CONCRETE SASK

**TECH TIP #1**

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# 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 they powder under any kind of traffic and 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. The weakness can be caused by:

- Any finishing operation performed while bleed water is on the surface. Working this bleed water back into the top 6 mm of the slab produces a very high-water cementitious ratio and therefore, a low strength surface layer.
- Poor finishing practices that utilize dry cement spread over the concrete surface to speed up finishing and or sprinkling water on the surface during finishing.
- Inadequate protection of freshly placed concrete from rain, snow, or drying winds.
- Insufficient or no curing. This omission often results in a soft surface skin which will easily dust under foot traffic.
- Floating and/or troweling operations after condensation moisture from warm humid air encounters cold concrete. In cold weather, the concrete sets slowly, particularly, 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.
- Inadequate ventilation in close quarters. Carbon dioxide from gas powered sources may cause a chemical reaction known as carbonation, which greatly reduces the strength and hardness of the concrete surface.
- Placement over a non absorptive subgrade or polyethylene This reduces normal absorption by the subgrade, increases bleeding and, as a result, the risk of surface dusting.

## HOW to prevent dusting?

- In general, use concrete with a moderate slump (not over 100 mm). However, concrete with a higher slump (up to 150 mm or 180 mm) can be used providing the mixture is designed to produce the required strength without excessive bleeding and/or segregation (Sask C-2 Mix). The higher slump levels may 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.

- NEVER sprinkle or trowel dry cement into the surface of plastic concrete to absorb bleed water. Removal bleed water can be performed 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 accelerating setting time.

- 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.

- Avoid direct placement of concrete on polyethylene or non absorptive subgrades. Place 25 mm to 50 mm of damp sand over polyethylene or non absorptive subgrade, prior to concrete placement. Placing any concrete on absorptive subgrades is not recommended.

- Provide proper curing by covering the surface with wet burlap or use a using liquid membrane curing compound. Protect young concrete from the environment.
- Concrete with a temperature exceeding 10°C, as well as using an accelerator, is recommended when placing concrete in cold weather.

## HOW to repair dusting?

- Applying a chemical floor hardener such as zinc or magnesium fluorosilicate in compliance with manufacturer's directions on thoroughly dried concrete can be used to minimize or eliminate dusting. If dusting persists, use hardeners with cementitious properties (such as latex formulations), boiled linseed oil or paint.

- Sandblasting or high-pressure water washing of the concrete can be used to remove the weak surface layer.

- 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 or severe dusting.

References

1. *CIP 1 – Dusting Concrete Surfaces, National Ready Mix Concrete Association*
2. *Guide for Concrete Floor and Slab Construction, ACI 302.1R, American Concrete Institute*
3. *Concrete Slab Surface Defects: Causes, Prevention, Repair, Portland Cement Association*
4. *CAN CSA A23.1-24/A23.2-24.*