Joint Filler Protrusion in Exposed Concrete Floors

While most joint filler protrusion (extrusion) occurs in floors that are covered with VCT or other floor coverings (see *Technical Bulletin T13*), filler protrusion can and does happen in exposed concrete floors. As with covered floors, the cause of protrusion is almost inevitably a result of concrete floor dynamics, rather than the joint filler itself.

Filler protrusion in exposed floors has the same root cause as covered floors; slab panel mass increases, the slab expands in a linear direction (creating a narrowing at the joints) and the filler is compressed, causing it to be extruded upward above the floor's surface. Slab expansion behavior can be influenced by a number of factors (see below), but one constant is that the resulting compression at each joint location is directly related to the spacing of the joints. Wider spacing, i.e. 20' (6 m) on center, leads to increased joint compression, tighter spacing, i.e. 12' (3.7 m) on center, results in less compression at each joint location.

To understand the phenomenon, one needs to consider the potential causes of slab re-expansion and joint compression:

Seasonal Temperature and/or Humidity Changes

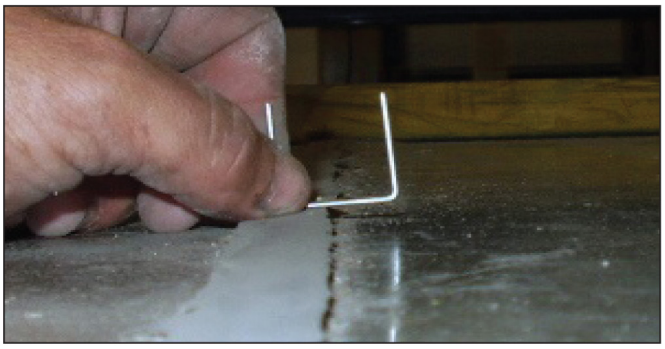
Concrete will expand (or re-expand) when its moisture content and/or temperature is increased. If a building environment has a low relative humidity in March, followed by higher humidity due to a rainy April, slab expansion can be expected. Similarly, the coolness of winter followed by the heat of summer can also cause slab expansion. All floors not under temperature/humidity control have the potential to expand or contract with seasonal changes.

When floors expand, the difference can be measured at the joints. The same joint can be 1/4" (6.35 mm) wide in December and 1/8" (3.17 mm) wide in July. You will generally not notice the joint width change if the joints are not filled. But if the joints are filled, you can tell immediately how much the slab has expanded or contracted.

Example of filler protrusion in building with no climate control

HVAC/Climate Control Activation

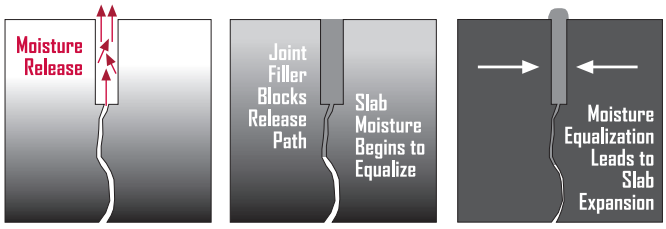
On many projects, the joints are filled before the HVAC is turned on. If the joints are filled while the ambient temperature is cool, and then the heat is turned on, the increase in temperature can cause slab expansion, which in turn causes joints to narrow, causing filler extrusion.



Example of filler protrusion in exposed floor

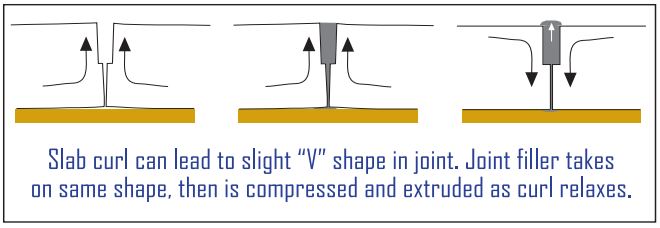
Slab Moisture Gradient Equalization

Surface sealers and liquid hardeners/densifiers can reduce moisture evaporation through the slab surface. Once the joints are filled, the slab moisture is essentially trapped. As the moisture within the slab equalizes, moisture migrating to the upper portion can cause slab expansion, which in turn can cause filler compression.



Filler Extrusion Caused By Relaxation Of Curled Edges

All slab panel edges curl to some degree (see *Technical Bulletin T15*). When edges curl, they lift upward and back away from the joint, causing the joints to become slightly ''V" shaped. If curl is relaxed (due to an increase in upper slab moisture content, higher humidity at surface level, etc.) the joint walls can once again become plumb and parallel (eliminating the ''V" shape), potentially causing joint filler compression and protrusion.



Slab curl can lead to slight "V" shape in joint. Joint filler takes on same shape, then is compressed and extruded as curl relaxes.

Summary

Joint filler protrusion/extrusion is almost always caused by changes within the concrete itself. To determine the actual cause, look for what changes have occurred that would increase slab moisture and/or slab temperature, or what may have caused slab edge curl relaxation.

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