

St. Astier natural hydraulic limes (NHL): hydraulicity and properties.

ANNEX 1

Potentially damaging components in binders

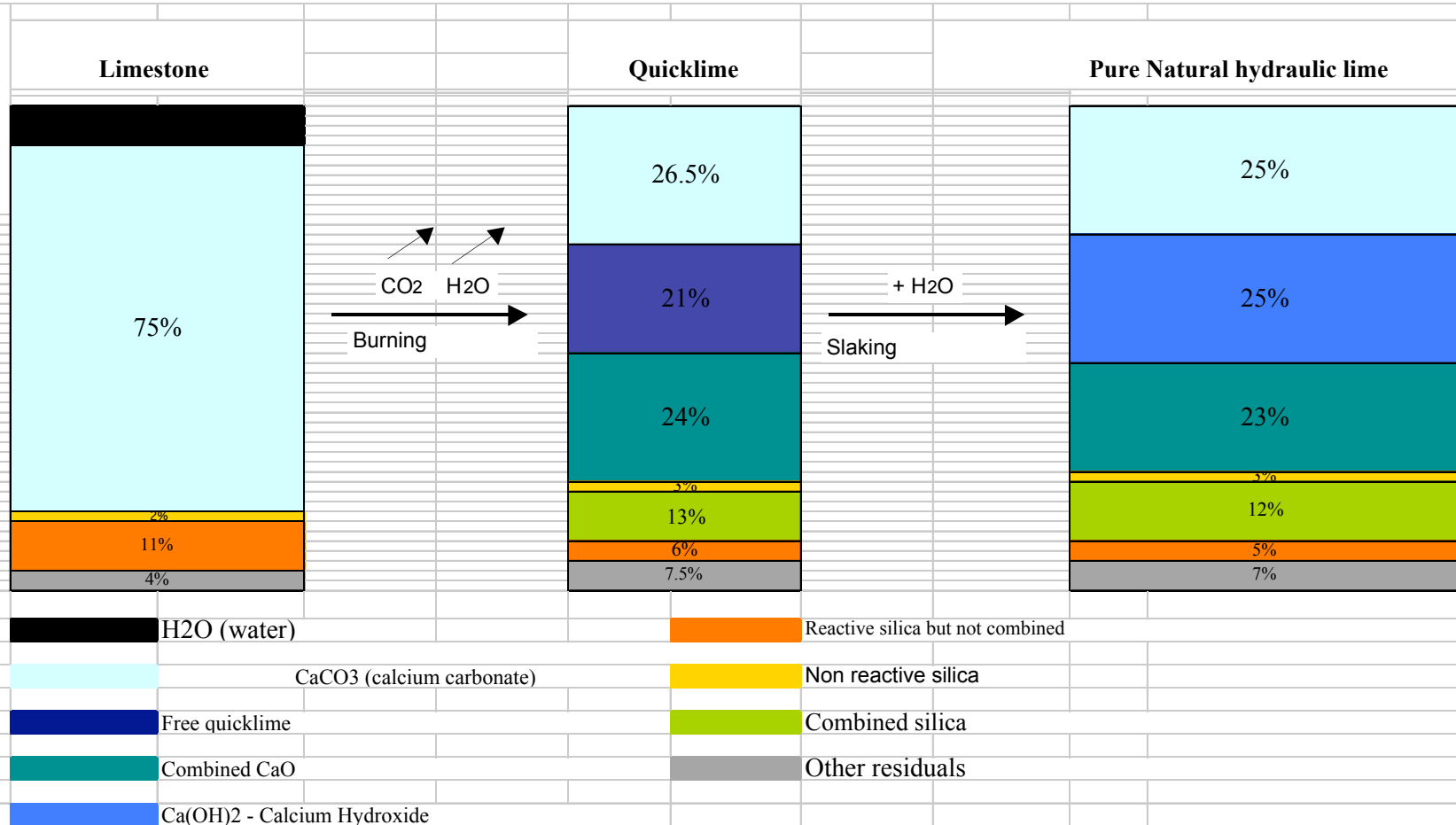
		% content in OPC	% content in St. Astier NHL	<i>Potential damaging effect</i>
Tricalcium Aluminate	C₃A	3 - 10+	< 1	Reacts with Sulphates and water producing sulphate attack causing mortar deterioration and eventual failure. Reacts with sea salts. Affects bricks/stones.
Tetracalcium Aluminoferrite	C₄AF	8 - 10	NIL	Reacts with Gypsum causing expansion
Sulphates	SO₃	2 - 7	0.4 - 0.6	Contributes to sulphate attack
Alkalis	Na₂O/K₂O	1 - 3	>0.1	Reacts with the silicates in cement and sand producing gradual disintegration - ALKALI-SILICA REACTION
Gypsum	CaSO₄	2 - 9	NIL	Subject to expansion, efflorescence. Deteriorates in contact with sea salt

Note: in marine locations the air contains sea salt. Sea salt also contains sulphates. These react with C3A in OPC producing Ettringite and resulting in sulphate attack.

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ANNEX 2

CHEMICAL PROCESS IN THE PRODUCTION OF PURE AND NATURAL St ASTIER HYDRAULIC LIME



ANNEX 3

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Hydraulicity: % of soluble silica and relative hydraulic properties

EU NORM (prov) 459-1	NHL Classification	
NHL 5	5-15	
NHL 3.5	3.5-10	Psi (N/mm2) @ 28 days (mortars prepared with a binder:sand ratio of 1:1)
NHL 2	2-7	

