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ALKALI-SILICA REACTION GUIDELINES

INTRODUCTION

With warmer temperatures, the potential for Alkali-Silica Reactions (ASR) increases. ASR is a chemical reaction between the alkali's from cement and reactive silica minerals in aggregate. When this reaction occurs, a gel is formed and when in the presence of moisture, the gel expands, causing internal pressure and leading to cracking, spalling and surficial popouts. Fine aggregate popouts can start soon after finishing and continue for several days. All of the native sand in Minnesota has the potential to contain a small amount of alkali-silica reactive material. Sands that are mined to the Mn/DOT 3137/ASTM C33 standards can also contain amounts of these materials. While these popouts do not affect the structural performance of the slab, they can present an aesthetic problem. The problems can be even more troublesome when they occur below resilient flooring materials.

The following are our recommendations to minimizing the affects of ASR:

- The problem can be prevented by flushing the concrete surface with water after finishing and before curing. This flushing will remove all the alkali at the surface and effectively halt the reaction before the popouts occur. It should be noted that this is only effective for slabs which will not be covered with flooring materials, i.e., vinyl composition tile or sheeting. The use of certain flooring materials or adhesives may cause the alkali's from the cement to concentrate beneath the flooring material. Caution should be taken when selecting the adhesive used to secure the flooring materials as they may also cause an increase of alkali concentration.
- Ensure that the temperature of the concrete surface is as low as practicable. The rate of an ASR reaction is greater at temperatures near 90 °F than at 70 °F. Direct sunlight on the concrete should be avoided.
- Reduce the surface evaporation by curing the concrete with water. The use of ponding or wet burlap has been shown to greatly reduce the potential for popouts. This should be done after the surface has been flushed with water.
- The use of sealers can potentially increase the likelihood of popouts. The sealers can trap the alkali's that cause this problem.
- Avoid using polyethylene sheeting as a method of curing. This may cause a concentration of alkali's at the surface of the concrete which can lead to popouts.
- Do not use chemical hardeners that contain potassium silicate or sodium silicate.

NOTE: This document should not be used as a substitute for experience or project specifications. Please contact your Cemstone Representative or go to www.cemstone.com for more information or for non-routine applications.

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