Dehumidifying render - natural hydraulic lime NHL and ECO-POZZOLAN.

IS IT:

- [X] *Product*
- [ ] *Technology*
- [ ] *Equipment*

APPLICABLE FOR:

- [X] *Restoration*
- [X] *Rehabilitation*
- [X] *New Construction*

APPLICABLE ON:

- [ ] *1. Foundations and underground structures*
- [X] *2. Vertical structures*
- [ ] *3. Horizontal structures and vertical connections*
- [ ] *4. Roof and terraces*
- [X] *5. Façade and building envelope*
- [ ] *6. Finishes and completion elements*
- [ ] *7. Integrated services*
- [ ] *8. General strategies for building recovery*

Related companies: *No companies; university research; structural study.*

DESCRIPTION

Macro porous products that are salt-resistant, de-humidifying renders, based on lime and Eco-Pozzolan. These are used for repairing old masonry deteriorated by the presence of capillary rising damp. Repairs to masonry deteriorated by the disintegrating action of concentrated salts or by the action of atmospheric agents and environmental conditions or by ageing.

They are de-humidifying renders used for reconstructing old lime-based render on stone, brick, tuff and mixed masonry with saline efflorescence.

They are also used as a base layer for de-humidifying, transpiring and “structural” render (e.g., Mape-Antique MC).

WHY TO USE

Other uses of the products:

- Internal and/or external macro-porous, de-humidifying render on old walls with capillary rising damp.
- De-humidifying render on masonry in lagoon areas or close to the sea.
- Touching-up and plumbing facing walls with gaps and uneven surfaces.
- Pointing between layers of stone, brick, and tuff on masonry with a “natural finish”.

HOW TO USE AND APPLY

PREPARATION OF THE SUBSTRATE:

On masonry with capillary rising damp and soluble salts, the deteriorated render should be completely removed either manually or with mechanical means to a height of approximately 50 centimeters above the deteriorated area, and in all cases to a height of at least twice the thickness of the wall. All traces of loose or crumbly material, dust, mold and any other element should be removed which could compromise the bond of the de-humidifying cycle of the render (e.g. Mape-Antique Rinzaffo and Mape-Antique MC) until the substrate is clean, sound and compact. Then the wall should be cleaned with low-pressure water jets to remove any efflorescence or soluble salts present on the surface. This operation should be repeated several times if necessary. Gaps and uneven areas in the masonry must be repaired by patching or tacking with some render (e.g., Mape-Antique MC, Mape-Antique Intonaco NHL or Mape-Antique Allettamento) in combination with pieces of stone, brick, or tuff with characteristics as similar as possible to the original material. The substrate should be saturated with water to prevent it from absorbing water from the mortar and compromising its final performance characteristics. Excess water must be left to evaporate off, so that the masonry is saturated, and the surface is dry. Compressed air may be used to speed up this process. If the substrate cannot be saturated with water, it is recommended that it is at least dampened to allow the mortar to bond correctly.

MIXING:

The render can be prepared with a vertical cement mixer. Small amounts of the product may be prepared using a low-speed electric drill with a mixing attachment. Mixing the products by hand is not recommended.

Even though these renders are suitable for application using manual techniques, it is recommended to use a rendering machine to apply the product on large surfaces to obtain a better yield. For applications by trowel, after pouring the minimum amount of clean water required into the mixer, slowly the powdered mortar in a continuous flow should be added. Mixing for approximately 3 minutes is required and checking if the blend is well mixed, even and free of lumps. A further amount of water should be added if required.

APPLICATION:

In the case of particularly difficult walls, such as stone walls, walls made of porous material or mechanically weak walls, it is recommended to apply an initial 5 mm thick layer of semi-fluid dehumidifying render (e.g., Mape-Antique Intonaco NHL or Mape-Antique Rinzaffo) in order to even out the absorbency of the substrate and improve the bond of the render.

On walls with mixed building materials or on walls out of plumb by more than 4-5 cm, which would lead to the layer of render having an irregular thickness, it is recommended to insert Ø 2 mm zinc-plated metallic mesh with a mesh size of 5 x 5 cm before applying the render. The mesh

must be fixed in place to the wall with nails, chemical anchoring and plugs with a small gap between the wall so that it becomes embedded in the middle of the layer of render.

If a layer of plaster has been applied (for example on masonry with capillary rising damp and soluble salts), wait until this layer has "set" and then apply a new layer of at least 20 mm thick with a trowel, starting from the bottom of the wall. If the thickness to be built up is thicker than 30 mm, Mape-Antique MC must be applied in several layers. Form levelling strips or place vertical guides in position to define the correct planarity and thickness of the render. Each layer must be applied without tamping the previous layer. After applying the mortar, few minutes should be passed before levelling off. Levelling should be carried out using an aluminum H-type or blade-type straight edge by passing over the surface horizontally and vertically until it is flat. The vertical guides should be removed, if they have been used, and the gaps should be filled in.

The surface of the render (e.g., Mape-Antique MC and Mape-Antique Intonaco NHL) should be finished with a plastic, wooden or sponge float a few hours after application, according to the surrounding temperature and conditions.

It is a 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 render, especially during the first 36-48 hours. Water should be sprayed on the surface or employ other systems to prevent the mixing water evaporating off too quickly.

APPLICATION OF AN ADDITTIONAL FINISHING COAT:

If a finer-grained surface finish is required, a layer of finer skimming compounds with different grain sizes may be applied (e.g., Mape-Antique FC Ultrafine, Mape-Antique FC Civile or Mape-Antique FC Grosso). It is important to wait until the render and skimming layer, if applied, are completely cured before painting the surface or applying any other type of finishing product. The surface should be painted with Silexcolor Painting or Silancolor Painting should be carried out after applying their corresponding primers. For constructions particularly exposed to rain, if the render does not require any coating, it may be protected with a transparent water-repellent product such as Antipluviol S siloxane resin impregnator in solvent or Antipluviol W siloxane resin impregnator in water dispersion.

TECHNICAL CHARACTERISTICS

This type of products is 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 5, with compressive strength > 5 N/mm².

When mixed with water in a cement mixer, a salt-resistant masonry mortar with a plastic-thixotropic consistency and good trowel ability is formed. It should have an extremely low rate of hygrometric shrinkage which drastically reduces the risk of the formation of cracks in the mortar. It is also recommended to obtain properties which make the product resistant to various chemical-physical aggressive phenomena, such as soluble salts, freeze-thaw cycles, the leaching action of rainwater and alkali-aggregate reactions.

Lime mortar types and mixes are presented below in the table (Young, 2020):

Table 2: Lime mortar types and mixes

Table 2: Lime mortar types and mixes					
Mortar type	**Pure lime**	**Lime + pozzolan**	**Natural Hydraulic Lime (NHL)**	**Sacrificial lime**	**Narrow joint**
Nominal mix	1:3	1:3	1:2.5[1]	1:4	1:1.5
Binder	Quicklime or lime putty[2]	Quicklime or lime putty[2]	NHL 2 or NHL 3.5	Quicklime or lime putty[2]	Lime putty
Pozzolan		10% FA, GGBFS or 20% trass[3]			± 5% FA, GGBFS or 10% trass[3]
Sand	2–3 parts	2–3 parts	1.5–2.5 parts	3–5 parts	1–1.5 parts
Porous aggregate	± Por. agg. replacing 0.5 part of sand	± Por. agg. replacing 0.5 part of sand	± Por. agg. replacing 0.5 part of sand	Por. agg. replacing 0.5–1 part of sand	
Filler	± Finely ground limestone/ marble	± Finely ground limestone/marble	± Finely ground limestone/ marble		Finely ground limestone, up to 0.5 part
Admixtures	± Air-entrainer ± Water-retainer	± Air-entrainer ± Water-retainer	± Air-entrainer ± Water-retainer	Air-entrainer Water-retainer	± Air-entrainer ± Water-retainer
Alternative mixes	Fresh hydrated lime can be used but its density must be allowed for	Less pozzolan (e.g. half the above %); Other pozzolans; NHL mixes	NHL + putty; NHL + pozzolan; Lime + pozzolan mixes	Lime + 5% pozzolan or NHL 2 + 25% putty for exposed locations	NHL 2 + 25% putty for exposed locations

Notes:
1. Nominal mixes for NHLs (1:2.5) are richer than for pure limes (1:3) because NHLs contain a proportion of inert material.
2. Quicklime produces richer mixes than lime putty, that are more akin to traditional mortars.
3. Pozzolans are measured as a percentage of the lime content; their proportion depends on their hydraulic reactivity.
±. This symbol means 'plus or minus' the pozzolan, porous aggregate, filler or admixture, depending on the circumstances.

RECOMMENDATIONS AND OTHER INFORMATION

The plaster should be applied in layers of at least 20 mm thick – as an undercoat.

Thin coats of paint or colored coating should not be added as these could have a significant impact on the transpiration properties and porosity of some products

and, therefore, obstruct the evaporation of the damp in the masonry.

If the structures to be restored suffer from intense capillary rising damp and high concentrations of soluble salts, it is recommended to form a horizontal chemical barrier before applying the de-humidifying render to reduce the ingress of damp into the masonry as much as possible.

Products should not be applied if the temperature is lower than +5°C.

EXAMPLES

N/A

REFERENCES / SOURCES AND LITERATURE

Apostolopoulou, M., Bakolas, A., & Kotsainas, M. (2021). Mechanical and physical performance of natural hydraulic lime mortars. Construction and Building Materials, 290, 123272. https://doi.org/10.1016/j.conbuildmat.2021.123272

Böke, H., Akkurt, S., İpekoğlu, B., & Uğurlu, E. (2006). Characteristics of brick used as aggregate in historic brick-lime mortars and plasters. Cement and Concrete Research, 36(6), 1115–1122. https://doi.org/10.1016/j.cemconres.2006.03.011

Young, D. (2020). Lime mortars for the repair of masonry (Heritage Technical Code HTC 1:2020; p. 34). Heritage Council of Victoria, Department of Environment, Land, Water and Planning.

Holmes, S and Wingate, M (2002) Building with Lime: A Practical Introduction, 2nd edn, London: Intermediate Technology Publications

Historic Scotland (2006) Technical Advice Note 1 – Preparation and use of Lime Mortars Available online: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=3d5fbef1-8a1e-4945-a41e-a5c201034e56

The Building Lime Forum http://www.buildinglimesforum.org.uk

WEBSITE OF THE COMPANY

https://www.mapei.com/ae/en/products-and-solutions/products/detail/mape-antique-rinzaffo

https://www.mapei.com/ae/en/products-and-solutions/products/detail/mape-antique-intonaco-nhl

https://www.mapei.com/ae/en/products-and-solutions/products/detail/mape-antique-mc

https://www.mapei.com/ae/en/home-page

www.peletico.com

IMAGES AND CAPTIONS

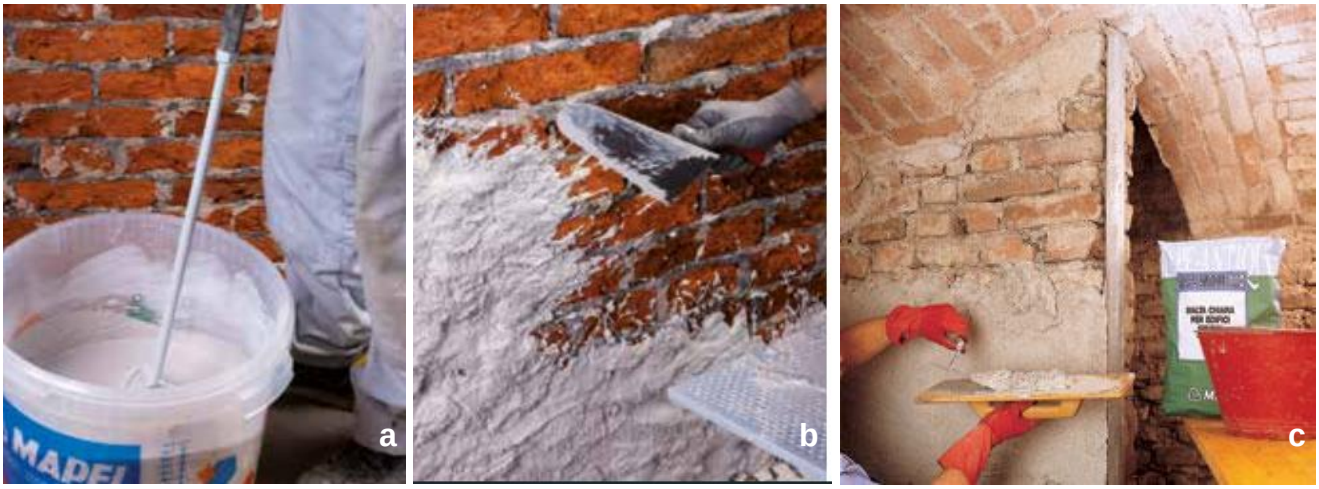

Fig.1: a) Mixing of Mape-Antique Rinzaffo, b & c) Application of Mape-Antique Rinzaffo on a brick wall after removing the deteriorated render. © *www.mapei.com/ae/en/home-page*

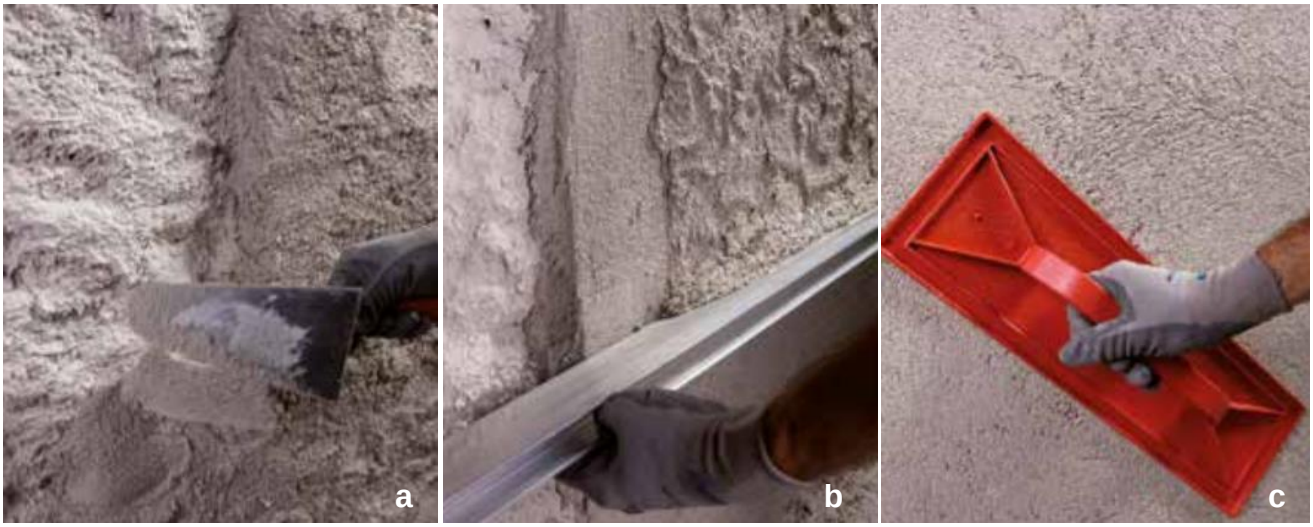

Fig.2: a) Applying Mape-Antique MC over Mape-Antique Rinzaffo, b) Levelling the surface of Mape-Antique MC with a straight edge, c) Levelling the surface of Mape-Antique MC. © *www.mapei.com/ae/en/home-page*

Fig.3: Finishing mortared joints pointed with Mape-Antique MC. *©www.mapei.com/ae/en/home-page*