

Curling on Concrete Slabs

Definition of Curling

Curling is the upward or downward bending of the edges of a concrete slab, giving the slab a cupped shape. The curled edges are unsupported by the base, making them susceptible to cracking under heavy loads.

Why Do Slabs Curl?

Upward curling usually occurs when the top portion of a slab shrinks at a faster rate than the bottom. This curling effect is the most apparent at the slab's edges and especially at its corners.

Moisture and temperature differences within the slab are the most common reasons for the uneven shrinkage rates. Warm air and low humidity above the concrete will accelerate shrinkage on its surface, while moist, humid air trapped in the slab will slow shrinkage near its base. Generally, anything that increases shrinkage drying, like an admixture, will increase curling. Excessive bleeding and poor curing will also increase curling.

Temperature differences can cause either upward or downward slab curling. If the top part of the slab is exposed to the sun it can expand more relative to the bottom, and the slab edges will curl downward. Conversely, on a cold night the upper portions of the slab will shrink more than the lower, and the slab edges will curl upward.

How to Minimize Curling

Use the following practices to help minimize curling:

- ❑ Use the lowest slump practical; try not to retemper, especially in hot weather.
- ❑ Use the greatest size and content of aggregate practical.
- ❑ Prevent excessive bleeding.
- ❑ Do not use vapor barriers under a slab unless it is covered with 6 inches of damp sand.
- ❑ Avoid higher cement contents than necessary; they tend to produce dense, impermeable concrete with high top-to-bottom shrinkage differentials.
- ❑ Thoroughly cure the concrete, especially at joints and edges.
- ❑ Cure the concrete with a heavy wax floor-sealing compound.
- ❑ Space joints (in feet) two times the slab thickness (in inches).
- ❑ Use a thicker slab.
- ❑ Use proper slab reinforcement.