EFFICIENT FILTRATION

with DynaDisc™ filter
DynaDisc disc filter – the solution to several problems

The DynaDisc is a microscreen consisting of filter discs, which has been developed to solve the problems that have so far prevented the use of microscreens in the pulp and paper industry, namely inadequate reliability of the seals and poor durability of the filter fabrics.

The DynaDisc has a patented sealing system which guarantees that the process will not be disturbed by unfiltered water being admitted into it. A guide plate system – which is also patented – inside the filter discs eliminates the risk of the filter capacity being reduced by falling filter cake. At the same time, the system also improves the safety of the filter, since the guide plates discharge foreign objects from the filter into the outlet trough.

The entire filter is of sturdy design. All parts that are exposed to stresses are subjected to computerized fatigue calculation by FEM (Finite Element Method) analysis. The filter discs and associated support elements are welded to the centre shaft. Therefore no seals are needed between the filter discs and the shaft.

If maximum filtration efficiency is required, the DynaDisc can be equipped with a patented device for dividing the filtrate into a pre-filtrate and a final filtrate. This design offers a filtration efficiency which is higher than that which can be achieved by any other disc type microscreen. In addition, in spite of the higher filtration efficiency, a coarser strainer fabric with larger openings can be used, thus minimizing the risk of clogging.

The DynaDisc is available in two versions – a free-standing filter in a steel tank, or for incorporation into a concrete tank. Both units are compact and easy to install, and have the same high efficiency.
DynaDisc disc filter – operation

Microscreening is an acknowledged technique for collecting particles efficiently and at low cost from any type of liquid. The DynaDisc is a microscreen consisting of a number of discs with the filter fabric comprising either stainless steel or synthetic material having small openings – down to 10 microns.

Depending on the application, the space available and the capacity, the filter elements of the DynaDisc can be fitted either to both sides and the periphery of the discs, or to the sides only. The direction of flow through the filter elements is from the inside out, although filters with reverse direction of flow can also be supplied.

The DynaDisc consists of one or several rotating filter discs (1) permanently mounted on a central shaft. The drive system is on the opposite side to the pipe connections. The liquid is admitted into the filter through the inlet (2) and flows into the filter discs through openings in the shaft.

The liquid flow is induced by the hydrostatic pressure due to the fact that the water surface of the incoming liquid inside the filter rotor is higher than the surface of the filtrate outside the rotor.

If required, the filtrate discharged can be divided by means of a patented device into two phases, i.e. the pre-filtrate (3) and the final filtrate (4).

During the filtration process, a filter cake is built up on the inside of the filter element. It is the filter cake and not the filter fabric that serves as the filter medium for the final filtrate, which is the reason for the high efficiency. The DynaDisc can achieve filtration efficiencies of up to 98%.

Spray pipes and nozzles (5) are provided to remove the filter cake, which then drops down into the coarse reject outlet trough (6) and is discharged from the filter through the reject outlet (7). Operation of both the filter disc drive and the spraying process can be either continuous or controlled by automatic level control system.
DynaDisc disc filter
– applications

The totally enclosed water cycle within a pulp and paper mill is fast approaching. Efficient utilization of the process water, recovery and recirculation are key concepts towards this end. The DynaDisc has been developed to serve as an important element in this process and can therefore be used in numerous applications in the pulp and paper industry:

- For white water filtration, including cleaning and recirculation of final filtrate and/or pre-filtrate for spraying applications.
- For improving the water quality further after existing fibre recovery filters (save-all filters).
- For fibre recovery.
- For raw water screening in the production of mechanically purified process water.
- As pre-filter in combination with DynaSand filter for the production of chemically purified process water.
- For the treatment of sealing water for pumps.
- For recirculating the water in wood rooms.

Other applications include purification of process water and recirculation of cooling water in the steel industry.

The DynaDisc is also used for municipal and industrial wastewater treatment for:

- Filtration and polishing of wastewater for removing phosphorus, for example.

In many applications, the DynaDisc is combined with the DynaSand continuous sand filter for achieving the highest filtration efficiency.

The DynaDisc has become the obvious choice in all applications in which maximum reliability is essential.
DynaDisc disc filter  
– unique detail features

SEAL (patented)
The seal (1) between the rotor and the tank is of unique design that entirely eliminates the risk of the unfiltered incoming flow leaking into the filtrate leaving the filter.

Any leakage is discharged instead into a visibly arranged overflow pipe outside the filter, where any such leakage can immediately be detected.

This patented seal is perhaps the most important single reason for the DynaDisc now being used in applications such as the pulp and paper industry, in which the highest standard of reliability is essential.

BEARINGS
The drive side of the filter rotor is supported in a self-aligning roller bearing with a bearing housing of standard type.

On the opposite side, where the pipe connections are located, the rotor is supported by a sliding contact bearing (2) made of a synthetic material which is alloyed with a lubricant. The sliding bearing has an extremely long useful life and has a wire (3) cast into it to serve as a wear warning device. When the bearing has worn down to a predetermined thickness, the wire will come into electrical contact with the rotor.

Even after the wire has initiated an alarm, the filter can remain in operation for a relatively long time, until a suitable opportunity has arisen for changing the bearing. The changing work itself is very simple and quick.

PRE-FILTRATE SYSTEM
(patented)
For applications in which it is required to divide the filtrate into two fractions, the filter discs are provided with pre-filtrate troughs on both sides. This design, which is patented, provides simple means for presetting the required proportion of pre-filtrate (e.g. 20%). The boundary between pre-filtrate and final filtrate is very distinct, and there is no risk of the two fractions being mixed.

The design provides better filtration efficiency than any other type of microscreen. The design also allows coarser filter fabrics to be used, which increases the useful life of the fabric and minimizes the risk of clogging.

GUIDE PLATE SYSTEM
(patented)
The insides of the filter discs are provided with a number of guide plates. These capture any parts of the filter cake that may have fallen off the filter elements and any foreign objects that may inadvertently have entered the filter, and guide them into the outlet trough for the coarse reject.

The guide plate system is designed so that virtually none of the water will enter the outlet trough to dilute the coarse reject.

The guide plates have enabled the outlet trough to be located at the extreme top in the central shaft. This increases the filtration capacity due to the higher water level inside the filter rotor.

THE ADJUSTABLE OVERFLOW WEIR
The tank has an adjustable overflow weir by means of which the filtrate level can easily be adjusted to the required value. The water surface inside the rotor is then adjusted automatically to a level which is higher than that of the filtrate, which causes a water head difference and the filtration process begins.
DynaDisc units with capacities from 1000 l/min upwards are now in operation. Since several discs can be mounted in the same filter and several filter units can be operated in parallel, there is virtually no upper limit to the filter capacity. There are filters now in operation that have a capacity of 150 000 l/min.

Narrow discs with filter elements fitted only to the sides of the discs are generally used. But if the spray water flow is to be reduced to the minimum possible, the discs can be provided with filter elements both on the sides and on the periphery. Low spray water flows are particularly important if the filter flow capacity per unit of area is low, since the filtrate from the filter itself is used as spray water.

The DynaDisc is available as a free-standing unit with the filter discs contained in a stainless steel tank, and also for building into a concrete tank. The method of operation is the same in both types.

PILOT TESTS

The DynaDisc is subjected to pilot tests aimed at determining the filtration efficiency, the necessary filter area and the best choice of filter fabric. Two types of pilot test equipment are available, i.e. a mini filter with an area of 4 dm$^2$ and a full-scale filter with an area of 5 m$^2$. The latter has a disc with filter elements on both sides and around the periphery.

The pilot test equipment provides accurate values that can be used for sizing.

A "leaf test" can also be used for sizing.

For accurate dimensions and other particulars, please refer to separate dimension leaflets.
Growing numbers of factories and municipalities require complete solutions for water and wastewater treatment. To meet this demand, Nordic Water Products delivers complete systems based on the Company’s own products.

In a complete system, products such as the DynaDisc disc filter are integrated, for example, with the DynaSand continuous sand filter and the Johnson Lamella Separator. The plant is delivered with a performance guarantee, thus eliminating the need for the customer to allocate resources for detailed planning and implementation of the project.

DYNA DISC COMBINED WITH DYNA SAND FOR HIGH-EFFICIENCY FILTRATION OF PROCESS WATER.

DYNADISC WITH REVERSE DIRECTION OF FLOW (patented)

The DynaDisc is also available in a version in which the liquid flows from the outside inwards through the filter elements. This design produces a much higher concentration of the outgoing coarse reject, e.g. 3 – 5% for pulp suspensions.

As in the design with the liquid flowing from the inside out, the filter is equipped with only one seal between the filter rotor and filter tank.

EXAMPLE OF SYSTEM DELIVERY FOR RAW WATER TREATMENT.

THE RAW WATER IS PRE-FILTERED IN THE DYNA DISC DISC FILTER BEFORE BEING CHEMICALLY TREATED IN THE DYNA SAND FILTER. THE SLUDGE FROM THE DYNA SAND FILTER IS SEPARATED AND CONCENTRATED IN A JOHNSON LAMELLA SEPARATOR. THE SYSTEM DELIVERS HIGH-GRADE PROCESSED WATER, WITH THE LEAST POSSIBLE AMOUNT OF REJECT.
Nordic Water Products AB provides equipment and systems for water and wastewater treatment to process industries and public utilities. Our headquarter is located in Göteborg on the Swedish west coast. We have offices and service units in Nynäshamn, Mariestad, Sala, Klippan and Hanhals. The products are distributed worldwide through a network of representatives and agents.

Our products represent the state of the art in the water industry. The product line includes DynaSand Continuous Sand Filter, DynaDisc Filter, Lamella Separator, MEVA Fine Bar Screens, Screw Wash Presses, Grit Washers and Sludge Thickeners, Zickert Sludge Scrapers and equipment for settling tanks.