

## INFORMATION SHEET 6 – WHAT IS LIME?

### What is Lime?

Lime is a naturally occurring compound made up of calcium and other elements. Mixed with other aggregates and allowed to absorb carbon dioxide from the air it becomes the perfect 'binder' in construction and has been used for thousands of years before the introduction of cement in the mid 19<sup>th</sup> century.

Lime mortars and plasters take many forms and colours depending on where they are from. It is possible to match existing mortar on ancient buildings to new compounds for restoration work.

There are two main types of lime:

- **Pure Lime** which is also known as
  - air lime, because it hardens on exposure to air
  - fat lime, from its consistency in putty form
  - high calcium lime
  - non-hydraulic lime
- **Hydraulic Lime** – which is synonymous with water lime, as it sets under water. It is produced by, firstly, making **quicklime** by burning limestone, marble, chalk or shell at above 900°C to drive off carbon dioxide. If the material being burnt is pure calcium carbonate, then **pure quicklime** is produced. If the material being burnt contains impurities, typically aluminium and magnesium silicate, then **hydraulic quicklime** is produced.  
Lime is created by adding quicklime to water, referred to as '**slaking**'. With hydraulic quicklime sufficient water is used to produce a dry powder. Pure lime is produced either as putty or a powder. The powder is also known as:
  - Builders' lime, because it is generally available from builders merchants and is used by builders to gauge cement mortars
  - Hydrated lime or dry hydrate, which is confusing because all lime is hydrated by virtue of having had water added

When lime is mixed with an aggregate, lime mortar is created. Lime plasters normally also have animal hair added. When exposed to air, both pure lime and hydraulic lime mortars and plasters harden by reabsorbing carbon dioxide to become calcium carbonate again. This is called carbonation.

### Why use Lime?

The benefits of using lime and sand as a building material in both traditional and modern buildings are many and varied. Some of them are outlined here:

- Plaster is vapour permeable, allowing buildings to breathe naturally, and perfect for humid or damp conditions as lime absorbs and releases condensation according to its environment.
- Free lime reacts with atmospheric carbon dioxide, locking it in to the chemical compound and increasing its strength while reducing CO<sub>2</sub> in the air.
- Gentle but effective adhesion qualities mean low impact on substrates and surrounding materials
- Calcite crystals perfectly refract light creating lustrous translucent finishes over time. The malleability and ease of use allow for exquisitely detailed features to be created.
- Durability. Consider some of our oldest Cathedrals are bound with lime, and the Pantheon dome survives after 2000 years.

Self-repairing (autogenous.) All buildings settle and move over time. Stiffer concretes react by producing wide cracks, but lime, being more flexible, makes narrower cracks that can heal themselves. The calcium particles in the material react with water and flow into the voids which, on evaporation, produce new lime deposits that fill the spaces to repair its own cracks.