LIME IN MORTARS

MASONRY MORTARS, RENDERS & PLASTERS
– A PROVEN SUSTAINABLE AND ECONOMICAL SOLUTION

EuLA
The unique properties of lime

Lime is a product derived from limestone in an industrial process. Naturally occurring limestone, which is composed almost exclusively of calcium carbonate, transforms into quicklime, calcium oxide, by applying heat. When slaked with water, quicklime transforms into hydrated lime, which is a dry powder composed of calcium hydroxide. Hydrated lime can be used in a suspension called milk of lime.

Once processed, these products derived from limestone have the unique ability to return to their original chemical form by reacting with carbon dioxide to eventually form calcium carbonate. This process, commonly called THE LIME CYCLE (from limestone to limestone) helps lime to make a continuous uniform bond between mortar and masonry unit. It helps to make the mortar more permeable to vapour, allowing moisture movement, and to give the mortar the necessary flexibility to respond to the various stresses and movements of masonry.

Designers, builders and owners look for only the best performing construction materials to provide long-term, sustainable and economic building solutions. To conform to these criteria, a well-built masonry structure should be: durable, flexible and easy to maintain.

Challenges for building professionals and owners: durability & long-term performance

Lime-based mortar has always been widely used in masonry buildings. Its durability and long term performance are demonstrated by the myriad of historic buildings in our towns and cities.

However, over the last two or three decades, lime has largely been replaced by other materials in mortars. The emphasis here is on the early age compressive strength needed for faster, taller and thinner constructions. This causes a notable increase in problems such as cracking, water penetration and general lack of durability.

These emerging problems with durability have been recognised and researched at European universities and building institutes, which nowadays support the multiple benefits of lime in mortars.

The European Lime Association (EuLA) commissioned an independent institute to provide an exhaustive overview of the internationally available scientific publications relating to mortar functionalities and performance of lime-based mortars. The full study as well as other resource material is available at www.eula.eu
Lime in mortars – masonry mortars, renders & plasters – a proven sustainable and economical solution
Lime-based mortars meet the needs of building professionals

Designers, architects and engineers all need a reliable product with a predictable performance that meets the requirements of the client.

The builder and craftsman need a material which is consistent, easy to use and enables good workmanship with rapid, cost-effective, economic working.

Building professionals need to provide owners with long lasting attractive masonry, without cracking, water penetration, or damage due to frost or moisture.

Lime-based mortars fulfill the criteria for sustainable building

- Full compliance with code requirements (EN 1996).
- Supported by existing mortar standards (EN 998).
- Deliver the flexural strength required for more slender walls.
- Meeting the requirements for appropriate compressive strength.
- Additional benefits in bond quality and durability.
- Addressing masonry behaviour in relation to shear strength and water tightness.

SUSTAINABILITY is supported by the greater durability of masonry with lime containing mortars. In addition, at the end of a building’s life, masonry units can potentially be reused by cleaning off the mortar. If the mortar used was a lime-based mortar, which is usually softer than the brick, reuse of the bricks is generally possible. This is not the case with mortars which do not contain sufficient lime, as the mortar is usually too hard and brittle to remove without damaging the brick or block.
Benefits of using lime-based mortars

- **Low water penetration**

  The unique properties of lime allow for a continuous uniform bond between the mortar and the masonry unit. These properties mean that the masonry is less susceptible to water penetration while allowing breathability and moisture control.

- **Increased breathability and moisture control**

  Although lime-based mortars are better at withstanding water penetration, they also allow the moisture trapped in the masonry to evaporate through the mortar which reduces related damage to masonry. In addition, the lower potential for condensation and damp contributes to a healthy indoor environment.

- **Reduced cracking**

  Lime-based mortars reduce the risk of major cracks occurring. When cracks do appear, they tend to be in the form of microcracks within the mortar rather than macrocracking or separation from the masonry units. These microcracks are self-healing by the lime in the mortar as moisture movements bring dissolved calcium salts into the microcracks where they react with carbon dioxide to harden and “heal” the crack.

- **Less efflorescence**

  Lime-based mortars reduce efflorescence, which are white stains and deposits on masonry and render surfaces. Moisture movement in masonry using these mortars tends to occur through the mortar joints, which lessens efflorescence by reducing evaporation through the bricks. The result is a better, more uniform appearance.

- **Easier and cheaper building maintenance**

  Lime-based mortars are easier to remove and replace when necessary. This means easier maintenance on older buildings.

- **Workability and water retention resulting in optimum material use & productivity**

  When lime is used in a mortar, it allows the mix to hold a greater amount of water and has a lubricating effect which improves the plasticity of the mortar. Lime-based mortars usually have a longer “spot” life – the mortar remains plastic and useable for a longer time after mixing, increasing productivity. Mortars with these properties are generally appreciated by craftsmen, promoting good workmanship with better joint filling and finishing. This increased productivity can lead to improved economy in use and less waste.
Lime is an enabling material for the circular economy and climate change adaptation. Current construction trends intend to take advantage of the benefits of materials suitable to create spaces with adequate temperature, ventilation and lighting, in addition to an attractive appearance and minimizing climate change impact.
**Climate Change**

A comparative environmental assessment study (Life Cycle Inventory) was conducted in 2014 by the European Lime Association (EuLA) in collaboration with mortar producers from various EU countries. Seventeen formulations consisting of mortars, renders & plasters were studied. The outcome of the “cradle-to-gate” results indicated that the lime carbonation process lowers the overall carbon footprint during the first period of the use phase of mortars in buildings [1].

**CO₂ Capture**

Lime is one of the most potent NATURAL CO₂ absorbents of all existing building materials, as hardening of air lime depends on the lime reacting with carbon dioxide from the air.

The above mentioned studies show that – for lime-based mortars, up to 92% [1] of the lime content of the mortar absorbs atmospheric carbon dioxide to form calcium carbonate, at a pace that depends on the way the mortar is used in the construction. 90% NATURAL CO₂ absorption of a 20 mm thick layer of lime-based plaster or render will generally require a year from the time of application [2]. The lime content of the mortar will have “captured” 0.535 kg CO₂ per kg of lime [3]. Cement will also carbonate and will capture approximately 0.1 kg CO₂ per kg of Portland clinker.

**Building Environment**

Lime based mortars and renders have vapour permeability properties which will allow the walls to “breathe”, and thus avoid moisture problems. The unique properties of lime allow for a continuous uniform bond between the mortar and the masonry unit. These properties mean that the masonry is less susceptible to water penetration while allowing breathability and moisture control.

Lime based mortars help to reduce water ingress but can transmit water vapour. Although lime-based mortars are better at withstanding water penetration, they thus allow the moisture trapped in the masonry to evaporate through the mortar which reduces related damage. Also, the lower potential for condensation and damp contributes to a healthy indoor environment.

**Natural Protection**

Lime is not hazardous to the environment. It has been used traditionally in mortars, plasters washes and painting in households and buildings.

**Circular Economy and Life Cycle**

Regarding Circular Economy, the key benefit of LIME in mortars is DURABILITY: Due to their flexibility, lime-based mortars can accommodate minor building movements over time without excessive cracking. Also, lime-based mortars are self-healing: the lime contained in the mortar reacts with CO₂ to increase the mortar strength and “heal” micro-cracks which may develop.

The numerous historic buildings in our cities provide evidence of the long-term performance and durability provided by the use of lime-based mortars.

Lime-based mortars are also generally easier to remove from masonry units at the end of a building’s life, frequently allowing construction materials to be re-used – a valuable contribution to the preservation of our environment and the concept of the circular economy.

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References:
Designers, such as architects or engineers, need a reliable end product that meets every client’s needs. They must bring together the short term requirements of the builder, who needs to work quickly and economically, and the long term requirements of the building’s owner who needs a durable, attractive and trouble-free construction.
When selecting an appropriate mortar, a designer takes into account a wide array of characteristics that are shown in the figure below.

Let’s take a closer look at how **lime positively influences** each of these characteristics.

### Bond strength

Lime-based mortars have excellent adhesion and bonding properties due to their high degree of workability, stickiness and water retention. They are also able to create continuous bonds with brick surfaces and completely fill the spaces within them. Inspections have revealed that the adhesion between lime-based mortar and brick is not always due to purely physical phenomena but also due to chemical reactions. Focusing only on high strength mortars, neglects the importance of bond strength and shrinkage.

### Water leakage

Water penetration into masonry and buildings is essentially a failure of the building system to prevent moisture ingress. Water is the driving force behind deterioration and can fundamentally affect the performance and durability of many components in buildings. Masonry walls constructed with lime-based mortars show good resistance to water leakage. This is mainly due to the better bond between lime-based mortars and bricks.

### Durability

Until the late 20th Century, almost all masonry buildings used lime-based mortar. Its durability and long term performance are demonstrated by the myriad of historic buildings that are found in our towns and cities. Lime-based mortars perform well on the different durability aspects of masonry: freeze-thaw resistance (due to their permeability), water leakage, and resistance to SO2 (sulphate attack).

### High flexural strength combined with suitable compressive strength

Inappropriate mortar strength relative to the units being mortared together is a common cause of cracking. Softer lime-based mortars offer greater elasticity and help to accommodate minor movements and volume changes, which reduces the need for movement joints.

Lime based mortars are more flexible and can absorb a high degree of deformation before breakage. Deformable masonry structures are proven to be more durable than brittle ones when subjected to normal stresses such as thermal movements and also unforeseen imposed deformation from other sources, ranging from differential settlement over time, to earth tremors.

References:
European Lime Association (EuLA) and Danish Technological Institute (DTI), “Bibliography lime in mortars”, 2010.
The builder of a masonry structure requires that the mortar being used is workable and of a consistency which allows for easy handling. The joints and beds of masonry mortar must be readily and completely filled, while the units must be placed and their position adjusted quickly and easily. The mortars, renders & plasters must have properties which help the craftsman to work smoothly, quickly and economically with minimum waste and consistent work quality.
Incorporating lime in the mortar mix helps to fulfil all of these requirements.

Workability
Using lime adds a fine particle binding agent which has a very high surface area. This enables the mix to hold a greater quantity of water. It also has the twin benefits of enhancing the fluidity of the mix and improving its stability.

Building
The increased water retention provided by lime also gives the practical benefits of allowing easy repositioning and adjustment immediately after placing. This is due to the fact that the mortar remains workable for longer under the suction effect of the brick or block.

Versatility
Mortars containing sufficient lime also remain workable for longer in the tub or on the spot board, allowing for longer time periods between replenishments of the mix.

Work quality
The smoother, more workable consistency of lime-based mortars and the retention of workability in the mortar immediately after application promotes good workmanship and by enabling the complete filling of beds, perpends more easily and allowing smooth finishing of the plaster. Joint finishing and tooling is therefore accomplished to a high standard. This helps to ensure the quality and watertightness of the masonry and renders.

Economy & value
Lime-based mortars can be more economical to use. The combination of the workability, water retention and easier use with more consistently accurate joint filling and better adhesion, can lead to less waste. Achieving higher quality of workmanship will also reduce the likelihood of rework or remedial measures.
Owners and designers involved in building or renovating all aim at using reliable solutions and materials which positively contribute to functional, aesthetic and sustainability requirements as well as providing a healthy living space. A building which meets the needs of its owner will:

- provide a healthy and comfortable living space,
- offer durable, long-lasting construction and finish,
- be environmentally sustainable.
Lime-based mortars, renders & plasters help to meet these aims, reducing the necessity for maintenance while at the same time maintaining a comfortable, healthy indoor environment.

**Indoor air quality**

By allowing moisture to escape through the mortar and preventing water penetration through the masonry structure, lime-based mortars help to preserve the integrity of the masonry structure. The moisture and humidity within the building is better controlled by using lime based mortars, renders & plasters, with other materials which allow the building to “breathe” instead of trapping condensation and moisture within the structure. This makes for a healthier indoor environment. Crucially, better moisture control and the natural properties of lime-based mortars can also help to prevent the formation of mould & fungi inside the building.

**Durability**

We expect our buildings to be durable, but any construction is constantly exposed to climatic and structural stresses. Making the right choice of materials is thus vital to get right and will prevent damage and water penetration. Due to their flexibility, lime-based mortars are able to accommodate building movements without excessive cracking. In addition, lime-based mortars are self-healing: the lime contained in the mortar reacts with water to increase the mortar strength and “heal” micro-cracks. As they have excellent adhesion properties, lime-based mortars more readily allow for continuous, uniform bonds to masonry units. This considerably reduces the chances for water penetration, and the resulting damage or moisture problems. Lime-based mortars are vapour permeable: this allows the structure to “breathe” and any water that enters a structure through a crack can easily escape by evaporating through the mortar.

**Aesthetics**

Using lime based materials usually results in a natural and warm appearance in masonry and rendering. Mortars based on lime considerably reduce the chances of efflorescence* formation as they contain minimal amounts of soluble salts and sulphur. They also have unique bonding and permeability properties which allow water to evaporate through the mortar rather than through the brick.

**Environmental performance**

Lime-based mortars can accommodate natural (e.g. thermal) movements, which adds durability and reduces the need for maintenance. At the end of the building’s life, lime-based mortars allow construction materials to be more easily re-used, contributing to resource sustainability.

- The numerous historic buildings in our cities provide evidence that lime based mortars and finishes effectively contribute to long lasting performance.
- Lime-based mortars are generally softer than bricks. This makes the mortar easy to remove without causing damage: **bricks originally laid with lime-based mortars can be cleaned and re-used in new constructions**.

Lime absorbs the carbon dioxide from the air which gradually further increases its strength over time, and which improves the carbon footprint of a building over its lifetime.

During the lifetime of a building, maintenance operations will be required. Mortars therefore need to be replaceable without causing damage to the brick work. Lime-based mortars are generally softer than the bricks, making the mortar easier to remove without causing damage.

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* Efflorescence is a powdery deposit of water-soluble salts which forms on the surface of bricks, mortars or facades. It is caused by multiple factors and tends to increase with increasing proportions of alkali salts, sulphur and high moisture content in masonry walls.
Lime in masonry mortars delivers long term sustainable and economic solutions for masonry buildings. Lime used in mortars has a proven history over centuries and its performance has been demonstrated by scientific work. Combining many beneficial properties, both in the fresh and hardened state, no other material can equal or replace lime in masonry mortars.
Benefits

Owner / Client
In any new building or a renovation project the owner and client will want to use materials which are environmentally sustainable and contribute to a durable construction and a healthy comfortable living space.
The use of lime in masonry mortars allows moisture vapour to escape at the same time as preventing water penetration into the building fabric, contributing to better moisture control within the structure and in the building. In addition, lime mortars are able to accommodate minor movements due to thermal or settlement forces without permanent large cracking or separation from the masonry.

Designer / Engineer
The designer and engineer will seek to use materials which give optimum performance. Using lime in masonry mortars improves bond quality between brick and mortar, helps to minimize water penetration and assists moisture control in the building, avoids the cracking and debonding which can be caused by over-strong, brittle mortar in masonry, and provides an attractive durable solution.

Contractor / Craftsman
The contractor and craftsman will want to use materials which assure good progress with minimum problems. During construction, lime-based mortars are generally more fluid as well as being more cohesive, which gives a long working life and easy working properties – all these factors encourage good workmanship and rapid progress.

General guidance
If you are using / prescribing factory made “readymix” or “silo” masonry mortars
Ask the supplier if hydrated or hydraulic limes are used in the mixes. The current standards allow mortars to be produced both with and without lime. Remember that strong, hard and brittle mortars are never advisable for long term durability.
In order to get the benefits mentioned in this document, at least 20% of the binder by mass of the mortar (in general 5% of the total mortar mass) should be air lime.
Eurocode 6, the building design code, with its national annexes, has harmonized local rules, traditions and guidelines. European countries now have common building codes which describe the performance of mortars in terms of their compressive strength (e.g. M2,5 for 2,5 Newtons / square millimetre), as well as the different types of mortars allowed. Factory made mortars must comply with the European Standard EN 998-2, and are subject to mandatory CE-marking.
- M2,5 – internal work or sheltered location; lightweight insulating units & lightweight concrete blocks,
- M5 – most general brick & masonry work above ground,
- M10 – work in severely exposed locations or below ground.
If you are making masonry mortars on site
Site made mortars are not subject to the requirements of European Standard EN 998-2. The specifications on the mortar strength are given by the architects or engineers specification documents possibly referring to national reference documents. The ingredients for the mortars require to be CE-marked, for example cement (EN 413 or EN 197), lime (EN 459), sand & filler for mortars (EN 13139) and any additives (EN 934-1 and EN 934-3). Suggested mix proportions for general masonry applications are given in the table below.

<table>
<thead>
<tr>
<th>Type of masonry</th>
<th>Volume proportions Cement : Lime : Sand</th>
<th>Typical compressive strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal masonry</td>
<td>1 : 2 : 9</td>
<td>2,5 MPa</td>
</tr>
<tr>
<td>External masonry</td>
<td>1 : 1 : 6</td>
<td>5 MPa</td>
</tr>
<tr>
<td>External masonry below ground</td>
<td>1 : 0,5 : 4,5</td>
<td>10 MPa</td>
</tr>
</tbody>
</table>

Table 1. Cement (EN 197-1), Lime (EN 459-1 CL90-S), Aggregates (EN 13139). Mixing proportions should be checked according to local recommendations.

You should measure the ingredients by volume, using a gauging box or a bucket rather than a shovel for measuring the amounts of lime, sand & cement. Add a small amount of water to the mixer first & then the lime and sand. Mix for at least 10 minutes before adding cement and finally adjusting the workability with water.
LIME IN MORTARS

LIME IN RENDERS
– BENEFITS AND GENERAL GUIDANCE

Renders are widely used for finish and protection to masonry buildings throughout most of Europe. Lime has long been an essential component of renders and continues to offer important benefits.
Benefits

Designer
Architects are obliged to follow many design principles; designed buildings must be durable, economically justified, with minimum environmental impact and cost-effective to maintain. Building materials used for construction should, where possible, be from natural sources. Those materials need to be of low toxicity, non-radio-active and should not emit harmful volatile chemicals. Renders based on lime should always be considered as one of the most appropriate and sustainable building materials available. They are durable, long lasting, widely available and compatible with most construction materials.

Building materials used for construction should, where possible, be from natural sources. Those materials need to be of low toxicity, non-radio-active and should not emit harmful volatile chemicals. Renders based on lime should always be considered as one of the most appropriate and sustainable building materials available. They are durable, long lasting, widely available and compatible with most construction materials.

Lime in the form of calcium hydroxide - Ca(OH)₂, is chemically pure and contains no impurities that are hazardous to human health. Additionally, lime is not only a versatile binder but also ensures resistance to biological growth and provides permeability to water vapour.

Contractor
Lime renders are versatile and compatible with most commonly used masonry units e.g. clay bricks, silica bricks, aerated concrete blocks and concrete. Lime-based mortars can be used for both interior plastering and for renders of building facades, which decreases the costs of the construction process. Lime enhances properties of the render, such as good workability, plasticity, high water retention and extends the working time of fresh mortar, encouraging good quality and efficient workmanship and increasing cost effectiveness of construction.

End-user
Render is a kind of protective coat for a building. It should withstand the deleterious action of wind, temperature changes, precipitation and pollution and should be durable. Ingress of water coming from rain or snow causes damage and degradation to the building fabric. In addition, exposure to the sun, resulting in heat cycling and UV radiation, also has a strong influence on the durability of building facades.

The maintenance cost of buildings is directly related to the render quality. Lime reduces the thermal expansion coefficient of renders, therefore lowering sensitivity to temperature changes. Lime aids in the drying process of damp renders. Lime also has self-healing properties – renders containing lime tend to develop many tiny cracks instead of fewer larger ones in response to thermal and other movements, and when small cracks form in the mortar or render, lime provides the ability to fill and seal these cracks by the action of natural moisture movements in the render layer.

General guidance

Renders normally are applied as multilayers. The multilayer comprises three layers, which are different in material composition and function:

- **scratch coat** – provides the bonding to the substrate and storage of salts,
- **brown coat** – is used for levelling uneven masonry surface; provides a barrier against water ingress and wind penetration into the masonry surface,
- **finishing coat** – top layer is not only for decoration (it may be coloured and or textured) but also allows for evaporation of water vapour and dampness.

![Figure 1. Three layer render – natural suction pump that evaporate dampness from wall.](image)

Proposed mix proportions for the different layers and their related properties are summarized in the Table 1 below. The multilayer system is also commonly used in mortars dedicated to the renovation of older buildings.

<table>
<thead>
<tr>
<th>Type of layer</th>
<th>Volume proportions Cement : Lime : Sand</th>
<th>Typical compressive strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final coat (3-5 mm)</td>
<td>0 : 1 : 3</td>
<td>≤ 1 MPa</td>
</tr>
<tr>
<td>Final coat (3-5 mm)</td>
<td>1 : 3 : 10</td>
<td>1 MPa</td>
</tr>
<tr>
<td>Under coat (15 mm)</td>
<td>1 : 2 : 9</td>
<td>2.5 MPa</td>
</tr>
<tr>
<td>Base coat (5 mm)</td>
<td>1 : 1 : 6</td>
<td>5 MPa</td>
</tr>
</tbody>
</table>

Table 1. Cement (EN 197-1), Lime (EN 459-1 CL90-S), Aggregates (EN 13139). Mixing proportions should be checked according to local recommendations.
For most of us, much of our lives is spent inside buildings, so it is important that the indoor climate is comfortable and healthy. Finishing interior walls with lime-based plasters helps to provide and maintain these properties.
Benefits

Owner
Comfort – the level of comfort of the indoor climate depends on different factors, in particular the temperature and the humidity. Because of their physical structure and vapour permeability lime-based plasters are able to maintain the humidity levels within an indoor environment. They absorb water vapour when humidity is high, and release it again when the humidity becomes low.

Health – the humidity of the internal air affects both comfort and health. High levels of humidity can cause condensation on the walls and promote the development of mould, fungi, bacteria, etc. The properties of lime plasters allow for water vapour to be absorbed, thus preventing the walls from becoming wet. Thanks to the higher alkalinity of lime, microbiological growth is inhibited. When the humidity of the indoor environment is too low, there is an associated increase in the occurrence of colds and flu and some skin problems. As lime-based plasters help to regulate the internal humidity, they help in reducing these effects. Lime based plasters do not emit any harmful substances to the environment, such as VOCs (volatile organic compounds).

Designer / Contractor
Aesthetic – for the finish, various options are available. The surface of the hardened plaster can be painted and finishing coats of different grain sizes, structures and colours can be applied. For smooth surfaces lime levelling compounds deliver the highest quality finish.

Mechanical properties – lime-based plasters show good workability in a fresh state and have excellent adhesion properties. When applied correctly, lime-based mortars are resilient and minimise the potential for the formation of cracks.

General guidance
Application
The substrate must be dry, clean and free from loose particles. Any film-forming substances have to be removed before the lime-based plaster is applied.

The hardening of air lime depends on the lime reacting with carbon dioxide from the air. The full carbonation reaction of 10 mm of plaster will require approximately 3 months from the time of application. For a situation requiring greater thicknesses, the application of several layers is advisable – in order to facilitate hardening and carbon dioxide uptake. The plaster must be protected from drying too quickly.

To preserve the beneficial properties of the lime-based plaster, care must be taken in the selection of the final paint or finish, using only highly permeable coatings.

Recipe
Lime-based plasters are available as ready mixed mortars/renders according to EN 998-1 and normally apply to the compressive strength classes CS I, maximum CS II.

Alternatively, they can be mixed on site. Suggested mix proportions (derived from former German Standard DIN 18550) are shown in the table below. As the table shows, high strengths are not necessary and should be avoided as leading to impermeable final hardened material, and increased risks of shrinkage & cracking.

<table>
<thead>
<tr>
<th>Type of mixed mortar</th>
<th>Volume proportions Cement : Lime : Sand</th>
<th>Typical compressive strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air lime mortar / plaster (CL90-S)</td>
<td>0 : 1 : 3</td>
<td>≤ 1 MPa</td>
</tr>
<tr>
<td>Mortar with “hydraulic lime” (e.g. FL 2 or 3,5)</td>
<td>0 : 1 : 3</td>
<td>1 MPa</td>
</tr>
<tr>
<td>Mortar with ‘high hydraulic lime’ (e.g. FL 5)</td>
<td>0 : 1 : 3</td>
<td>2,5 MPa</td>
</tr>
<tr>
<td>Cement Lime mortar (CL90-L)</td>
<td>1 : 2 : 9</td>
<td>2,5 MPa</td>
</tr>
</tbody>
</table>

Table 1. Cement (EN 197-1), Lime (EN 459-1), Aggregates (EN 13139). Mixing proportions should be checked according to local recommendations.
Lime substances are classified under Regulation (EC) No. 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation). Information on the hazards of specific products is available directly from your lime supplier. Before handling, always read the extended Safety Data Sheet (e-SDS) and container labels for safe use, physical and health hazard information. An e-SDS template for lime substances is available and can be downloaded from the EuLA's website www.eula.eu