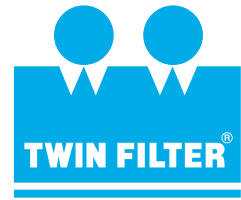


# COMPARISON OF FILTER PRESS AND VPL/DE FILTERS

## INTRODUCTION

This letter intends to give an objective overview of the main differences between two commonly used filtration systems for Completion/Gravel Pack fluids.



There are mainly two groups of DE filters used in the OILFIELD INDUSTRY.

1. D.E. filter presses or plate & frame.
2. Twin Filter VPL DE pressure leaf filters.

DE stands for Diatomaceous Earth, which is a natural precoat material. Today Celite, Decalite, Perlite or Kieselguhr is also used as precoat (filter aid) material.

The first precoat filters used were DE plate and frame filters, which were developed in the beer industry.

## DE FILTER PRESS:

This type of equipment is proven during the years as reliable filtration equipment. However, the internal construction is such that because of turbulence in the filter chamber no uniformly built up filter cake is formed. During filtration, contamination and filter aid reach the filtered liquid, sometimes in significant amount.

A press filter accepted filtration efficiency is 98% . During fluctuations in the inlet flow or pressure shocks, the efficiency drops below 95% with downstream contaminations up to 350 ppm or more. Due to the construction of the filter press the FP is often used at a high flow rates. The high flow rate creates the turbulence between the filter plates what's effect a non uniform filter aid distribution and so a low efficiency. Therefore a full size cartridge filter system is required to bring the brines at the required specification.

Including the precoat /bodyfeed equipment and cartridge filter unit the total plant is quite voluminous. However, space is limited in offshore applications.

Also a lot of labour is required for running and cleaning the FILTER PRESS filter. The old type FILTER PRESS filter has to be placed in a drip pan because a plate and frame filter is never 100% tight. These two aspects (labour and leaking) requires the operators to wear personal safety equipment to protect themselves adequately at all times.



## CONCLUSION FILTER PRESS :

- Commonly accepted filtration system.
- 100% manual cleanable
- Requires large footprint and is heavy.
- Turbulent flowregime may cause breakthrough of dirtparticles, thus reducing it's efficiency.
- Requires significant downtime and manual labour to clean (1,5 hrs for 800-1000 sq.ft).
- Not an enclosed system thus inherently prone to environmental & personal safety issues.
- Not complete leakproof.

## DE VERTICAL PRESSURE LEAF FILTERS TWIN FILTER VPL SYSTEM

The VPL System is a totally enclosed system during the whole operation, which ensures a drip free environment during filtration and even during the cleaning the system will remain closed because of the built-in wash down spraypipe.

The filtration efficiency is depending on the filter aid used. A uniform distribution on the filter leaves is of crucial importance, not any part may be uncovered with filter aid which may be the case with filter press.

A large influx area towards the filterleaves surface area allows an ideal flowregime to cause a uniform cake distribution all over the filterleaves. Therefore the filtration efficiency is not as much effected as compared to the filter press system. Working at average process conditions the VPL system filters down to 0.5 micron nominal and 10 micron absolute (depending on type filter aid).



*We care, we filter*

# COMPARISON OF FILTER PRESS AND VPL/DE FILTERS



The amount of solids in the filtered liquid is far less than 5 ppm. The clarity is below 10 NTU. Light KCl brines have shown results of 0.5 NTU after the VPL/DE. Because of the higher efficiency the second stage cartridge filter can be sized considerably smaller, thus saving on cartridge consumables. The biggest advantage of the VPL system is that the whole VPL filtration system is totally enclosed in a pressurized vessel. Therefore the system is complete drip free. Operator's personal safety and environmental uncontrolled discharge during filtration is therefore nihil. A built-in spray system utilizes washwater to rinse the filterleaves under high pressure. As the spray system is part of the enclosed system there is no need for opening the system when cleaning takes place. The spray system allows fast, convenient, effective and easy cleaning of the system therefore downtime is reduced significantly compared to a filter press.

Because of the enclosed system the complete footprint (and weight) of the VPL system is relatively small. All main valves are pneumatically operated from an easy access control panel.

## CONCLUSION VPL SYSTEM

- Small Footprint
- Reduced downtime for cleaning
- Effective and convenient cleaning
- Reduced manpower for operation and cleaning

## GENERAL COMPARISON

The filter presses are commonly accepted because of their long-term presence in the OILFIELD industry. The DE VPL system is relatively new in the market (although in the market for more than 20 years) and therefore it requires a "change of attitude" in the Oilfield Industry to accept the advantages of this system.

However the marketshare of the VPL system is steadily and continuously increasing over the last decade. This indicates that the advantages of the VPL system become more and more accepted as a superior alternative to the filter presses.

Worldwide the presses and VPL systems are in use depending on the preference of the Oil Company. In the NorthSea mostly plate and frame filters with 2 micron cartridge filters are used because one service company has more or less a monopoly. The preference is changing to pressure leaf because of the described advantages.

SHELL and N.A.M. specify a closed system, which means the pressure leaf type. They are in favour of a system like the Twin Filter DE VPL filter units.

There are also oil companies who are against any DE filter system because of very bad experiences in the past. Formations were damaged because of very bad operation of the plate and frame filter. Therefore experience and training is important for the operators

## FEATURE COMPARISON

Subject	Filter press (600 sq.ft.)	Vertical Pressure Leaf (600 sq.ft.)
Equipment requirements	Requires separate mixing skid and if high rates are required, a separate	Requires a separate centrifugal pump centrifugal pump if high rates are required
Space requirements	6.8m <sup>2</sup> filter press 2.4 m <sup>2</sup> slurry skid 9.2 m <sup>2</sup> total (excl. Int.hoses)	5.6 m <sup>2</sup> all connections on one side
Effective net. filtration area	500 sq.ft.	600 sq.ft.
Operation	Easy to operate, all valve manually operated	Easy operation from central controlboard
Weight (empty)	7500 kgs (incl. slurry skid)	4000 kgs
Set-up	Complicated "Rig-Up"	Simple "Rig-Up"
Material	Usually not made of SS	Made of 316 SS
Nominal rate	10 BPM (100 m <sup>3</sup> /hr)	6 BPM (60 m <sup>3</sup> /hr)
Maximum rate	15 BPM (150 m <sup>3</sup> /hr)	10 BPM (100 m <sup>3</sup> /hr)
Flow path through unit	Turbulent	Non Turbulent
Cleaning time	± 60 minutes	± 15 minutes
Performances	>40 NTU	>10 NTU

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