

Repairing Cracks and Pitting in Concrete Floors

Introduction

Concrete slab floors, ramps, steps, and loading docks make it easier to move produce and produce handling equipment using wheels. The smooth surfaces also allow for easier clean up and wash down at the end of the shift by providing an easy surface to sweep and hose down with good drainage (Callahan, Bihm, & Chamberlin, 2020).

Concrete is sturdy and hard once cured. It holds up to heavy loads in compression. But it is brittle which causes it to chip. It often fails in tension which causes cracks to appear. Concrete is also prone to pitting if exposed to acidic liquids such as can



Cracks in floors can accumulate plant matter, soil and water and are very difficult to get clean and completely dry. This is called harborage and can lead to cross contamination of food with human pathogens.



Pitting can lead to uneven surfaces and ponding of water. These can really disrupt smooth flow of produce whether carried by people or rolled with hand carts or fork trucks. The ponding of water can become a produce safety concern as well.

drip from bins of apples and other fruit. When concrete fails in the form of a crack or pitting it gets in the way of smooth operation and can also pose a personnel risk in the form of a trip hazard or unlevel floor which could put rolling loads out of balance.

Cracks and pitting in concrete floors in food handling, washing, and storage areas can also pose a food safety risk (Ingram 2015, United Fresh 2018). The Food Safety Modernization Act's Produce Safety Rule highlights the need for design, maintenance, and cleaning of floors to provide sanitary conditions in §112.126 (FDA 2016, FDA 2018).

Cracks and pits prevent adequate drainage. Water, soil, and food build up cracks and pits during wash down and drying is inhibited. Water can accumulate in pits and cracks resulting in standing water. This can result in harborage points for human pathogens. In addition to human pathogens, plant pathogens may also find harborage in these locations resulting in increased product loss in storage.

If your produce or its container is placed on the floor, the floor can become a food contact surface increasing the need for attention to its cleaning and sanitization. Even if you are careful about keeping containers off the floor on pallets, splashing water from the floor can be a source of contamination. So, keeping a floor in good condition so it can be kept clean is important.

Repair Approach Decision

Not all cracks and pits are easily repaired, and some may require cutting and re-pouring if they are significant. How do you know how to proceed? Use the following guidance:

- **Are the cracks large (>2 inches on average with offset edges (like a cliff)?**: Cutting and re-pouring is likely the best option. Contact a mason. Smaller cracks (2 inches wide on average or smaller) can be repaired using the methods described below.
- **Are the pits deep (>2 inches deep)?** Cutting and re-pouring may be your best option. More shallow pits can be repaired using the methods described below.

Repair Material Decision

- **Are the sides of the crack moving relative to each other seasonally?** Use a flexible sealant which will allow some movement (not covered in this document). Do note that if there is movement, there may be a more significant



Tools and supplies that are needed for concrete repairs. (A) Quikrete Concrete and Asphalt Cleaner Concentrate, (B) Quikrete Advanced Polymer Crack Sealant, (C) Quikrete Quick Setting Cement, (D) Quikrete Gray Concrete Crack Sealant, (E) Sika Pro Select Ready Mix Concrete Patch, (F) Sika Pro Select Self-Leveling Sealant, (G) Sika Pro Select Crack Flex Sealant, (H) 3 lb hammer, (I) Masonry chisel, (J) 6"x2" margin trowel.



SAFETY FIRST

- Always wear appropriate personal protective equipment such as gloves, glasses and face masks.
- Also remember to remove any produce, handling equipment, tools, or other food contact surfaces that could be contaminated during the floor repair from the work area.

structural issue that needs attention. Repairing a crack with significant dislocation and movement over time is not a long-term solution.

- Is the damaged area relatively stable and not moving? Is it in a traffic or heavy load area? Use Fast Setting Repair Mortar or Quick Setting Cement. Repair mortar and cement will cure to provide high strength in compression which will stand up to typical loads.

Repairing Cracks

For cracks up to 2 inches wide the repair steps are highlighted in a video series online at <http://go.uvm.edu/concretecracksvideo> and are outlined below.

Expose

It is important to expose a fresh face of concrete along the damaged area using a hand sledge and mason chisel or an angle grinder with a masonry wheel. This step is meant to remove any weak or brittle material that wouldn't support a strong new bond, don't hold back. If you do not break it off, it will break off on its own after your attempts to repair it. If you find that material breaks off very easily with one strike, that is a clue that you may have to take more off in that location. Aim for about finger or thumb width when making

the new V-shaped version of the crack. You will develop a feel for it.



Use a masonry chisel and a hammer to break off the sharp edge of the crack to expose a fresh surface and widen the crack to finger or thumb width so enough repair material can be applied to provide a solid bond.

Clear

Vacuum up the debris and loose material after exposing the fresh face of concrete. A stiff bristled broom or wire brush is helpful here and the masonry chisel will help loosen

stubborn bits. The wire brush is especially important if the crack or pit has existed for some time. This longer-term exposure weakens the surface and continues to slowly erode the material. Brushing removes this weakened material. Some more hand sledge and chisel work may be needed to get some of it out. Vacuum out all the loose material, this will help your cleaner go further and do a better job.



Chisel the crack to open it up to about thumb-width, clean with a wire brush, and then vacuum to remove the debris.

Clean

Wet the surface with clean and safe water and apply masonry cleaner in accordance with the label of the repair material you plan to use. Use a stiff bristled brush or a wire brush to work the cleaner into the crack and clean the surface. In some instances, multiple applications and rinses may be required. If the cleaning solution becomes brown and greasy, you have got more work to do. The final cleaning should result in a relatively white and frothy or bubbly appearance.



The crack has had water applied prior to having cleaner applied. A wire brush is then used to ensure the cleaner is distributed through-out the crack surface. Note the white, frothy appearance. This is usually a sign that the current application of the cleaner is effective. If there is heavy soil or other accumulation, the cleaner will quickly become brown and there will be very little suds or frothing. This is usually an indication that another application will be required following a rinse and wet vacuuming.

Wait

Concrete cleaner is designed to work over time. Typically, 1-5 minutes is recommended. Consult the label for your



application. Hydrate and give your back a stretch, the next steps require attention.

Vacuum

Use a wet/dry vacuum to clear up the bulk cleaner and any debris that wire brushing has loosened. It is important to have a clean work area for the next step. Once we start applying mortar, we want to be sure we can “float” or smooth it without having pebbles getting in the mix. Vacuum not only the crack and pit, but the area surrounding them also. You will end up applying mortar to an area wider than the crack or pit so you can smooth it properly.



The crack has been rinsed with water and a wet vacuum was used to remove the water, cleaner and any debris that resulted from the cleaning. It is ready to be repaired.

Prepare Repair Material

It is best to use either Fast Setting Repair Mortar or Quick Setting Cement for these repairs. Follow the product label for mixing and preparing.

Apply Repair Material

It is generally best to use a 6"x2" margin trowel for applying the repair material, smoothing it initially with the wider edge. Apply more than you think you need, spread it with the margin trowel ensuring that the material is driven into the

crack.

Smooth

Smooth the repair by “floating” with a rubber grout trowel. It is helpful to have a steel trowel and a bucket handy for scraping extra repair mortar off of the rubber trowel as you smooth the repair.



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Cure

Allowing the repaired area to dry naturally. Divert traffic away from the repair.

Repairing Pits

For pitting the approach is quite similar. There are two main differences.

Expose

The pit has largely been exposed for some time, so exposure in this case is about angling the cliff edge around the pit and getting to solid material and getting rid of any loose or weak material within the pit that may prevent a solid bond when filled.

Apply Repair Material

This can be a real trick. Remember that we are aiming for “better” and don’t let perfect be the enemy of good enough. You will reach a point where you want to go back and float it some more and you just add more problems. That said, a longer floating trowel is helpful for floating these areas. A magnesium float (mag float) can be nice for the centers of these repairs in larger pits, though they work best on large

fresh pours of concrete. The existing hard surfaces on the sides of these pits tend to make them less helpful in repair work.

Conclusion

Concrete floors are a popular choice for both new and renovated packing house and cooler floors. Like any floor they require maintenance and cleaning. The information provided is meant to help growers ensure the integrity of their floors so that their cleaning and sanitization procedures can be most effective.

References

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Video Version of this guide:
go.uvm.edu/concretetcracksvideo



Web Sharable Link for this guide:
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