

# 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

	NHL2	NHL3.5	NHL3.5 White	NHL5	
Colour	White(73 Value)	Off-White	White(76.9 Value)	Pale Buff	Our NHL3.5 White is the most white/brightest Natural Hydraulic Lime available on the market- it is where sand colour reproduction is of priority.
Fineness to 90 μ	4.50%	7.00%	4.10%	7.20%	The exceptional fineness of Roundtower Natural Hydraulic Limes gives an excellent plasticity and plastering workmanship.
Fineness to 200 μ	1.00%	1.00%	1.50%	1.50%	
Expansion (soundness)	0.0 mm	0.5mm	0.2 mm	0.1 mm	The near zero expansion of NHL binders and the elasticity of pure NHL mortars are such that jointing is possible.
Bulk Density	0.649 kg/dm <sup>3</sup>	0.779 kg/dm <sup>3</sup>	0.612 kg/dm <sup>3</sup>	0.636 kg/dm <sup>3</sup>	Binders are bought by weight and used by volume. Bulk density is important in evaluating economic value.
Real Density	2.4 g/cm <sup>3</sup>	2.64 g/cm <sup>3</sup>	2.56 g/cm <sup>3</sup>	2.61 g/cm <sup>3</sup>	
Plasticity/Blaine value	13200 cm <sup>2</sup> /g	7119 cm <sup>2</sup> /g	9445 cm <sup>2</sup> /g	10099 cm <sup>2</sup> /g	The Blaine value establishes the area that a gramme of lime can cover. A high value gives the lime consistency much loved by the user. A high value also ensures minimal free water.
Free water	0.50%	1.04%	1.51%	1.12%	Free water is the moisture that is not combined with the material. Excessive free water(>2%) can cause hydraulic set. Roundtower's low Free Water content allows for long shelf life in dry conditions.

## Mechanical Properties

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Setting Times	600 mn	149 mn	216 mn	186 mn	Early initial set with slow long term hardening.
Compressive Strength 7 days	0.9 Mpa	1.70 Mpa	2.21 Mpa	2.18 Mpa	Early strength achievement is excellent in fighting frost attack.
Compressive Strength 28 days	3.3 Mpa	5.40 Mpa	5.87 Mpa	5.79 Mpa	If applied properly, NHL mortars will achieve great durability.
Penetration Test	36.5 mm	29.9 mm	34.2 mm	28.6 mm	Flexible mortars are essential to avoid cracking and are particularly suitable for solid masonry construction.

## Chemical Properties

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SO <sub>3</sub>	1.20%	1.53%	1.99%	2.13%	Less than 3% has no detrimental effect on Lime or Lime mortars. The minute amounts of SO <sub>3</sub> present are used during calcination and not the raw material.
Free Lime	33.70%	18.10%	28.20%	24.30%	Roundtower Natural Hydraulic Limes high percentage of Free Lime gives mortars exceptional workability.
CaSO <sub>4</sub> (Gypsum)	<1%	<1%	<1%	<1%	The presence of Gypsum can cause expansion, efflorescence and failures, especially in marine climates. Roundtower Natural Hydraulic Limes are all suitable for use in marine conditions.
C <sub>3</sub> S (Tricalcium silicate)	0%	0%	0%	0%	Indicates possible cement additions.
C <sub>3</sub> A (Tricalcium Aluminate)	<1%	<1%	<1%	<1%	Reacts with Sea Salts and other Sulphates. Can affect brick and stone.
Potassium (K or K <sub>2</sub> O)	<.5%	<.5%	<.5%	<.5%	Presence of Alkalies, Potassium or Sodium, can cause Alkali/Silica reaction. Reacts with the silicates producing gradual disintegration.
Sodium (Na or Na <sub>2</sub> O)	<.1%	<.1%	<.1%	<.1%	
Quicklime (CaO)	0	0	0	0	Unslaked lime will expand when hydrated. Makes products unstable.
Additions (Waterproofers, plasticisers, 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 shrinkage.
Active Clay(SiO <sub>2</sub> +AL <sub>2</sub> O <sub>3</sub> +FeO <sub>2</sub> )	c.10%	c.15%	c.15%	c.25%	The percentage of Active Clay will indicate a mortars hydraulicity. Roundtower Natural Hydraulic Limes conform to standard EN-459.
Loss on Ignition	25%	19%	17.26%	14.85%	The loss on ignition is the sum of the free water, bound water and carbon dioxide.

Tests are carried out in accordance with EU Norm EN-459 and under strict laboratory conditions. All mortars tested adhere to the EU test mortar norm of 1Binder:1.13Aggregate mix. Aggregate used in all tests is