



Popout Fact Sheet

What are popouts? Popouts are blemishes in the concrete surface that appear as early as one to two days, or as late as years after the concrete is placed. Popouts are a result from a chemical reaction between alkalis (sodium and potassium) found in Portland cement and sand particles (usually silica in the shale). The expansive sand particle can be seen at the bottom of the popout. Popouts may detract from appearance but do not affect the structural integrity of the concrete.

Where is the affected geographical area? The shale containing the reactive silica was deposited in central, north central and northwest Iowa by the Keewatin Glacier. Manatts, Inc. uses aggregates that meet Iowa DOT specifications. It is often assumed that meeting IDOT specifications ensures that popouts will not occur, but that assumption is not valid. Special care should be taken in areas of Iowa that are West of Highway 63 and South of Highway 20, though popouts can occur anywhere.

Why do popouts occur? Popouts are caused by a chemical reaction of the shale particles and the alkali content of the concrete at the slab surface. The alkalis migrate with the bleed water to the surface of the concrete where they can be concentrated as much as seven-fold during the drying of the surface. This concentration of alkalis on or near the surface increases the likelihood of contact and reaction with the expansive sand particle. With moisture available, a chemical reaction creates “reaction products” which results in expansion. The popout occurs when the pressure of this expansion is greater than the concrete can resist.

Minimize Your Chances of Popouts

- **Properly cure your concrete:** Use a method of curing that maintains water on the surface of concrete. These include ponding, continuously spraying or saturated wet covers such as wet burlap or wet sand. Such methods provide some cooling of that surface and allow the reaction products to leave the concrete. It has been reported that proper curing can virtually eliminate popouts. Before allowing the concrete to dry, it is important to rinse the surface to remove reaction products. Do not use membrane-forming curing compounds or any sealers with reactive sands.
- **Proper Concrete Mix:** Use a concrete mix with workability suited to the type of placing and finishing equipment that will be used. The greater the slump, the more likely small particles will be brought to the surface. Use the lowest possible slump.
- **Correct Finishing Time:** Do not begin any finishing operation while there is excess moisture on the surface. Such action will only aggravate the concentration of alkalis at the surface and cause other surface problems.
- **Avoid placing a vapor barrier under the slab:** Only place a vapor barrier under the slab when the floor is to receive an impermeable surface finish or will be used for any purpose where the passage of water vapor through the floor is undesirable. When a vapor barrier is necessary, cover it with two to three inches of damp, not wet, compacted sand.
- **Imported Sand:** Imported sand from other areas of Iowa will minimize your chances of experiencing popouts. If you would like to explore this option, notify your local plant manager or contact Manatts’ home office.

Additional Questions?

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