

SERFILCO®

RECESSED PLATE FILTER PRESS

TECHNICAL
BULLETIN
TF-117

The SERFILCO Recessed Plate Filter Press incorporates modern materials and methods suited to dewatering applications in plating and other industries.

The graph on the right demonstrates the savings possible relative to other sludge dewatering methods. Sludge dewatering and thickening equipment are classified into two basic categories: gravity dewatering equipment, which relies on the difference in size and/or density between the solids and the water to thicken the sludge, and mechanical dewatering devices, which subject the sludge to external forces to affect liquid/solid separation.

Underflow from most clarifiers, where metal hydroxides have been precipitated, flocculated, conditioned and allowed to settle, usually contains 99 to 99.5 percent water. With the enactment of the Resource Conservation and Recovery Act (RCRA), these metal hydroxides must be disposed of in a licensed landfill. This involves transportation and disposal costs to be paid by the generator. Both costs depend to a large extent upon the volume of the sludge. Reducing the water content reduces the volume and, ultimately, the disposal costs.

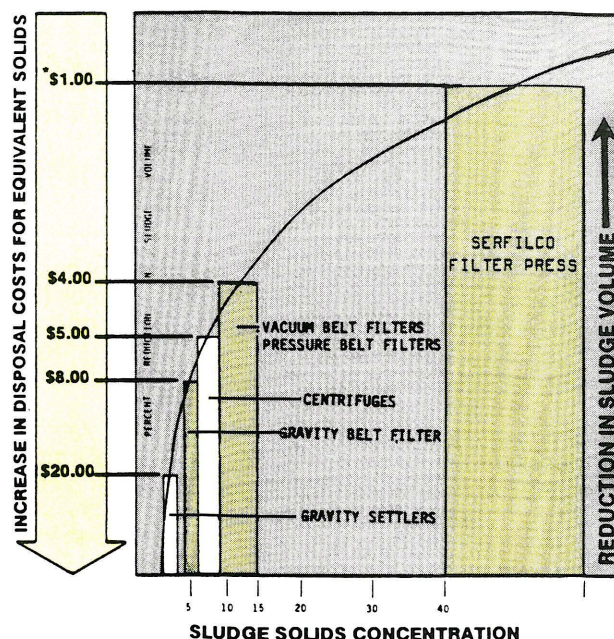
Thickening equipment such as gravity settlers and gravity belt filters remove the "free" water, contained in the cavities between the particles producing up to 10% total solids concentration. Removing floc water, water bound to the particles as a result of attraction to polar hydroxide particles, cohesive forces and surface tension, requires mechanical dewatering equipment applying forces stronger than gravity. Filter presses supply the type and amount of force necessary to achieve 25 to 50 percent solids content. The Serfilco Recessed Plate Filter Press applies sufficient compaction pressure to compress the sludge and "squeeze out" the water, yielding a dry cake of 25% to 60% total solids concentration in many cases.

The reduction in disposal costs resulting from the decrease in sludge volume amount to as much as a 99% savings. In most cases, the Filter Press pays for itself by reducing sludge disposal costs.

PRESS APPLICATION

GENERAL: The filter press has been utilized for many years to separate liquids from solids. In many cases the liquid is saved, while in other cases, the solids are the desired product. The filter press is an efficient system which provides high pressure filtration and/or compaction and use of operation. Other filtration systems offer high pressure filtration, but only the filter press has both high pressure capability and efficient filter cake removal.

The filter elements are constructed of light-weight polypropylene. They are extremely corrosion resistant and virtually eliminate plate breakage.



* ASSUME SLUDGE DISPOSAL COSTS TO BE \$1.00 PER GALLON.

HEAVY DUTY CONSTRUCTION

The filter's skeletal framework is completely fabricated of heavy gauge steel. The internal stresses and pressures generated by the hydraulic ram are absorbed by the steel frame. Only the stationary weight of the press is transferred to the support structure. Heavy duty solid side bars connect the head section to the tail section and support the filter plates.

RECESSED PLATE CHAMBERS

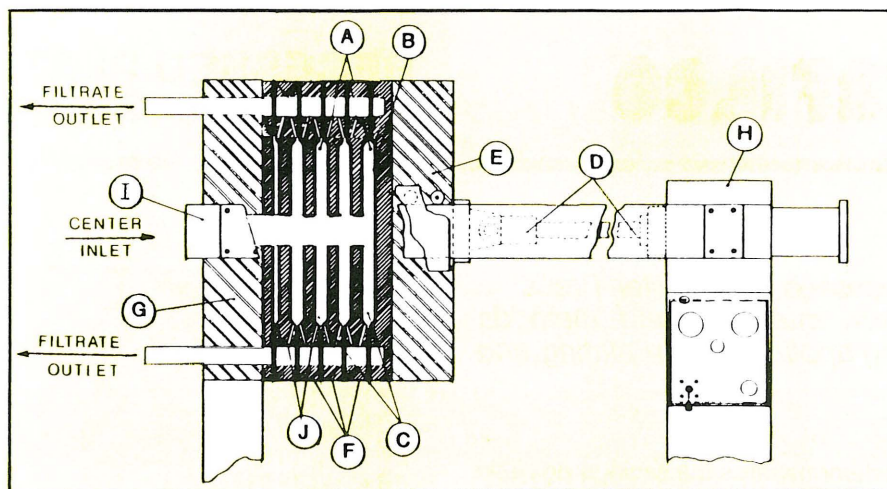
The surface of the plate is recessed by machining. When two recessed plates are held together, a cavity is created between them, thereby eliminating the need for a frame. A filter membrane stretched across each plate to retain the filter cake.

The cake is not suspended in a frame as in the conventional plate and frame unit and thus is readily discharged when the press is opened. Since the external surfaces of the cavity are now structurally tied together by the plate, the unit can withstand much higher internal filtration pressures.

The filter cloth forms the seal between the plates. Latex tracking is applied to the cloth to limit the leakage of the filtrate. The high internal filtration pressures will, however, force a small quantity of the filtrate from between the plates. Gasketed plates are available which retain valuable filtrate and also prevent leakage.

Manual Hydraulic units are available in the smaller sizes for an economical press without sacrificing the quality of the standard semi-automatic systems.

OPERATION



Dewatering is accomplished by pumping a slurry or sludge into chambers (A) surrounded by filter membranes (B). As pumping pressure is increased the filtrate is forced through the accumulated filter cake (C) and membrane until the chamber is full of solid filter cake.

The chambers are formed by two recessed plates held together under hydraulic pressure. The hydraulic ram (D) moves the follower (E) against the stack of filter plates (F) closing the press. The ram continues to apply sealing pressure of sufficient force to counteract the high internal compaction pressures. The head stock (G) and tail stock (H) are held in place by specifically engineered side rail support bars (L).

The filtrate passes through the membrane and is directed by channels in the plates and drain ports (J) to the head stock for discharge. The filtrate typically contains less than 15 ppm suspended solids. The filter cake is easily removed by simply reversing the hydraulic ram, thus opening the press. The lightweight plates may then be moved apart, permitting the compacted cake to fall from the chambers.

HYDRAULIC OPERATION

The follower is moved into the operating or pressure position and back to the cleaning position with a heavy duty air powered hydraulic ram. This self-compensating hydraulic system prevents over pressurization and automatically prevents loss of closure pressure from thermal expansion/contraction of the polypropylene filter chambers. All components are mounted inside the tail stock. A check valve prohibits loss of hydraulic pressure if air pressure is lost.

AIR BLOWDOWN MANIFOLD

An air blowdown manifold to purge the filter cake of excess water is desirable to blow air into the press prior to opening, creating a drier, more readily removable cake.

PLATE SHIFTER

An optional electric plate shifter is available for the larger units.

The higher the internal pressure, the greater the solids compaction. The standard SERFILCO press is constructed to withstand 130 psi compaction pressure producing a hard dry cake. The special high pressure press can withstand 225 psi for sludge more difficult to dewater.

Air diaphragm type pumps provide very efficient compaction of the sludge. The maximum pressure may be set with the air supply regulator and the pumping rate set with the volume of air flow. The pump will run rather rapidly during the initial phase of the cycle, slowing steadily as the back pressure increases, and finally stopping at the desired peak back pressure. Low initial back pressure induces rapid pumping and shortens the overall cycle time. When the pump attains the desired pressure, the compaction cycle is complete.

The overall cycle time is also dependent upon the concentration of the inlet sludge. Higher concentrations dramatically reduce the cycle time. Typical cycle time is one to four hours. Typical cleaning time is one to three minutes per plate.

CONTROL CONSOLE

One convenient control console houses all air and hydraulic controls. The compact console contains the off/on switch, press opening/closing control lever, air regulator, air pressure gauge and hydraulic pressure gauge.

