LIME IN MORTARS

MASONRY MORTARS, PLASTERS AND RENDERS – THE BENEFITS FOR THE DESIGNER

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.

EuLA

When selecting an appropriate mortar, a designer takes into account a wide array of characteristics that are shown in the figure below.

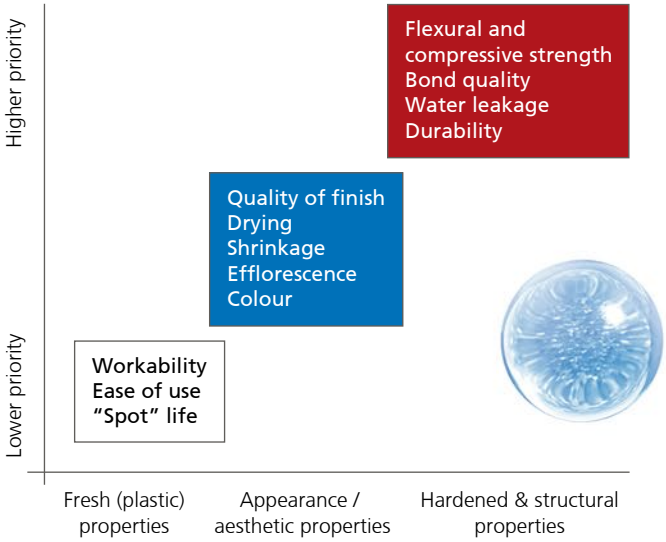

Figure 1. Prioritising mortar characteristics (based on: J. A. H. Oates, "Lime and Limestone. Chemistry and Technology, Production and Uses", p. 272, 1998).

Lime has a positive impact on mortar characteristics that are most important for designers.
It guarantees good bond strength, minimizes water leakage, is highly durable and offers a well-balanced compressive strength.

References:
European Lime Association (EuLA) and Danish Technological Institute (DTI), "Bibliography lime in mortars", 2010.

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 SO_2 (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.

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