

# Roundtower Natural Hydraulic Limes

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NHL2	NHL3.5	NHL3.5 White	NHL5	Why is this important?
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## Physical Properties

Colour	White(73 Value)	Off-White	White(74 Value)	Pale Buff	
Fineness to 90 µ	4.50%	5.70%	0.90%	5.80%	Our NHL3.5 White is the most white/brightest Natural Hydraulic Lime available on the market- it is the best material to use where sand colour reproduction is of priority.
Fineness to 200 µ	1.00%	0.80%	0.10%	0.70%	The exceptional fineness of Roundtower Natural Hydraulic Limes gives an excellent plasticity and encourages high quality plastering workmanship.
Expansion (soundness)	0.0 mm	0.3mm	0.0 mm	0.5 mm	The near zero expansion of of NHL binders and the elasticity of pure NHL mortars are such that joint free construction is possible.
Bulk Density	0.578 kg/dm3	0.808 kg/dm3	0.520 kg/dm3	0.885 kg/dm3	Binders are bought by weight and used by volume. Bulk density is important in evaluating economy comparisons .
Real Density	2.54 g/cm3	2.73 g/cm3	2.58 g/cm3	2.77 g/cm3	
Plasticity/Blaine value	14586 cm <sup>2</sup> /g	7448 cm <sup>2</sup> /g	12990 cm <sup>2</sup> /g	9743 cm <sup>2</sup> /g	The Blaine value establishes the area that a gramme of lime can cover. A high value gives the lime a natural "Fatty", plastic consistency, much loved by the user. A high value also ensures minimal shrinkage and associated cracking.
Free water	0.79%	0.70%	0.66%	0.68%	Free water is the moisture that is not combined with the material. Excessive free water(>2%) can cause a premature hydraulic set. Roundtower's low Free Water content allows for long shelf life under normal enclosed warehouse conditions.

## Mechanical Properties

Setting Times	600 min	290 min	1190 min	294 min	Early initial set with slow long term hardening.
Compressive Strength 7 days	1 MPa	2 MPa	2.5 MPa	3.3 MPa	Early strength achievement is excellent in fighting frost attack.
Compressive Strength 28 days	3.5 MPa	4.3 MPa	4.5 MPa	5.5 MPa	If applied properly, NHL mortars will achieve great durability.
Compressive Strength 6 month	8 MPa	9 MPa	/	11.5 MPa	
Compressive Strength 12 month	9 MPa	11 MPa	/	13.5 MPa	

## Chemical and Mineralogical Properties

SO <sub>3</sub> (%)	1.47	1.7	1.49	1.46	Less than 3% has no detrimental effect on Lime or Lime mortars. The minute amounts of SO <sub>3</sub> present come from the fuel used during calcination and not the raw material.
Free Lime (%)	45	25	38	18	workability and self-healing properties.
Potassium (K <sub>2</sub> O) %	0.60	0.90	0.60	0.90	Presence of Alkalies, Potassium or Sodium, can cause Alkali/Silica reaction. Reacts with the silicates in cement and sand producing gradual disintegration.
Sodium (Na <sub>2</sub> O) %	0.08	0.10	0.08	0.10	
Portlandite Ca(OH) <sub>2</sub> %	58	47	59	42	recarbonated in CaCO <sub>3</sub> after set
Tri/Di calcium silicate (C <sub>3</sub> S+C <sub>2</sub> S)%	33	40	31	45	linked to hydraulicity index of Natural hydraulic Lime
Tricalcium Aluminate C <sub>3</sub> A %	2.0	4.6	3.9	5.0	
CaSO <sub>4</sub> (Gypsum)	0	0	0	0	The presence of Gypsum can cause expansion, efluorescence and failures, especially in marine climates. Roundtower Natural Hydraulic Limes are all suitable for use in marine conditions.
Quicklime (CaO)	0	0	0	0	Unslaked lime will expand when hydrated. Makes products unstable.
Additions (Waterproofers, plasticisers, water retainers, pozzolans, air entrainers )	0	0	0	0	Due to absence of setting agents, NHL mortars can be re-worked up to 24 hours. Essential for minimising waste on site.
Active Clay(SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> +FeO <sub>2</sub> )	/	/	/	/	The percentage of Active Clay will indicate a mortars hydraulicity. Roundtower Natural Hydraulic Limes conform to the standard EN-459.
Loss on Ignition %	17	14	17	14	The loss on ignition is the percentage of mass lost after heating at high temperature. It represents the free water, bound water and carbon dioxide.

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