

CONCRETE BLEEDING



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INTRODUCTION

Concrete bleeding, also known as water gain, is a form of segregation in which some of the water in the concrete mix tends to rise to the surface of the freshly placed concrete. This results from the inability of the solid concrete constituents in the mix to hold all the mixing water when they settle downwards. The external manifestation of bleeding is the appearance of a layer of clear (or sometimes slightly green) water on the surface of the concrete mixture after it has been placed and compacted, but before it has set. When the cement paste in the concrete has set and stiffened sufficiently, bleeding of the concrete stops.



EFFECTS OF BLEEDING

Bleeding results in the top layer of concrete becoming too wet, thereby forming a porous and weak layer of non-durable concrete. Remixing the bleeding water during the finishing of the top surface also results in the formation of a weak wearing surface.

During bleeding, the solid particles in a concrete mix settle to the bottom of the concrete under the force of gravity. This results in a top surface with less solid particles, which may lead to settlement cracking.



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Bleeding also results in the formation of voids under aggregate particles and reinforcing steel as water migrates upwards. This reduces the concrete strength and increases the porosity of the hardened concrete and reduces bond between the concrete and reinforcement. The water migrating upwards leaves behind voids and since all these voids are oriented in the same direction, the permeability of the concrete in the horizontal plane may be increases.

Bleeding is not always harmful. If it is undisturbed (and the water evaporates), the effective water/cement ratio may be lowered with a resulting increase in strength. However, if the rising water carries with it a considerable number of finer particles, a layer of laitance (which is a weak layer of fine particles which forms on the surface of concrete, resulting from an accumulation of these particles as they migrate to the surface of the concrete) will be formed. If this occurs at the top of a slab, a porous surface will result in a permanently dusty surface. At the point of a lift (at the interface of two concrete layers), a plane of weakness may form, and the bond with the next lift will be inadequate. For this reason, laitance should always be removed by brushing and washing. Laitance can also occur due wo surface finishing which may become damaged due to air bubbles or bleed water becoming trapped to form blisters.



BLEEDING AVOIDANCE MEASURES

Bleeding may be reduced by modifying the mix or by taking certain measures on site. Bleeding avoidance or reduction measure include:

- Using a finer cement in the concrete mix
- Using CSF (condensed silica fume) or very finely ground GGBS (ground granulated blastfurnace slag)
- Reducing the concrete water content
- Increasing the proportion of minus-300- μm material in the concrete mix
- Using an air-entraining admixture
- Delaying power troweling until bleeding has stopped and bleed water has evaporated or has been otherwise removed
- Avoiding overworking of the surface
- Removing laitance by washing and brushing
- Recompacting concrete
- Vacuum dewatering

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