

FILTERING THROUGH THE NEWS No.15

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Attn :To whom it may concern.

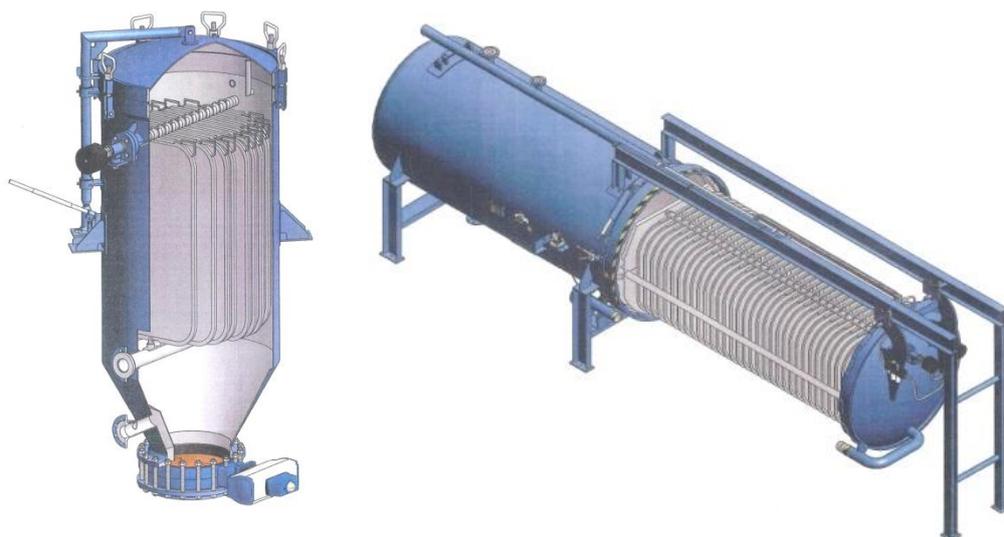
60 MESH & CAKE-BREAKER BARS ON FILTER LEAVES

NEWS LETTER 07/2015 FILTER LEAVES WITH BREAKER BARS:

In line with the industries search for improved pressure leaf filter operation it was obvious that our clients, those who encounter the day to day problems of working with a unit operation that is not continuous by itself and requires always minimal 2 filters to make it continuous(one on stream and one stand by) are looking for improved filter performance . In our quest to be ahead of all others we have made use of the experience gathered over years in the various edible /vegetable, animal oil and fat filtration steps.

Specially the change in attitude towards the use of a bio degradable and incineratable filter aid like cellulose had big consequences. Already in the past cellulose was used in applications where the other filter aids where rejected because of the leaching of metals from the filter aid (f.i. Al and Fe from kieselguhr and perlite in brine).

The use of cellulose had other but specific disadvantages as well and the main one was that the fiber got entangled both fiber to fiber as well as in the wire mesh. It formed a kind of horse blanked and if we were able to vibrate it of the leaf it got stuck on the manifold or blocked the cone. If one likes to have more info on cellulose filter aids contact JRS filter aids Mr Stepan Neufeld(dr.neufeld@jrs.de)



It was only after the processing industry got a re-newed interest in Cellulose as a result of its bio degradable nature in a world of environmental challenges. Not the fibrous type but now as a more cubical shape cellulose filter aid. Credit must be given to JRS Germany who, led by Stepan Neufeld, attacked the industry with new products for the various applications in the refining of oils and fats. This started with the cold pressed crude oil followed by winterised oils, hydrogenated oils (post bleach and interesterification), G/S in Bio-diesel and lately they also offer cellulose as filter aid but also as adsorbent material in dry degumming and bleaching. We don't want to comment on their products but ;

FILTER AID = FILTER AID and ADSORBENT = ADSORBENT!

Already in the late 70 ties Manville produced a product called SORB SIL and the claim to fame was that it would do both nl act as filter aid and adsorb oil form an oil spill in water. Only the fact that the DE was positive charged and the Zeta potential difference made the oil being attracted to the Sorb Sil. Limited adsorptive capacity and a high price made the product disappear after 1 or 2 years.

At present the discussion is again about adsorption by cellulose and this due to the acid activation of the cellulose. We urge you and anyone else to test it and if possible let us have the results .

We don't want to comment on the enthusiastic market approach, don't automatically agree with all that is published but we follow the discussion with great interest.

Some of the criteria are listed below and should be handled with care;

- 1) The use of (cellulose) filter aid as a pre-coat will result in drier cakes ?
- 2) The use of (cellulose) filter aids as pre-coat result in thicker cakes and the leaf pitch should be increased to 150 mm h.o.h.(is in most cases 75 mm)??.
- 3) The use of (cellulose) filter aids for bio-diesel G/S filtration should be in line with the use of breaker bars (vertical and horizontal on the filter leaves in order to enhance cake discharge).!!
- 4) The filter screen used should be 60 mesh to be sure the cake can be discharged properly.!!

We have been involved in a number of filtration test where this claim to fame was more or less installed and this is what we found.

A) Cake Drying;

The drying of filter cakes(1) is the biggest lie you will come across in the refinery or bio-diesel plants.

In order to get a dry as possible spend filter cake from G/S filtration we should consider the drying medium Nitrogen to be heated to 80 or 100 degrC. This will result in at least 3-5 % more dry solids in the spend cake if compared to blowing with cold N2.

In the S/G filtration step drying with steam is optional but can be used without any filtration problems. Question is what to do with the condensate in the filter? Flash it off under vacuum ?? For bleached oil the drying with steam is std practice and the residual oil content in the spend cake is best at 22-25 % (AOCS petroleum extraction method AL 4031 E115)).

The amount of drying N2 used in the main filter is approx 0,15-0,2 Nm3 Nitrogen per sqm filter area per minute. N2 at 2-3 bar pressure and duration 15-20 minutes. In the case of steam we would recommend to use the figure of 1 kg stem at 2-3 bar pressure per kg dry cake per cycle based on 20 minutes drying max. With the fact that we are able to use filter aid there is no fear about the filterability of the product. The type and quantity of filter aid is the only important issue to watch. The choice of filter aid should be based on availability, price and disposal.

Again our opinion would be ;

At all times it should be avoided that the use of a specific clay, adsorbent or filter aid results in a dedicated design and makes the use of other products not possible.

B) G/S pre-coat filtration of bio-diesel;

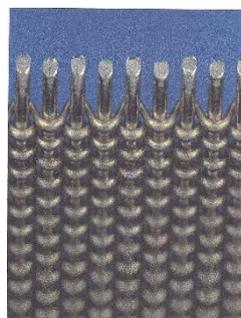
The idea of a thicker cake if we use (cellulose) filter aid is by itself already strange. The max delta P is a function of the inlet pump pressure and the cake resistance. The more filter aid or body feed we use the thicker we can grow a cake but than we have to ask the question ;WHY?

If we create more cake we are going to lose more product in the cake. It would be beneficial if the filter cycle can be extended to twice the time but we have not seen this happen in the plants we saw What we did see was the cake formed as a card board sheet that came of the surface of the leaves and instead of breaking up and falling down it was standing on the outlet manifold (or cone wall) and it fell together with the sheet from the other leaf and formed one big lump . Vibration only did not remove the cake from the filter and in many cases the filter had to be opened to manually assist the cake to fall. Filter cake with Kieselgur like FW 14 was more likely to break up .

C) Screen selection in G/S pre-coat filtration;

The use of the correct screen(see bulletin on screen selection how & why)has been very important in the success of the filtration performance. In the bleached oil filtration step we found that the screen 24 x 110 Dutch weave was the industry std. For some clay's the PZ80S Panzer cloth was giving improved performance but the results could not

be transferred to other applications like crude oil , winterized oil or Bio-fuel G/S filtration steps. The bleaching clay had a complete different

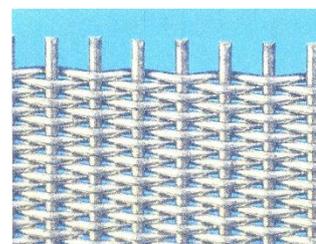


Panzer Weave PZ80S
with wire 0,2/0,4 mm
and 80 micron

structure than the foots in crude oil, the crystals in winterized oil and the filter aid in pre-coat applications specially when cellulose was used.

It is common knowledge that if possible the filtration should be done without the use of additional filter aid. In bleaching the clay is made to meet the filtration requirements and all manufacturers have products that say so ; HF = high filtration ,SF= speed filtration (see write up on bleaching) .

If we however start to use a pre-coat material in the filtration of bleached oils the story will change.



Dutch Weave 24 x 110 mesh
120 micron and wire 0,26/0,36

In order to improve the bleaching clay filtration but with the introduction of cellulose the screen became part of the equation. Cellulose fibers got entangled in the tight 24 x110 Dutch weave or PZ 80 S panzer weave screens so we had to look for alternatives. The most common used screen already in service at crude oil and winterized oil applications was introduced here as well. This 60 mesh plain weave screen however had only wire thickness of 0,19 mm and a nominal retention of 240 microns.

It was weak and very open with the result that once this was chosen in bleached oil filtration cases it would require a pre –coat prior to the actual filtration. The 240 micron was to open for the bleaching clay and re-circulation of the clay to get clarity would on this screen not work.

The reasons for pre-coat are numerous but to mention the most common one we list;

- Pre-coat to cover all holes or, damage at leaf surface.
- Pre-coat to make layer between clay and screen to improve cake discharge.
- Pre-coat to make difficult to filter fine clays filterable.

All these are legitimate reasons to look at filter aids but keep in mind that with the addition of more solids we not only accept the extra cost of filter aid we also lose more oil.

In our quest to make a difference we have with the co-operation of a German weaving company developed a screen that has the advantages of the open 60 mesh plain weave screen, it is stronger and it has only 150 micron nominal retention. This results in a screen that can be operated with clay only and will last much longer due to it's strength .

For more info and material choice see bulletin on “screen selection”.



Plain Weave 60 mesh 240
micron with wire 0,19 mm



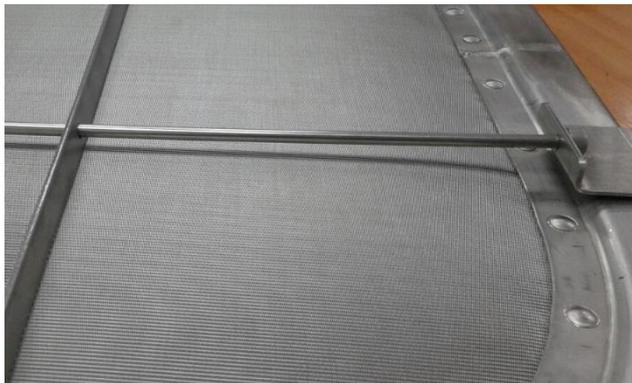
Twilled Weave wire 0,28 mm and
150 micron

D) BREAKER BARS ON FILTER LEAVES

The last innovation is the use of breaker bars on the filter leaves and our special TWILLED 60 mesh screen. These new features are especially useful in cases where pre-coat with filter aid like DE or cellulose is used. Our 60 mesh **TWILLED** weave screen has only 150 micron nominal retention , the wire diameter is 0,26 and mm which makes it strong and durable but at the same time has the good cake discharging and pre-coat abilities.

The remaining issue however was the difficult cake discharge by vibrator assistance only. The cake had to be broken up in smaller particles. On leaves with a middle support there was a natural break line on the leaves and it could be observed that this break line made the cake in that particular area discharge better.

As seen on the pictures and after many tests and trials we have the option to offer filter leaves with or without breaker bars. The vertical breaker bars are strip type while the horizontal breaker bars are spring loaded wires to ensure that they remain tight and strait. With the already offered corner reinforcements this guarantees a strong and durable construction.

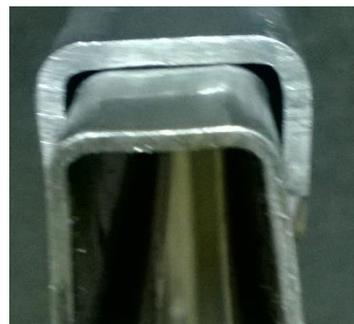


Breaker bar construction

NOTE: The construction is such that it can be removed and the leaves re-screened if that is necessary. The leaves with breaker bars cannot be manually scraped . Only tapping with rubber mallets is possible to assist cake discharge when this is still necessary.



Corner reinforcement





We hope this info will answer some of the questions and offers options / alternatives to the industry.

For questions and or offers contact your PMI Sdn,Bhd service point and they will be glad to help where possible.

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