermeability to positive hydraulic lift (1.5 bar for 7 days) expressed as water penetration	No penetration and increase in weight 5 g
Impermeability to negative hydraulic lift (1.5 bar for 24 days) expressed as water penetration	No penetration
Resistance to sulphates	High (Anstett test method)



Protection and waterproofing of building elements.



Application by roller.

PACKAGING

15 kg unit:
component A: 10 kg bag,
component B: 5 kg can.

CONSUMPTION

Approx. 1.65 kg/m²
(for mm thick layer).

COLOUR

Light hazelnut.

APPLICATION

By brush, roller,
trowel, spray.

CERTIFICATIONS AND MARKINGS



CHARACTERISTICS



RECYCLED
MATERIAL



CEMENT
FREE



LIME
BASED



EPDs



LOW EMISSION OF VOC
IN INNER ENVIRONMENTS



Reinforcing with lime

High-performance injection slurries and mortars

New technologies that combine the techniques of the past with the knowledge of the present enable the creation of high-quality, high-performance, **lime-based, cement-free materials for reinforcing historic structures**.

Among the most common improvement interventions we find:

- Injections with slurries for the consolidation.
- Pointing and armed stiching.
- Realisation of armed renders.

The current norm

Mape-Antique Strutturale NHL, fibre-reinforced mortar with high mechanical performance, in combination with stainless steel or composite material mesh, is ideal for the reinforcement of brick, stone, tuff or mixed masonry. In particular, its use with glass fibre mesh such as **Mapenet EM 30** and **Mapenet EM 40**, is foreseen by the **NTC 2018** (point 8.6). In fact, they foresee that all building materials, if used for structural use, must be:

- identifiable;
- in possession of specific qualification for the intended use;
- subject to control during acceptance by the director of works.

If the building materials for structural use are not **CE marked** (according to EU Regulation no. 305/2011) they must be in possession of a **CVT** (Certificate of Technical Assessment) issued by the president of the CSLLPP, Superior Council of Public Works. The CSLLPP President approved by **decree no. 292 of 29 May 2019** (Italian decree) the **Guideline** for the identification, qualification and acceptance control of preformed mesh systems in fibre-reinforced polymer matrix composite materials to be used for the structural consolidation of existing buildings with the CRM reinforced plaster technique.



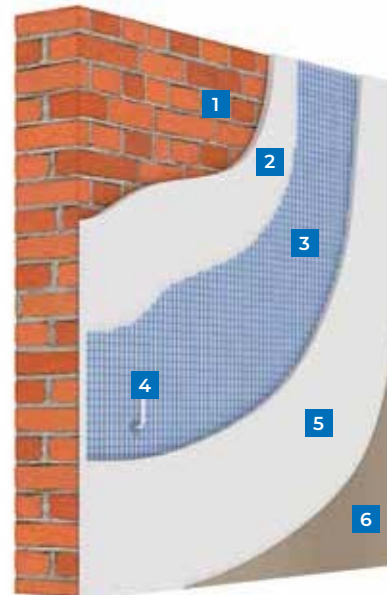


CRM systems: what they are and which characteristics they have

CRM (Composite Reinforced Mortar) refers to the technique that involves the use of a **structural mortar** with **composite material mesh** applied on the surface of the masonry structural element to be reinforced. In this way, the FRP mesh is able to absorb tensile strength while the structural mortar helps to absorb the compressive strength. The **transfer of effort** between the support and the reinforcing mesh is also guaranteed by the presence of the connectors, which ensure the structural collaboration between the wall element and the reinforced render.

The render, made with inorganic matrix mortars and applied for a minimum thickness of 30 mm, totally incorporates the reinforcement and acts on the transmission of efforts between the pre-existing masonry and the reinforcement. The **CRM technique** allows for obtaining a **homogeneous and widespread reinforcement** of existing walls of different types and characteristics, providing consistent improvements in terms of

mechanical performance, on and off the plane. It gives ductility in the structure, durability and compatibility also with historic walls.



CRM system, reinforcement with “armed” render

- 1 Existing masonry
- 2 Mape-Antique Strutturale NHL
- 3 Mapenet EM 30/40
- 4 Mapenet EM Connector
- 5 Mape-Antique Strutturale NHL
- 6 Mape-Antique NHL ECO Rasante Civile

Waterproofing and **protection** with the lime



Mapei has formulated an innovative material **totally compatible with all types of masonry**, in particular with ancient supports, combining the techniques of the past with current knowledge. An indispensable product for the protection and waterproofing of buildings and historical construction elements.

Mape-Antique Ecolastic is a **two-component elastic coating** based on hydrated lime. It is applied in a thickness of 2 mm per layer, also in combination with reinforcing glass mesh with a brush, roller or spray.

Mape-Antique Ecolastic: characteristics

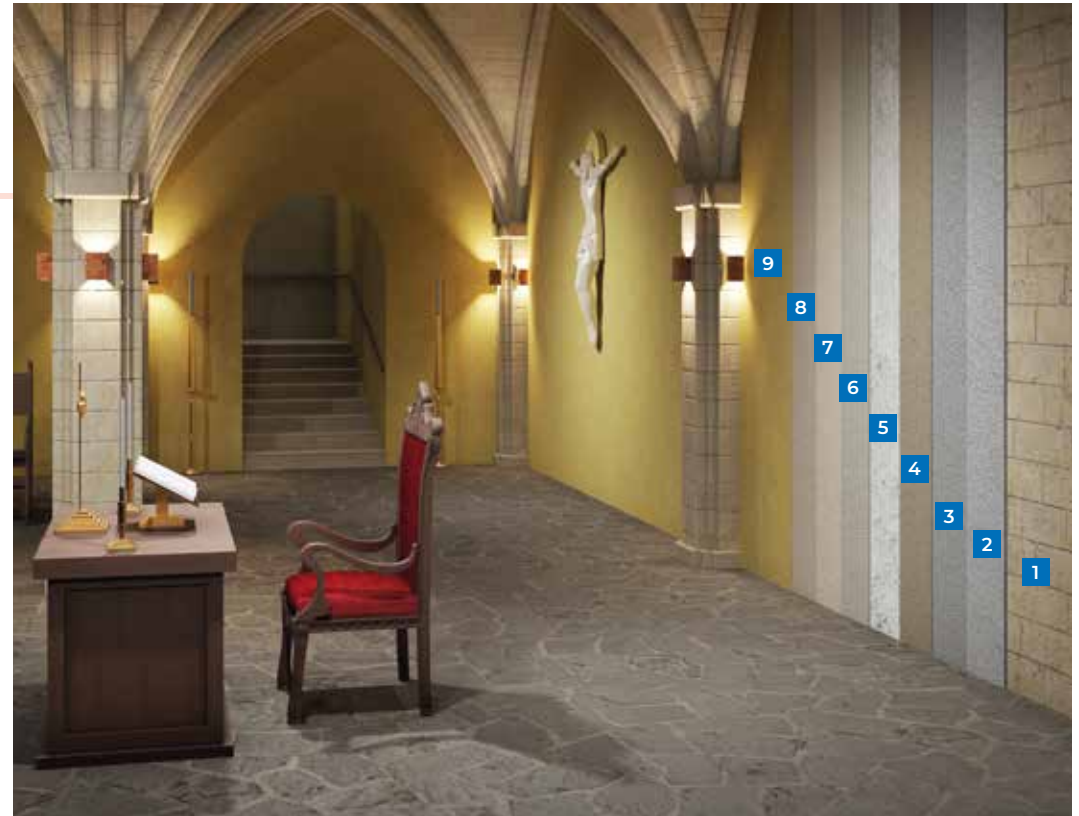
- It may be left with an exposed finish as it has **excellent resistance to UV rays**.
- **Pigmentable** with oxides or natural pigments or **paintable** with elastomeric finishes.
- **Waterproofing and elastic**.
- **Resistant to positive and negative hydrostatic pressure** (anti-condensation systems for semi-underground masonry).
- **Cement-free**.
- With a high content of **recycled material**.



Moisture in the masonry against the ground

Moisture in underground or semi-underground walls can be treated with **water removal systems** or with **waterproofing outside** the structure. The aim is to eliminate water in contact with the walls under height. In some cases, however, these solutions are not always practicable and the problem is addressed with the creation of an anti-condensation system. The system, made inside the underground rooms, is composed of **counter-thrust waterproofing** integrated with an **anti-condensation system** for the management of surface condensation.

The anti-condensation system can also be made with only lime-based materials and free from cement for historic buildings bound by the Superintendencies.



Lime-based anti-condensation system

- **First layer:** regularization with fibre-reinforced mortar based on natural hydraulic lime, free from cement.
- **Second layer:** waterproof coating based on lime, free from cement, resistant to negative hydraulic lift.
- **Third layer:** system formed by a scratch-coat mortar, a macroporous plaster and a skimming coat based on NHL and free from cement, for the absorption of surface condensation.
- Possible **coloured finish** based on silicates.

1 Masonry

2 Mape-Antique Strutturale NHL

3 Primer 3296 diluted 1:1 with water

4 Mape-Antique Ecolastic

5 Mape-Antique NHL ECO Rinzafo

6 Mape-Antique NHL ECO Risana (min 1 cm)

7 Mape-Antique NHL ECO Rasante Civile

8 Silexcolor Primer

9 Silexcolor Paint

Colour and decoration

Our cities have a rich historical and artistic heritage. The finishes to be used in the **renovation** and **conservative restoration** of these buildings must meet certain basic requirements.

- High water vapour permeability of thick-coloured paints or coatings.
- Insensitivity to rainwater runoff.
- Perfect adhesion to substrates.

Lime-based, cement-free materials, such as products from the **Mape-Antique** and/or **Mape-Antique NHL ECO** ranges, can be used to carry out these operations.

Mapei solutions

For conservation work, **Mapei** recommends the use of coatings from the **Silexcolor** range, products based on **potassium silicate**, and compliance with DIN18363. These coatings are able to form a **single unit** with the render, through the reaction of **silicification**, which consists of the transformation of potassium silicate into calcium silicate as a result of the presence of lime in the underlying mortar.

Unlike traditional paints or toners, **Silexcolor** products, despite containing pigments and fillers, **do not obstruct the passage of water vapour**. Therefore allow the characteristics and properties of the render made with products from the **Mape-Antique** ranges to be maintained.

The crystallisation of the potassium silicate in the porosity of the mortar gives the substrate a certain **impermeability**, which helps to protect the mortar from the leaching action of rainwater. Finally, unlike finishes consisting solely of lime (not with any latex additives), the mineral products in the **Silexcolor** range **resist chemical aggression** caused by acid rain. They are in fact insensitive to the disintegrating action of sulphuric acid, which, through the sulphation reaction, attacks the protective film containing calcium carbonate.

Breathability and water repellency

If coloured coatings with a higher water-repellent effect are required, low thickness paints or coatings from the **Silancolor** range can be used as an alternative to **Silexcolor** products. These are **siloxane-based systems** that combine the advantages of traditional mineral products, such as breathability, with those of 'synthetic' materials, such as water repellency.





Silexcolor range: properties

- **Perfect adhesion of the products to the substrate**, with which they react chemically through the silicification reaction, unlike traditional finishing products.
- **High water vapour transpirability**, so the evaporation of water contained in masonry is promoted.
- **Increase in the render's ability to "repel" rainwater**, due to the crystallisation of potassium silicate in the porosity of the mortar.
- **Insensitivity to the disruptive action** of acid rain.
- **Countless aesthetic-decorative effects** can be achieved in product-colour combinations.

The products

The **Silexcolor** range comprises a series of materials capable of satisfying the different aesthetic-functional requirements in the colouring of **Mape-Antique** products used in the renovation and restoration of buildings.

- Smooth paints to be applied by brush, roller or spray, such as **Silexcolor Paint**.
- Low thickness coloured coatings of different grain sizes, such as, **Silexcolor Tonachino** and **Silexcolor Graffiato**.
- Ultra-fine smoothing grouting, such as **Silexcolor Marmorino**.

To even out the absorption of the substrate, **Silexcolor Primer**, a transparent primer or **Silexcolor Base Coat**, a pigmented, filler primer, must be applied before applying these products.

Consolidation of stone material

What is stone material?

In accordance with the **Normal Recommendations**, the term stone material is used to define not only marble and stone but also stucco, mortar, render and ceramic products used in architecture such as bricks and tiles.

Superficial modifications

The surface of a **stone natural material** (marble, stone, granite, and any other rock used in architecture) or **artificial** (stucco, mortar, plaster, ceramic products, materials used in architecture that derives from the processing of raw materials of natural origin, etc.) undergoes changes over time due to atmospheric agents.

Alteration: a change in the material that does not necessarily indicate a deterioration of its characteristics from a conservation point of view (e.g. a patina or colour change).

Degradation: a change that always indicates deterioration (alveolarization, disintegration, etc.).

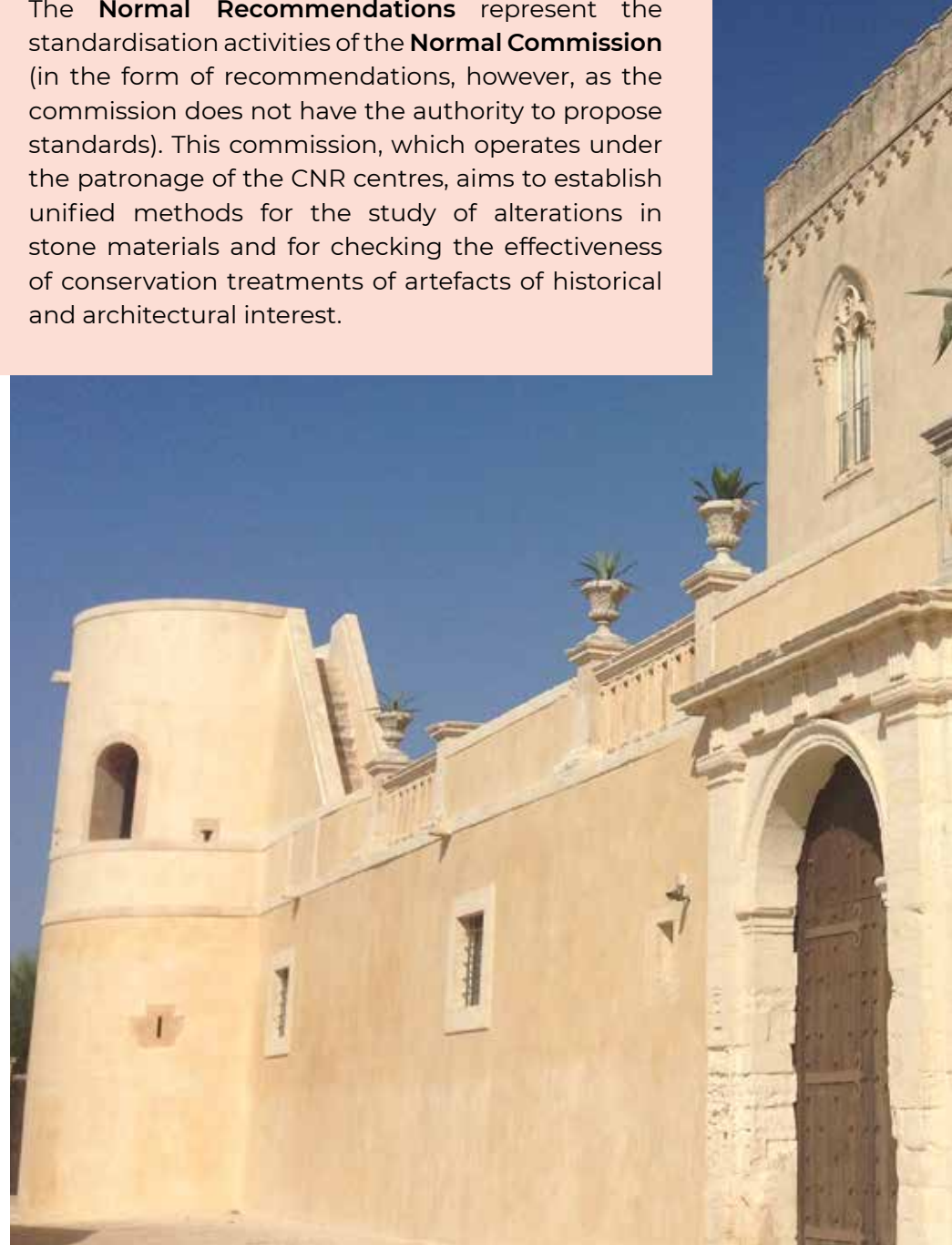
Consolidation treatment

The general aim of **the consolidation treatment** is to **re-establish continuity** between the outer part of the material and the innermost part, in order to guarantee a material cohesion capable of eliminating the physical-mechanical differences that have arisen between the various layers.

Consolidation operations must ensure the adhesion of the damaged material to the healthy one in order to **re-establish a structural balance** capable of guaranteeing a solid behaviour towards the various stresses and, at the same time, allow the boundary conditions to be coped with. The aim is to **restore the original mechanical strength of the healthy material**,

Normal recommendations

The **Normal Recommendations** represent the standardisation activities of the **Normal Commission** (in the form of recommendations, however, as the commission does not have the authority to propose standards). This commission, which operates under the patronage of the CNR centres, aims to establish unified methods for the study of alterations in stone materials and for checking the effectiveness of conservation treatments of artefacts of historical and architectural interest.





Main techniques for applying cortical consolidation

- Impregnation by brush, pad or roller.
- Impregnation by spray.
- Pocket or pack impregnation.
- Impregnation by percolation.

avoiding excessive interventions that could alter the intrinsic constitution of the structure with long-term effects that are difficult to predict.

How to consolidate

Stone materials are consolidated by **cortical treatment**, i.e. by applying substances of various kinds (organic and/or inorganic) to their surface in order to impregnate them in depth, using the most suitable tools. This procedure avoids overlaying a degraded layer with a resistant surface layer. The success of the intervention depends on both the substance used and its correct method of application. It is important that the consolidating substance is compatible with the nature of the material in terms of modulus of elasticity and thermal expansion, so as not to create internal trauma to the structure. At the same time, it must be able to hinder the aggression of pathogens. Furthermore, the material introduced must not completely saturate the pores so as not to alter the material's own vapour permeability values.

Consolidation procedures

Consolidation procedures are always particularly delicate operations. They require a careful **analysis of the state of affairs** both from the point of view of the conservation of the materials and of the cracking framework, in order to understand the nature of the support and the causes triggering the pathologies of degradation. The results of the analyses allow the selection of the most suitable products and methods of intervention.

Ethyl silicate: Consolidante ETS and Consolidante ETS WR

Ready-to-use liquid products **based on ethyl esters of silicic acid** in alcohol solvent, characterised by **high penetration power** and excellent resistance to alkalis and ultraviolet rays.

The **very small molecular size** of the compound means that both products can also be used to consolidate substrates with very small porosity.

The ethyl esters of silicic acid, of which **Consolidante ETS** and **Consolidante ETS WR** are composed, react with atmospheric moisture and turn into **silica gel**, releasing ethyl alcohol as a by-product, which evaporates along with the solvents used.

The silica gel, in turn, establishes a strong chemical bond with the treated substrate, giving it better mechanical properties.

- **Consolidante ETS:** has excellent consolidant properties.
- **Consolidante ETS WR:** combines its consolidating power with a good water-repellent effect.

The two consolidants do not change the vapour permeability of the substrate, maintaining the open pore condition.

*Façade of Palazzo Tupputi - Bisceglie.
Application of Consolidante ETS WR on component parts.*





Vinyl-versatile copolymers: Consolidante 8020

Consolidante 8020 is a ready-to-use, reversible liquid product made from vinyl-versatile copolymers in a water-alcohol solution characterised by its **high penetration capacity** in porous substrates and excellent resistance to alkalis and UV rays.

The very small molecular size of the compound means that both products can also be used to **consolidate substrates with very small porosity**.

It is used on internal and external surfaces to consolidate stone materials, brickwork, render, weak mortar with poor cohesion and lime-based paint. It improves the mechanical surface characteristics without creating any film-forming effect:



Consolidation of Sacrestia Aquilonare del Duomo - Milan - Italy

Some restoration sites

Nonantola Abbey
Modena, Italy



Church of Matrice, Italy



Casa degli Artisti - Milan, Italy





National Railway Museum of Pietrarsa - Naples, Italy



Church Santa Veneranda
Pavia, Italy



Former Convent of Santa Chiara - Brindisi, Italy



B&B la casa di Montalbano - Punta Secca, Italy

Colosseum - Rome, Italy



Masseria Tagliatelle - Lecce, Italy



St. Ambrogio Basilica – Milan, Italy



Castelu de Lut Valea - Zânelor, Romania



Palazzo della Carovana - Scuola Normale Superiore - Pisa, Italy



Church of Madonna della Bruna e Sant'Eustachio
Matera, Italy



Pietrasa - Italy



Church San Paolo Eremita - Puglia, Italy



Church of Santa Maria Annunziata - Italy



Church of Saint Sava - Belgrad, Serbia



Ex residence of Shi Liangcai - Shanghai - China



Casa Venecia - Puerto de Mahón - Menorca



Sant Pere del Bosc - Lloret - Spain



Victoria Theatre & Concert Hall - Singapore



Masjid Sultan Mosque - Singapore

EVERYTHING'S OK WITH MAPEI

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