

CONCRETE SURFACE RETARDERS

Basic Information - Technical-Procedural Data

CONCEPT

Etching concrete or exposing aggregate underlying concrete surfaces can be successfully and economically accomplished with the aid of chemically active concrete surface retarders. These compounds, as their generic classification implies, retard the set of surface concrete only. Accordingly, they facilitate removal of the matrix by mechanical means after the internal concrete has achieved sufficient strength to support the weight of workers.

RETARDATION MECHANICS

The retarded matrix, if left undisturbed, begins to harden within 12 hours following concrete placement.

MATRIX REMOVAL

Hardening of surface matrix occurs from within, gradually reducing etch depth. Mechanical means necessary to remove retarded matrix range from high pressure water and/or brushing with stiff bristled brushes through abrasive blasting. The means necessary vary with the time lapse and climatic conditions following concrete placement. Less vigorous procedures are required under cool, dry weather conditions and when retarded matrix is removed as soon as base concrete has set, 3-18 hours depending on temperature and humidity. Removal becomes increasingly more difficult and time consuming as surface crust formation develops. Generally, matrix removal must be accomplished within 24 hours.

RETARDATION DEPTH

Many factors affect the depth of concrete surface retardation. Up to a point, the depth of retardation is proportional to the amount of retarder applied, assuming all other variables remain constant. Other factors affecting the degree or depth of retardation include size, shape and quantity of aggregate, cement type and quantity, consolidation, curing time, weather, elapsed time and procedures employed for matrix removal. *Surface retarders react only with cement in the surface matrix.* A reduction in cement content either specifically or precipitated by increasing sand or aggregate or aggregate size will, in general, increase retardation depth, assuming other variables remain constant.

EXPOSURE UNIFORMITY

Care should be taken to screed concrete surfaces as planar as possible with no depressions that would accumulate excessive amounts of the liquid retarder. Other important factors include: water/cement ratio, slump (should not exceed 2-3 inches), prevention of segregation during placement and/or consolidation of the concrete and completing removal of matrix when and while desired surface retardation is apparent.

DURABILITY

Mix designs for exposed aggregate concrete require higher cement content than smooth concrete if maximum durability is to be obtained. Following removal of retarded matrix, all surfaces should be water cured, if possible. Following cure, the application of a chemically active hardener is recommended. Surfaces should then be suitably sealed.

TEST APPLICATION

Prior to proceeding with exposed aggregate production, a test panel, slab, or wall should be prepared on site under the same conditions and using the same materials, procedure, and personnel, to be utilized in actual construction. A decision to use a specific chemical retarder should be based solely on the results obtained in the test pour.

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chemical solutions to concrete problems