



# CONCRETE TECH-TIP 25

## Mortar Flaking

### 1. WHAT is Mortar Flaking?

Mortar flaking is the dislodging of small sections of surface concrete, usually smaller than a dime, directly above coarse aggregate particles. Mortar flaking is typically very shallow in depth and consists of distinct delaminations (flakes) that occur directly over the coarse aggregate particles in the concrete. It is most common in exterior concrete exposed to freeze/thaw conditions but can occur any time rapid evaporation has occurred immediately after finishing.

Mortar flaking can be distinguished from pop outs (see CCT-17) - a similar looking surface blemish - by examining the nature of the aggregate particle exposed by the loss of surface mortar. If the aggregate particle is substantially intact, the problem is defined as mortar flaking and is indicative of poor curing practices. If the aggregate particle is fragmented with a portion remaining in the concrete and a fragment imbedded in the lost surface mortar, then the defect is a pop out and is a result of susceptible aggregate in the mix. Each has its own cause and must be treated as two different phenomena.

### 2. WHY does Mortar Flaking Occur?

The delamination of small sections of the surface mortar from the coarse aggregate particles is due to drying of the surface before the normal bond forces were developed between the mortar and

the stones. Bleed water rising within in the mix is forced to travel around such particles so that the mortar above is not replenished with moisture from below. The mortar over these stones dries out, undergoes normal drying shrinkage, fails to develop bond and flakes off as a result.



### 3. HOW to prevent mortar flaking

Mortar flaking typically occurs in concrete that was not properly cured immediately and for the following 7 days. Therefore addressing curing procedures is a must.

All concrete requires curing in order that the chemical reaction between the batch water and the cementitious materials can occur. This permits the mix to develop the strength and durability it is capable of. Curing techniques are those that trap water inside the concrete for a week or more or, like poly or wet burlap, that trap water against the exposed surface. While wet curing provides the best curing conditions, most exterior concrete surfaces are more practically cured by spraying on a liquid curing compound. Be certain to apply the correct dosage – usually 200 to 400 square feet per gallon. Using less is false economy since a complete seal of the surface will not occur.

Curing must start as soon as possible which, for exterior textured surfaces, means as soon as the broom finish or other texture has been applied. Returning the next day or later to apply curing will not reduce the risk of mortar flaking.

For flatwork that is to be hard trowelled, such as industrial floors, the hours-long waiting period

between stages of the finishing procedure means the surface is at risk of evaporation during these waiting times and this could lead to mortar flaking. When a high evaporation rate is a risk – and that is not just in hot dry windy conditions – the finisher should apply mono-molecular spray film such as Con-Film or Sure-Film between operations to minimize evaporation prior to the final curing with a curing compound.

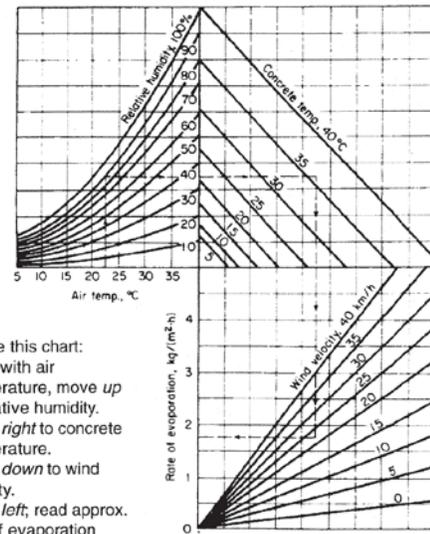


Fig. 12-9. Effect of concrete and air temperatures, relative humidity, and wind velocity on rate of evaporation of surface moisture from concrete. Reference 12-2.

#### Follow These Rules to Help Avoid Mortar Flaking

1. Refer to Concrete Tech Tip #14 for proper finishing of concrete flatwork.
2. Cure the concrete as soon as all finishing is completed and the water sheen has left the surface. Some methods of curing area: liquid curing compounds; plastic to cover the concrete; ponding; continuous sprinkling; burlap, and straw or sand that is kept wet.
3. Seal the surface of the concrete. Do not seal surface early - before air or bleed water from below have escaped.
4. Select the proper mix to match placing conditions.