

plastic shrinkage cracking

Definition

Plastic shrinkage cracks are cracks that appear on the surface of a freshly placed concrete slab during finishing operation or soon after. Plastic shrinkage cracks are usually parallel to each other. The cracks are usually 1 to 2 inches deep and rarely affect the permeability of the slab. Plastic shrinkage cracks rarely impair the strength of the concrete.

Contributing Factors

Plastic shrinkage cracks occur when the rate of evaporation of surface moisture exceeds the rate at which the rising bleed water can replace it and the surface dries. As the bleed water evaporates and recedes below the concrete surface, small cracks develop between the fine particles of cement and aggregate causing a tensile force to develop in the surface layers. If the concrete surface has started to set and has developed sufficient tensile strength, cracks do not form. However, if the surface dries before sufficient tensile strength develops, the tensile force in the layers will exceed the tensile strength of the concrete and cracks will develop. If the surface dries very rapidly, the concrete may still be plastic, and cracks do not occur at that time, they will as soon as the concrete stiffens more.



How to Minimize Plastic Shrinkage Cracks

- Have proper manpower, equipment and supplies on hand so that the concrete can be placed and finished properly. If delays occur, cover the concrete with wet burlap or polyethylene sheeting between finishing operations. Spraying a chlorinated rubber curing compound or a monomolecular film on the surface behind the screening operation and before floating or troweling and help minimize plastic shrinkage cracks.
- Start curing the concrete as soon as possible. Spray the surface with a liquid membrane curing compound or cover with a wet burlap and keep moist for a minimum of 3 days.
- If concrete is to be placed on a dry subgrade or on previously placed concrete, the subgrade or the concrete base should be thoroughly dampened. The formwork and reinforcement should also be dampened.
- In the very hot and dry periods, use of fog sprays can minimize plastic shrinkage cracks.
- Erect temporary windbreaks to reduce wind velocity over the surface of the concrete and if possible, also provide sun shades to control surface temperature of the slab. If conditions are critical, schedule the placement for later afternoon or early evening.
- If protection cannot be provided, then do not place concrete that day.

References

Plastic Shrinkage Cracking,
NRMCA, CIP#5, 1998