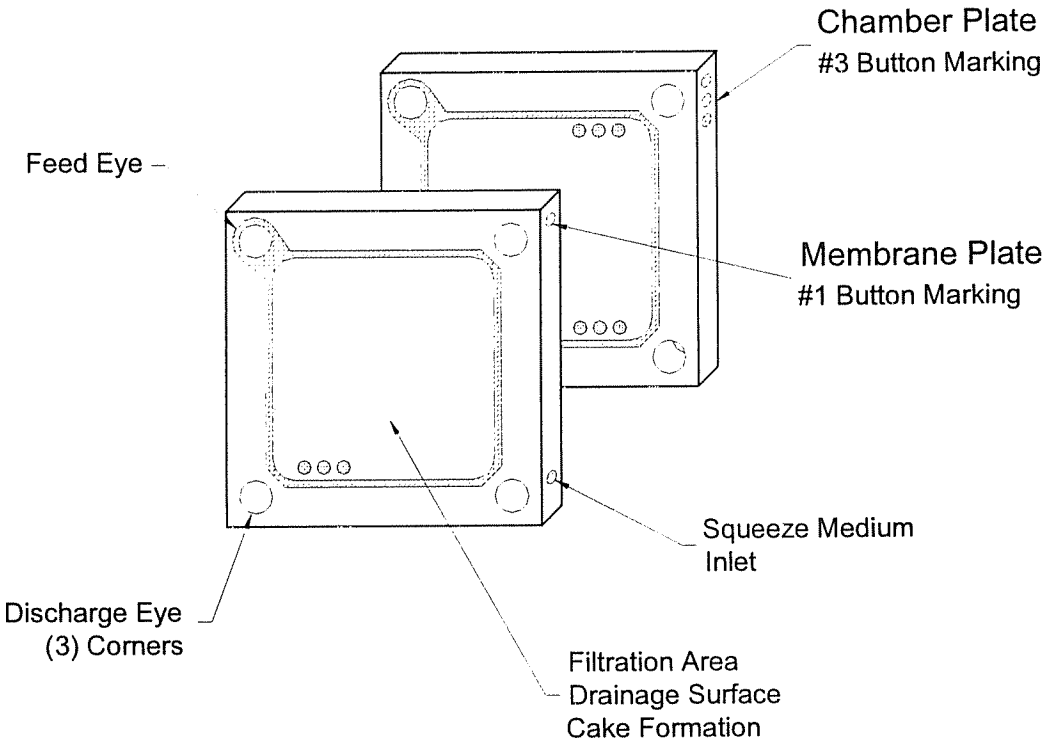
4 K-S Avery Filter Press Filter Plates

4.1 Description of K-S Avery Filter Plates

The heart of your filter press system is the filter plate stack. The filter plates form a series of vertical chambers by stacking membrane and companion chamber plates together. Filter cake is formed within these chambers.

Mixed Pack Membrane Plate Combination



The filter plates support the filter media on which filter cake is formed and provide a drainage surface from which the filtered liquid or "filtrate" is discharged. Ports on the filter plates are provided for feed and discharge.

The filter medium can be paper, felt, or a woven material. Typically polypropylene or other modern synthetics are used. Refer to the Filter Media section for additional information.

4.1.1 Membrane (Diaphragm) Filter Plates

Membrane filter plates allow for the formation of the driest solids possible with the added benefit of reduced cycle times. The membrane or diaphragm consists of an impermeable, flexible, polypropylene sheet that is fused to the polypropylene body (core) of a filter press plate at the edges. Pressurized air or water is introduced into the space between the plate and membrane (diaphragm) to inflate the membrane. The mechanical force pressurizing the membrane compresses the filter cake within the chamber.

Membrane filter presses react differently to feed pressure than do standard recessed chamber plate presses. With standard recessed chamber plate presses, the feed pressure of the slurry is the primary dewatering force in cake formation and drying. With a membrane filter plate press, feed slurry to the press is stopped once the chamber is filled but the cake solids are still low. Mechanical force or squeeze pressure is then applied to dewater the filter cake. If the chambers are overfilled, the membranes will not be able to move and may be damaged and the effectiveness of the dewatering is reduced.

CAUTION: DO NOT overfill membrane chambers or feed at high pressure. Typical feed or filtration pressure for membrane plates is below 60 psi. Typical fill volume is 70% to 80% of total press volume. Overfilling or feeding at excessive pressures may damage the membrane plates.

CAUTION: Refer to the filter plate manufacturer's pressure versus temperature chart for recommended operating conditions including squeeze pressure ramp time in the Reference Drawing Section.

4.1.2 Handling of Polypropylene Filter Plates

Below are recommendations for handling the polypropylene filter plates.

1. Filter plates must be protected from mechanical damage. Shield plates from weld splatter and other construction debris.

2. Polypropylene filter plates must not be exposed to temperatures below 0 °C. Polypropylene resins become brittle at low temperatures. Special low temperature resins are available for special applications.

3. If filter plates are to be stored for a long period prior to installation in the filter press, the plates should be kept indoors and in an upright position. Refer to Section 3.4.1 for additional storage instructions.

4.1.3 Installation of the Filter Plates

The plate stack comprises one head plate, membrane plates, companion chamber plates, and one tail plate. The head and tail plates have only one (1) filtration surface and the other surface is machined flat. Refer to Customer Specifications for information regarding the specific filter plates provided.

Each plate has indentations or "buttons" above the plate handle for ease of installation. To install the filter plates, refer to the Filter Plate Installation Sequence drawing in the Reference Drawing Section. Refer to the customer specifications for the specific weight of each individual plate.

The filter plates are also provided with plastic pegs or pins (cloth dogs) located on top of the plates, which are utilized to properly align the filter media on the plate. Plates are manufactured with alternating red and blue cloth dogs to provide an additional check for correct plate stack sequencing.

4.2 Filtration Cycle Optimization

The following guidelines are provided for optimization of the filtration cycle. Refer to the Customer Specifications for the filter press capacity.

1. For membrane filter presses, multiply the filter press volume in cubic feet by 70% to 80% as a starting point. [Example: 100 cu ft * 0.7 = 70 cu ft]

2. Convert this calculated volume to pounds of wet cake solids. Multiply the volume by the unsqueezed wet cake density in pounds per cubic foot. If unknown, use the density of water as an estimate. [Example: 70 cu ft * 62.4 lbs/cu ft = 4,370 lbs]

3. Convert the calculated pounds of wet cake to pounds of feed based on estimated cake solids and feed solids. [Example: Cake solids = 50% solids and Feed solids = 5% solids. Then, 4,370 lbs cake solids * 0.5 / 0.05 = 43,680 lbs feed solids.]

4. Convert the calculated feed weight to gallons of feed per batch based on the specific gravity of the feed slurry. If unknown, use SG = 1.0. [Example: 43,680 lbs of feed solids / 1.0 * 8.34 lbs/gal = 5,240 gals feed per batch.]

5. Fill the filter press with the calculated batch of feed slurry and end the filtration cycle without running the squeeze step. Open the filter press and inspect the filter cakes. Use a higher batch volume if the filter cakes are loose and watery, and use a lower batch volume if the filter cakes are dry and hard. A firm but moist filter cake is desired for the unsqueezed filter cakes.

Alternative Method

1. An alternative method is to measure the initial filtration rate in gallons per minute and continue monitoring the rate throughout the filtration cycle. Stop filtration when the rate reaches approximately 20% of the initial rate. [Example: Initial flow = 100 gpm. Multiply 100 gpm*0.2 = 20 gpm for end of filtration step.]

2. Open the filter press and inspect the filter cakes. Use a higher batch volume if the filter cakes are loose and watery, and use a lower batch volume if the filter cakes are dry and hard. A firm but moist filter cake is desired for the unsqueezed cakes.

NOTE: Standard membrane plates require a final squeezed cake thickness of at least 1/3 total chamber thickness. [Example: If chamber thickness=32mm, then minimum squeezed cake thickness= 32*1/3= 11mm.] Empty Chamber membrane filter plates and Universal membrane filter plates do not have any restriction on final cake thickness.

CAUTION: Gradually increase and decrease squeeze pressure per the recommended ramp time. Do not shock membranes with immediate full high pressure squeeze. Refer to the filter plate manufacturer's pressure-temperature chart for the recommended squeeze pressure ramp time.

WARNING: DO NOT apply squeeze pressure unless the filter press is closed with sufficient closing force to counteract the squeeze pressure. DO NOT open the filter press until all squeeze pressure is relieved from the system. Either action may cause serious damage to the equipment and possible personal harm.

4.3 Filter Plates During Operation

Process feed material is introduced into the filter plate chambers under pressure. The surface of the plate is machined at the feed eye to allow the feed material to enter the chamber. All of the filter chambers are fed process material in parallel filling simultaneously.

The filter media retains the solid particles in the feed slurry forming a particle bed (filter cake) within the chamber. As filter cake builds, the liquid (filtrate) flows through the cake and the filter media, across the drainage surface, and through drainage ports in the plates. The drainage ports are connected to the filtrate discharge eyes, which form a channel to the discharge process piping (closed discharge). When filtration is complete, the press is opened and the plates are separated to remove the cake from the chambers.

CAUTION: Never interrupt the filtration cycle for extended periods. Filter cake will fall to the bottom of the chamber. Restarting filtration may cause plate breakage.

4.3.1 Process Feed Material Recommendations

1. Process feed material being filtered should be of uniform consistency. Lumps in the feed slurry could cause blockages in the feed ports leading to uneven filtration within the chambers.

CAUTION: Resulting differential pressures across the plate stack could cause plate breakage.

2. Solids in suspension should not be allowed to settle out. Material stored in tanks should be agitated.

3. Filtering in the feed eyes and feed channels must be avoided. Filter cloth with an impermeable material in the feed eye is recommended for fast dewatering slurries (high filtration rate). Blocked feed eyes or channels due to dewatering will cause differential pressures across the plate stack that could cause plate breakage.

4.3.2 Filter Medium Maintenance

1. Never mix filter media with different filtration characteristics in the same plate stack. This will cause uneven filtration and lead to pressure differentials across the filter plate stack.

2. Damaged or blinded filter cloth should be changed immediately. If changing one filter cloth (due to damage), clean the rest of the cloths to minimize differential flow rates and pressures. Improperly cleaned filter cloth causes uneven filtration and pressure differentials.

4.3.3 Filter Plate Maintenance

1. Inspect and clean filtration drainage area and ports behind filter media, on a regular basis.

2. Clean plate sealing surfaces and feed channels after every discharge.

3. Avoid exposure to incompatible chemicals especially chlorine and aromatic hydrocarbons such as benzene, toluene, and xylene.

- WARNING -

Polypropylene filter plates are susceptible to damage from misuse including but not limited to: exceeding design pressures and temperatures, exposure to incompatible chemicals, improper handling and poor operating practices. K-S mechanical warrantee for filter plates DOES NOT apply to plate failures resulting from misuse.

Should you have any question regarding your K-S Avery filter press filter plates, please contact the K-S Customer Service Department.

Klinkau GmbH+Co

Membranplatte

membraneplate

plateau chambre a membranes

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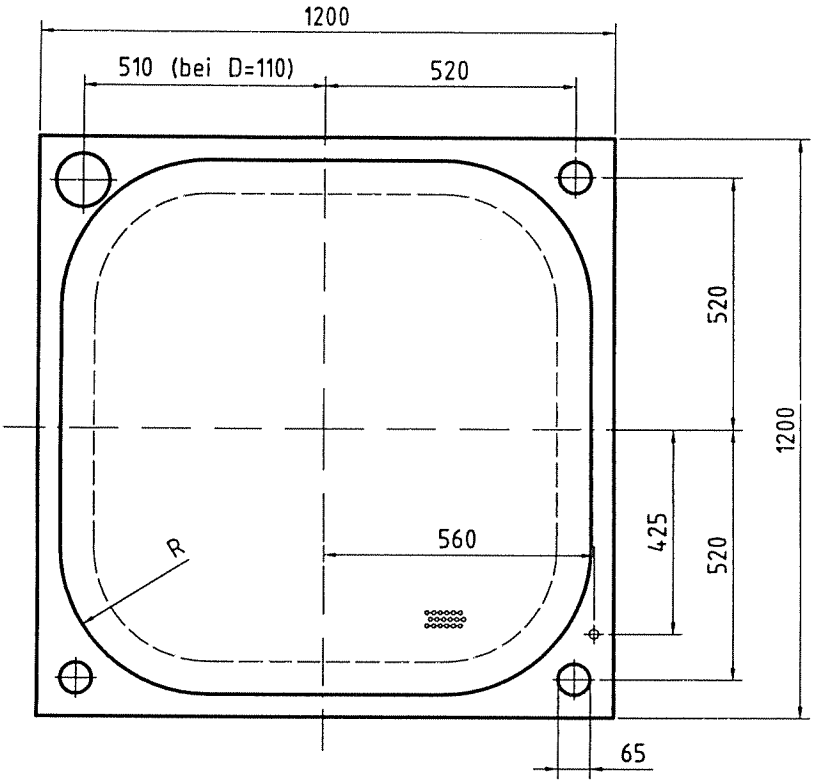

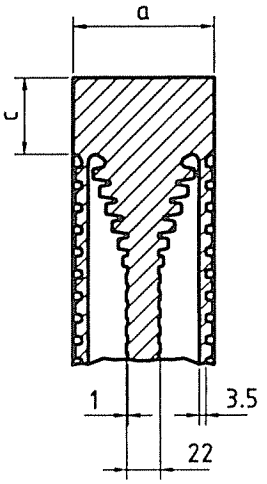

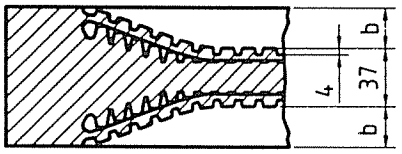

Kuchen-dicke	Platten-dicke	Kammer-tiefe	Dichtrand	Stützknocke	Radius	Filter-fläche	Volumen	Gewicht
cake thickness	plate thickness	recess	sealing edge	stayboss	radius	filterarea	volume	weight
epaisseur du gateau	epaisseur du plateau	profondeur	plan de joint	bossage	radius	surface filtrante	volume	poids
[mm]	a [mm]	b [mm]	c [mm]	d [mm]	R [mm]	[dm ^{2}]	[dm ^{3}]	[kp]
20	57	10,0	47	-	305	115,0 x 2	21,4	48
25	62	12,5	47	-	305	115,2 x 2	26,5	51
30	67	15,0	47	-	305	115,4 x 2	31,6	54
32	69	16,0	47	-	305	115,4 x 2	33,7	55
35	72	17,5	47	-	305	115,5 x 2	36,9	56
40	77	20,0	47	-	305	115,7 x 2	42,4	58
45	82	22,5	47	-	305	115,9 x 2	47,9	60
50	87	25,0	47	-	305	116,0 x 2	53,6	62

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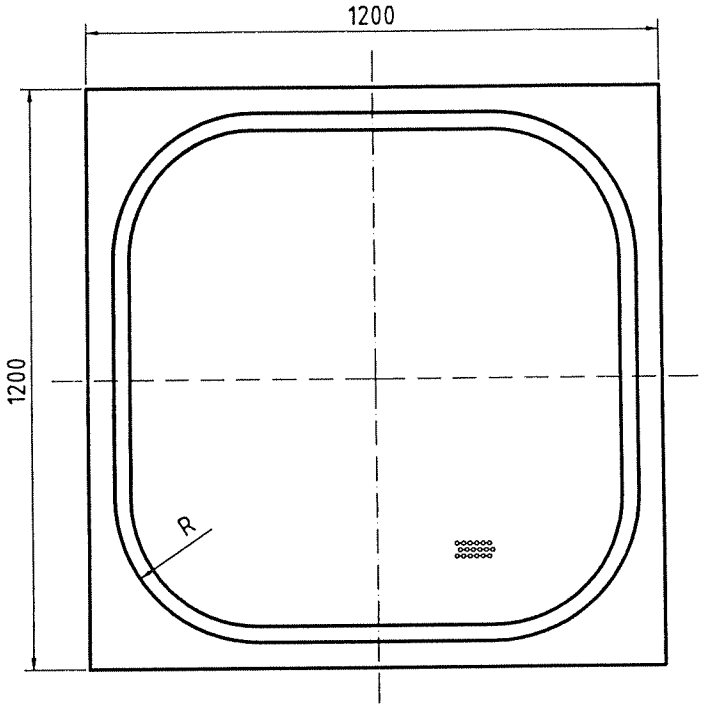

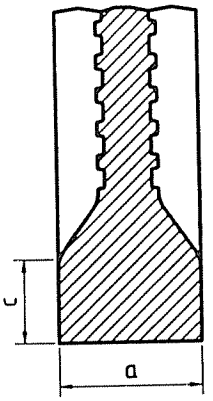

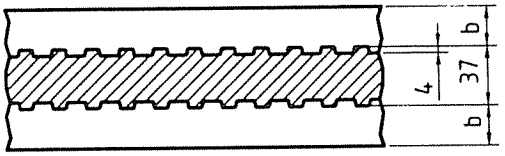

Kuchen-dicke	Platten-dicke	Kammer-tiefe	Dichtrand	Stützknocke	Radius	Filter-fläche	Volumen	Gewicht
cake thickness	plate thickness	recess	sealing edge	stayboss	radius	filterarea	volume	weight
epaisseur du gateau	epaisseur du plateau	profondeur	plan de joint	bossage	radius	surface filtrante	volume	poids
[mm]	a [mm]	b [mm]	c [mm]	d [mm]	R [mm]	[dm 2]	[dm 3]	[kp]
30	67	15,0	67	-	285	109,1 x 2	33,4	56
32	69	16,0	65	-	287	109,7 x 2	35,8	57
35	72	17,5	63	-	289	110,7 x 2	38,8	59
40	77	20,0	59	-	293	112,4 x 2	44,3	62
45	82	22,5	56	-	296	114,1 x 2	49,8	65
50	87	25,0	52	-	300	115,7 x 2	55,4	67

5 K-S Avery Hydraulic Power Unit

5.1 Description (Electric driven double gear pump)

The hydraulic power unit provided is electrically operated. Refer to the utility section of the Customer Specifications for the recommended power requirements. The power unit is coupled with an appropriately sized hydraulic cylinder for the size and capacity of the filter press.

The hydraulic power unit consists of the following:

1. a pair of electric driven hydraulic gear pumps,
2. a hydraulic fluid reservoir that serves as a base for the power unit components,
3. directional control valve,
4. pressure relief valves,
5. return line oil filter.
6. a hydraulic accumulator, and
7. pressure switches as required for motor and system control.

The hydraulic power unit is coupled with an appropriately sized hydraulic cylinder for the size and capacity of the filter press.

The filter press is closed by applying pressurized hydraulic fluid to the cap end of the hydraulic cylinder. The cylinder extends pushing the steel follower plate, attached to the end of the cylinder rod, against the filter plate stack. The press is held closed against internal filtration pressure by the high pressure oil applied to the cylinder piston.

To open the press, the pressurized hydraulic oil is released from the cap end of the cylinder and pumped to the rod end of the cylinder. The cylinder retracts, pulling the follower away from the plate stack.

The double gear pump system is designed with two pumps driven by a single motor. One pump is a high volume pump which delivers the high flow required to open and close the press. The other pump is a high pressure pump that produces the high pressure required to hold the press closed against internal filtration pressure. After the press is closed the high volume pump is disengaged by an unloading valve and the high pressure pump continues to pump. After the design system operating pressure is achieved, the pump motor is stopped. System pressure is maintained by a hydraulic accumulator. When the system pressure drops below a preset pressure, due to normal leakage through control valves and cylinder seals, the pump motor is restarted to "pump up" the system. Sometimes this hydraulic circuit is described as a "pump up and hold" circuit.

5.2 Hydraulic Power Unit Components

5.2.1 Pressure Relief Valve

A pressure relief valve is provided to insure that over pressurization of the hydraulic system does not occur. If system pressure raises above the design pressure, excess fluid is relieved back to the reservoir. The pressure relief valve is adjusted to 10% above the system design operating pressure. Refer to the Customer Specifications for design and relief valve pressure settings.

5.2.2 Hydraulic Pressure Accumulator

The double gear pump power unit ("pump up and hold") has a hydraulic accumulator that works with a counterbalance valve to hold the press closed while the pump is not running. The accumulator is precharged with nitrogen to work most effectively at the operating pressure of your system.

5.2.3 Hydraulic Counterbalance Valve

The double gear pump power unit ("pump up and hold") has a special type of hydraulic check valve that works with the accumulator to hold the press closed while the pump is not running. This special valve has a relief circuit and cross piloting that provides over pressure protection to prevent mechanical damage to the filter press and plates from thermal expansion of the plate stack. The unloading valve is sandwiched between the directional control valve and the D03 size valve subplate. It has a pressure adjusting set screw protruding from one side.

5.2.4 Hydraulic Unloading Valve

The double gear pump power unit ("pump up and hold") has a special type of hydraulic relief valve in addition to the standard pressure relief valve. This is the unloading valve. The purpose of the unloading valve is to disengage the high volume pump when the press is closed and its flow is no longer required The unloading valve is located in the same valve block as the pressure relief valve and is physically the larger of the two valves. The unloading valve is adjusted to a pressure just high enough to move the follower while pushing the plate stack, or working against the counterbalance valve.

5.2.5 Hydraulic Pressure Switches

The double gear pump power unit ("pump up and hold") uses three (3) pressure switches. Two (2) to control the pump motor and one (1) to give feed back to the filter press controls as a signal of press status. The pressure settings of these three switches are critical to the proper function of the hydraulic power unit and total filter press system. Refer to Customer Specifications and manufacturers specifications for the hydraulic power unit.

Hydraulic Power Unit Maintenance

Proper regular maintenance of the hydraulic power unit will insure long life and sustained performance. Refer to the vendor manual provided in the Commercial Components Section for maintenance information on your specific hydraulic power unit. We recommend observing the following general maintenance instructions.

5.2.6 Hydraulic Fluid

Use only an approved petroleum based hydraulic fluid. Refer to the list of approved hydraulic fluids in manufacturer's manual. Typically, use grade ISO-32 fluid for ambient temperatures below 40 °F and use ISO-46 fluid for ambient temperatures above 40 °F.

WARNING: DO NOT use any synthetic hydraulic fluids. Pump, valve and cylinder seals are not compatible with synthetic fluids. Use of any synthetic hydraulic fluid voids all hydraulic power unit warrantees.

5.2.6.1 Fluid Level

Check the fluid level in the reservoir with the hydraulic cylinder fully retracted (press open). An acceptable fluid level is near the top of the sight gauge. If the level is below this, fill the reservoir to the top of the sight gauge. Check the hydraulic fluid levels weekly.

5.2.6.2 Fluid Change Interval

Hydraulic fluid should be changed at approximately 1000 hr. intervals. Additionally, the fluid should be changed when changing the oil filter or whenever fluid appears cloudy in the sight gage. Clean pump suction strainers when changing the hydraulic fluid.

5.2.7 Oil Filter

The K-S Avery hydraulic power unit is fitted with an inline return oil filter. This filter cleans the fluid returning to the power unit from the hydraulic cylinder or other hydraulic powered device. The filter element should be changed whenever the hydraulic fluid is changed or when excessive backpressure is indicated on the filter housing pressure gage.

The hydraulic system has been provided with one of two different types of filter backpressure gauges either a red/green gauge or a gauge with a dial face. Check the pressure with the filter press in the open position. Excessive backpressure is indicated by the red zone of the red/green gauge or manufacturer's specific pressure limit.

5.2.8 Hydraulic Pressure Accumulator

The accumulator is precharged with nitrogen to work most effectively at the operating pressure of your system. Accumulator precharge should be checked yearly or every 2000 hrs of operation. Refer to the manufacturer's instructions provided in the Commercial Components Section of this manual.

WARNING: Hydraulic accumulators store hydraulic fluid under pressure. Exercise CAUTION to bleed off all pressure before attempting any maintenance. All pressure MUST be relieved prior to performing any maintenance to the accumulator or the hydraulic system components.

5.3 Hydraulic Power Unit System Adjustments

5.3.1 Pressure Settings

The pressure relief valve and pressure switches are factory set. Komline-Sanderson recommends contacting our Customer Service Department if an adjustment to any of the pressure settings is required.

5.3.1.1 Hydraulic Counterbalance Valve Adjustment

The counterbalance circuit is factory set at 400 to 600 psi over pressure. If field adjustments are required follow these steps.

1. Loosen unloading valve adjusting screw locknut.
2. From the press closed position, run the power unit to open the filter.
3. As the cylinder retracts, adjust counterbalance valve until the pressure to move the follower is between 400 and 600 psi.
4. Turn adjusting screw clockwise to lower pressure, counterclockwise to raise pressure.
5. After setting pressure, tighten locknut.

5.3.1.2 Hydraulic Unloading Valve Adjustment

The unloading valve is factory adjusted for the filter, typically 600 to 1000 psi. If field adjustment is necessary, follow these steps. Adjust counterbalance valve before adjusting the unloading valve.

1. Loosen unloading valve adjusting screw locknut.

2. Turn adjusting screw clockwise until lightly seated.

3. From the press closed position, run the power unit to open the filter. Observe the rate of cylinder movement.

4. As the cylinder retracts, turn relief valve adjusting screw counterclockwise until the cylinder movement slows down (this is due to the high flow pump oil going back to the tank instead of going to the cylinder). Note the pressure at that point.

5. Turn adjusting screw clockwise to raise the pressure setting 100 to 200 psi over the observed drop out pressure from step 4 and tighten locknut.

NOTE: If cylinder movement is very slow, 1-2" per minute. The unloading valve adjustment is too low. If the cylinder movement is correct 6-8" per minute but the motor stalls or draws excessive amperage to reach the operating pressure, the unloading valve is adjusted too high.

5.4 Troubleshooting the Hydraulic Power Unit

The hydraulic system has been designed to minimize mechanical problems and maximize safe operation of the filter press. However, problems may still arise during the lifetime of the hydraulic system. Often these problems can be corrected with simple adjustments or service. Guidelines for troubleshooting the hydraulic system are provided below.

For additional information, refer to the vendor data provided in the Commercial Components Section regarding the specific hydraulic power unit and hydraulic cylinder supplied. Should a problem arise with the hydraulic system that is not covered in this section or in the manufacturer's literature, please contact the Komline-Sanderson Customer Service Department immediately.

5.4.1 Hydraulic Pump Not Operating

PROBLEM: Loss of hydraulic pressure with hydraulic pumps not operating.

Possible Cause	Corrective Measure
Pump Motor Failure	• Check power to motor starter. • Check motor starter overload. • Check motor control circuit. • Check pump control pressure switch settings. • Refer to manufacturer's literature for service.

5.4.2 Hydraulic Pump Not Pumping

PROBLEM: Loss of hydraulic pressure with the hydraulic pumps operating but not pumping.

Possible Cause	Corrective Measure
Low hydraulic fluid level	Fill reservoir to correct level using only acceptable hydraulic fluids.
Incorrect Pump Rotation	Rotation must match arrow on pump case. Correct as required.
Leak in pump suction line	Check all lines and fittings, replace or repair as necessary.
Clogged pump suction strainer	Clean or replace if necessary.
Pump failure	Refer to Manufacturer's literature.

5.4.3 Pumps Cycling Excessively

PROBLEM: Pumps cycling excessively.

Possible Cause	Corrective Measure
Trapped air in the hydraulic lines	Bleed air from all lines as necessary.
Emulsified hydraulic fluid	Replace the hydraulic fluid.
Relief valve adjustment	Contact factory.
Bypassing of the cylinder seals	Refer to Section 5.6.

5.4.4 High Hydraulic Pressure

PROBLEM: Excessively high hydraulic pressure.

Possible Cause	Corrective Measure
Faulty or out of adjustment pump control pressure switch.	Test pressure switch. Replace or adjust as necessary.

5.5 Hydraulic Cylinder

The K-S Avery filter press uses a hydraulic cylinder to open and close the filter press. When closed, the cylinder produces the force required to counteract the internal pressure developed on the filter plates. The cylinder supplied with your filter press has been selected to best fit the requirements of that filter.

5.5.1 Hydraulic Cylinder Maintenance

Once put into service, the hydraulic cylinder requires no special maintenance. However, poor quality or contaminated hydraulic fluid in the system will adversely affect the life of the cylinder as well as the other hydraulic system components. Care should be taken to keep dust and debris off of the cylinder rod. A rubber boot can be supplied to protect the cylinder rod in harsh or dusty environments. If external leakage is observed, replace the affected seals as soon as possible. It is recommended to keep cylinder seal kits on hand to minimize down time in event of seal failure. The following test can be done to evaluate the condition of internal piston seals.

1. Close the press and shut off the hydraulic power unit.

2. Bleed all pressure from system.

3. Disconnect hydraulic hose from the rod end of the hydraulic cylinder. Fluid may drip from open ports. Take care to contain any spills.

4. Start the hydraulic power unit in the closed press mode. This will apply pressure to the cylinder cap end.

5. Check open rod end ports for fluid flow. Any piston seal leakage will flow out the open ports. Any more flow than a few drops per minute indicates worn or damaged piston seals.

6. Replace seals if necessary.

6 Plate Shifter Operation

The plate shifter is designed to shift one (1) filter plate at a time to discharge filter cake within the chambers. The plate shifter is comprised of two reciprocating shuttle cars mounted to the filter press side bars and a power transmission system mounted to the filter press cylinder end bracket. Power transmission is by shaft and chain through a torque-limiting clutch mounted in the shifter drive enclosure. A 1/2 HP electric gearmotor supplies the power.

The heart of the plate shifter is the pair of shuttle cars. These cars have two spring-loaded "pawls" which both position the car and move each plate sequentially to allow cake discharge. The shuttle cars ride on a track that also carries the drive chains.

Directional control is by a reversing motor starter supplied by either Komline-Sanderson or the customer. The motor starter can be controlled manually by the press operator or by a PLC.

6.1 Plate Shifter Operation

When a completely automated system is provided, the plate shifter can be operated either as semi or fully automated.

6.1.1 Semi-Automated Operation

To operate the plate shifter, press F1 on the plate shifter menu until the option reads "PLATE SHIFTER MANUAL". The shifter is now operated by FORWARD/REVERSE push buttons located on the hand held pendant.

The pendant is supplied with a cord so that the operator may conveniently inspect the operation of the shifter during the cycle. The pendant is typically shipped loose for installation on-site. Refer to Customer Control drawings for electrical connection of the pendant.

To move a filter plate, hold down the FWD pushbutton to drive the shuttle cars forward and pick-up a filter plate. To shift the plate, hold the REV pushbutton down moving the plate towards the follower. Continue shifting each plate until all of the filter cakes have been discharged from the filter press. The head filter plate is not designed to be shifted.

After the last filter cake has been discharged, the shuttle bodies must be run to the forward position until contact is made with the end of the track. The shuttle bodies will contact a mechanical stop that will cause both "pawls" to be depressed and enable the shifter to be reversed returning to the starting point. Another mechanical stop is located at the starting point, which will cause the "pawls" to be released and prepare the filter for the next cycle. It is important that the shifter be returned to this stop.

6.1.2 Automated, PLC Controlled Operation

Plate shifter technology enables Komline-Sanderson to provide a fully automated plate shifter that limits the necessary operator attention time.

To operate the plate shifter, press F1 on the plate shifter menu until the option reads "PLATE SHIFTER AUTO". Press F2 for "PS AUTOSTART" option to begin plate shifting. The shifter will automatically stop at the first plate and reverse direction pulling the plate from the stack to discharge the filter cake. After moving a filter plate, the shifter will reverse direction again to pick-up the next filter plate. The plate shifter will automatically move all of the plates and return to the starting position and turn itself off.

If the shifter is operating too quickly for proper cake discharge, pull the stop cord located along the press side bar. To continue shifting plates, pull the stop cord again. A built in time delay is supplied to prevent accidental restart of the plate shifter.

NOTE: Similar to the operation of a semi-automated system, the shuttle cars must return to the starting position before closing the filter press.

6.2 Plate Shifter Maintenance

Drive chains are located along both sidebars. Drive chains adjusters are located under stainless steel sheet metal guards at the head end of filter press. Chains require some slack (1/4") and should never be over tightened.

The pillow blocks that support the connecting shaft are provided with grease fittings and should be lubricated periodically. The sprockets which carry the chains should be inspected, and lubricated periodically

NOTE: Six month maximum interval between all lubrications is recommended.

6.3 Shuttle Car Maintenance

Proper and preventative maintenance of the shuttle car assembly will insure that a continuous acceptable operation of the plate shifter is attained. Clean and lubricate the entire shuttle car assembly regularly to insure proper performance and protection against corrosion. Follow the instructions below to insure that appropriate shuttle car operation is attained. Refer to the Shifter Car Adjustment Instruction drawing in the Reference Drawing Section.

6.3.1 Horizontal Shuttle Car Adjustment

For proper operation of the shifter mechanism it is necessary that the two shuttle cars move evenly throughout the cycle as they carry plates along the sidebars. Should the chains wear unevenly, the cars may lose their alignment. This may be corrected in the following manner.

1. Check both drive chains for proper tension and adjust as necessary, see Section 6.2.

2. To properly align the shuttle cars, break the drive chains at their connecting links to permit the shuttle cars to be moved as necessary. Push both shuttle cars against the "head end" mechanical stops. Reconnect the links of the drive chains and begin operation. Readjust the shuttles as necessary.

6.3.2 Vertical Shuttle Car Adjustment

If the shuttle car is mounted too low, the "pawls" will extend too soon and drag the filter plates in the wrong direction. Adjust the height of the shuttle car as follows:

1. Set the shifter pawls in the retracted (down) position).

2. Loosen the 3/8" nuts on the back of the shifter car, which connect the shuttle car to the mounting arm.

3. Raise the shuttle car until the retracted pawls skim the undersides of the plate pins or set to the maximum position of 1 /16" clearance under the plate pins.

4. Hold the car level and tighten nuts. The shuttle car cover plate may need to be removed to allow access to the bolt heads when tightening the attachment bolts.

NOTE: Lock-tite is recommended on the attachment bolts.

6.4 Torque Clutch Adjustment

A torque-tamer clutch is mounted on the drive shaft in the motor box. This is to safeguard against overloading the drive motor. Adjust as follows:

1. Loosen the hex head cap screws.

2. Tighten the adjusting nut, finger tight. Back off three (3) splines and tighten the set screw.

3. Tighten the cap screws until the heads bottom.

If an increased torque is required, repeat the procedure outlined above; however, back off only one or two splines in step number 2. Adjust the clutch for the minimum torque required to move plates. This saves wear on more expensive drive components.

6.5 Plate Shifter Troubleshooting

The system has been designed to minimize potential mechanical problems and maximize safe operation of the filter; however, some mechanical problems will arise during the lifetime of the plate shifter. Should a problem arise with the plate shifter that is not covered in this section, please contact the Komline-Sanderson Customer Service Department immediately.

6.5.1 Plates not being Picked-up

PROBLEM: Shuttle car does not pick up filter plate.

Possible Cause	Corrective Measure
Pawls not extending	Clean and lubricate the plate shifter shuttle cars. Reset pawls to the UP position by operating the shuttle car to the cylinder end mechanical stop.
Shuttle car mounted too low	Refer to Section 6.3.2

6.5.2 Plate Shifter Dragging.

PROBLEM: Plate shifted in the wrong direction due to the shifter dragging.

Possible Cause	Corrective Measure
Poor shifter car alignment	Refer to Section 6.3
Vertical position of shuttle car misaligned	Refer to Section 6.3.2

6.5.3 Plates not Moving.

PROBLEM: Plate shifter is operating; however, the plates will not move.

Possible Cause	Corrective Measure
Clutch worn or misadjusted.	Inspect and adjust the clutch as necessary.

6.5.4 Plate Shifter not Operating.

PROBLEM: Plate shifter will not operate.

Possible Cause	Corrective Measure
Clutch worn or misadjusted.	Inspect and adjust the clutch as necessary.
Motor starter overload tripped.	Reset Overload Switch.
Motor wiring problem.	Inspect Wiring and Repair as needed.
Pendant control failure	Inspect and test wiring. Inspect and test pendant pushbutton contacts.
No control voltage.	Check control cross-former fuses.

6.5.5 Plate Shifter will not Start.

PROBLEM: Plate shifter will not start.

Possible Cause	Corrective Measure
"Follower" limit switch faulty.	Check the limit switch arm adjustment. Check for input from limit switch.

6.5.6 Shifter will not Stop at End of Cycle.

PROBLEM: Shifter will not stop at end of cycle.

Possible Cause	Corrective Measure
Shuttle car limit switch faulty.	Check the limit switch arm adjustment. Check for input from the limit switch.