The effective filtration area affects the flow rate, while the increment of the retention time affects the final dryness.

For this reason the WR "Greenland" belt press filter was designed to achieve the optimum ratio between effective filtration area (that is the surface where water removal actually takes place) and the pressing time.

The effective filtration areas are expressed in m2 of the rubber coated rolls.

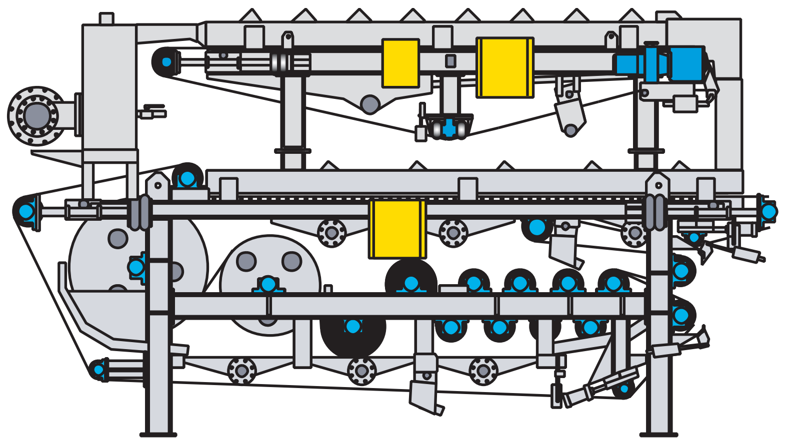
Model	1200	1600	2000	2500	3000
WR 7	17.8	24.8	30.2	38.2	48.4
WR 9	19.9	26.8	33.5	43.0	53.5
WR 11	21.0	28.3	35.4	45.4	57.0
WR 15	24.1	32.3	40.5	52.7	67.4

This is how we calculate the effective filtration areas:

Drainage zone: the calculation of the working area is based on the effective drainage length and on the effective width (usually the effective width of all the belt press filters is approx. 100 mm shorter than the total belt width). Some machines utilize pre-thickening by rotation drum; in this case the working area is the diameter times the length of the drum, giving 25% of the total area.
Low pressure or wedge zone: the calculation of the working area is based on the effective pressure length times the effective width (equal to the working width). For this zone, it is considered the area of the two belts (upper and lower). In the case of machines with perforated rolls (instead of wedge zone) with a diameter over one meter, the working area is the diameter of the roll, the winding angle and the working width. The working area of the belt external to the roll is a mathematical one, while for the belt in contact with the perforated roll it is calculated by the free surface of the apertures of the roll wall.
High pressure or "S" pressure zone: the calculation of the working area is based on the roll diameter, the winding angle and the working width. In the case of rolls with an integral wall, the working area is the one of the belt external to the roll, while for perforated rolls there is also the addition of the internal belt considering the free surface of the apertures of the roll wall. The belt area between two subsequent rolls is not taken into account.

Cascade System

When high hydraulic flow rates of sludge need to be treated, the drainage zone can be extended by installing a thickening stage before the actual dewatering process.
A continuous belt table (Gravity Table) is fitted before the Greenland in the "Cascade" configuration



TECHNICAL DATA

WR 9 Model		**1200**	**1600**	**2000**	**2500**	**3000**
Working width	mm	1200	1600	2000	2500	3000
Installed power	kW	2x1.1	2x1.5	2x1.5	2x2.2	2x2.2
Empty weight	kg	7450	8600	11400	15300	21500
Overall dimensions *(mixer included)*	m	8.0x2.9x2.7	8.2x3.4x2.8	8.2x3.8x2.8	9.0x4.0x3.0	9.4x4.6x3.1

Not binding data. The Company is allowed to make any modification or improve the unit without notice.
The machine is without safety protections (CE Mark) to show technical details.

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DPL 010/E/06-1107

BPF WR "GREENLAND"

High solids belt press filter

Water Technologies

SIEMENS

The aim in designing the Greenland was to produce a belt press filter with performance decidedly better than any other with this dewatering technology.

We have succeeded! The Greenland is able to handle flow rates 50% higher and 5 points more in the solid content of the cake than any other belt press filter, with the same belt working width.

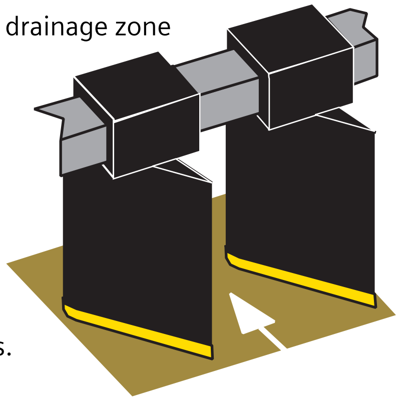
1

Proper chemical conditioning is necessary to reach highest dewatering performance. This reaction requires both an efficient mixing between the sludge and the reagent solution and a sufficient time to allow flocculation before the dewatering stages. This process is carried out in a vertical mixer which contains a variable speed rotating shaft with stirring blades to enhance the mixing action. The mixer volume ensures the necessary reaction time. When flocculated, the sludge comes out at the top and is discharged into the feeding box.

2

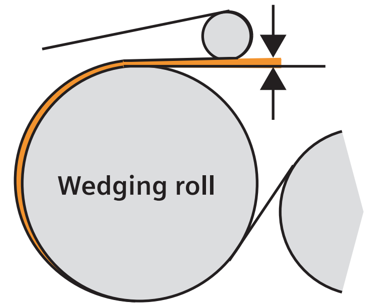
The machine configuration features a particularly long drainage zone which can handle high hydraulic flow rates even for a "difficult" sludge. In addition, the filtering belt is supported by polyethylene bars which break the surface tension and help the drainage by gravity.

Parallel rows of vertical plows can be fitted to further improve the pre-dewatering efficiency. Their shapes help the water drainage. They are made of a plastic material, with replaceable shoes of anti-wear plastic. The plows are assembled on stainless steel bars.



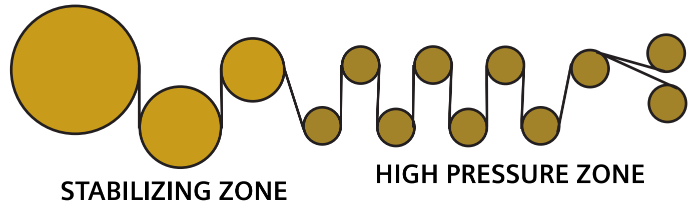
3

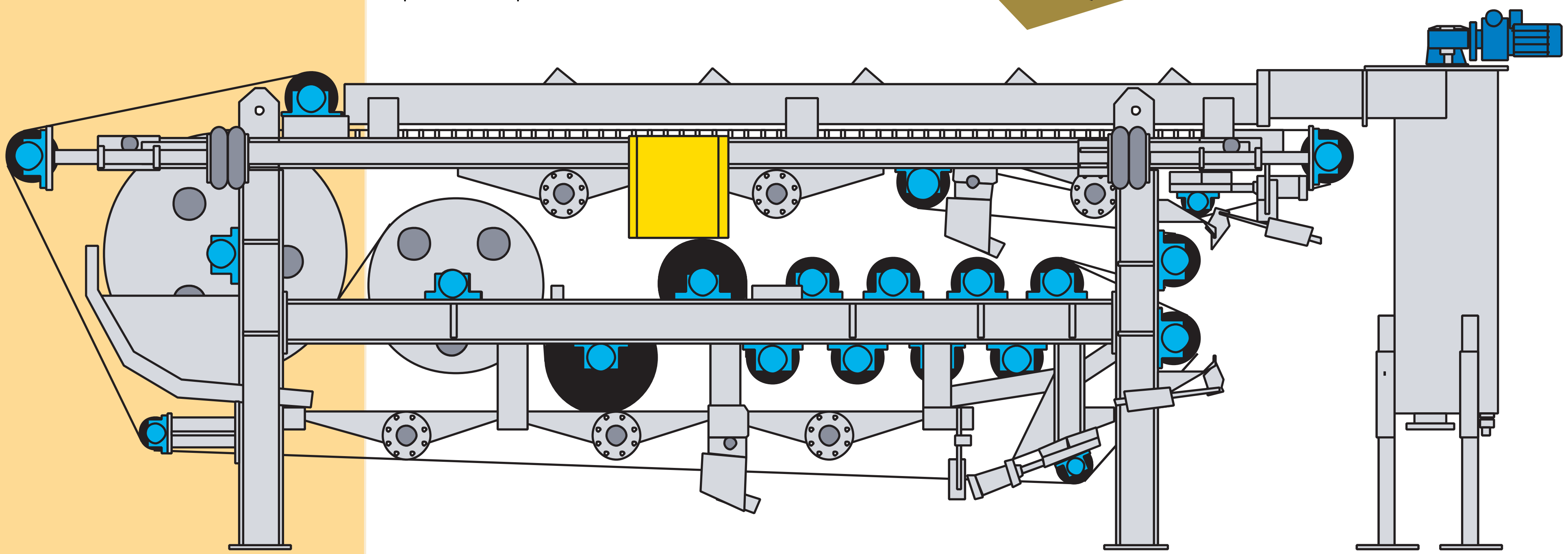
The low pressure zone consists of an innovative roll system (wedging roll). This large diameter (1200 mm) perforated roll exerts a gentle and even pressure (typically approx 0.10-0.15 kg/cm2) over the sludge for a long retention time and causes further separation of the water. Roll parts in contact with the belt, are made of perforated sheet (either in stainless steel, or hot dip galvanized carbon steel or in rilsan coated carbon steel).
The separated water is removed through the belts.



4

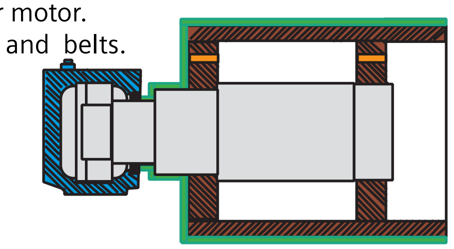
The high pressure zone consists of a sequence of rolls (from 5 up to 15). The two belts containing the sludge wind round them in "S" shaped configuration. The initial four rolls, the first being the wedge roll described above, feature progressively decreasing diameters along the working direction, to gradually increase the pressure on the sludge, which gives a stabilizing effect.
All the following pressure rolls are of the same diameter and increase the retention time of the sludge in the high pressure zone, with a consequent rise in final dryness. The number of rolls in this last stage can vary depending on the application.





5

The mechanical stress over the rolls is reduced to a minimum by sizing them to a deflection below 0.6 mm/m at the middle of the roll. This is with a continuous operation with 9 kg/cm linear tension on the belts, 4.5 m/min belt speed and torque due to gear motor.
This gives a longer life of the rolls, bearings and belts.
The bearings are selected to guarantee a life of 100.000 hours. The rolls (apart from the perforated ones) are fully coated, including journals and stubs, either by 5 mm Buna-N rubber (with 85±5 shore A hardness) or by Rilsan®.



6

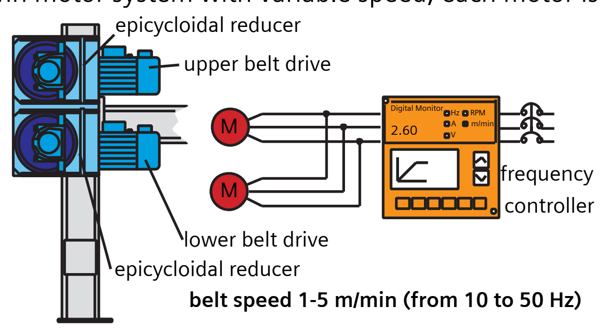
The frame is designed to guarantee steady long term performance and reliability of the machine. Basing the calculation on the method of the boundary elements, the maximum stress is lower than 1/4 of the material yield strength and the maximum deflection is lower than 2 mm. The structural beams are in Fe 510 (carbon steel) with a high moment of inertia I.

Model	WR 1200-2000		WR 2500		WR 3000	
Beam	HEB	I cm4	HEB	I cm4	HEB	I cm4
Drainage zone	140	1510	200	5700	200	5700
Pressure zone	200	5700	200	5700	240	11260

The frame is completely hot dip galvanized to 70 micron minimum thickeness. Fasteners are made of A2 stainless steel (AISI 304).

8

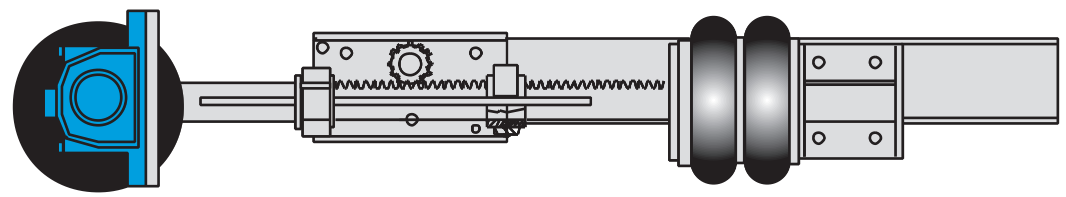
The belt motion is carried out by a twin motor system with variable speed, each motor is connected to a traction roll, independent for the upper and the lower belt. This allows a constant torque on the belts with consequent stress reduction and life increase.



Great care was spent to minimize the spare parts costs, e.g.: upper and lower belt are equal in length.

7

Belt tension is kept and controlled pneumatically. Increasing the tension raises the dewatering pressure applied both on the low and high pressure zones. The air bellows have the advantage of being elastic, thus transmitting the forces to the belts smoothly; they are joined to tensioning rolls by stainless steel rack shafts connected across the machine width to have parallel motion.



This system allows the belt tension to vary up to 10 kg/cm and to adjust it without stopping the machine.