

Think Lime... for Asphalt

Benefits of Hydrated Lime in Asphalt include:

- Increased moisture resistance
- Increased ageing resistance
- Improved durability
- Extended service life
- Abundantly available in UK

Introduction to hydrated lime in asphalt

- Hydrated lime is calcium hydroxide – Ca(OH)_2
- Hydrated lime is most commonly added as a 1% -2% by mass of aggregate filler replacement
- It's used as a multi-modal asphalt modifier that helps create high performance asphalt pavements
- Hydrated lime has been recognised for many years as the premier asphalt modifier to correct stripping problems
- As hydrated lime use has grown worldwide, wider service benefits have been identified in the laboratory and in the field



Moisture resistance

- Hydrated lime is generally accepted as providing moisture resistance, based on evidence from research & international practice
- It is accepted as preventing stripping from siliceous aggregates
- The precipitation of calcium ions on the aggregate surface increases the bond with the bitumen

Asphalt mixture with granite aggregate	With no hydrated lime	With 1% hydrated lime	With 2% hydrated lime
Compressive strength of dry sample (MPa)	8.5	8.8	9.0
Compressive strength of wet sample after 7 days in water at 18°C (MPa)	7.3	8.3	8.7

See Note 1

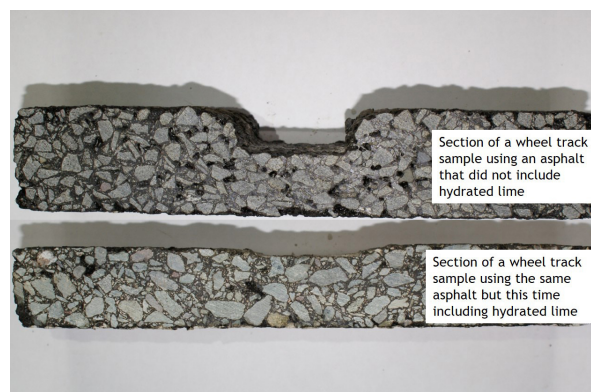


Ageing resistance

- Hydrated lime reduces the amount of acidic species that form upon ageing
- Ageing results from the formation of acidic species in the bitumen - such as carboxyl acid
- Oxidation and acid formation, and loss of volatile components, results in bitumen hardening
- Published laboratory and field evidence supports this conclusion

Durability improvements

- Rutting resistance is improved as a result of improvements in stiffness
- Fatigue resistance is noted to improve in many cases
- Marshall asphalts for airfields have specified the use of hydrated lime for decades
 - To reduce maintenance costs
 - To lower the risks of aggregate plucking
 - It's used in many racetracks for similar reasons



Extending service life

- USA experience is that life expectancy increases from 10 to around 14 years
- Similar experience in life expectancy has been reported in Northern France, Poland and Denmark
- Median service life increase realised with hydrated lime additions is 25%
- Worst case service life increase is 10%

Service life of asphalt materials with 25% median increase in service life

Material	Material service life in designed roads <small>See Note 2</small>	Material service life in evolved roads <small>See Note 2</small>	Potential material service life in designed roads using hydrated lime	Potential material service life in evolved roads using hydrated lime
Asphalt Concrete	8 years	6 years	10 years	7.5 years
Hot Rolled Asphalt	20 years	20 years	25 years	25 years
Thin Surface Course System	15 years	10 years	18.75 years	12.5 years
Stone Mastic Asphalt - low texture	20 years	20 years	25 years	25 years
Stone Mastic Asphalt - other	15 years	10 years	18.75 years	12.5 years

Note 1: Data from Lesueur, D, Denayer, C, Ritter, H-J, Kunesch, C, Gasiorowski, S, d'Alto, A (2016), "The use of hydrated lime in the formulation of asphalt mixtures: European case studies", Proceedings 6th Eurasphalt & Eurobitume Congress

Note 2: Material service lives from Association of Directors of Environment, Economy, Planning and Transportation and Mineral Products Association (2015), "Service life of asphalt materials for asset management purposes".

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The British Lime Association is part of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and silica sand industries.

For further BLA information visit www.britishlime.org

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