



CONCRETE IN PRACTICE

**CIP
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***What, Why & How?* Dusting Concrete Surfaces**

WHAT is Dusting?

Chalking or powdering at the surface of a concrete slab is called dusting. The characteristics of such surfaces are:

- a. They powder under any kind of traffic**
- b. They can be easily scratched with a nail or even by sweeping.**

WHY Do Concrete Floors Dust?

A concrete floor dusts under traffic because the wearing surface is weak. This weakness can be caused by:

- a. Any finishing operation performed while bleed water is on the surface. Working this bleed water back into the top ¼ inch of the slab produces a very high water-cement ratio and, therefore, a low strength surface layer.
- b. Placement over a nonabsorptive subgrade or polyethylene. This reduces normal absorption by the subgrade, increases bleeding and, as a result the risk of surface dusting.
- c. Insufficient or no curing. This omission often results in a soft surface skin which will easily dust under foot traffic.



Dusting concrete surface.

- d. Floating and/or troweling of condensation moisture from warm humid air on cold concrete. In cold weather the concrete sets slowly, in particular cold concrete in basement floors. If the humidity is relatively high water will condense on the freshly placed concrete which, if troweled into the surface, will cause dusting.

- e. Inadequate ventilation in close quarters. Carbon dioxide from open salamanders, gasoline engines or generators, power buggies or

mixer engines may cause a chemical reaction known as carbonation which greatly reduces the strength and hardness of the concrete surface.

f. Inadequate protection of freshly placed concrete from rain, snow or drying winds.

HOW to Prevent Dusting

a. In general, use concrete with a moderate slump (not over 5 inches). However, concrete with a higher slump (up to 6 or 7 inches) may be used providing the mixture is designed to produce the required strength without excessive bleeding and/or segregation. The higher slump levels can be used in hot weather when setting time is reduced and less time is available for bleeding. In cold weather delayed setting will increase bleeding and require use of lower slump. Concrete having a low water-cement ratio and moderate slump helps produce a strong wear resistant surface.

b. **NEVER** sprinkle or trowel dry cement into the surface of plastic concrete to absorb bleed water. Remove bleed water by dragging a garden hose across the surface. Excessive bleeding of concrete can be reduced by using air entrained concrete, by modifying mix proportions and by reducing setting time.

c. **DO NOT** perform any finishing operations with water present on the surface. Bleed water can be worked into surface fines from delayed bullfloating. Initial screeding must be promptly followed by bullfloating. Do not use a jitterbug to bring excess mortar to the surface.

d. Avoid direct placement of concrete on polyethylene or nonabsorptive subgrades. Place 1 to 2 inches of damp sand over polyethylene or nonabsorptive subgrade prior to concrete placement. On absorptive subgrades dampen the surface just prior to concrete placement.

e. Provide proper curing by using liquid membrane curing compound or by covering the surface with wet burlap. Protect young concrete from the environment.

f. When placing concrete in cold weather use warm concrete as well as an accelerator.

HOW to Repair Dusting

a. To minimize or eliminate dusting, apply a chemical floor hardener such as zinc or magnesium fluosilicate in compliance with manufacturer's directions on thoroughly dried concrete. If dusting persists, use hardeners with cementitious properties of their own, such as atex formulations, boiled linseed oil or paint.

b. In severe cases, a serviceable floor can be obtained by wet-grinding the top surface, followed by properly bonded placement of a topping course. If this is not practical, installation of a floor covering, such as carpeting or vinyl tile covering is the least expensive solution to severe dusting.

References:

1. "Job Conditions Affect Cracking and Strength of Concrete in Place," by Richard H. Campbell et al. ACI Journal, January 1976.
2. "Guide for Concrete Floor and Slab Construction," ACI 302.1R.
3. "Causes of Floor Failures," by A.T. Hersey, ACI Journal, June 1973.
4. "Slab Construction Practices Compared by Wear Test," by Blake Fentress, ACI Journal, July 1973.
5. "Cement Mason's Manual for Residential Construction," Portland Cement Association.
6. "The Effect of Various Surface Treatments, Using Zinc and Magnesium Fluosilicate Crystals on Abrasion Resistance of Concrete Surfaces," Concrete Laboratory Report No. C-819, U.S. Bureau of Reclamation.

Follow These Rules to Prevent Dusting

1. Use moderate slump concrete.
2. Finish properly.
3. Cure properly.



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