1. Description

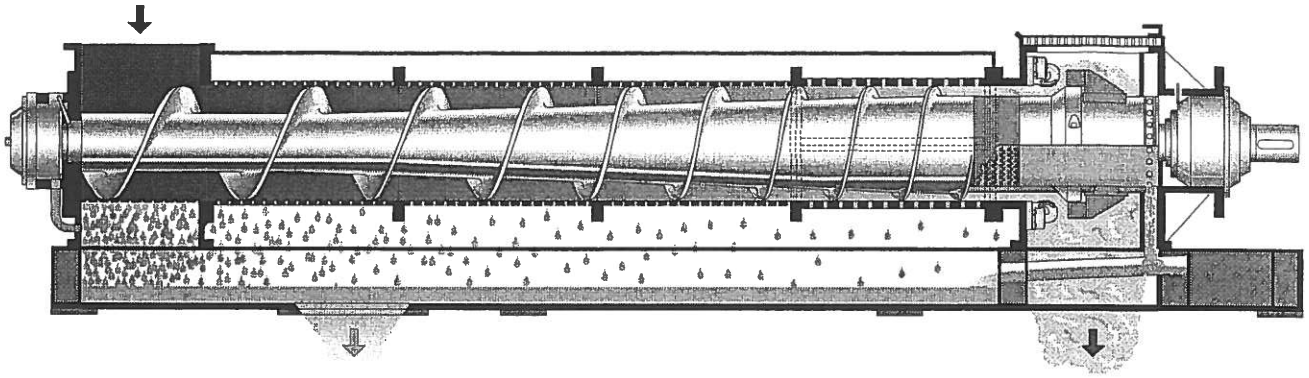

Figure 1 - Kvaerner Screw Press - Section

In this section, the general design concepts, nominal specifications, and the basic operating principles of the standard version Kværner Screw Press, are presented.

For special applications, and where customer specified design is involved, certain details may differ from the standard version of the Kværner Screw Press. Such details are described separately as required

1.1. General Design

The Kværner Screw Press consists of cylindrical screens supported by heavy duty houses at both ends of a rigid frame. An internal screw compresses and dewaters the pulp as it is conveyed from the inlet to the outlet house.

The type designation of the SP-series screw presses includes a specification of size and model. Thus, the screen cylinder of the SP 70 press has an inside diameter of 70 cm. The length and other model features are specified by letters.

For example, a press with three cylindrical screen sections is a long model (L) and with four sections it is a super-long model (SL).

The following types of the Kværner Screw Press are manufactured as standard versions.

Table 1 - Nominal Specifications

Type	Height mm	Length mm	Width Mm	Weight kg	Capacity t/day
SP 23	635	2535	660	970	20
SP 32L	910	3955	950	2600	60
SP 45L	1030	4160	950	3200	120
SP 45SL	1030	4910	950	3700	120
SP 70L	1415	6460	1420	10200	300
SP 70SL	1415	7660	1420	11300	300
SP100L	1795	7840	1680	14700	500
SP100SL	1795	9340	1680	16600	500
SP150L	2750	9760	2245	31000	1000
SP150SL	2750	11760	2245	33000	1000

The Kværner Screw Press is also available in many special designs and versions for optimizing particular applications. These include presses with non-standard screen hole diameter and/or open area and anti-rotation devices ("breaker bars"). Note that all wet parts, including cover, are manufactured in high-grade stainless steel.

The general design of the Kværner Screw Press is discussed in the following with reference to the four assembly units; base frame assembly, screen system, press screw assembly and counterpressure system.

1.2. Base Frame Assembly

The base frame assembly includes the base frame, the in- and outlet houses and the screen cover.

The heavy duty beam frame supports the screw press. Built into this frame is a trough that collects filtrate water (backwater) from the entire screen system. The frame is designed to be bolted down to either steel or concrete foundations.

The inlet and outlet house consist of an upper and a lower section connected by a horizontal flange. (The inlet and outlet houses of the smaller size presses are cast as a single unit). On one side is a flange for the inlet bearing and on the other a flange for the cylindrical screen sections.

The pulp outlet opening in the outlet house is rectangular. One lid on the top and two lids on the sides (large presses only) allow inspection and access to the counterpressure system.

The screen cover is supported by the frame beams and the inlet and outlet houses. There are inspection windows on both sides.

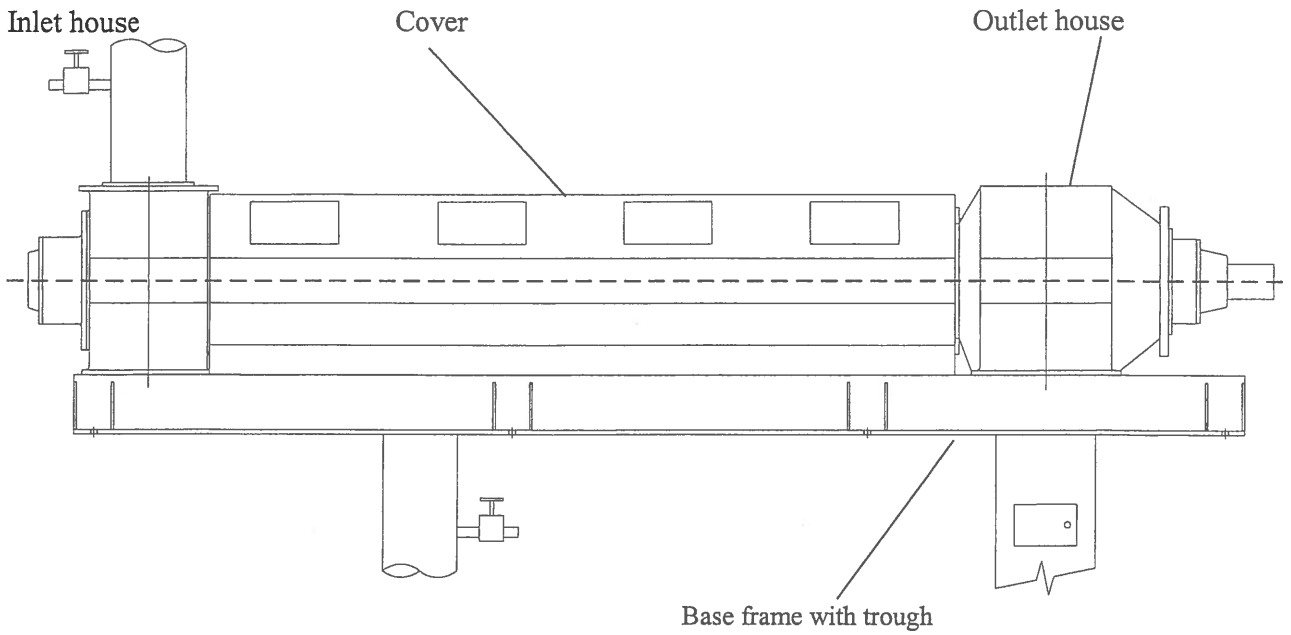

Figure 2 - Base Frame Assembly

1.3. Screen System

The screen system includes the inlet house screen, the cylindrical screen sections, and the screw stem screen.

The inlet house screen consist in a screen plate that is shaped into a half cylinder and welded into the lower part of the inlet house.

The first of the cylindrical screens operates at relatively low pressure. The L- and SL-models have one or two additional low pressure screen sections. These screens are made of a thick stainless steel plate that is rolled into a cylinder, and seam welded. Both ends have specially designed flanged connections.

For some applications, a medium pressure section with a heavy duty mantle (backing shell) is provided for additional rigidity.

The final screen section operates at high pressure. The screen plates in this section are supported by a heavy duty coarsely perforated mantle (backing shell). The mantle is a cylinder with flanges at both ends and is divided in two halves along a horizontal flange. The screen plate segments of each half are retained by axial locking/anti-rotation bars, or attached to the mantle screen by means of screws.

A screen plate is also provided on the screw stem in the high pressure section, partly within the outlet house. This screen allows inwards dewatering of the pulp, into the hollow screw. The water discharges into a chamber in the outlet house, and is piped back to the base frame trough.

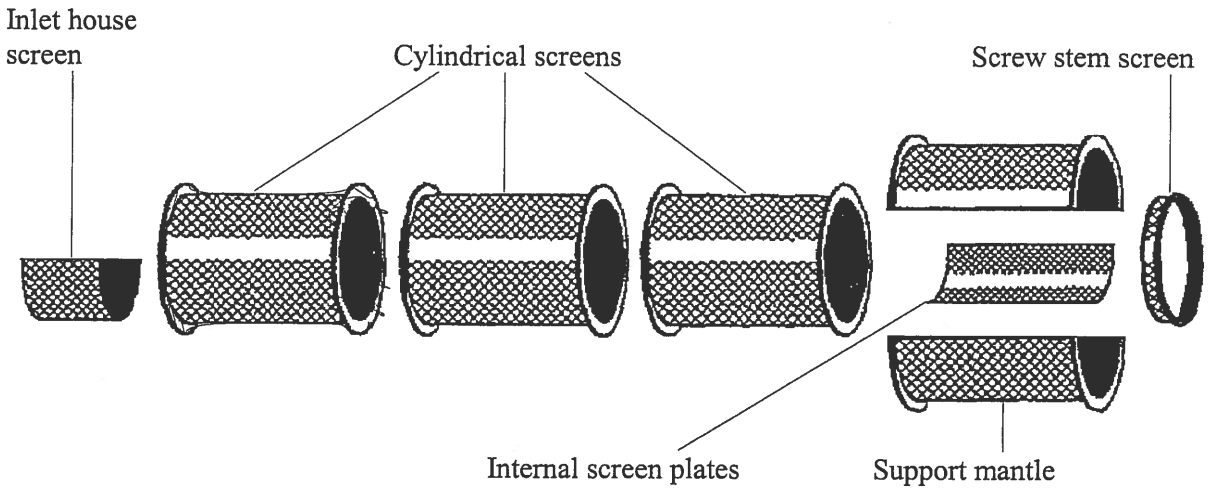

Figure 3 - Screen system

1.4. Press Screw Assembly

The press screw assembly includes the press screw, the inlet and outlet bearing assemblies, and the counterpressure cone with shredder arms.

The volume between the screw flights (wings) decreases progressively as a result of the increasing screw diameter and the decreasing flight pitch. The edges of the screw flights in the high pressure section is covered with a wear resistant hard metal. The part of the screw that passes through the outlet house has shredder arms that break up the pulp cake before discharge from the press.

The inlet end of the screw is supported by a heavy duty spherical roller bearing assembly. This bearing is protected from the pulp by a lantern water seal arrangement with seals that release into the inlet house. The bearing at the outlet end is a heavy duty bearing system designed for thrust in both directions and radial loads. This bearing is protected by seals and open space.

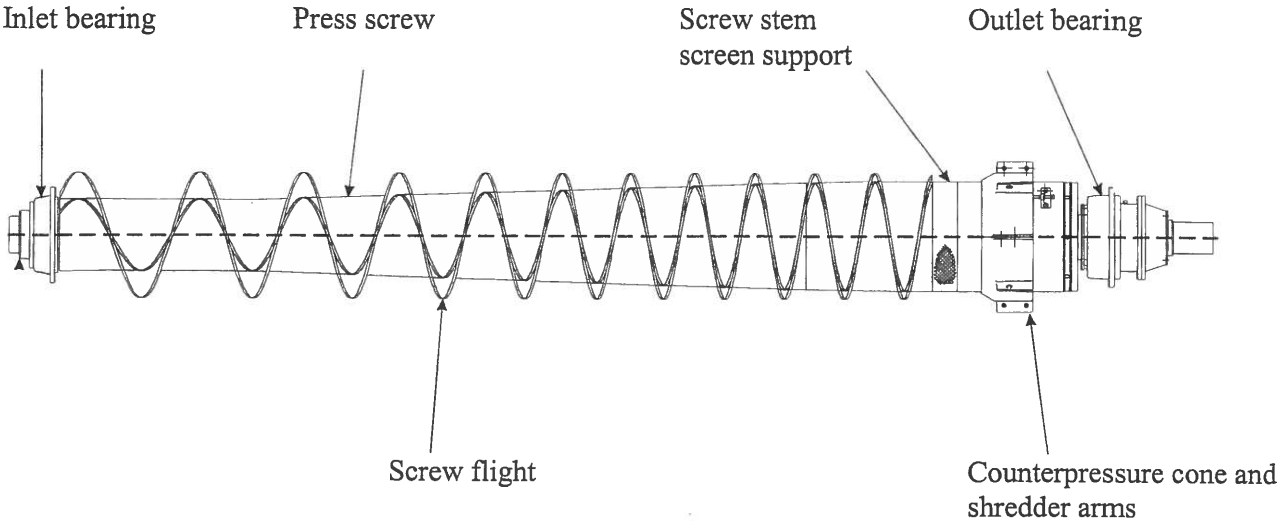

Figure 4 - Press screw

1.5. Counterpressure System (Not applicable)

The counterpressure system provides a controlled resistance to the flow of pulps out of the screw press. The system consists of two parts, one active (movable) and one fixed. The active part is a set of pneumatically actuated flaps that are positioned around the annular opening between the screw stem and the screen in the outlet house (discharge nozzle).

The fixed part is a cone clamped onto the screw stem. The cone position is set manually.

1.6. Principle of Operation

Basically, the Kværner Screw Press is a conveyor screw rotating inside a screen cylinder. Since the volume between the screw flights and the screen cylinder decreases progressively, the pulp suspension will be subjected to increasing pressure that forces water (liquor) out through the screen plates while the fibrous material is retained.

The friction between the pulp and the screen is higher than between the pulp and the screw. This prevents the pulp from rotating with the screw and thus the screw forces the pulp forward towards the outlet. To enhance the effect of friction, anti-rotation devices are used in critical areas.

Control of the pressure and stabilization of the consistency and flow of dewatered pulp as it discharges from the screen sections into the outlet house is highly important. To achieve this, a "plug" of pulp is formed in the last part of the screw where it is restrained by the counterpressure system. In addition, the screw stem is provided with a screen in this area for inwards dewatering.

The screens are cleaned by the screw flights. A wad of high consistency pulp forms in front of the screw flight, and is forced along the inside of the screens. The edge of the screw flights has a taper to prevent wedging between the flights and the screens. The screen holes are drilled conical with the smaller openings on the pulp side to prevent accumulation of fibre and plugging of the holes.

The water removal efficiency is a function of the time and the pressure that is applied to the pulp suspension. It is therefore important that the press screw is designed in such a way that the pulp is under a continuous pressure which increases in proportion to the increasing ability of the pulp to sustain it. This is achieved by a carefully designed tapered screw stem with variable flight pitch optimized for specific applications.

For difficult applications, variable speed drives with control systems based on torque and/or inlet pressure can offer a better opportunity for optimization than fixed speed drives. Thus, the choice of drive system (mechanical, hydraulic, frequency converter) is also important in the selection of a complete system for a particular application.