



# CONCRETE TECH-TIP 17

## Popout

### 1. WHAT is a Popout?

A popout is a relatively small piece of the concrete surface that breaks out due to weathering of unsound aggregate. Popouts generally vary in size from 6 to 50 mm in diameter, but can be up to 300 mm in size. Usually a fractured aggregate particle will be found at the bottom of the hole, with a part of the aggregate still bonded to the point of the popout cone.

### 2. WHY Do Popouts Occur?

Popouts are usually caused by the expansion of porous aggregate particles having a high rate of absorption. As the offending aggregate absorbs moisture or freezes under moist conditions, its swelling creates internal pressures sufficient to scale the concrete surface. Ironstone, coal, shale and soft fine grained limestones are the commonly observed causes of popouts.

Most popouts occur within the first year of concrete placement. Moisture induced

swelling may occur shortly after placement due to moisture absorption from the plastic concrete, or they may not occur until after prolonged rainy weather or the first winter. Popouts are generally considered a cosmetic flaw primarily affecting the concrete appearance and usually do not affect the service life of the concrete. Interior slabs with moisture proof finishes such as linoleum can experience bubbling of the finished surface if the slab is not provided with good underslab drainage.



A popout is a small fragment of concrete surface that broke away due to internal pressure, leaving a shallow, typically conical, depression.

### 3. **HOW** To Repair Popouts

Surfaces with popouts can be repaired. A small patch can be made by drilling out the spalled particle and filling the void with a damp pack mortar, epoxy mortar, or other appropriate patching material. If popouts are too numerous to patch individually, a thin bonded overlay or surface grinding may be used to restore serviceability.

For additional information on popouts, refer to "Popouts: Causes, Prevention, Repair," Concrete Technology Today, PL852B, June 1985.

#### **Follow these steps to minimize or eliminate popouts:**

1. Use durable aggregate from a proven source. A limit of 1% deleterious material by mass of dry aggregate has been found to minimize difficulties with popouts.
2. Use Concrete with the lowest water content and slump possible for the application.
3. Use air entrained concrete.
4. Do not finish concrete when bleedwater is on the surface.

5. Avoid over finishing or hard-steel trowelling where not needed, such as most exterior and garage slabs.
6. Reduce concrete temperature to 10°C to 21°C.
7. Impervious floor coverings or membranes should be avoided for slabs on grade as they can aggravate popouts.
8. Provide proper drainage. Slope the slab surface to provide good drainage. Basement slabs should be provided with a free draining granular base in areas with high groundwater conditions.



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