TECHNICAL ADVICE

Hot-Mixed Lime Mortars

TAN6

There is renewed interest in hot-mixed non-hydraulic lime mortars with many proponents being of the view that lime mortars prepared in this way have advantages over the normal practice of mixing lime putty and sand. Hot mixed mortars are those where quicklime, aggregate and water are mixed together at the same time, and either used immediately while still hot, or stored and allowed to cool for later use. The quicklime is therefore slaked and mixed in the same operation and much heat produced, hence the term 'hot-mix'.

There is little doubt that historically lime mortars were often produced in this way. There were logistical advantages associated with the delivery of quicklime to site, and lime putty production, maturation, storage and transport were avoided. I recall speaking to a plasterer some 25 years ago who had worked repairing bomb-damaged buildings in post-war London, and he recalled mixing Dorking chalk quicklime with sand, hair and water on a board in the road, and using this base-coat plaster immediately.

Hot mixes were often specified in cold or frosty weather, with the proportion of lime increasing as the temperature fell. Work was to be stopped only if the temperature fell to less than minus -7ºC. The mortar was to be mixed in a shed at a temperature of at least +10C, and all work was to be protected with sacking.

The two principal questions that need to be addressed are:

1. Is there verifiable evidence to show that there is an advantage in the hot-mix method?

and if so...

2. What is the explanation for the improved performance?

Many hot-mix site trials are being conducted, often under the direction of Historic England and Historic Scotland and hopefully the results of these trials and the performance data will be published, as there is not yet sufficient data on which to base an assessment other than a subjective opinion.

Many proponents of the hot-mix method believe a more intimate bond between lime and sand is achieved due to the heat produced during mixing. Some speculate that the hot alkali lime etches the surface of silica sand particles, possibly releasing potentially reactive silica. I have been looking for evidence of this ever since the last period of renewed interest in hot-mixes in the late 1990s, and have not seen this, nor am I aware of any analysts or analytical laboratories that have.

A possible explanation for any improved performance might simply be that the hot-mix method allows more lime-rich mortars. 1:3 quicklime to sand ratio roughly equates to 2:3 lime putty to sand.

A weakness in the hot-mix proposal is the fact that many seem to think it necessary to gauge hot-mixes with hydraulic lime, begging the question of why should this be necessary if a hot-mix has an advantage over putty.

A reason to hope that the hot-mix method might have advantages is that it is becoming clear that hydraulic limes are in many cases far too strong for historic/traditional building repair. Historic England is conducting a comparative assessment of all currently available hydraulic limes and we look forward to the results and their appraisal with great interest.

For now, our position at Rose of Jericho must remain that the hot-mix method is potentially interesting but there is as yet insufficient data and long-term in-service evaluation on which to base an informed assessment.

Quicklime is a significantly more dangerous material than lime putty or hydraulic lime. Because of the vigorous reaction with water, quicklime causes severe irritation and burns when inhaled or in contact with moist skin or eyes. Quicklime is not considered a fire hazard, but its reaction with water can release enough heat to ignite combustible materials.