

SLUDGE THICKENING AND DEWATERING LINES

Vanex designs, delivers and produces components for dewatering and thickening lines mainly for WWTP and for various technological processes.

SLUDGE DAWATERING

One very important part of various technological processes is the dewatering and thickening of sludge and of other media.

The pressing on belt presses is one traditional, but very efficient method for sludge dewatering.

Company Vanex produces classical belt presses of various dimensions achieving parameters according to enclosed table.

BELT PRESS TYPE	BELT PRESS DIMENSIONS (L x W x H)	WEIGHT	FILTER BELT WIDTH	INFORMATIVE PERFORMANCE	
				kg DS/h	m ³ /h (4% SLUDGE INLET)
VX - GORO 6V	3,20 x 1,38 x 1,85	950	0,6	20 - 120	0,5 - 3,0
VX - GORO 8V	3,20 x 1,58 x 1,85	1 100	0,8	30 - 200	0,8 - 5,0
VX - GORO 10V	3,20 x 1,78 x 1,85	1 250	1,0	40 - 280	1,0 - 7,0
VX - GORO 12V	3,20 x 1,98 x 1,85	1 350	1,2	50 - 344	1,2 - 8,6
VX - 6A	3,35 x 1,61 x 1,80	1 150	0,6	60 - 200	1,5 - 5,0
VX - 8A	3,35 x 1,81 x 1,80	1 520	0,8	100 - 320	2,5 - 8,0
VX - 6N	4,62 x 1,75 x 1,90	1 350	0,6	80 - 240	2,0 - 6,0
VX - 8N	4,62 x 1,95 x 1,90	1 650	0,8	160 - 400	4,0 - 10,0
VX - 10N	4,62 x 2,15 x 1,90	2 150	1,0	220 - 520	5,5 - 13,0
VX - 12N	4,62 x 2,35 x 1,90	2 580	1,2	280 - 600	7,0 - 15,0
VX - 15N	4,98 x 2,39 x 2,36	7 000	1,5	360 - 800	9,0 - 20,0
VX - 20N	4,98 x 2,89 x 2,36	8 000	2,0	500 - 1 120	12,5 - 28,0

The expected dry matter output from a belt press is 16 – 30 % (municipal sludge).

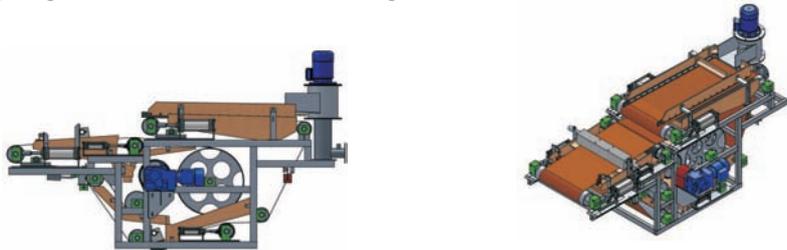
The performance and quality parameters of a line depend mainly on the physical features of the sludge, on the type of used flocculation medium, on the sieve and on the quality of the operating personnel.

Another possibility how to increase the dry matter output, especially in pressing of industrial sludge, is to use a special high-pressure press - type VX-VT. - used mainly in paper industry.

BELT PRESSES VX - GORO 6V ÷ 12V

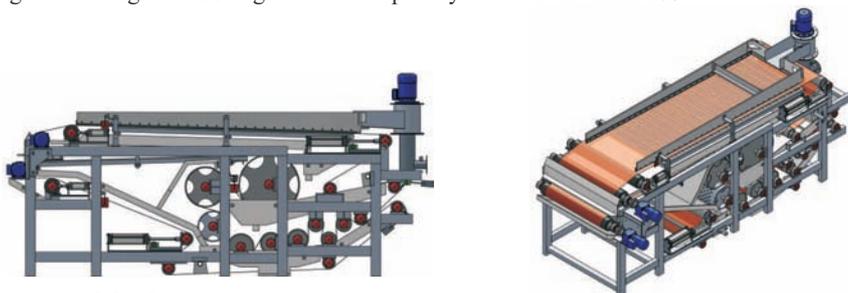
Vanex developed for sludge dewatering inf bigger villages or smaller towns the belt press VX - GORO. This belt press is intended for localities with connection about 1 000 – 5 000 EO.

The complete press is made of stainless steel and plastic materials - the corrosion is eliminated.



BELT PRESSES VX - 6 ÷ 12N

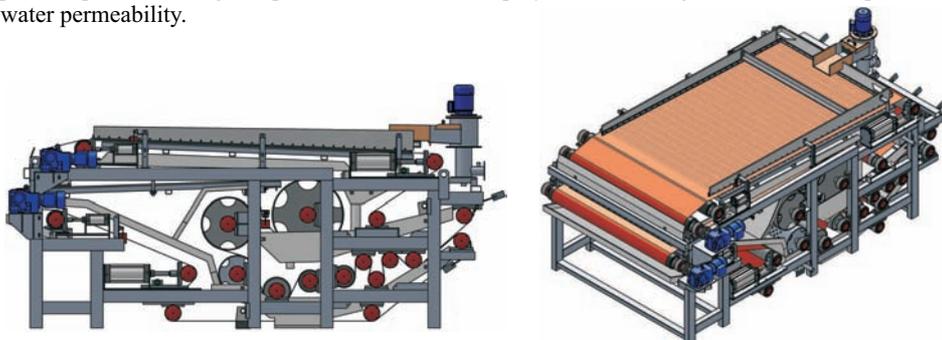
The upper sieve also has a function of a thickener because the sludge getting through this sieve on the clean bottom sieve is at the same time turned over. This solution enables extending the gravitation sector for water separation to circa 6m (except for the press VX - GORO). This technical solution enables pressing of inhomogeneous sludge with low input dry matter even under 1%.



BELT PRESSES VX - 15 ÷ 20N

- the biggest presses regarding the size and capacity.

One of the main characteristics of VX belt presses is that corrodible material such as gutters, hoppers, covers etc. are made of polypropylene. The frame and another parts are made of stainless steel. The surface treatment of the cylinders is metallized with 100 micrometers of zinc. This is coated with 2 layers of two-component epoxide coating indurated with polyamide with high content of solid particles and low water permeability.



Following media are necessary for the operation of a belt press (they can be provided by other components of the line):

- compressed air circa 0,60 MPa, 0,5 m³ / h,
- pressure water for washing the filter sieves circa 6 - 16 m³ / h, pressure circa 0,6 - 0,8 Mpa,
- power system 3/N/PE/AC 400/230 V 50 Hz TN S, installed power capacity: 2,25 kW (VX - GORO), 2,00kW (VX - 6 ÷ 12N), 3,00 kW (VX - 15 ÷ 20N) including flocculation unit,
- flocculation medium solution for enhanced separation efficiency of the belt press.

The line is recommended to be equipped against damage with following locking functions:

- ▶ sludge shortness (possible damage of the pump),
- ▶ shortness of flocculation medium (no sludge flocculation, flowing the sludge over and through the filter sieves),
- ▶ insufficient pressure in the compressed air system (the possibility of deviating the filter belts and of their destruction),
- ▶ monitoring of filter belts deviation (the second way of securing the filter sieves against damage),
- ▶ engine failure.

The main construction parts of the belt presses are:

- frame,
- air system,
- cylinders,
- gutters,
- electricity system,
- hoppers,
- filter belts (2 pcs),
- filtrate lead-in ,
- propulsion unit.

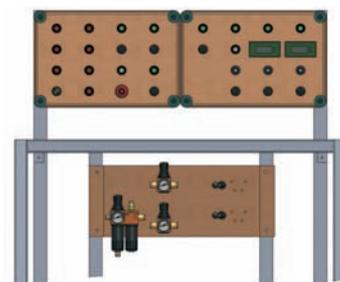
The speed of filter belts, high speed mixer, sludge pump, dosing pump of flocculant solution is regulated by the frequency converter.

Regulation and tension of the filter belts is ensured through the air system.

The technological line is operated from the control panel VX-OP, which is recommended to locate on the operating platform of the belt press. From this panel the whole pressing process can be easily checked and controlled by the operating personnel.

The sludge homogenization is recommended before its pressing to achieve unvarying sludge quality during the pressing process. This way the necessity for intervention of the operating personnel into the pressing process is reduced.

All line components are supplied with the electric power from the **main distributor VX-R**, which is recommended to be located in a separate room.



The indication of the pumped amount of the sludge and flocculant solution can be seen on the display of the control panel VX-OP (indirect measurement - from the pump speed), eventually it can be sent to the control computer center.

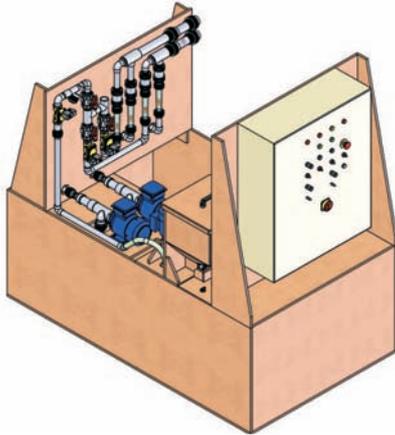
The flocculation medium solution is added into the sludge before high speed mixer.

The flocculation medium solution is prepared in an automatic cycle in the **unit for chemicals preparation VX-CHHXXX-DA** without any necessity for checking and controlling the cycle.

The responsibility of the operating personnel is reduced to supplying the storage bin with powdery flocculation medium or to the change of the emulsion tank after horn sounds.

The amount of powdery flocculation medium in the storage bin is read through capacitive stock level indicator. In case of insufficient amount of flocculation medium the operating personnel is informed by a horn.

The solution concentration is set up through a potentiometer in the separate distributor, that is placed on holders on the front side of VX - CHHXXX-DA unit.



The dosage of pumped solution can be regulated through a frequency converter by the potentiometer from the press from control panel VX-OP.

The thinning rate can be read on the implemented rotameters and can be regulated through the slide valve and through engine revolutions of the dosing pump.

Unit for chemical preparation consist of two polypropylene tanks placed next to each other. The solution is automatic pumped from dissolving to storage tank.

Unit Dimensions (m)			Weight (kg)
Length	Width	Height	
2,0	1,2	1,8	485

PARAMETERS		
Expected Concentration Range (%)	0,1	1,0
Informative Mixing Performance (m ³ .h ⁻¹)	0,7	0,5

UNITS ADVANTAGES

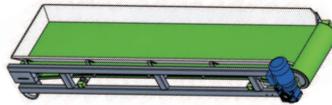
- own distributor, which considerably reduces the costs related to electrical installation of the unit,
- the continuous remote control of the pump performance during the operation and automatic preparation of flocculation medium solution
- enables optimal setting of the flocculation medium charge (flocculation medium savings) and simplifies the operation of the whole line,
- the dosing pump performance can be regulated also with electric current 4 – 20 mA (the possibility for pump performance control from the governing control system),
- the possibility for displaying of the pumped solution amount on the display of the control panel or on the PC-screen.

Washing water is recommended to be pumped through the **storage tank VX - ZN** using the high pressure pumps. Stainless steel sieve that captures

the dirt from feeding water is mounted in this tank. The tank construction enables simple and efficient cleaning this sieve through implemented washing unit.

Above mentioned dirt could damage the pump or foul washing nozzles in the belt press. The removal of the filter press cake is recommended to do by belt conveyers of our production. The length of **VX-PD** belt conveyers can be adapted according to the customer's requirements in different lengths from 2,5 to circa 20 m. The frame of belt conveyer is made of stainless steel.

Another possibility of sludge cake conveying is a usage of scroll conveyers. However, the scroll conveyers with their mixing properties optically reduce dry matter output of sludge cake. They are used mainly in lines with hygienization of the filter press cake with powdery lime, for example in the sludge application in agriculture.



MOBILE LINES FOR SLUDGE DRAINING

Mobile lines have all the line components built-in on truck chassis, eventually on a separate trailer. They can also be placed into a container.

Mobile lines are suitable mainly for:

- municipal and industrial WWTP in case that sludge must be relocated to several places,
- WWTP with lower sludge production where the costs for one stationary sludge draining line would exceed financial sources. The inputs and outputs for needed media are arranged with regard to quick putting of the mobile line in operation.

SLUDGE THICKENING

The belt thickeners are machines designed for continuous thickening of various sludge types. During thickening process the free liquid component - filtrate - is separated from the thickened sludge.

In most cases the flocculant solution must be added to the thickened sludge before high speed mixer (the speed is adjustable), which ensures a perfect blending solution to the sludge.

The main construction is made of polypropylen or stainless steel with covering that is divided in the inlet part, dewatering part, outlet part of the filtrate and tank of the thickened sludge.

Sludge is usually dosed into the thickener via screw pump. The possibility for changing the delivered sludge volume and flocculant solution volume is ensured via frequency converter that is controlled through potentiometer on the control panel VX-OPZ. If it is required the control panel VX-OPZ can be use as main distributor VX-RZ.

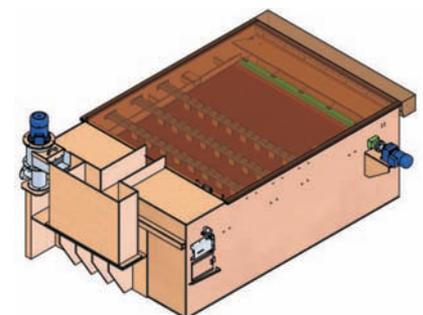
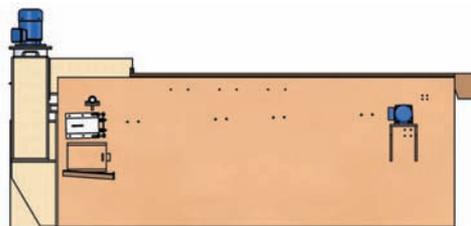
The thickening sludge is scrapped from the filter belt by plastic scrapper.

Type	Length (m)	Width (m)	Height (m)	Weight (kg)	Input (kW)
VX - PAZA 6	3,94	1,26	1,26	430	2,05
VX - PAZA 8	3,94	1,46	1,26	470	2,05
VX - PAZA 10	3,94	1,66	1,26	510	2,05
VX - PAZA 12	3,94	1,86	1,26	550	2,05
VX - PAZA 15	3,94	2,18	1,26	595	2,30
VX - PAZA 20	3,94	2,70	1,26	680	2,30
VX - PAZA 22	3,94	2,90	1,26	720	2,30

Type	Input volume (m ³ /h)	DS		Quality of the filtrate (mg.l ⁻¹ D.S.)
		Input DS (%)	Output DS (%)	
VX - PAZA 6	5 - 15	0,5 - 1,0	3,0 - 7,0	100 - 200
VX - PAZA 8	15 - 25			
VX - PAZA 10	17 - 30			
VX - PAZA 12	19 - 34			
VX - PAZA 15	25 - 40			
VX - PAZA 20	30 - 50			
VX - PAZA 22	33 - 55			

The requirements for the operation of the belt thickener are:

- suitable place for installation of the thickening line,
- a reservoir for accumulation of thickened sludge (a plastic can be included as part of delivery),
- to solve the outlet from thickener by sludge pump or gravitational,
- sludge supply,
- flocculant,
- pressure water for washing the filter sieves circa 4-10 m³/hod, pressure cca 5-6 bar,
- power system 3/N/PE AC 400/230 V, 50 Hz.



Cylinders, washing unit, high speed mixer and connection material is made of stainless steel.

The performance data are valid for the use of emulsion flocculant.

Belt thickener does not require an air system (regulation of belt filter is secured by a different way). Vanex configures its thickeners according to requirements and circumstances of the concrete locality.

REFERENCES

VANEX since its beginning (1992), has been developing and continuously improving belt presses and other additional components of the lines.

Vanex has, up to now; delivered and implemented its products in more than 440 localities to countries such as Slovakia, Czech Republic, Hungaria, Russia, Belorussia, Bulgaria, Lithuania, Latvia, Austria, Germany, Ukraine, Poland, Serbia and Syria.

For more information about our company, our products and references see our web page www.vanex.sk