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Lime Injection Grout Data Sheet

Ecologic® Type 1 (I) Grout

St. Astier NHL 5, Type I [premixed NHL 5 - size: 40 - 60 microns] shall be used for very fine cracks up to a width 1/16 inch. NHL 5 = 38 lb , casein = .38lb casein is allowed as an admixture

Ecologic® Type 2 (II) Grout

St. Astier NHL 5, Type II [premixed NHL 5 - size: 300 microns] shall be used for fine cracks or voids between 10 mils (0.010 inch) and 1/8 inch. 1 part NHL 5 and 1 part glass micro spheres by volume

Ecologic® Type 3 (III) Grout

St. Astier NHL 5, Type III [premixed NHL 5 - size: 600 microns] shall be used for cracks or voids between 1/8 inch and 1/4 inch. 1 part NHL 5 and 1 part #100 or fine white silica sand by volume

Ecologic® Type 4 (IV) Grout

St. Astier NHL 5, Type IV [premixed NHL 5 - size: 800 microns] shall be used for cracks or voids between 1/4 inch and 1/2 inch. 1 part NHL 5 and 1.5 part blended aggregates by volume

Ecologic® Type 5 (V) Grout (Coulinex)

St. Astier Type V grout is grout material with proprietary additives and no aggregates. Type 5 (V) can be modified following the chart below:

- Mix 1: water ratio 0.875L
- Mix 2: water ratio 0.897
- Mix 3: water ratio 0.93
- Mix 1: no additions (Coulinex only) L
- Mixes 2 and 3 are with addition of fine aggregates Type M- 1:1 , Type M- 3:1

	MIX 1	MIX 2	MIX 3	NOTES
Dosage	100% Coulinex + water	50% Coulinex/50% sand 400µ-200µ + water	75% Coulinex/25% sand 400µ-200µ + water	
SO4 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 liter	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* % @ 24h	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	28 days cured 7 days in the mould and dried before testing
Bulk density g x liter	1383	1768	1605	28 days cured 7 days in the mould and dried before testing
Comp. strength N/mm ²	4.87	4.48	5.18	90 days
Tens. Strength N/mm ²	1.32	2.27	2.91	90 days
Bulk density g x liter	1381	1828	1632	90 days
Comp. strength N/mm ²	5.18	5.20	6.00	180 days
Tens. Strength N/mm ²	1.41	1.42	1.63	180 days
G x liter	1378			180 days

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

Main Data and Application Recommendations

COULINEX, based on NHL 3.5, is a grout, which can be used for injection. It has no cement or pozzolanic additions and can be used on its own or with the addition of sand, depending on the size of the voids. COULINEX can be applied by gravity feed or by pump with a very low pressure. In fine injection work it can be applied on its own or with very fine aggregate, depending on the voids size.

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 with or without very fine aggregate, depending on the size of the voids.

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 zero 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 zero 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.

Packing:

- Coulinex L 55 lbs (25 kg bags)
- Coulinex M 44 lbs (20 kg bags)

Shelf life:

- 8-12 months kept sealed and dry
- Can be applied via low pressure pump

Working Temperatures:

- not below 40 degrees F or above 85 degrees F
- The area must be dampened to control suction.

Mix ratio	Coulinex L only + water	1:1 (Coulinex M) sand No. 40 – No. 70 + water	3:1 (Coulinex L) (sand No. 40 – No. 70 + water) – on site mix
Compressive strength - psi (N/mm²)			
28 days	195 (1.35)	207 (1.43)	460 (3.17)
90 days	706 (4.87)	650 (4.48)	751 (5.18)
6 months	751 (5.18)	754 (5.2)	870 (6.0)
Tensile strength - psi (N/mm²)			
28 days	45(0.31)	78(0.55)	155(1.07)
90 days	191(1.32)	329(2.27)	422(2.91)
6 months	205(1.41)	206(1.42)	236(1.63)
Water	±5.5-6 gal/25 kg bag	±2 gal/20 kg bag	±3.2 gal/ 20 kg powder
Setting time	21 hours	15 hours	
Bulk density lbs/ft³	36.1 (579)	62.2 (996.5)	55.8 (894)
SO4 content %	0	0	0
Organic content %	0	0.2	0.2
Consumption	25 kg of material + water = 1 cubic feet	20 kg of material + sand + water = 0.5 cubic feet	
Fluidity Marsh Cone 10mm (should be between 13-25 seconds)	24	13	16
Stability % @ 3 hours	1.05	0.25	0.2
Stability % @ 24 hours	1	0	0

Mixing time: 5 minutes in a cement mixer