

Coulinex - Lime grouting and injection

St. Astier has developed a product named COULINEX based on NHL 3.5 with no cement or pozzolanic addition. It can be used on its own or with addition of sand, depending on the voids size. The water addition is dictated by the amount of COULINEX used and the fluidity required.

When grouting porous materials, clean water should be used first to reduce suction to avoid the risk of blocking some voids, impeding the grout to fill the whole of the grouting area. This operation should be conducted slowly and with care, making sure that there is no free water (saturation) in the cavity. This can be done by making a small hole in a joint at the bottom of the grouting area, if water pours out one should stop adding water and wait for the water to be absorbed by the structure.

COULINEX can be applied by gravity feed or by pump with a very low pressure. In fine injection work it can be applied neat or with very fine aggregate, depending on the voids size.

Injection and grouting work normally starts from the lowest part of a structure or the section of a structure to be treated. Re-pointing work is done before the intervention, to the level of the first grouting/injection point. About 24 hours later, the operation is repeated on the section above, until completion of the work.

Grouting can also be used in **retrofilling work** when stones or bricks have been changed in a section of a structure. Here the size of the voids is known and therefore the joints work can be done on larger areas. To allow COULINEX to achieve its best performance, however, the grouting work should be performed in stages at 24 hours interval, depending on the porosity of the materials with which the grout will be in contact.

In choosing a grout, particular attention should be paid to its "stability". This is the property of the grout to retain unnecessary water (this is the water exceeding the amount required for hydration and fluidity) not allowing it to flow freely. It is measured in hours and, ideally, a NIL value should be achieved within 24 hours although figures of about 1% are still considered low enough for further work to continue. In other words, within 24 hours either NIL or only a small percentage of water is free to flow. Tests conducted on COULINEX show that this value is achieved within the time stated.

Injection and grouting materials should not contain sulphates and organic components, especially in restoration/conservation work. None of these is contained in COULINEX.

Dense and non breathable mixes (cementitious) can cause severe long term damage, especially if dense mortars are applied also in the joints, as eventual moisture will not be able to evaporate and condensation will be created. In the presence of porous stones or bricks, the moisture will be absorbed by the bricks or the stones. Moisture movement will also generate the migration of salts that might be present within the structure and unnecessary pressure will be generated within the structure itself.

St. Astier COULINEX grouting and injection - 180 days tests**Mix 1: water ratio 0.875****Mix 2: water ratio 0.897****Mix 3: water ratio 0.93****Mix 1: no additions(Coulinex only)****Mixes 2 and 3 are with addition of fine aggregates**

	MIX 1	MIX 2	MIX 3	NOTES
Dosage	100% Coulinex + water	50% Coulinex/50% sand 400 μ -200 μ + water	75% Coulinex/25% sand 400 μ -200 μ + water	
SO ₄ content %	0	0	0	Should not be above 0.5%
Organic content %	0	0.2	0.2	Should not be above 1%
Bulk density g x litre	579	996.5	894	Powder only
Water addition - grams	875	375	600	Per kg. of powder
Fluidity Marsh cone 10mm	24	13	16	Should be between 13 and 25 seconds
Stability * % @ 3h	1.05	0.25	0.2	Should be <3% @ 3 hours
Stability* % @ 24 hours	1	0	0	Should be NIL at 24 hours

Comp. Strength N/mm ²	1.35	1.43	3.17	28 days cured 7 days in the mould and dried before testing
Tens. Strength N/mm ²	0.31	0.55	1.07	ditto
Bulk density g x litre	1383	1768	1605	ditto
Comp. Strength N/mm ²	4.87	4.48	5.18	90 days
Tens. Strength N/mm ²	1.32	2.27	2.91	ditto
Bulk density g x litre	1381	1828	1632	ditto
Comp. Strength N/mm ²	5.18	5.20	6.0	180 days
Tens. Strength N/mm ²	1.41	1.42	1.63	ditto
g x litre	1378			ditto

*** over 3% the grouting/injection mortar will become unstable and leaching can occur.**

For further Guidance, contact your St Astier Distributor.

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