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# PRODUCTS, INC.

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**EPOXY & FIBERGLASS FLOORING, SEAMLESS FIBERGLASS WALL SYSTEMS, SEALERS, HIGH PERFORMANCE COATING SYSTEMS, AND INDUSTRIAL CLEANERS**

# PRODUCT BULLETIN
# PFAC I AND PFAC II

## DESCRIPTION

**PFAC I and PFAC II– POLYUREA FILLER AND CAULK are two component polyurea/amine blends that provide a hard, tough surface.** PFAC MAY BE APPLIED SUCCESSFULLY FROM –30F TO 120F WHILE PFAC II SHOULD BE USED FROM 50F AND ABOVE. **Either works well as a stand alone spall or hole filler, as an all purpose crack and joint filler, or mixed with various aggregates to provide a build up or slip resistant surface. PFAC is in-line blended utilizing a two component mixer apparatus allowing the applicator to use amounts ranging from a few ounces to nearly continuous feed. PFAC I AND PFAC II ARE AVAILABLE IN BLACK, GRAY, AND CLEAR . These are apt to amber in strong sunlight, and allowing them to freeze may ruin the material.**

## USES- PFAC I IS A 2:1 MIX AND PFAC II IS A 1:1 MIX

**PFAC is supplied in a two component "caulk gun" system for minor repairs, and joints, as well as in bulk for a two component mixing apparatus. PFAC exhibits excellent adhesion to wood, tiles, concrete, asphalt, glass, brick, shingles, metals or other clean surfaces. PFAC I NEEDS NO PRIMER, has excellent weather and water resistance, may be used indoors or outside**. PFAC CURES TO USE for wheeled traffic at 34 degrees F in 3.5 hours, at 0 degrees F in 3.5 hours and –20 degrees F in less than 20hours. **THIS IS THE ONLY PRODUCT WE KNOW THAT GIVES A HIGH PERFORMANCE END RESULT AT THESE LOW TEMPERATURES. PFAC II cures to use at 65 degrees F in 30min. Both have good thermal resistance to 300 degrees F and excellent thermal cycling resistance. PFAC II is more economical and flexible. It is a good choice in warehouses, fork truck areas and lighter abuse production environments. PFAC I is your choice in cold or more extreme use environments.**

## APPLICATION

**Clean and properly prepare surface.** Steel should be sand blasted, concrete should be chemically cleaned or mechanically abraded, wood should be sealed against moisture migration. Floor cracks and holes should be thoroughly cleaned with an acid detergent – XA-201 is a good choice – and/or a good degreaser – CD-103 is a good choice too, or they can be sawed out. Consult us for chemical resistance recommendations.

## SPECIFICATIONS- PFAC I AND PFAC II

SOLIDS – 100%
WATER RESISTANCE- EXCELLENT
FLEXIBILITY – 400%
SET TIME –1 MIN
ADHESION: + 350PSI (concrete fails)

DUROMETER D 65 PFAC II 45
UV RESISTANCE- EXCELLENT ( will yellow)
HEAT RESISTANCE – TO 300F
ODOR – NONE
FLASH POINT: +200F

CHEMICAL RESISTANCE- EXCELLENT FOR OILS AND CAUSTICS

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# INDUSTRIAL FLOORING TECHNOLOGY SERIES- #3 JOINTS
# WHY, WITH WHAT, WHEN, HOW

## WHY

Ok so you have a floor you want to use. You probably have some idea of a sealer or topping to keep it from dusting, make it look nice, and keep it from wearing. Joints??? Do you fill them or not? 20 years ago few projects had the joints filled. Now a great percentage of them are filled.

The main reasons to fill joints are:

1. Keep the edges of the joints from breaking. This gives the fork truck drivers a smoother ride, diminishes wear on the fork truck ball joints =expensive repairs, makes it easier to push carts around, and makes it easy to push air float skids around.
2. USDA/FDA regulations require a smooth easily cleaned surface.
3. You want to contain any spills from leaking through the concrete to the dirt underneath and so avoid meeting the nice DNR guys. This is important in machine shops to contain any oil spills and for chemical using facilities or storages.
4. Filled joints make the area easier to keep clean.
5. The surface looks more presentable. This is often true if a stain, or a colored coating or topping is used and you want the look of a continuous surface.

## WITH WHAT

There are MANY different joint filling materials. These have applicability in a wide variety of situations. They may be classified as:

1. **Elastomeric**. Usually one component- eg bathtub caulk-and stay elastic. These are very good for outside use for horizontal and vertical surfaces. There is a whole industry devoted to this craft so I won't go into the various merits of this or that approach here. I do not think these are particularly useful for inside industrial concrete floors. They are not tough enough, and we have removed and replaced a lot of these for this reason.
2. **Epoxy**. Two component materials usually described as "semi rigid" – ie has some extensibility 20%-50%. There are a LOT of different ones. Usually these are chosen because
   a. The high end epoxies are more light fast and do not yellow appreciably so if you want a clear or colored joint fill for decorative work, these are a good choice.
   b. They are easy to mix, have an agreeable pot life and may be poured into the joint easily
   c. Other epoxies and urethanes stick to them.
   d. They are tough and usually have sufficient chemical resistance- especially to acids- for the job.
3. **Poly ureas.** These are a two component mix of an isocynate ( urethane) + an amine. Like the epoxy choice there are a LOT of them. You need to check out their characteristics ahead of time to see if they are what you want. We think a Durometer of 60+ ( hardness) is essential, and good oil and caustic resistance ( for cleaners and machine shop use) is important.

Otherwise:

- **a.** Poly ureas generally harden to use in 15-30 minutes and are ideal for existing facility work. They are put in the joint and a few minutes later any excess overflow is razor shaved off and the area is put in use.
- **b.** Generally require a two component pump and mixer set up or two component caulk tubes as the pot life is 1- 3 minutes. Not so many contractors have this capability. See picture below.
- **c.** Many such as our PFAC have YEARS of immersion in caustic and oil with no effect.
- **d.** Some such as our PFAC can be installed in coolers and freezers and be ready for use in a short time.
- **e.** Most poly ureas react an aromatic type amine so the material will yellow in time. Some more than others. If this is a problem use a good- ie. cycloaliphatic- epoxy.
- **f.** Poly ureas are tough. We often give customers a sample of our PFAC, a big hammer and tell them to have at it. When they get tired of hitting it, and the sample shows nearly no effects of the beating, they become convinced it will last in their facility.

4. **Polyesters and vinyl esters.** These are used where exceptional chemical resistance is needed. The resin itself is usually not suitable for joint filling- it can be brittle- unless it is sand filled first. This is usually done in conjunction with polyester or vinyl ester toppings or liners.

**WHEN**

Most joint fillers can be installed any time but some times are better than others.

a. As new concrete dries it shrinks. If you put in the joint filler too soon the concrete will shrink and make the joint wider- and the joint filler will often pull off one side of the joint. We have had good luck putting a moisture vapor test in ( see the write up on moisture vapor transmission) and filling joints when the MVT level was acceptable for a coating.
b. For silicates that can go on the concrete soon after the concrete is poured, fill the joints last. Stall a bit if you can, turn the heat up etc, to let the concrete dry as much as possible. Let the customer know **it is his risk of pull off** if he wants you to go ahead quickly. See some of the big box stores for joint pull offs.
c. For freezers and coolers install the joint material AFTER the area is in use – ie install the joint filler when it's cold- yea, yea, yea, I know, wear gloves and a jacket. The concrete will shrink in the cold. Filling the joint then is when the joint will be the widest and so avoid pull offs as the concrete cools.

**HOW**

This is simple: **CLEAN OUT THE JOINT COMPLETELY AND FILL COMPLETELY FROM BOTTOM TO TOP.**

- **A.** The walls and the bottom of the joint have to be clean. Pressure washing works but you have to wait for the joint to dry. We saw cut to clean them out and use a very expensive vacuum system to keep the dust to a minimum. See the picture below.
- **B.** AVOID FOAM BACKER RODS. These allow the contractor to use less joint filler material and save money. In use, these often collapse The joint filler breaks away from the walls and the joint sides break. We have saw cut out a LOT of this and then filled from bottom to top. Figure this fix up to be 2 times or more the cost per linear foot of doing it right the first time.
- **C.** For already broken out joints saw cut back to good concrete and chip out the concrete, to give a vertical joint wall of at least ¾" and fill completely. If the joint is not sawed out the feathered edge is weak and breaks in use and we are back fixing the joint again. Sometimes the broken parts are at the X intersection in the concrete or not entirely along the joint wall. Nonetheless saw cut a vertical. Tell the customer that the repair might not look very good and certainly will be irregular. This is another good reason to do the joint work properly at the start.
- **D.** For face cracks saw them out at least 1/2 " deep ideally ¾" and fill from bottom to top. No matter what this will look ragged. We get a lot of this in older work with 20' or greater centers for control joint cuts. Often we get a nice X across the center of the slab where additional control joints ought to have been cut.

**E.** AVOID HAVING JOINTS. In small areas or where there is decorative flooring to be installed ask the contractor to try to put the control joints under walls so there are none, or as few as possible, under the new floor surface.

**F.** Pour joints. If possible have these doweled to other concrete. In existing facilities you never know. Stand with your legs across the joint and have a heavy vehicle drive over it. If you don't feel movement you are probably ok. If you feel movement we suggest that either you honor the joint or put a fiberglass strip – minimum 1 ½ ounce fiberglass-over the joint before you put your topping on, In critical installations take no chances and use a fiberglass overlay on all pour joints. Doing this for all control joints does raise the cost, though it too might be a good safety factor in the floor design.

**G.** To repair a joint that has movement we saw cut the sides, put in a slip plane down the middle- plastic strip -and fill both sides of the joint. This is a relatively expensive repair but it usually works.

**H.** Expansion joints. They are there for a purpose. Honor them when at all possible.

**I.** Joints between buildings on different footings. Often there is a LOT of movement. We have used some two component, reinforced, elastomeric urethanes, one done 20 years ago that is still doing fine.

**INTERESTING THINGS**

1. If you want to estimate the lf of joints in a floor take the area sqft x 15%. That is a good approximation for 11-13 foot centered caw cuts.
2. 1 gal of joint filler will fill 50 linear feet of ¼" wide and 1 ½" deep joints with a 10% excess for shave off.
3. Figure the gal of joint filler from the above x $40/gal gives a good approximation of the materials cost to the dealer.
4. In 100,000 sq ft there are 15000 lf of joints. And if as above the contractor should use about 300 gal of filler which at $40/gal would cost $12000.00, or $0.80/linear foot. Doubling this gives $1.60/lf as a not too unreasonable cost per linear foot to do the job. If saw cutting, if doing the work in pieces, if the job is a lot smaller, if working at odd hours is required, if the joints are deeper or wider, or the work is WAY out of town, then expect the cost to go up. If the contractor has other things he can do perhaps the cost will diminish a little. If the suggested cost is WAY different you might want to ask why.
5. Shot blasting a floor and then squeegee applying 100% solids epoxy over everything IS NOT filling joints. We have taken off a lot of such "joint filing" along with a couple of inches on either side of the joint where the epoxy delaminated and we filled the joints properly. The fix ups ALWAYS show.
6. Put joint filler in AFTER the floor is sealed to avoid staining of the joint edges with material overflow. If this is a concern there is a joint guard material- a sort of wax- that can be rolled on which the over flow of joint filler will not stick to nor stain the underneath concrete. This material can be later buffed off with a floor machine.
7. Included is the literature for our PFAC joint filler. Of course there are others that are good. We like this one because it has worked well in 100mi + of joint filing in the past 10+ years.

Tom Hennessy ChE
I hope this helps.

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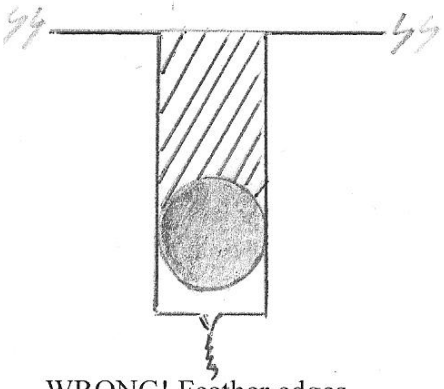
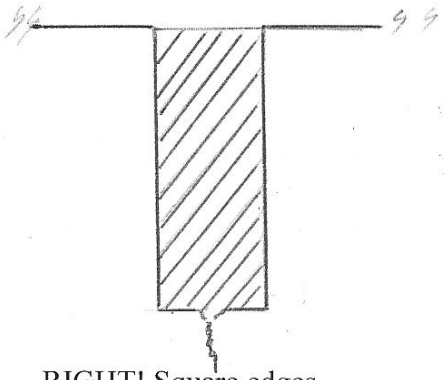
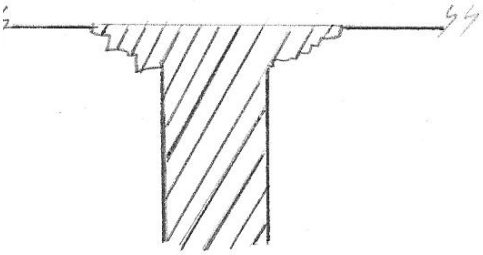
WRONG! Joint with foam backer



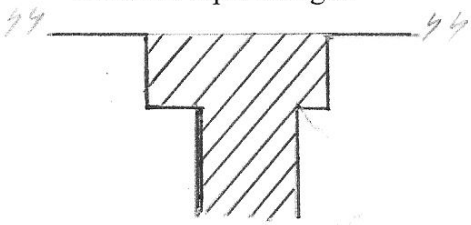
RIGHT! Fill completely



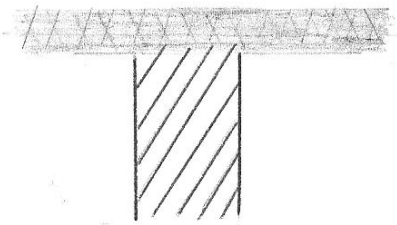
WRONG! Feather edges



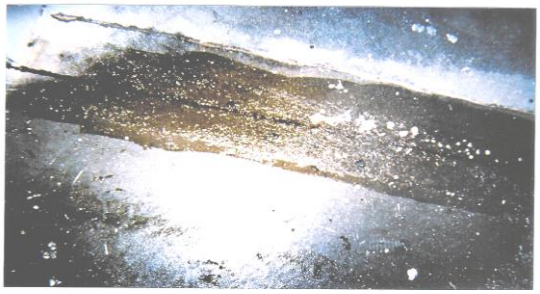
RIGHT! Square edges



NOT SO SECURE! Topping alone on control joint



SECURE: fiberglass overlay on control joint



SAW CUTTING JOINT WITH VACUUM

FILLING JOINT WITH PFAC

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This joint was filled at the steel track vehicle shop at Fabco in Milwaukee with our PFAC joint filler 25+ years ago. Because the joint runs perpendicular to the direction of the tread travel the edges take a terrific beating. The Joint material remains like new.

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## Joint Filling Estimator

For estimating the amount of material needed to fill a joint or crack of a given size. The figure show is the amount of joint that one gallon of material will fill.

**Example:** A joint ½ " wide and ½ " deep will require one gallon of material to fill 77 lineal feet of joint. Always add 10% to the number of gallons to cover waste, etc.

| | WIDTH | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Joint | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 | 1 1/4 | 1 3/8 | 1.1/2 |
| | 1/8 | 1232 | | | | | | | | | | | | | | |
| | 3/16 | 820 | 547 | | | | | | | | | | | | | |
| | 1/4 | 616 | 404 | 308 | | | | | | | | | | | | |
| | 5/16 | 484 | 328 | 246 | 196 | | | | | | | | | | | |
| | 3/8 | 410 | 274 | 205 | 164 | 136 | | | | | | | | | | |
| | 7/16 | 350 | 234 | 176 | 140 | 116 | 100 | | | | | | | | | |
| | 1/2 | 306 | 205 | 154 | 122 | 102 | 87 | 77 | | | | | | | | |
| | 5/8 | 246 | 164 | 123 | 98 | 82 | 72 | 61 | 49 | | | | | | | |
| | 3/4 | 205 | 133 | 102 | 82 | 68 | 57 | 51 | 41 | 34 | | | | | | |
| | 7/8 | 176 | 116 | 88 | 70 | 58 | 50 | 44 | 35 | 29 | 25 | | | | | |
| | 1 | 154 | 102 | 76 | 61 | 51 | 43 | 38 | 31 | 25 | 22 | 19 | | | | |
| | 1 1/8 | 136 | 91 | 68 | 54 | 45 | 39 | 34 | 27 | 23 | 19 | 17 | 15 | | | |
| | 1 1/4 | 123 | 82 | 61 | 49 | 41 | 35 | 31 | 24 | 20 | 17 | 15 | 13 | 12 | | |
| | 1 3/8 | 112 | 74 | 55 | 44 | 37 | 32 | 28 | 22 | 18 | 16 | 14 | 12 | 11 | 10 | |
| | 1 1/2 | 102 | 68 | 50 | 41 | 34 | 29 | 25 | 19 | 17 | 14 | 12 | 11 | 10 | 9 | 6 |