



From Project to Jobsite

LIME INJECTION / LIME INJECTION AM

COLLOIDAL LIME INJECTION SLURRY FOR THE CONSOLIDATION AND RESTORATION OF MASONRY WALLS

Description LIME INJECTION is a binder for the consolidating injection of walls in bricks, stones or mixed. The setting and hardening is based on the lime-reactive silica reaction and the presence of hydraulic lime, without the harmful soluble salts. Due to the exceptional flowing properties and the very fine particle size of the fillers, allow deep penetration into the substrate porosity and cracks even smaller than 1 mm.

Advantages and characteristics LIME INJECTION is used for the consolidating injection of masonry in stone or brick, or mixed. Specially recommended for the restoration of ancient walls where compatibility problems with injection materials based on cement (with expansive crystallisation reactions, too high strengths) or epoxy resins (vapour barrier) can occur.

When consolidating ancient masonry structures by injection of bigger volumes of grouts, with operation extended in time, it is always important to avoid :

- The difference in hardening from one part of the injected area to another, eventually not consolidated (cement based injection slurries develop too fast higher mechanical resistance values).
- Water vapour barriers which interrupt the normal transpiration balance of the wall structure (this occurs when using epoxy based injection resins).
- Stresses in the masonry wall, developed by excessive heat development during the hardening and setting of several binders (for example very fine Portland cement).
- Chemical incompatibility with the existing materials of the masonry structure, resulting in expansive crystallisation reactions like ettringite or thaumasite due to the reaction of sulphates, already present in the structure (bricks, mortars, rocks, capillary rising humidity) and Portland cement with high calcium-aluminate concentrations.

It is essential that:

- The injection slurry develops the mechanical resistance slowly and gradually, and that the modulus of elasticity, after curing, is compatible with the substrate.
- Injection slurries are chemically compatible with the substrate, without development of expansive crystallisation stresses, or other disruptive reactions.
- Injection slurries have the highest possible penetration capacity through the smallest pores or cracks in order to guarantee a well distributed structural equilibrium.

All these considerations were well studied during the formulation process of LIME INJECTION, to finally obtain following advantages :

- Develops very low hydration heat.
- Does not block the water vapour permeability fluxes in the wall.
- Contains very the smallest possible particles, does not show any bleeding or sedimentation, develops high adhesion properties to stone and bricks.

All physical-mechanical characteristics are listed in the table below, in comparison with traditional cement based injection slurries.



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Method of **Screen of drill-holes:**

use In order to obtain the maximum continuity, compactness and resistance of the consolidation process, a screen of drill-holes is made in the corresponding jointing mortar using a suitable mechanical drill. The drill holes are slightly tilted towards the floor-level (usually approximately 9 holes per m² are made, with interstitial distance of 50 cm, and with a hole diameter of 20 millimetre). On the next page, a purely indicative application drawing is shown, demonstrating the drill-hole screen (remind that the decision on the position of the drill-hole screen, and the diameter of the holes, the angle of inclination, the depth of the holes, the necessity to reinforce the drill-holes, etc., must be taken based on a deep study of the desired result and the state of degradation of the masonry structure).

Preparation of the wall:

Before initiating the consolidation injection all the joints and cracks must be absolutely sealed to avoid that the injected products run out and create discontinuity of the consolidation. This can be done best in the following way:

- In the case a final render layer will be foreseen on the wall, apply first a closed key-coat with **ASPER® rinzafo** or **MACROPORE® rinzafo**.
- If the wall remains as such, seal all the joints perfectly with **ASPER® intonaco** (repair all the damaged or failing mortar joints).
- Fill all the cracks and damages with the two-component, fibre reinforced repair mortar, **BS – 38** (the holes with connecting reinforcement can be filled with the same **BS – 38** two-component or with special mortars or slurries with higher or faster strength build up as **FLASH 10, BS 40 INIEZIONE, BS 91 ANCORA**).
- Apply 2 layers of the slurry **TECNOSEAL V1** on the backside of underground wall structures.

Take out all the dust of degraded mortars and from the drilling, and saturate the wall well with water. Apply plastic tubes in the drill-holes to facilitate the injection to deeper levels, and fix them with the fast setting mortar **FLASH TIXO** (about 10 minutes workability time) or **TECNOSTOP** (about 2 minutes workability).

Mixing of LIME INJECTION

The mixing of the LIME INJECTION must be done with highly efficient mechanical mixers (for example double axed mixers with variable speed), respecting the amounts of mixing liquid as indicated on the label. Mix at least for 3 minutes (because of the very fine particles and special additives, LIME INJECTION will obtain its special fluid character only after accurate and prolonged mixing). Once the optimal workability is obtained, and just before starting the injection, it is advisable to pass the slurry through a sieve of 1,5 mm (or similar) to eliminate all eventual lumps.

Injection

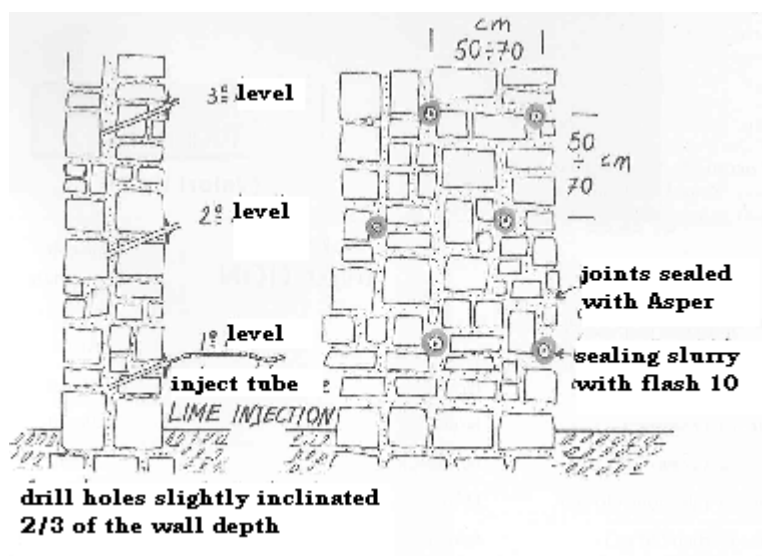
The injection can be done by means of gravity or mechanically, always starting from the lowest drill holes, working to the top, using constant pressure (lower than 2-3 atm.)

When applying with mechanical equipment, use preferably adjustable low pressure equipment.

The workability time of the mix is quite long (>1h) but it is advisable, during pauses in the pumping operation, to keep the slurry in agitation, and to apply the product within 3 hours. At that moment, even not visual with naked eye, the product will lose its special flowing and penetration properties in the smallest cracks.



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Storage Information according to 2003/53/CE:

12 months in original packaging, un opened, kept in dry and protected area between temperature from +5°C and +35°C.

Packaging Bags of 14 kg.

Technical Data (typical values)

	LIME INJECTION	Cement based mixture
Maximum temperature build-up during hardening °C (starting from 20 °C)	23	± 65
• Compressive strength 24 hours	N/mm ² 0,5	10÷20
• Compressive strength 7 days	N/mm ² 5	25÷30
• Compressive strength 28 days	N/mm ² 10 - 12	35÷50
• Flexural strength after 30 days	N/mm ² 3,5	3÷4,5
• Modulus of elasticity after 28 days	N/mm ² 5.000-7.500	25.000÷40.000
• Adhesion to brick after 60 days. (direct tension)	N/mm ² >1	1,5
• Specific surface	cm ² /gr 30.000	3.000
• Penetration into a cavity of 1 mm	optimal	poor
• Particle size < 20 micron	% 90	45
• Particle size > 20 micron	% 10	55
• Wet density	gr/lt 1.700	1.950
• Consumption	Kg/m ³ 1.160	1.450



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LIME INJECTION AM

On request, the product LIME INJECTION AM is available with slightly increased mechanical strengths and modulus of elasticity.

		LIME INJECTION AM
• Compressive str. 1 hour	N/mm ²	0
• Compressive str. 24 hours	N/mm ²	2
• Compressive str. 28 days	N/mm ²	20-25
• Tensile strength 28 days	N/mm ²	3,5
• Static modulus of elasticity 28 days	N/mm ²	9.000-12.000
• Adhesion to stone	N/mm ²	>1
• Adhesion to brick	N/mm ²	>1
• Water vapour permeability	coeff. μ	15

Safety indications Read carefully the safety indications on the packaging, or consult the relevant Material Safety Datasheet of this product

The above data are based on our actual and most experienced practical and laboratory knowledge and the results are collected from application of the product in different situations. Tecnocem Italiana does not assume any responsibility regarding inadequate or negative performance as a result of improper use of the product or for defects deriving from factors or elements other than the quality of the product including improper storage. The technical characteristics and performance mentioned in this datasheet are updated periodically. The revision dates and number of revision of the datasheets are listed in the table below. Eventual variations are traceable on our website www.tecnocem.it where the most updated datasheets can be retrieved.

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Nr. rev.: 3

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