Popout

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Print FAQs

Q **What is & How To repair Popout ....**

A 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 50mm in diameter, but can be up to 300mm in size. Usually fractured aggregate particles 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.

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 motar, or other appropriate patching material. If popouts are too numerous to patch individually, a thin bonded overlay or surfaces 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 bleed water is on the surface.

5. Avoid over finishing or hard-steel troweling where not needed, such as most exterior and garage slabs.

6. Reduce concrete temperature to 10C to 21C.

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. Basements slabs should be provided with a free draining granular base in areas with high groundwater conditions.

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We are seeing a greater occurrence of popouts in driveways, garage floors and other exterior flatwork due to the effects of unusually warm winter conditions and the increased use of de-icing salts on streets and roadways. These factors mean that exposed concrete is subjected to an increased number of freeze thaw cycles.

Moderate winter temperatures ranging from -10 C to 10 C and the effects of higher salt use allows free moisture and salts to penetrate the concrete and subjects the concrete to greater attacks and result in more potential popouts.

In Saskatchewan, popouts are mainly due to soft, absorbent rock and or alkali reactive rock, which can be present in concrete. These deleterious aggregates are found throughout Central North America in varying amounts in the alluvial till (rock and sand) used to produce concrete.

The Canadian Standards Association (CSA) has limits as to the amounts of these materials allowed in concrete (see ©CSA International A23.1-00 Table 6). However these limits do not totally eliminate these deleterious aggregates and some popouts can still occur.

To help keep popouts to a minimum, the SRMCA recommends the following for all exterior or exposed concrete:

1. Use Duramix or a minimum 32 MPa concrete.
2. Ensure air contents of 5 to 8%.
3. Use a maximum slump of 80mm.
4. Slope the concrete surfaces to drain properly.
5. Do not finish concrete with bleed water on the surface.
6. Do not use a steel trowel to finish the concrete to a hard, smooth surface. Steel trowelling reduces the air void structure at the concrete surface. This air void system is required to resist the damaging effects of freeze thaw cycles and aid in durability.
7. Finish the concrete surface with one pass of a magnesium hand trowel. Float blades of a power trowel may be used only on garage floors, then one hand trowel to finish.
8. Use a light broom to texture for slip resistance.
9. Flush the concrete the same day the concrete is placed and sufficiently hardened to remove any reaction products to reduce popouts.
10. Use wet curing methods a minimum of 7 days.
11. Flush the concrete surfaces before final drying.
12. Use of a concrete sealer is acceptable but not until 28 days after placing the concrete.
13. Do not use deicing. salts, fertilizers or other products, which contain chlorides, on the concrete.
14. Clean and maintain concrete surfaces by removing snow and ice.
15. Do not use high pressure washing devices directly on your concrete surface (within 12 inches).

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