

Dusting Concrete Surfaces

1. 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.

2. WHY Do Concrete Floors Dust?

A concrete floor dusts under traffic because the wearing surface is weak. The 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 1 mm of the slab produces a very high water-cement ratio and therefore, a low strength surface layer.
- B) Inadequate protection of freshly placed concrete from rain, snow or drying winds.
- C) Insufficient or no curing. This omission often results in a soft surface skin which will easily dust under foot.
- 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.



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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 surfaces.
- F) Placement over a non-absorptive subgrade of polyethylene. This reduces normal absorption by the subgrade, increases bleeding and, as a result, the risk of surface dusting.

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References:
 1. Guide for Concrete Floor and Slab Construction, ACI 302.1R, American Concrete Institute, Farmington Hills, MI.
 2. Slabs on Grade, Concrete Craftsman Series CCS-1, American Concrete Institute, Farmington Hills, MI.
 3. Concrete Slab Surface Defects: Causes, Prevention, Repair, IS177, Portland Cement Association, Skokie, IL
 4. 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.
 5. Residential Concrete, National Association of Home Builders, Washington, D.C.
 6. Trouble Shooting Guide for Concrete Dusting, Concrete Construction, April 1996.

3. HOW to Prevent Dusting

- A) In general, use concrete with a moderate slump (not over 100 mm). However, concrete with a higher slump (up to 150mm or 180mm) 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 bull floating. Initial screeding must be promptly followed by bull floating. Do not use a jitterbug to bring excess mortar to surface.
- D) Avoid direct placement of concrete on polyethylene or non-absorptive subgrades. Place 25mm to 50mm of damp sand over polyethylene or non-absorptive 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 and consider using an accelerator.

4. HOW to Repair Dusting

- A) To minimize or eliminate dusting, apply a chemical floor hardener such as zinc or magnesium fluorosilicate in compliance with manufacturer's directions on thoroughly dried concrete. If dusting persists, use hardeners with cementitious properties (such as latex 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 can be a more cost effective solution to severe dusting.

Follow These Rules to Prevent Dusting

- a. Use moderate slump concrete
- b. Finish properly
- c. Cure properly