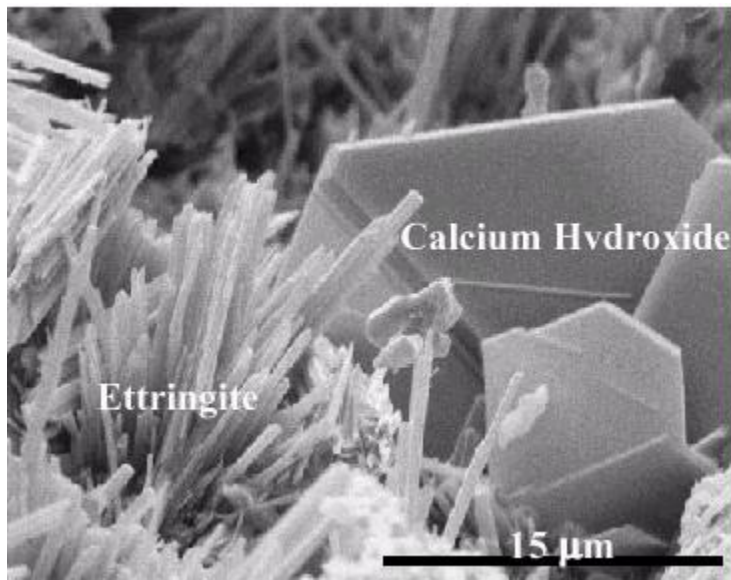


St. Astier Natural Hydraulic Lime for Historic Restoration, Conservation and New Build Projects

Prior to the 1940's many brick and stone buildings were constructed with lime and sand for mortar. Many times these limes were inadvertently hydraulic limes. The lime putty used may have had a hydraulic set because of impurities in the limestone when a limestone contained various degrees of reactive silica and was burned along with the pure calcium carbonate stone. Today, it is unfortunate that many of these pre-1940 buildings have been repaired using Portland cement based mortars and stucco. There are some consequences with this remedy. All buildings move and cracks develop in rigid Portland cement mortars and stucco. When a Portland cement mortar is stronger than the brick or stone laid up in the mortar, cracks that develop will transfer to the face of the exterior masonry allowing water penetration. Water can then be driven deeper into the masonry as it migrates to inside spaces.



Portland cement has a **dense pore structure and a needle-like crystal structure** that has the same expansion and contraction coefficient as steel, the unyielding joints and stucco will eventually crack in various places. This is especially true with free standing church bell towers and the like. Water that does not migrate to the inside of the building may evaporate out of the more porous soft brick or sandstone and only accelerate its decay. The mortar on the other hand will remain proud as the masonry units will decay back and finally hollow out from their original face plane.

Tricalcium aluminates and Tricalcium silicates which form during the burning process of Portland cement have a detrimental chemical reaction when they come in contact with water that gets trapped in the bedding mortar and salts which are found in old buildings. This reaction results in what is called "The Sulphation of Cement". It is known to bulge once sound masonry walls as expansion occurs with this reaction sometimes causing even massive stone walls to topple over. Lime, however, has an open pore structure and a hexagonal crystal structure which allows the plates to shift between one another and yields flexibility and high vapor and liquid permeability. **Some advantages of lime mortars are:**

- Walls breath better and moisture can escape
- Mortar and stucco does not set too hard
- Thermal movement can be accommodated without damage
- Expansion joints can be avoided
- Insulation is improved and cold bridging reduced
- There is a reduced risk of condensation
- There is little risk of salt staining because salts get flushed from wall surfaces
- Masonry life is increased
- CO₂ emissions in the manufacture of lime are 20% less than cement and during carbonation of the lime, the mortar and stucco reabsorb considerable quantities of CO₂
- Natural Hydraulic lime gives an excellent reproduction of sand color

All St. Astier NHL mortars can be reworked (8-24 hours), reducing waste of material and increasing work rate due to its hydraulic set. St. Astier NHL contains no cement, gypsum, pozzolans, tetra calcium Aluminoferrites, (high in Portland cement and contribute to expansion when reacting with gypsum.) St. Astier NHL does not have high aluminates, Sulphates, Alkalis making it suitable for marine environments.