SCA SLAG CEMENT ASSOCIATION

Information Sheets

4: Saw Cutting Joints

What are Saw Cuts?

Saw cuts are a means of creating joints in concrete. Joints are an effective way to control cracking due to shrinkage. Joints are installed at prescribed intervals to determine where cracks occur.

Joints need to be cut after the concrete has achieved enough strength to keep it from raveling, but before internal stresses in the concrete become great enough to initiate a crack. The earlier the concrete can be cut without raveling, the better the chances are that the concrete will not crack before saw cutting.

The difficulty in correctly determining the earliest time for saw cutting is that it changes according to the type of admixtures in the concrete, the ambient temperature and environmental conditions at the site, the cementitious factor in the mix, the types and percentages of mineral admixtures used, and the type of aggregates used.

An example of just how difficult it can be to correctly judge the right time for cutting joints is to consider a change in coarse aggregate from gravel to quartzite. A concrete mix with quartzite needs to achieve a compressive strength of nearly 800 psi more than a gravel mix before it can be safely saw cut.

Saw-cut joints are an effective way to control cracking due to shrinkage. Joints need to be cut before internal stresses in the concrete become great enough to initiate a crack.

How does Slag Cement Affect Saw Cutting?

When placing concrete manufactured with slag cement, it is important to remember that set times may be increased and early strength development may take longer. The higher the percentage of slag cement used and the lower the ambient temperature, the more pronounced these effects will be.

In the summer, when moderate to high temperatures are the norm, mixtures containing up to 50 percent slag cement have been used with success. In colder seasons, the percentage of slag cement may need to be decreased in order to achieve the early strengths necessary to provide an adequate window for saw cutting.

Early entry saws allow a much larger window for saw cutting concrete before the development of uncontrolled shrinkage cracks.

One method to eliminate the guesswork in the timing of cutting joints in any concrete is using an early entry saw. This method allows a much larger window for saw cutting concrete before the development of uncontrolled shrinkage cracks.

Whatever method is used, it is important for contractors to understand the materials they are using and how these materials will affect the correct time for saw cutting concrete joints. It is also important to understand how these mixes can be adjusted for different environmental conditions.

As a rough guideline, the time to saw cut is delayed approximately 30 minutes for every 10 percent of slag cement replacing portland cement. With colder mixture temperatures the delay may be longer. This delay can be adjusted through the use of accelerating admixtures, heated water, or heated aggregates.

References

1. ACI 224-01, "Control of Cracking in Concrete Structures (Reapproved 2008)," American Concrete Institute, Farmington Hills, MI, 2008.

2. ACI 302.1-15, "Guide to Concrete Floor and Slab Construction," American Concrete Institute, Farmington Hills, MI, 2015.

3. "Guidelines for Timing Contraction Joint Sawing and Earliest Loading for Concrete Pavements, Volume I: Final Report," Federal Highway Administration, McLean, VA, 1994.