3 Operating Instructions

3.1 Security Steps

The Kværner Disc Filter is a closed unit. No surveillance is necessary during operation. Normal security steps are sufficient. However, the following points should be noted.

For service purposes there are inspection openings on each side of the hood as well as on top of it. During normal operation all covers must be shut.

Due to the risk of injuries, no persons are allowed to be in the vat when the filter is in operation.

The surface of the filter plates can become very hot. Any contact that can cause burns should be avoided (concerns Filters in TMP mills).

For mechanical inspection and maintenance work the drive has to be disengaged, i.e. the motor switch must be locked. This switch is not part of a normal Kværner delivery.

Normal security rules for work in an industrial environment are to be followed.

3.2 Operating Principle

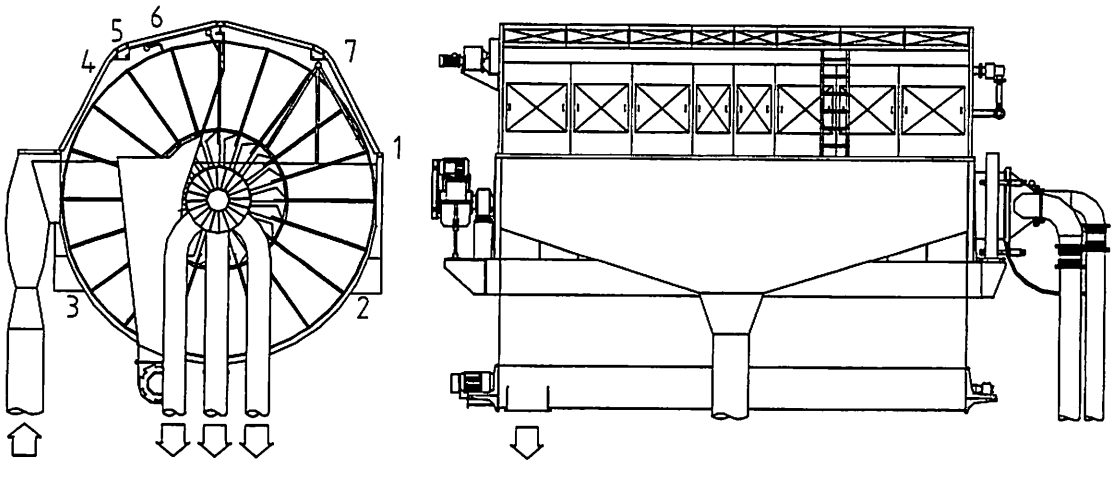

Figure 4 - Operating Principle

THE DISC FILTER is built around a horizontal shaft with filtrate channels increasing in taper from the drive to the valve side. A number of filter discs are installed on the shaft with each disc consisting of 20 sectors and each one connected to a corresponding channel in the shaft. The disc area is submerged 63% in a filter vat, containing the suspension to be filtered.
The open end of the shaft is connected to a filtrate valve, which opens and closes the channels to a vacuum, created by the barometric leg.

Operating principle:

1. The filter sector enters the suspension in the vat. The pulp mat starts to form under atmospheric pressure, which optimizes the dewatering of the bottom layer. Cloudy filtrate is drawn through the filtrate valve.

2. A bridge in the filtrate valve separates the cloudy filtrate zone from the clear filtrate zone (vacuum zone).

3. In some installations a third or super clear zone is provided. (Not applicable on this order).

4. As the sectors are draining, air is drawn through the pulp mat allowing the pulp mat to dry.

5. The vacuum is shut off by a bridge in the filtrate valve.

6. The pulp mat is removed by the discharge shower.

7. The filter cloth is cleaned by the oscillating cleaning shower.

3.3 Start-Up Disc Filter

A. Check the level in the clear filtrate tank. Water should be filled up automatically to a minimum level for start-up purposes.

B. Start the disc filter with associated equipment. The motors should be interlocked for the correct starting sequence. The order should be as follows:

   1. The screw conveyor
   2. The shower water pump
   3. The motor for the oscillating cleaning shower
   4. The main drive of the filter
   5. The feed pump for pulp to the filter

   If any motor stops, all the other motors later in the sequence should stop as well. For service purposes it should be possible to operate the oscillating shower and the main drive from local panel at the filter.

C. The level in the filter vat is controlled automatically by the speed of the filter.
The speed range is 0,4 - 2,0 rpm. Normal level is about one inch below the inlet overflow.
Start the disc filter with the level controller in the automatic position.

D. When the vat level has stabilized, a vacuum is created by means of a barometric dropleg.
Normal vacuum is 1,5 - 6 psi.

E. Check the shower systems

1. Discharge shower
2. Oscillating cleaning shower
3. Sluicing shower

All spray nozzles should be open and adjusted to right position (see "Inspection during normal operation"). Use maximum valve openings for discharge and cleaning showers (min 100 psi).

3.4 Shutdown

A. Reduce the feed consistency to the filter. If possible feed the filter with just water for 5 minutes.

B. Stop the flow to the feed box.

C. Close the valve for sluicing water to the pulp outlet.

D. Run the filter appr. 5 minutes with just shower water.

E. Stop the following motors:

- the main filter drive
- the oscillating cleaning shower drive
- the shower water pump
- the screw conveyor

For a short shutdown (less than 8 hours) the remaining pulp could be left in the filter vat.
For extended shutdown period, the vat should be drained and carefully cleaned. The inside of the hood and the shower pipes in the hood should be cleaned as well.

3.5 Inspection during Normal Operation

CHECK ONCE PER SHIFT

A. Discharge shower
Check that all nozzles are open. The nozzles can be cleaned during operation. Each nozzle has a valve for cleaning. When the valve is turned 90° the main pipe is flushed, and when the valve is turned 180° the nozzle is backflushed.

B. Oscillating cleaning shower
Check that all nozzles are open and that the total disc area is cleaned. The motor for the oscillating cleaning shower is equipped with a brake, which makes it possible to stop the cleaning shower at the periphery of the disc. In this position the nozzles can be reached for cleaning. The nozzles are of the same type as the discharge shower nozzles, and are cleaned in the same way.

C. Filtrate valve
The filtrate is normally split in two fractions, cloudy- and clear filtrate. In some cases there is also a third fraction, super clear filtrate.
The proportion between cloudy- and clear filtrate can be adjusted by moving a bridge between cloudy- and clear filtrate zone.
This bridge can be reached through an inspection opening in the valve housing. The bridge is locked with a screw.
The solids content in two (three) filtrates should be checked regularly. Higher solids content than normal could be caused by holes in the filter bags (see separate instructions for changing filter bags).

D. Leakage
The following points should be checked.

1. The stuffing boxes between filter vat and shaft. If there is a leakage the gland should be tightened until the leakage stops. All nuts should be uniformly tightened.
The packing should be changed if necessary.

2. Seal between filtrate valve and shaft. Leakage of air into the filtrate valve causes lower vacuum. The seals should be changed when necessary.

3.6 Trouble Shooting List

TABLE 3 - TROUBLE SHOOTING LIST

TROUBLE	REASON OR CORRECTION
Poor pulp discharge	- Too low inlet pulp consistency - Too high inlet flow (too high filter speed) - Discharge nozzles plugged or in wrong position - Cleaning shower does not clean the entire disc area - Too low shower water pressure
Low level in filter vat or level variations	- Too low feed flow - Problem with level control - Level control in manual mode
High level in filter vat	- Too high feed flow - Discharge nozzles plugged or in wrong position - Cleaning shower does not clean the entire disc area - Cleaning shower nozzles plugged - Problem with level control - Level control in manual mode
High solid content in filtrate	- Too low sweetener flow (white water cleaning) - Holes in filter bags
Too low vacuum	- Too low feed flow - Holes in filter bags - Incorrect vacuum indication - Seal between shaft and filtrate valve in bad condition - Hole in hose for return of leakage water
Too low outlet pulp consistency	- Too low vacuum (see above) - Too high level in filter vat (see above) - Too much sluicing or dilution water

3.5 Inspection during Normal Operation

CHECK ONCE PER SHIFT

A. Discharge shower
Check that all nozzles are open. The nozzles can be cleaned during operation. Each nozzle has a valve for cleaning. When the valve is turned 90° the main pipe is flushed, and when the valve is turned 180° the nozzle is backflushed.

B. Oscillating cleaning shower
Check that all nozzles are open and that the total disc area is cleaned. The motor for the oscillating cleaning shower is equipped with a brake, which makes it possible to stop the cleaning shower at the periphery of the disc. In this position the nozzles can be reached for cleaning. The nozzles are of the same type as the discharge shower nozzles, and are cleaned in the same way.

C. Filtrate valve
The filtrate is normally split in two fractions, cloudy- and clear filtrate. In some cases there is also a third fraction, super clear filtrate.
The proportion between cloudy- and clear filtrate can be adjusted by moving a bridge between cloudy- and clear filtrate zone.
This bridge can be reached through an inspection opening in the valve housing. The bridge is locked with a screw.
The solids content in two (three) filtrates should be checked regularly. Higher solids content than normal could be caused by holes in the filter bags (see separate instructions for changing filter bags).

D. Leakage
The following points should be checked.

1. The stuffing boxes between filter vat and shaft. If there is a leakage the gland should be tightened until the leakage stops. All nuts should be uniformly tightened.
The packing should be changed if necessary.

2. Seal between filtrate valve and shaft. Leakage of air into the filtrate valve causes lower vacuum. The seals should be changed when necessary.

3.6 Trouble Shooting List

TABLE 3 - TROUBLE SHOOTING LIST

TROUBLE	REASON OR CORRECTION
Poor pulp discharge	- Too low inlet pulp consistency - Too high inlet flow (too high filter speed) - Discharge nozzles plugged or in wrong position - Cleaning shower does not clean the entire disc area - Too low shower water pressure
Low level in filter vat or level variations	- Too low feed flow - Problem with level control - Level control incorrectly in manual mode
High level in filter vat	- Too high feed flow - Discharge nozzles plugged or in wrong position - Cleaning shower does not clean the entire disc area - Cleaning shower nozzles plugged - Problem with level control - Level control incorrectly in manual mode
High solid content in filtrate	- Too low sweetener flow (white water cleaning) - Holes in filter bags
Too low vacuum	- Too low feed flow - Holes in filter bags - Incorrectly vacuum indication - Seal between shaft and filtrate valve in bad condition - Hole in hose for return of leakage water
Too low outlet pulp consistency	- Too low vacuum (see above) - Too high level in filter vat (see above) - Too much sluicing- or dilution water