MAPEI

IN COMPLIANCE WITH EUROPEAN STANDARD EN 998-1 GP-CS IV MAPEI RENDERING AND PLASTERING MORTAR

IN COMPLIANCE WITH EUROPEAN STANDARD EN 998-2 G-M15 MAPEI MASONRY MORTAR

Mape-Antique Strutturale NHL

CE EN 998-1

CE EN 998-2

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

WHERE TO USE

Rendering old stone, brick, tuff and mixed masonries, including ancient and decorative ones, with high-performance transpirant mortar applied using a rendering machine or trowel.
“Reinforced” render with metal or composite mesh and construction joints for consolidating, strengthening and renovating weak masonry.
Pointing between elements on masonries, including those with a natural-finish.
Mape-Antique Strutturale NHL combined with **Mapenet EM 30** and **Mapenet EM 40** pre-primed, A.R. glass fibre mesh is consistent with the approach defined in the guidelines for the qualification of FRCM (Fibre Reinforced Cementitious Matrix) systems, which stipulate that the entire strengthening system must be qualified.
For load-bearing and buffer walls or for rebuilding old masonries.

Some application examples

- New layers of internal and external high-performance transpirant render on stone, brick, tuff and mixed masonries without capillary rising damp.
- Building and touching-up render on old masonries, including antique and artistic ones under the protection of the Fine Arts and Landscapes Authority.
- New render “reinforced” with galvanized or steel mesh or composite material (such as **Mapenet EM 30** and **Mapenet EM 40**) on weak masonry with no capillary rising damp.
- Capping “reinforced” with steel mesh or composite material (such as **Mapenet EM 30** and **Mapenet EM 40**) on the outer face of vaulted roofs.
- Levelling the outer face of vaulted roofs with uneven surfaces.
- Pointing between layers of stone, brick and tuff on natural-finish masonry.
- Making installation and “reinforced” joints using rebar or composites (such as **Maperod**), steel bows (such as **MapeWrap S FIOCCO**) using the overlaying technique.
- Building facing walls with high-performance masonry mortar compliant with standards applied in seismic zones.
- Touching-up and plumbing facing walls with gaps and uneven surfaces.

TECHNICAL CHARACTERISTICS

Mape-Antique Strutturale NHL is a pre-blended cement-free mortar in powder form for render and masonry work, made from natural hydraulic lime, Eco-Pozzolan, natural sand, special admixtures, micro-fibres and glass fibres according to a formulation developed in MAPEI’s research laboratories.
This product is classified as GP according to EN 998-1 Standards: “*General purpose mortar for internal/external render*”, guaranteed performance, Category CS IV.

Mape-Antique Strutturale NHL

Fastening zinc-plated mesh to the masonry

Checking the gap between the mesh and substrate

Spray-application of Mape-Antique Strutturale NHL

It is also classified as G according to EN 998-2 Standards: "*Guaranteed performance, general-purpose masonry mortar for external use on elements with structural requirements*", Class M 15, with compressive strength > 15 N/mm^2.

When **Mape-Antique Strutturale NHL** is mixed with water using a continuous mixing rendering machine or a cement mixer, it forms a transpirant rendering and masonry mortar with a plastic-thixotropic consistency which is easy to apply by spraying or with a trowel. Thanks to its special composition, **Mape-Antique Strutturale NHL** has an extremely low rate of hygrometric shrinkage which drastically reduces the risk of the formation of cracks in the mortar.
Typical values are shown in the Technical Data table (see Application Data and Final Performance sections) which refer to the main characteristics of **Mape-Antique Strutturale NHL** at both the fresh and hardened states.

RECOMMENDATIONS

- If it is difficult to thoroughly clean the masonry (internal walls for example) or if applied on mixed walls, wet the surface and apply a layer of **Mape-Antique Rinzaffo** before applying **Mape-Antique Strutturale NHL** to guarantee a good bond of the plaster.
- **Mape-Antique Strutturale NHL** must be applied in layers at least 10 mm thick.
- Do not use **Mape-Antique Strutturale NHL** for casting into formwork (in such cases use **Mape-Antique LC** mixed with aggregates with a suitable grain size).
- Do not use to make consolidating slurry for injection into the structure (in such cases use **Mape-Antique I** or **Mape-Antique I-15** or **Mape-Antique F21**).
- Never add admixtures, cement or other binders (lime and gypsum) to **Mape-Antique Strutturale NHL**.
- Wait until **Mape-Antique Strutturale NHL** is completely cured before skimming the surface or applying a thin layer of coloured coating.
- Do not apply paint or coloured coatings with a low thickness, otherwise the transpiration properties of **Mape-Antique Strutturale NHL** could be compromised. Use products from the **Silexcolor** or **Silancolor** ranges; paint, lime, and water-repelling products such as **Antipluviol S** or **Antipluviol W**.
- Do not apply **Mape-Antique Strutturale NHL** if the temperature is lower than +5°C.

APPLICATION PROCEDURE

Preparation of the substrate

Remove all loose and flaky parts, dust, mould and any other material either manually or mechanically until a clean, sound and compact surface is obtained to guarantee a good bonding surface for **Mape-Antique Strutturale NHL**. When rebuilding the masonry installation joints remove all deteriorated and loose mortar. Then clean the wall with low-pressure water jets to remove any efflorescence or salts present on the surface. Repeat this operation several times if necessary.
If weak substrates need to be consolidated, apply a number of coats of **Consolidante 8020** or **Consolidante ETS 10** or **Consolidante ETS 30** or **Primer 3296** (refer to the relevant Technical Data Sheets).
Voids and uneven areas in the masonry must be repaired by patching or tacking with **Mape-Antique Strutturale NHL** or **Mape-Antique Allettamento** with pieces of stone, brick or tuff with similar characteristics to the original material.
In the case of particularly difficult masonries, such as those in stone and mixed or porous or mechanically weak materials, we recommend applying a starter layer approximately 5 mm thick of **Mape-Antique Strutturale NHL** with a semi-fluid consistency or **Mape-Antique Rinzaffo** to even out the absorbency of the substrate and improve the bond of the plaster.
If large surfaces need to be rendered, we recommend applying the product with a continuous-feed rendering machine and to place vertical shims on the walls to check that the render is even and flat.
Before applying **Mape-Antique Strutturale NHL** the substrate must be partially saturated to avoid the substrate absorbing water from the mortar, compromising the final performance characteristics of the mortar. Excess water must be eliminated, so that the masonry is saturated and the surface is dry. Compressed air may be used to speed up this process.
When used to "strengthen" render or "reinforce" capping, put strips of metal mesh or composite material (such as **Mapenet EM 30** or **Mapenet EM 40** pre-primed, alkali-resistant glass fibre mesh) on the existing masonry and fasten it in place. When using a metal mesh, fasten it in place with nails or studs or with metal connectors. When using a composite mesh, fasten it in place with **Mapenet EM Connector**, special "L" shaped connectors made from A.R. glass fibre and thermosetting resin, such as vinylester-epoxy resin. Fasten the connectors to the masonry with **Mapefix PE Wall**, styrene-free, polyester resin-based chemical anchor (certified ETAg 029). The recommended number of fasteners to use is 4-5/m^2. Whatever type of strengthening mesh is used, it must be set at a certain distance from the substrate so that it is at the mid-point of the finished render.

TECHNICAL DATA (typical values)

PRODUCT IDENTITY			
Type of mortar (EN 998-1):	GP - General purpose mortar for internal/external render		
Type of mortar (EN 998-2):	G - Guaranteed performance, general-purpose masonry mortar for external use on elements with structural requirements		
Appearance:	powder		
Colour:	light hazel		
Type of hydraulic binder (EN 459-1):	NHL 3.5 and NHL 5		
Maximum size of aggregate (EN 1015-1) (mm):	2.5		
Apparent volume mass (kg/m³):	1,400		
Chloride content (EN 1015-17) (%):	**Requirements EN 998-1**	**Requirements EN 998-2**	**Performance of product**
	not required	< 0.1	< 0.05

APPLICATION DATA (at +20°C - 50% R.H.)	
Mixing ratio:	100 parts of **Mape-Antique Strutturale NHL** with 16-17 parts of water (4-4.25 litres of water per 25 kg bag of the product)
Appearance of blend:	thixotropic
Consistency of fresh mortar (EN 1015-3) (mm):	175
Bulk density of fresh mortar (EN 1015-6) (kg/m³):	2,000
Porosity of the mortar while fresh (EN 1015-7) (%):	7
Application temperature range:	from +5°C to +35°C
Workability time of fresh mortar (EN 1015-9):	approx. 60 minutes
Minimum applicable thickness (mm):	10
Maximum applicable thickness (mm):	40

FINAL PERFORMANCE (17% mixing water)

Performance characteristic	Test method	Requirements according to EN 998-1	Requirements according to EN 998-2	Performance of product
Compressive strength after 28 days (N/mm²):	EN 1015-11	CS I (from 0.4 to 2.5)	from class M 1 (> 1 N/mm²) to class M d (> 25 N/mm²)	> 15 (Category CS IV) (Class M 15)
		CS II (from 1.5 to 5.0)		
		CS III (from 3.5 to 7.5)		
		CS IV (≥ 6)		
Bond strength to substrate (brickwork) (N/mm²):	EN 1015-12	declared value and failure type (FP)	not required	≥ 0.7 Failure mode (FP) = A/C
Initial shear strength (f_{vok}) (N/mm²):	EN 998-2 Appendix C	not required	declared value	0.15
Static modulus of elasticity after 28 days (N/mm²):	EN 13412	not required	not required	10,000
Capillary action water absorption [kg/(m²·min$^{0.5}$)]:	EN 1015-18	from Category W 0 to Category W 2	declared value	< 0.2 Category W 2
Coefficient of permeability to water vapour (μ):	EN 1015-19	declared value	declared value	60
Thermal conductivity ($\lambda_{10,dry}$) (W/m·K):	EN 1745	tabulated value	tabulated value	1
Reaction to fire:	EN 13501-1	value declared by manufacturer	value declared by manufacturer	Class B-s1, d0

Close up of Mape-Antique Strutturale NHL

Squarring the render

Levelling the render

If strengthening layers are applied using the reinforced installation technique with rebar or composite bars (such as **Maperod**), the reinforcement must be placed at a depth which guarantees that it is covered by a layer of mortar at least 2 cm thick.

Preparation of the product
Mape-Antique Strutturale NHL must be prepared in a cement mixer if it is to be applied by trowel or in a continuous-feed rendering machine if mechanical application is preferred. Although the product is suitable for application using manual techniques, we recommend using a rendering machine to apply the product on large surfaces to obtain a better yield. Small amounts of the product may be prepared using a low-speed electric drill with a mixing attachment. Mixing by hand is not recommended.

Application of the product
Application with rendering machine
Pour the contents of the sacks of **Mape-Antique Strutturale NHL** into the hopper of a continuous-feed rendering machine (such as a PFT G4 or G5, Putzmeister MP 25, Turbosol or similar) and set the flow-rate at 320-340 l/h, according to the type of machine used, until a "plastic" consistency is obtained. Tests to validate the product were carried out using a Putzmeister MP 25 with the following fittings:

Stator Rotor	Mixer	Tube	Lance
D6 Power	Standard	Ø 25 mm, length 15 m	Standard, nozzle 14 mm
D6 - 3			

If an initial approx. 5 mm thick layer of **Mape-Antique Strutturale NHL** with a semi-fluid consistency or **Mape-Antique Rinzaffo** has been applied, wait until this product starts to set and then apply a single layer of **Mape-Antique Strutturale NHL** (max 40 mm) starting from the lower part of the masonry and working upwards.
If the thickness to be applied is thicker than 40 mm, **Mape-Antique Strutturale NHL** must be applied in several layers. Each layer must be applied without tamping the previous one.
We recommend rendering the wall from a distance of approximately 20 cm so that the product is applied uniformly.
After applying the mortar, wait a few minutes and level off using an aluminium H-type or blade-type straight edge by passing over the surface horizontally and vertically until it is flat.
Remove the vertical shims which were previously attached to the wall and fill the spaces with the same mortar.
Finish the surface of **Mape-Antique Strutturale NHL** with a plastic, wooden or sponge float a few hours after the application, according to the surrounding temperature and conditions.
Even though **Mape-Antique Strutturale NHL** contains products which contrast the formation of micro-cracks, it is good practice to apply the mortar when the wall is not exposed to direct sunlight and/or wind. In such cases, such as during hot and/or particularly windy weather, take special care when curing the mortar, especially during the first 36-48 hours. Spray water on the surface or employ other systems to impede the mixing water evaporating too quickly.

Application by trowel
After pouring a minimum amount of water in the mixer (approximately 4 litres per 25 kg sack of **Mape-Antique Strutturale NHL**), slowly pour the powder in a continuous flow. Mix for approximately 3 minutes and check that the blend is well mixed, even and free of lumps and remove all the material which has stuck to the walls of the mixer.
Add more water if required up to a maximum total of 4.25 l per sack of product. Then mix **Mape-Antique Strutturale NHL** again for a further 2-3 minutes to obtain an even, "plastic" and thixotropic blend. Apply **Mape-Antique Strutturale NHL** in layers of up to 40 mm thick per layer, starting from the bottom of the wall.
If the product is used as masonry mortar on facing walls or for patching and tacking, form a laying surface beforehand and then apply the constructive elements by pressing them in with a light pressure until they are in the right position. Remove excess mortar with a trowel.
If the mortar is used for pointing, the product must be applied at a thickness of at least 2 cm. On natural-finish walls, remove any excess product and clean the facing wall with water and a sponge float.

FINISHING
If a finer-grained surface finish than the normal tamped finish of **Mape-Antique Strutturale NHL** is required, apply a layer of **Mape-Antique FC Ultrafine**, or **Mape-Antique FC Civile** or **Mape-Antique FC Grosso** fine-grained smoothing and levelling mortars made with lime and Eco-Pozzolan with different granulometries. If the surface of the render is to be smoothed off and then decorated or protected, use thin layers of a coloured finish such as **Silexcolor Tonachino** silicate finish or **Silancolor Tonachino** siloxane finish after priming the surface with a

primer from the corresponding ranges of products (**Silexcolor Primer** or **Silancolor Primer**). As an alternative to the products mentioned above, if the surface of the render is to be painted, use **Silexcolor Paint** or **Silancolor Paint** after applying their corresponding primers.
Always wait until the render is completely cured, usually approximately 7 days per cm of thickness, before applying any type of thin-layered coloured dressing product or paint.
For constructions particularly exposed to rain, if the render does not require any coating, it may be protected with a transpirant product such as **Antipluviol S** transparent, transpirant, siloxane resin impregnator in solvent or **Antipluviol W** transparent, transpirant, siloxane resin impregnator in water dispersion.

Cleaning
The mortar which has not yet hardened may be washed from tools using water. Once hardened, cleaning is much more difficult, and must be carried out mechanically.

PACKAGING
25 kg bags.

CONSUMPTION
approx. 17 kg/m^2 per cm of thickness.

STORAGE
12 months in a dry, covered environment in its original, unopened packaging.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION
Mape-Antique Strutturale NHL contains special hydraulic binders, which when in contact with sweat or other body fluids may cause corrosion and damage to the eyes.
During use, wear protective gloves and goggles and take the usual precautions for handling chemicals. If the product comes in contact with the eyes or skin, wash immediately with plenty of clean water and seek medical attention.
For further and complete information about the safe use of our product please refer to the latest version of our Material Safety Data Sheet.

PRODUCT FOR PROFESSIONAL USE.

WARNING
Although the technical details and recommendations contained in this product data sheet correspond to the best of our knowledge and experience, all the above information must, in every case, be taken as merely indicative and subject to confirmation after long-term practical application; for this reason, anyone who intends to use the product must ensure beforehand that it is suitable for the envisaged application. In every case, the user alone is fully responsible for any consequences deriving from the use of the product.

Please refer to the current version of the Technical Data Sheet, available from our website www.mapei.com

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GREEN INNOVATION

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