

WHAT is Cracking?

Cracking is the development of a network of fine random cracks or fissures on the surface of concrete or mortar caused by shrinkage of the surface layer. These cracks are rarely more than 3 mm deep and are more noticeable on steel-troweled surfaces. The irregular hexagonal areas enclosed by the cracks are typically no more than 40 mm across and may be as small as 12 or 20 mm in unusual instances. Generally, craze cracks develop at an early age and are apparent the day after placement or at least by the end of the first week. Often they are not readily visible until the surface has been wetted and it is beginning to dry out.

Cracking cracks are sometimes referred to as shallow map or pattern cracking. They do not affect the structural integrity of concrete and rarely do they affect durability or wear resistance. However, crazed surfaces can be unsightly. They are particularly conspicuous and unsightly when concrete contains calcium chloride, a commonly used accelerating admixture.

WHY Do Concrete Surfaces Craze?

Hard steel-troweled slab surfaces often have craze cracks due to shrinkage of the concentrated dense paste layer at the surface. Concrete surface crazing can also occur because one or more of the rules of "good concrete practices" were not followed. The most frequent factors when crazing occurs are:

- a. Poor or inadequate curing. Environmental conditions conducive to high evaporation rates, such as low humidity, extremes in ambient temperature, direct sunlight, and drying winds on a concrete surface when the concrete is just beginning to gain strength, cause rapid surface drying resulting in craze cracking. Avoid the delayed application of curing or even intermittent wet curing and drying after the concrete has been finished.
- b. Too wet a mix, excessive floating, the use of a jitterbug or procedures that will depress the coarse aggregate and produce an excessive concentration of cement paste and fines at the surface.
- c. Finishing operations performed while bleed water remains on the surface or the use of a steel trowel in a manner that the smooth surface of the trowel brings up excessive water and cement fines. Use of a bull float or darby with water on the surface or while the concrete continues to bleed will produce a high water-cement ratio at the surface resulting in a weak surface layer that will be susceptible to crazing, dusting, scaling and other surface defects.
- d. Sprinkling cement on the surface to dry up the bleed water is a frequent cause of crazing. This concentrates fines on the surface. Spraying water on the concrete surface during finishing operations will result in a weak surface susceptible to crazing or dusting.

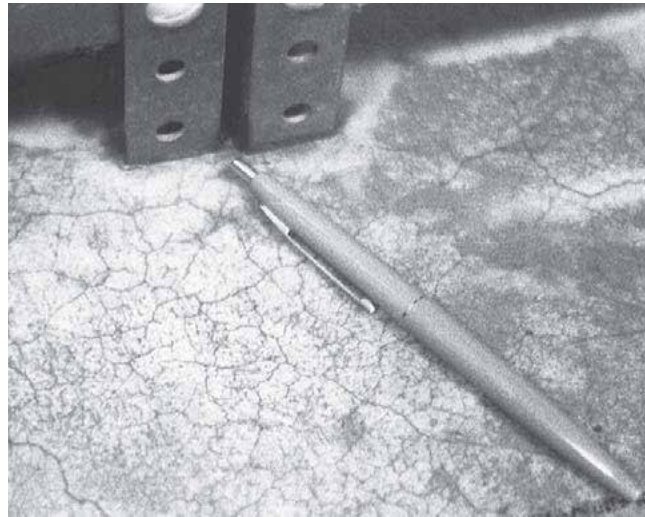
HOW to Prevent Cracking?

- a. To prevent crazing, start curing the concrete as soon as possible. Curing retains moisture required for proper reaction of cement with water, called hydration. Keep the surface wet by either flooding with water or by covering it with damp burlap and keeping it continuously moist for a minimum of 3 days. An alternative is to spray the surface with a liquid-membrane curing compound. Avoid alternate wetting and drying of concrete surfaces at an early age.
- b. When placing, use moderate slump 75 to 125 mm concrete. Higher slump 150 to 175 mm can be used provided the mixture is designed to produce the required strength without excessive bleeding and/or segregation. This is generally accomplished by using water-reducing admixtures.
- c. NEVER sprinkle or trowel dry cement or a mixture of cement and fine sand on the surface of the plastic concrete to absorb bleed water. DO NOT sprinkle water on the slab to facilitate finishing. If necessary, remove bleed water by dragging a garden hose across the surface. DO NOT perform any finishing operation while bleed water is present on the surface or before the bleeding process is completed. DO NOT overwork or over-finish the surface.
- d. When high evaporation rates are anticipated, lightly dampen the subgrade prior to concrete placement to prevent it absorbing too much water from the concrete. If a vapor retarder is required on the subgrade, cover it with 70 to 100 mm of a compactible, granular fill, such as a crusher-run material except when the slab will receive a vapor-sensitive floor covering or will be in a humidity controlled environment.

Follow These Rules to Prevent Cracking

1. Use moderate slump (3-5 inches) concrete with reduced bleeding characteristics.
2. Follow recommended practices and timing, based on concrete setting characteristics, for placing and finishing operations:
 - a. Avoid excessive manipulation of the surface, which can depress the coarse aggregate, increase the cement paste at the surface, or increase the water-cement ratio at the surface.
 - b. DO NOT finish concrete before the concrete has completed bleeding (look for the presence of a water sheen on the surface). DO NOT dust any cement onto the surface to absorb bleed water. DO NOT sprinkle water on the surface while finishing concrete.
3. Cure properly as soon as finishing has been completed.

CRAZING CRACKS



Cracking Concrete Surface (Dampened)