

Filter Press Troubleshooter



Filter Cloth is Blinding

Blinding, when little or no filtrate comes out and the back pressure goes up in a hurry, the cake fails to form or is wet. This is usually a process problem. Somewhere upstream a change took place. One of the first things to ask is, “When did it happen? Before or after the media was cleaned or changed?” If before, it is probably an upstream process problem.

If the slurry is changed making it more difficult to dewater the solution may be to add a body feed. The body feed can be anything from diatomaceous earth to ground up volcanic rock. It is added to the slurry to add bulk to it. A second option is to go to thinner cakes that can be dewatered. This means machining down the packing surface on the frames or recessed plates, or, changing the plate stack. You get a smaller batch size but the driest one. Although the cakes are thinner, additional chambers can be added in the new space generated by the thinner plate stack. If possible, try to correct any variables upstream that cause a wet cake.

Precipitation, the sneaky enemy, happens over time where solids in the filtrate come out of solution. Like lime in a teakettle. Check the hand of the media, if it is stiffer than when new, it's a good indication of precipitation. You may even get pieces of precipitate to crumble off into your hand. Another classic is **oil in a water mixture or vice versa**. If one gets into the media it stops the other from coming through, period.

The inlet pressure is brought up too fast. When this happens the solids are immediately compressed into the media interstices blinding them. It's like a night club where every one tries to get through one small door at the same time, in a panic. Log jam; nobody, nothing gets through. The symptoms are a thin layer of dry cake next to the media and slurry everywhere else. Take a look at the pump. If it has an air operated diaphragm pump look for a ball valve on the air inlet. Instant 100 psi into the pump and instant slurry inlet pressure of 100 psi into the press. The less experienced the operator, the more likely the valve goes wide open, right now. It is almost always best to bring the pressure up slowly. This gradually builds up the cake and allows the filtrate to pass through it and the media. The pressure builds up at the very end. Timers can be used to bring up the pressure gradually. On centrifugal pumps a block and bypass can be installed.

If the pump is a diaphragm pump always suggest a surge suppressor for it. The surge suppressor reduces the hydraulic hammer when the pump switches diaphragms. Without it the line pressure can go from 100-40-100 in a fraction of a second. The whole press bangs and jumps. Not good.

The inlet pressure is too high. In some instances the nature of the slurry is such that it just won't filter above a certain pressure. You have to maintain a pressure based on the slurry characteristics, not a pump curve.

Flocculants are sensitive. When they surround small particles and form clumps, the water around those particles is released. The clumps go against the media, the water goes through, and all is good. Now, how can this be messed up? For starters too much flocculent can be added to the slurry. If a little is good, right? This forms a goo against the media blinding it. Hmmn, less filtrate is coming out, crank up the pump pressure. Which really drives the flocculent into the media blinding it. If this happens on a belt press the flocculent looks like tiny tapeworms hanging on the roller side. If this happens on a filter press the cloths have to be cleaned or changed. We do have a cleaner for it, contact your NFM sales rep. Work on better operator training.

Precoats are coatings of diatomaceous earth or ground volcanic rock, put on the filter media prior to the main filtration event. A precoat acts as a filter media. They are usually mixed with a separate liquid compatible with the slurry and then pumped into the press filling from the bottom of the frame or recessed plate. An average thickness is 1/8". *The press has to be set up with the drains shut at the bottom and open at the top.* This lets the precoat evenly fill the chamber from bottom to top.

The precoat is recirculated until no trace of it appears in the filtrate. Then the slurry is pumped in, fills the chambers, the lower drain is opened and you filter. Can you imagine all the opportunities of messing this up? There are lots.

- The operator can put in the wrong precoat. Hey, it all looks the same to me.
- The whole amount is dumped in at once instead of fed slowly. Hey look, all the chambers at one end are full of precoat and there is nothing at the other end.
- What bottom drain valve? The precoat fills the bottom inch or so of each chamber.

On each one of these it appears the precoat went in fine and then blam, does the media blind off! You can be sure that the operator will clean the press by removing the filter aide and starting up again. But what about the slurry that had gotten into the media where there was no precoat on the prior run?

New piping? Yes it can. As plants change their processes they may decide to change their piping to better utilize their vessels and holding tanks. All that's needed is to put in a new run of pipe from the outlet of the press up a story or two and across the plant. Now that poor filtrate must not only go through the cake and out the press but up 10' and across 20'. And what if the slurry has a lot of viscosity? You get a wet cake, but not because of the media.

You may suggest that either the piping be changed or an inline pump be installed. Just be sure it doesn't pull a real vacuum on the press.

On metal plates, there can be precipitates filling in the drainage pyramids leaving a flat drainage panel. Doesn't work. For a few times it can be sandblasted clean. Chemical attack on the drainage pyramids gives you the same net result.

The cloth may have been **calendared too much** at the mill.

Particulate Bleeds through Filter Cloth

Bleed-through, the opposite of blinding. When the solids or parts of the solids pass through the media with the filtrate. Again, the 1st thing to do is ask has the process been changed and had the cloth been OK until then? Operators in need of retraining? Here are some causes-

Precoat

- They put in the wrong precoat. Sound familiar? If the wrong precoat is really coarse stuff the fines may go right through.
- The whole amount was dumped in and ended up in one end of the press letting all the slurry fines blast through the cloths at the far end of the press.
- Bottom drain valve is open all the time again. All the precoat is in the bottom half of the press letting the slurry fines shoot thru the media in the upper half.

pH-This gets you going like few other things in waste treatment. When certain metals are treated as waste their pH is adjusted to a narrow range that forces them to come out of solution. If the pH is either too low, acidic, or too high, alkaline, the metals go back into solution and turn up in the filtrate. Fewer things get operators more excited than the thought of hazardous wastes going into a sanitary sewer. Big fines. The cause is usually an upset in the chemicals added to keep the pH in the correct range. Too many or too little were added. Human error, bad pH meter, bad injector pump.

Pumps & Flocculent- Another problem with flocculants can be the pump. They are sensitive to shear. Centrifugal pumps have lots of shear and so do diaphragm pumps with no surge suppressor (at higher pressure ranges).

Media- It can be torn or punctured. This can be caused by using something sharp to knock out the cake. A plate panel can be broken and tear through the media. How do you find it? You can peel the cloths back and look for the drainage panel with cake on it. It's a dead give away. The cloths can be mounted wrong with a cloth eye spanning from a recess to a drain eye.

Cloth or thread may be incompatible with your operation. The threads are chemically attacked. They lose their strength and may dissolve. Operators will notice this right away.

Plates- If there is a scratch, gouge or low spot in the packing surface between a drain eye and the chamber the solids take a shortcut. Look in the individual drain eyes to see where the solids first appear. That should be the one.

In a thorough washing filterpress, the drainage eyes must all be in the same alignment. There is usually a mark on the sides of the plates (and frame) indicating the sequence of the plates. You start with the mark on the fixed head plate. It may be single mark, if it is a recessed plate the next plate has two, then one. They alternate. If it is a plate and frame press the fixed head plate will usually have a single mark, the frame two marks and the next plate three. A sequence of 1-2-3-2-1-2-3. If a plate or frame is reversed the porting sequence can really be messed up.

The bottom right corner is a feed for a frame and then a drain for the plate next to it. By the way, it is not uncommon for a customer to buy a used filter press and get plates and/or frames from another sent with it.

Filterpress is Leaking

- Use a set of cloths with latexed packing surfaces. They are very effective.
- See if the current cloths and/or plates have a precipitate build up. If they do the plate stack will be wider at the bottom than the top. This is what you will see-
 - With the press closed under pressure you will see the top of the plates literally arc. High at the ends & low in the middle.
 - Get your tape out and measure all four corners of the plate pack. They should all be the same. Want to take bets? Re-measure with the cloths out. The measurements should still be equal. Want to take another bet?
 - All the leaks come from the top of the press. The media has to be cleaned to remove the precipitate (acid washed?) or replaced and the lower packing surfaces have to be cleaned. Then remeasure.
- The hidden problem (again), backpressure. When the press is running the cake makes a darn effective seal against the media. But there isn't one on the drain panel side, unless you latex the packing surface. The greater the head the more the press will leak.
- **Recessed plates** have thrust buttons molded into the panels. The buttons are the same height as the packing surfaces. When the press is closed they line up with one another minimizing any panel movement. Can you bow or break a panel on a recessed plate? There is a way. To decrease the capacity of a recessed press operators will move the slide head plate from the end of the press to somewhere in the middle. On larger plates, even with thrust buttons, you can get a delta P of 100+ pounds per square inch of panel. It will go between the buttons and packing surfaces, destroying the slide head plate.

The remedy is simple, a dummy plate is needed. A dummy plate is a plate inserted into the press next to the back side of the slide head plate. It has its own handles and is thick enough to take up the unbalanced pressure. It is about twice as thick as a recessed plate. They can be inserted anywhere in the press allowing If you want to run the whole press there is usually enough room to keep it between the slide head and slide head plate. See your National Filter Media sales engineer about getting one.

- **Diaphragm Plates-** These are usually alternated with regular plates in the press. In time the diaphragms will wear out and leak. An inability to hold pressure into the diaphragms is a good indication of a leak. Be careful how hot the press is with diaphragm plates. As the slurry temperature goes up the amount of pressure in the diaphragm should be turned down. Consult your National Filter Media sales engineer.

Catastrophic leaks happen with a combination of factors

- A. **Pump pressure** into the press is so high it literally pushes the plates and/or frames apart. The slurry violently escapes from the weakest point. If you think this doesn't happen often look around at the walls and ceiling where the press is. If there are polypropylene frames in the press they will be bowed upwards in the middle and/or the top broken off to one side. A positive displacement pump, like a gear drive pump set to the wrong pressures, can do it.
- B. **High temperatures** will soften polypropylene to where it begins to lose its tensile strength. Again, this is most common in a press with frames. It has the same net result as above. Only this time it's hot too. There are different grades of polypropylene plates that take higher temperatures and pressures. Your National Filter Media representative will be glad to quote them & solve the safety issue.
- C. **A & B plus a precipitate build up.**
- D. The **closing device** on the press doesn't have enough closing pressure. It may have bad valves, pump, been designed undersized or ended up that way in the current application. Maybe the operator didn't crank up the hand pump enough? If it is a mechanical failure National Filter Media has access to a technician who may be able to repair or replace it. He would know hydraulics.
- E. **Thermal shock** to the plate pack can be caused when the press filters at higher temperatures and then wash water at a much colder temperature is pumped into the press. The press is then under pressure with two different temperature gradients passing through it. Plates or frames may crack. There is a chance that very cold hose wash water on hot plates or frames may also have the same result. Bring up the wash temperature.
- F. **All the above.** When you sell a plate pack be sure what A & B are-

As thorough as this trouble shooting guide is, there are always new challenges that come up when operating a filter press. Call us if you do have a problem, we'd like to help.

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