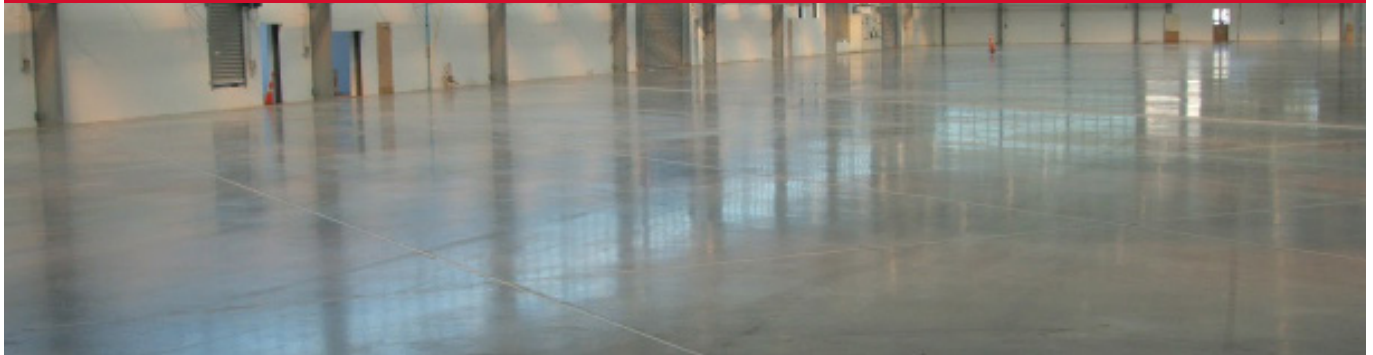


JOINT FILLER

Technical Bulletin 4



SEMI-RIGID FLOOR JOINT FILLER INSTALLATION TIMING

JOINT FILLING NEW CONCRETE FLOORS

The function of semi-rigid joint filler is to protect joint edges from damage caused by hard wheeled traffic. To provide optimum protection the filler should span the entire joint width and be directly up against the edge, and is easier said than done.

All concrete is placed with more water than is necessary to activate (hydrate) the cement. This excess water gradually leaves the slab via evaporation through the slabs surface. But as the moisture leaves, it causes the concrete to shrink in linear dimension. As the concrete panels shrink, the joints between the panels widen. It is not unusual for a 3mm wide joint to eventually open to 5mm – 6mm or more.

A rule of thumb is that typical concrete shrinks at the following rates of total expected shrinkage:

First 30 Days	Approx. 20 - 30%
Next 335 Days	Approx. 50 - 60%
One Year Total	Approx. 70 - 90%

In other words, joints are opening even as the filler is installed, and continue to widen well after the filler is in place. It's not unusual to fill one day, and find filler separation the next morning. This widening cause's the filler to separate adhesively or cohesively as the widening exceeds the fillers expansion capability.

In addition to moisture loss shrinkage, slabs can also shrink as a result of temperature and humidity changes. The best example of this is what happens in refrigerated areas. Cold temperatures cause slab panels to contract dimensionally. The refrigeration process also reduces moisture in the air and accelerates the evaporation process. In a freezer, it is not uncommon to see a 3mm joint open to 9.5mm or more.

RECOMMENDATIONS

1. TYPICAL NEW INDUSTRIAL SLABS

ACI & PCA both recommend delaying of filling for 60 – 90 days after slab placement, longer if possible. This is best recommended for buildings that will not be temperature controlled. If the building is temperature controlled, defer filling until that time. Once controls are in place the slab, and the joints will begin to stabilise.



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2. REFRIGERATED AREAS

Always defer filling joints in the refrigerated areas until the rooms have been brought down to their ultimate operating temperatures and stabilised there. ACI floor committees suggest allowing five days at ultimate temperature for coolers and 14 days for freezers before filling.

3. RETAIL STORES

The typical retail store is constructed so rapidly that filler deferral is almost impossible. If joints are filled early, the filler separation will be more significant. The best approach is to shorten the spacing between joints, thus reducing the amount of separation at each point.

FILLING OF OLDER FLOORS

Sometimes joints are not filled until the floors are 6 – 18 months old. An example would be spec buildings, where joints may not be filled until a tenant has been found. In this situation, the primary concern is not initial slab shrinkage but seasonal conditions. Slabs can expand with higher temperatures and humidity, and shrink with lower temps and humidity. If you fill in the summer, joints will be at their tightest. When cold weather arrives the joints will likely open, and filler separation will develop. If you fill in the dead of winter, when joints are at their widest, you may find that summer's heat and humidity have expanded the slabs and caused the filler to be compressed and extruded. If possible, always fill joints in mature slabs during mid-temperature months. Or if the facility will be temperature controlled, wait until the HVAC has been turned on for several weeks.

MINIMUM WAITING TIME BEFORE FILLING

While deferring filling as long as possible is preferable, we recognise that individual project circumstances sometimes require joint filling operations to be performed very early in the slab curing process. Per ACI/PCA guidelines, we recommend the absolute minimum time to allow before filling should be 28 days to ensure filler to joint wall adhesion is not compromised due to moisture.



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FLOOR JOINT FILLER TIMING FOR REFRIGERATED BUILDINGS

Filling joints in slabs that will be in refrigerated room's calls for a totally different approach than filling in ambient areas. There are two primary issues that must be dealt with:

1. Rapid shrinkage and excessive joint widening
2. The ability of the filler to cure

1. SHRINKAGE & JOINT WIDENING

All concrete shrinks in linear dimension as excess mix water leaves the slab via evaporation through the surface. A typical slab in a non-controlled temperature environment will shrink gradually, but relatively slowly. The evaporation rate will speed up in a cooler and drier environment and slow down in a warmer and more humid setting.

When the temperature in a refrigerated room is lowered, slabs begin to contract, generally in proportion to the rate of reduction. But a reduction in temperature is almost always accompanied by a drop in ambient humidity, which also speeds up evaporation. The result is that slabs in refrigerated rooms shrink faster than ambient environment slabs. As slabs contract, joints get wider. It is not unusual to see 3mm saw cut joints open to 9.5mm in coolers and 12.5mm in freezers.

The optimum filler performance and durability are achieved when joints are nearer their ultimate width. Therefore, filling in refrigerated rooms should not be performed until the room has reached its ultimate temperature and the slab shrinkage has ceased to be significant. In other words, the slab should preferably be dimensionally stable. ACI floor committees recommend that cooler room floors be stabilised at ultimate operating temperature for five days if at all possible, freezer rooms for 14 days, longer is better.

2. JOINT FILLER CURE

Not all fillers can or should be installed in cool/cold temperatures. Epoxies, for example, will not cure well or at all if room and slab temperatures are below 0°C. They will cure in temperatures above 0°C, but the cure is far longer, taking perhaps days instead of hours.

Polyureas, on the other hand, are generally not as temperature-sensitive and can usually cure in freezers.

LESA SYSTEMS 2017 LTD supplies both epoxy and polyurea semi-rigid. Our filler recommendations for various temperature installations are as follows:

13°C to 7°C - Spal-Pro RSF, Spal-Pro RS-88 or MM-80

7°C to 0°C - Spal-Pro RSF, Spal-Pro RS-88

0°C to - 35°C - Spal-Pro RSF

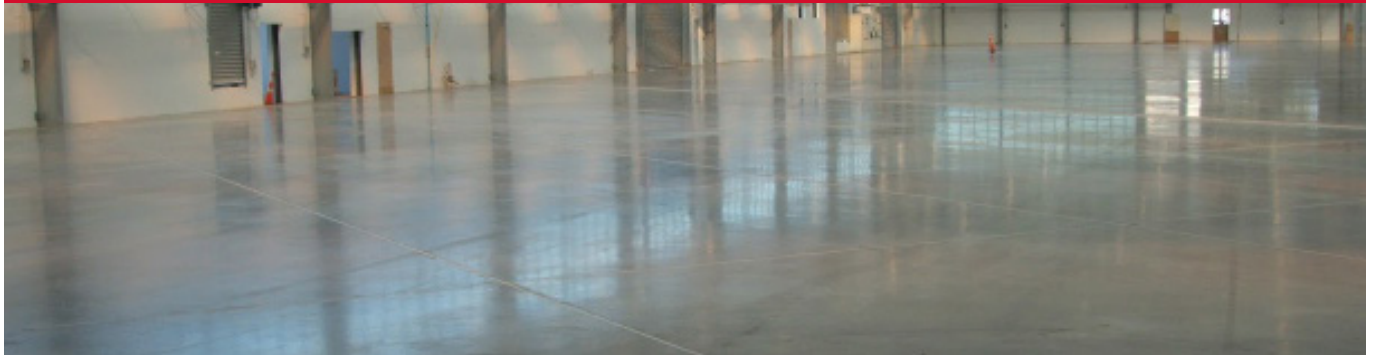


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FILLING JOINTS IN TREATED & COVERED FLOORS

Semi-rigid fillers are often installed in floors that will receive a treatment or a covering. This technical bulletin provides guidelines for proper installation procedures, and cautions of potential problems which might develop.

1. LIQUID HARDENERS/SEALERS/DENSIFIERS (PENETRATING)

Liquid hardeners/sealers/densifiers are often applied to concrete surfaces to provide additional protection against abrasion and wear, dusting, tire marking etc. These products are typically water-based, penetrating liquids with a sodium or lithium content that do not leave a surface film. They may be applied prior to the filler installation, after the installation, or both.

If applied prior to joint filling, care must be taken to remove any film or rinse residue left on the inner walls of joints. If a residue is left in place, it can compromise filler adhesion. Liquid hardeners can also convert saw laitance at the bottom of the joint into a hard, concrete like substance. Removal must be accomplished by mechanical means, such as running a saw along the joint walls. The saw blade should reach the depth of the base of the saw cut.

When applied after filling, they will not negatively affect the performance.

2. CURING COMPOUNDS (FILM-BUILDING)

These products are seldom used anymore, but when used can compromise filler adhesion. They must be thoroughly removed from joint walls by sawing as outlined above. Application over previously installed Metzger/McGuire joint fillers will not negatively affect the filler.

3. COATINGS & SEALERS (FILM-BUILDING)

These products will compromise filler adhesion and must be thoroughly removed by sawing prior to the filler installation. If used after the filing operation, the application should be delayed until the filler has a minimum 48 hours cure. A longer delay is best.

4. TILE, VCT, TOPPINGS ETC

It is our general recommendation that semi-rigid fillers not be used under impervious floor coverings. The primary reason for this is the potential for future joint filler protrusion/bulging. If a semi-rigid filler must be used to protect the floor covering from damage imposed by loading or hard wheeled material handling vehicles, contact a **LESA SYSTEMS 2017 LTD** technical representative to discuss material and procedural recommendations.



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