



**FILTRES
PHILIPPE®**

Horizontal Vacuum Belt Filter

Technical offer n° 731693_02rev5

Project : DCP production

For EUROCHEM

22/05/2025

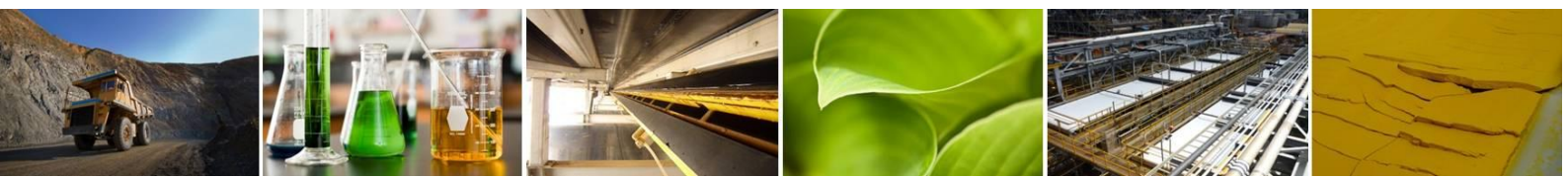
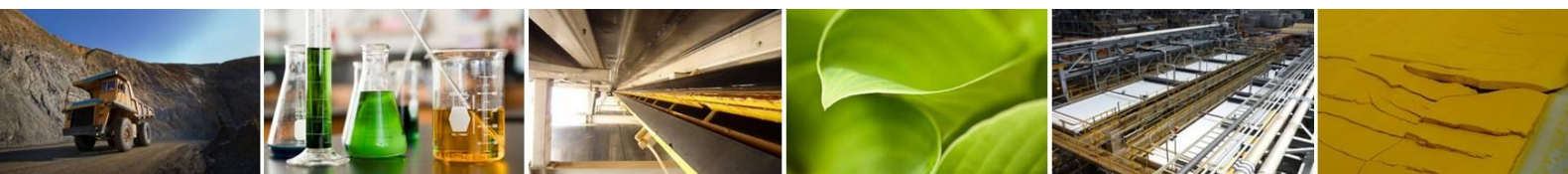


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I. YOUR REQUIREMENTS

You are planning to build an extension of your factory, with DCP and Gypsum production. So, you requested HASLER to design the appropriate vacuum belt filters that will suit your specific needs.



We propose the following design : it is reliable, efficient and proven filtration system that will handle your production requirements.

What are you waiting for ?

Chlorine content in gypsum: Maximum 0.2% on dried cake at 45°C.

Free moisture in gypsum cake: maximum 25%.

Thickness of the cake on the belt: between 15 and 20 mm.

Maximum water consumption: 42.36 m³/h

Filtration tests were performed by PRAYON at semi-industrial scale on Filtre Philippe pilot unit. PRAYON will handle process performances of the modules.

You also indicated the following values for washing:

- 1st and 2nd cake washing (made by counter-current): 62 m³/h.
- 3rd cake washing (made with process water): 40 m³/h.

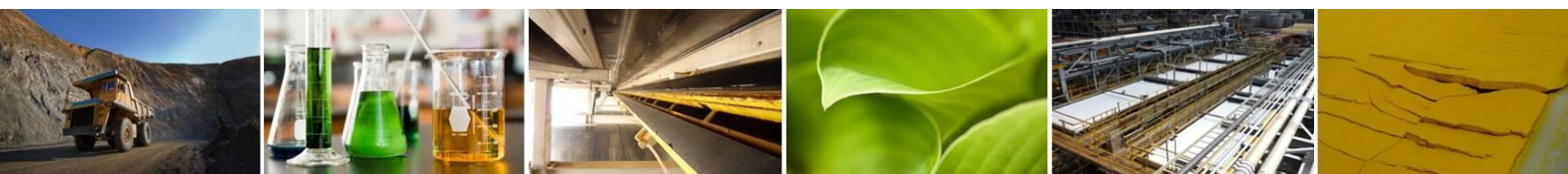
When HASLER performs filtration tests, we calculated our filtration time based on pick-up point (ie moment when liquid outcrop the cake) which makes it impossible to have more water for washing in first steps than with the one that brings the water (for counter-current washing).

So on, we cannot guarantee that this approach will work and we let PRAYON ensure the risk about this point.

Our recommendation is to have as much water for all the washes as for the last one.

Values indicated on this page are nominal flowrates given in datasheets. You can consider +20% as requested by TCC for maximum flowrate.

In order to validate pressure loads indicated in the technical offer for pumps, could you please share with us the planned ISO path of the piping. If this information isn't available at this stage, you'll have to deal with values indicated in our offer.



II. HASLER GROUP SOLUTION



a. A solution optimized for your project

Hasler Group, Prayon, tianchen & Eurochem were in contact last October. The purpose was to qualify suppliers for filtration systems. It turns out that HASLER is the perfect partner to support the client in this project.

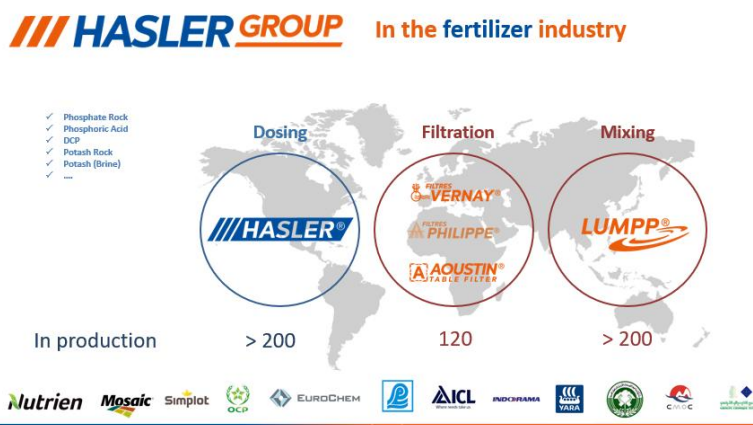
Since that meeting, we collaborated closely with you to define the best solution for your project. We are now in the position to send you here enclosed our best technical offer with the data we collected.

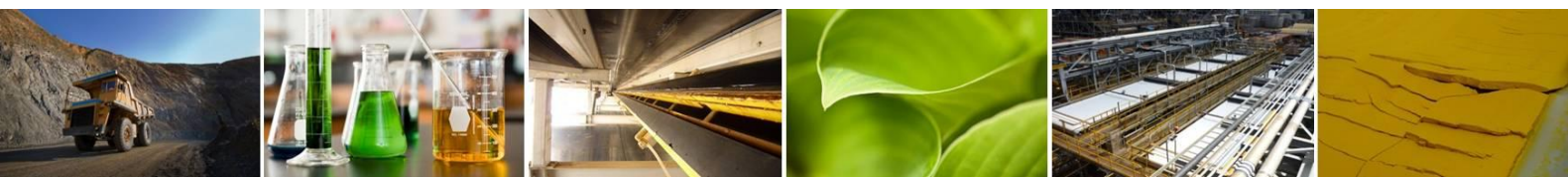
The HASLER Group is a leader in the field of vacuum belt filtration with our brand Filter Philippe, we have many references worldwide and more particularly equipment for fertilizers production.

The layout, the functional control logic and scope of supply have been adapted to your process requirements for your plant. We selected specific material of construction (SVR, Rubber lined carbon steel, ...) for all the parts in contact with the product to prevent and avoid corrosion effects due to the slurry characteristics.

HASLER Group has been working for decades in developing and maintaining a high level of service expertise. During erection and commissioning phasis, our service technicians will supervise and assist your team. Your operational teams will benefit from our expertise and will be quickly efficiently running your unit.

We've selected a 147m² filter (147B42 in our range of equipment), corresponding to the process data provided by PRAYON.





b. Water Consumption aspect

During our meeting in October, Prayon insisted on the importance of water consumption. For this filter, 42.36 m³/h are available at nominal flowrate (50.83 m³/h at maximum flowrate), and we need to operate the filter with that amount. So on, we have implemented several technologies to optimize this water consumption:

- High Pressure Ramp: Replacement of standard cloth washing ramp by high pressure ramp. Due to the high pressure, it will increase washing efficiency and also reduce water consumption.
- Vacuum Pump with complete recirculation: Closed loop in order to not consume any water during functioning.
- Drip pan under the whole filter: Recovery of most of cloth & belt wash and lubrication water for use in washing the cake.

This results in the following water balance:

Inlet water needed to feed TNK 56-670:

- Cloth & Belt washing: 14.83 m³/h
- Lubrication: 1.48 m³/h

Total: 16.31 m³/h

Note: We do not consider water needed for scrubber (CND 56-600) as the water recovered from the scrubber is sent to tank TNK 56-670.

Inlet water for TNK 56-440 (at nominal flowrate):

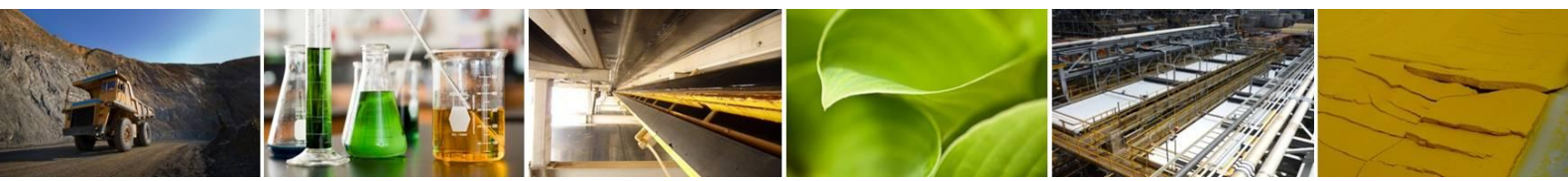
- Process water: 26.05 m³/h (remaining process water)
- Recovery of cloth & Belt Washing and lubrication: 14.68 m³/h

Water available for washing: 40.73 m³/h.

Inlet water for TNK 56-440 (at nominal flowrate):

- Process water: 26.05 m³/h (remaining process water)
- Recovery of cloth & Belt Washing and lubrication: 14.68 m³/h

Water available for washing: 49.2 m³/h.

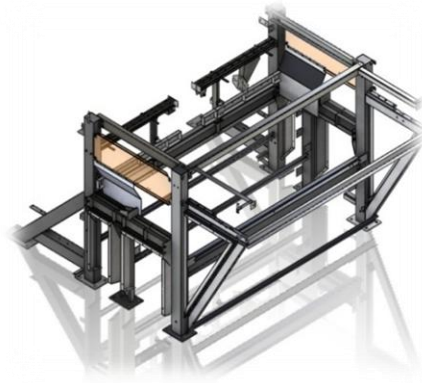


c. Key points of our design

Our equipment is described in technical specifications in part VII of this technical offer.
The main operational advantages of our design are listed here below:

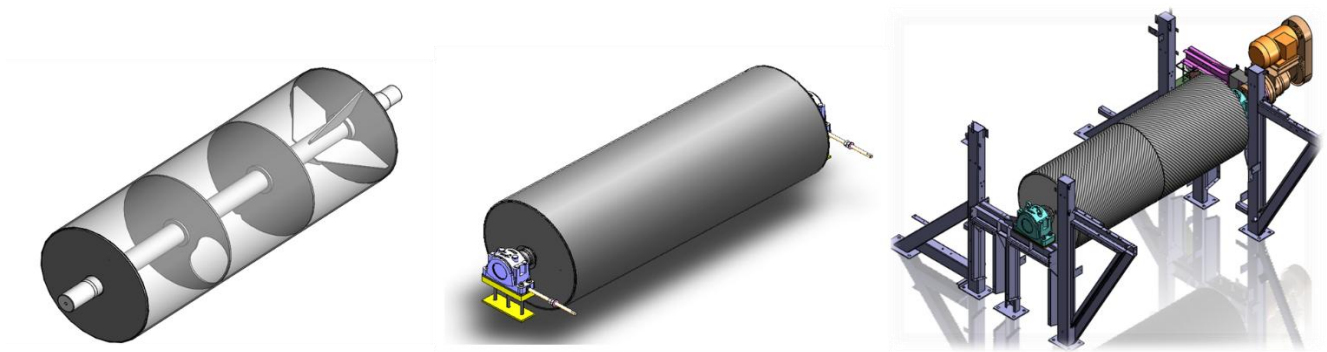


Frame

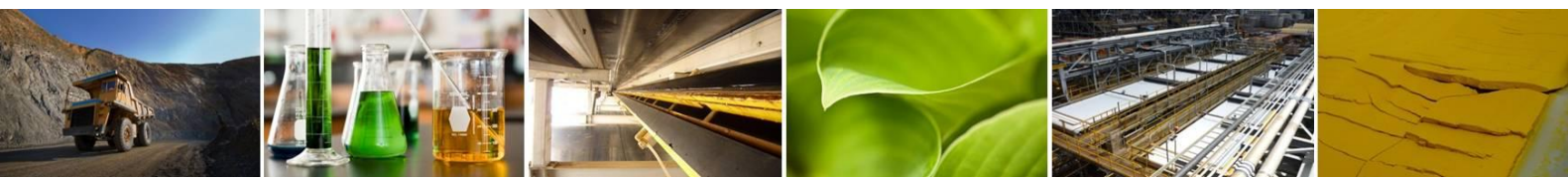


- Frame and internal parts of filter are completely bolted:
 - Easy mounting and unmounting of internal elements of the filter. It also allows to integrate an **endless belt**
 - The frame can be mounted and unmounted **without risking the flatness** of the frame.
- Optimized height between upper part of frame and ground level: **Easy access for maintenance operations**

Drive and head Pulleys



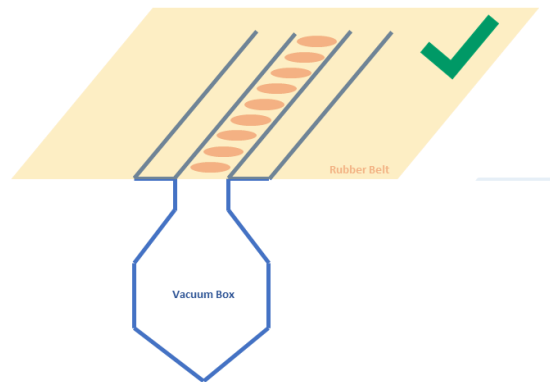
- **High rigidity design** : erases bending phenomenon on external surface
- Rubber lining on drums, flanges, and shaft offering:
 - **Durability of rubber adherence**. It limits the risk of slipping between the belt and the drums
 - Excellent **protection against corrosion** and abrasion.
- Chevron pattern on rubber lining, on drum cylinder
 - **Water evacuation** is optimized to limit belt slipping
 - Increased adherence coefficients between belt and drum

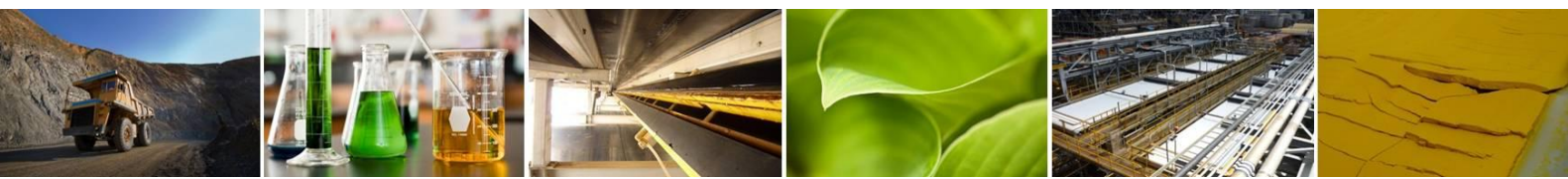


Belt

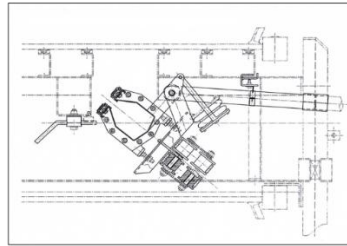


- Stabilizing, edge cutting, grooving and hole punching are done in Hasler Group French factory :
 - Endless belt ready to be installed **without any onsite stabilization**
 - **Holes on belt are perfectly aligned with vacuum box**
- Grooves sloped towards the center of the belt: **Filtrate's flow is optimized**
- Curbs have an "accordion" type profile: **No vacuum loss** and excellent cake and slurry containment



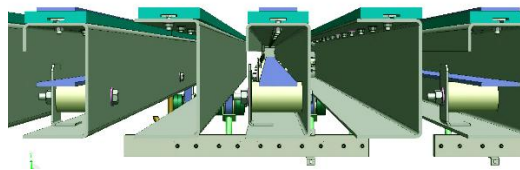


Vacuum box



- Internal movable dams allow **quick and easy set-up** in case you adapt the process
- Opening angle of 60°-65°: **Easy access and maintenance**
- Automatic opening by pneumatic jacks: vacuum box opens and tilts in 45 sec.
Inspection of vacuum box can be done in **under 30 min** without any need of special tools

Support table

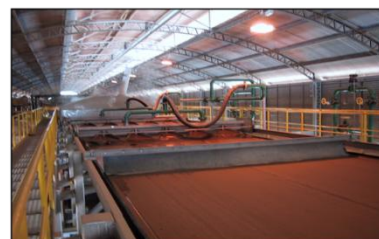


Wear Belt Table support (**Filtres Philippe Patented Design**)

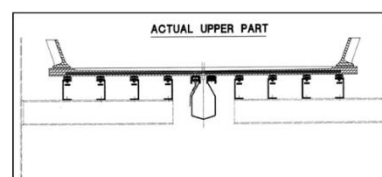
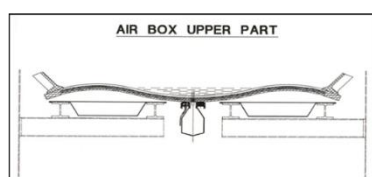
- Excellent flatness (+/- 1mm)
- No friction between table and belt with wear belt design
- **Uniform cake thickness** on all length of filter, **washing efficiency** and **filtrates recovery** are optimized

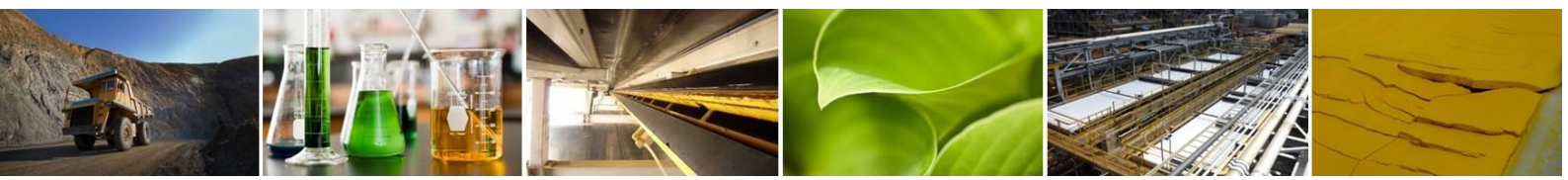


Other's design



Hasler's design





III. A peace of mind solution



- **High availability**, made for continuous processes.

An equipment designed to reduce downtime:

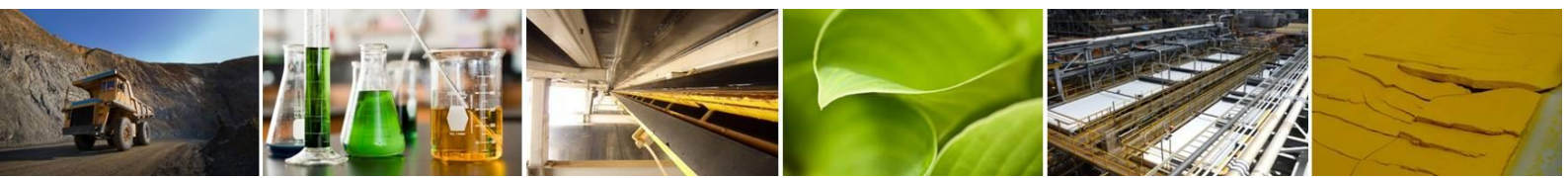
- Easy access to all the parts for **fast maintenance or process flexibility**
 - Vacuum Box **Tilting System**: access under 60 seconds with one operator
 - Belt support: **Wear Strips + Wear Belt** or **Dry Support Table** guaranteeing **low wear part consumption**
 - Fully **automated** (System controlled by PLC, Cloth Guiding & Tensioning Automatic Systems, Automatic Lubrication Units).
-
- **The complete filtration unit is designed to keep operating costs to a minimum:**
 - Low **water** consumption that can be reduced with a high-pressure cloth washing ramp
 - Low **energy** consumption: Variable speed drives, table support systems
 - Low **wear part** consumption: Table support system
 - Low **maintenance**: Fast & Easy Maintenance

IV. A solution that complies with the highest HSE requirements



Your **health & safety** is our concern.

Safety guards are installed around the unit to prevent any risk of accident.



V. HASLER GROUP always with you



At HASLER Group we take time to understand our activity's evolutions and to listen to our customers. Our philosophy is to focus on our customer's needs and to work with them on solutions. Services include:



**Worldwide
Support**

Local support and field engineers available worldwide



**Equipment
Upgrade**

Retrofit, Revamping of « Filtres Philippe » and Competition filtration units



**Laboratory
Tests**

Laboratory Tests in our research centre or at customer's site
Sizing of filtration units



Spare Parts

Fast & Worldwide Supply of high quality OEM spare parts



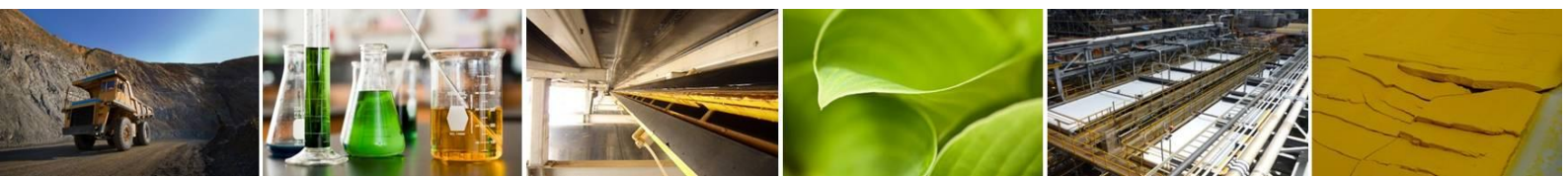
**Process
Optimization**

Process Audits performed by engineers to troubleshoot, debottleneck or optimize the equipment



Training

Training centers, On Site Training and Webinars



VI. A controlled & automated solution



All our equipment are fully automated (System controlled by PLC, complete communication with your DCS)

You will benefit of a Continuous data feedback and traceability system within your DCS.

Our automat would be able to control the filter, and our automation engineering team will help you defining the right functional analysis to control your pilot unit.

In Appendix of our technical description is detailed all functions of our electrical control that we offer.

VII. Technical specification

You will find hereafter the technical specifications of our scope of supply, including the following appendices.

TECHNICAL DESCRIPTION OF PHILIPPE FILTER

Design features
Painting
Limit of supply

COMPLEMENTARY EQUIPMENTS AND SERVICES

Appendix Cloth Ultrasonic welding machine
Appendix Fume Hood & Drip pan
Appendix Filtrate receivers
Appendix Cyclone
Appendix Scrubber
Appendix Scrubber feeding pump
Appendix Vacuum pump
Appendix Filtrate pumps
Appendix High pressure ramp
Appendix Cake washing pump
Appendix Cloth & Belt washing tank & pump
Appendix Electrical Control Cabinet
Appendix Erection on site
Appendix Commissioning on site
Appendix Spare parts – maintenance schedule
Appendix Water quality



TECHNICAL SPECIFICATION FOR "PHILIPPE" VACUUM BELT FILTER

CLIENT	Eurochem
JOB REF	Module 4
QUOTATION N°	731693_147B42-02rev2
PRODUCT	Gypsum slurry
SELECTED FILTER	VACUUM BELT FILTER 147 m ²
WIDTH	4200 mm
TYPE	147B42 - SERIE 5
DATE	22/05/2025

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Appendix "Scrubber"
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Appendix "Filtrate Pumps"
Appendix "High Pressure Ramp"
Appendix "Cake washing pump"
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Appendix "Electrical Control Cabinet"
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Appendix "Spare Parts - Maintenance Schedule"
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DRAWINGS FOR "PHILIPPE" VACUUM BELT FILTER

PFD
General assembly drawing for information only



TECHNICAL DESCRIPTION OF "PHILIPPE" VACUUM BELT FILTER

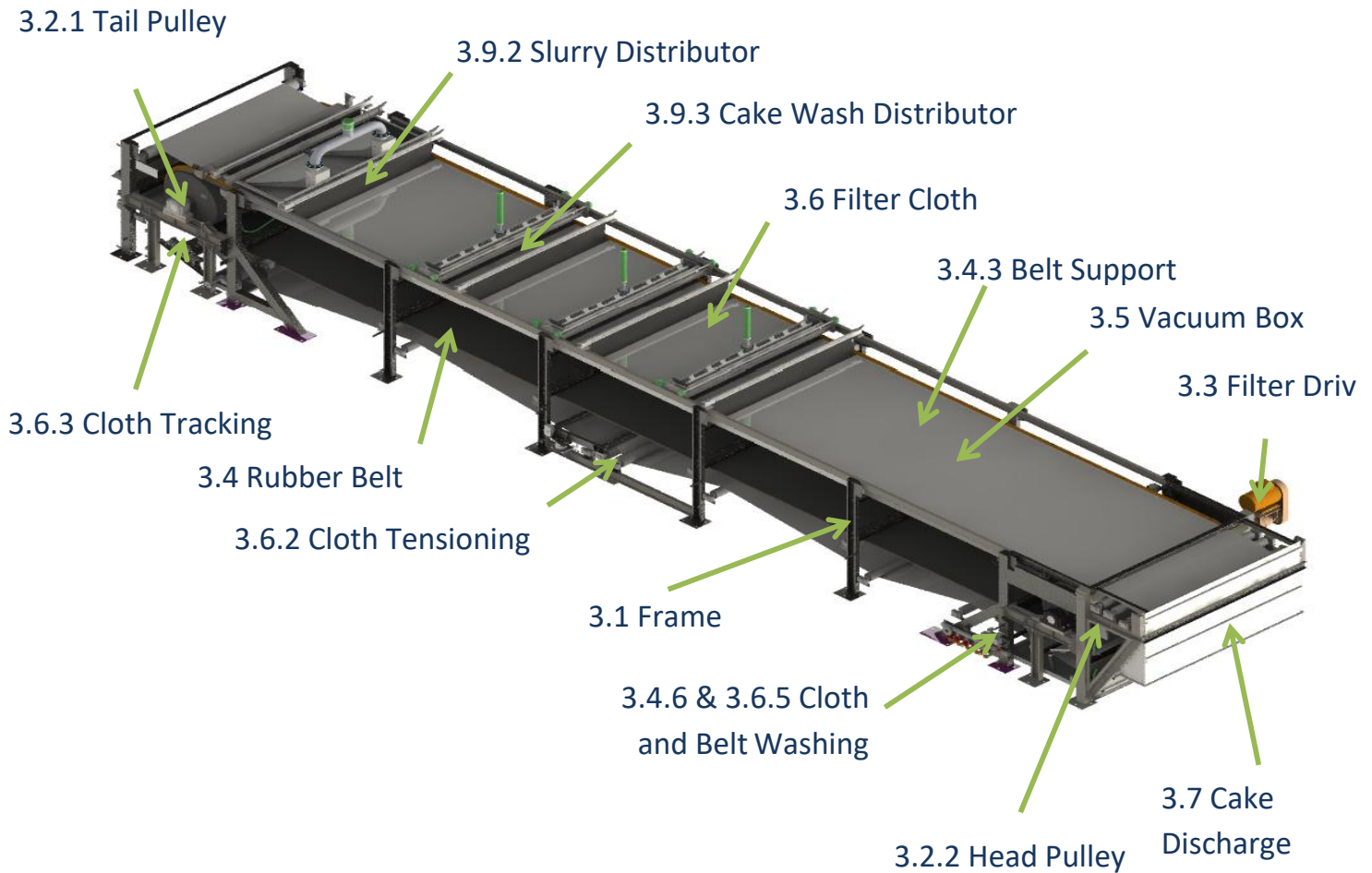
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2. Utilites
3. Filter specifications
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 - Pulleys
 - Drive
 - Rubber belt
 - Vacuum box
 - Filter cloth
 - Cake discharge
 - Fluid distribution
 - Process equipments
 - Electric & control equipments
 - Standard for connection
4. Painting specifications
5. Battery limits & exclusions
6. EC declaration of integration & safety personal protections



TECHNICAL DESCRIPTION OF "PHILIPPE" VACUUM BELT FILTER





1. MAIN FEATURES

1.1. ACTIVE FILTERING AREA: 147 m²

1.2. GENERAL DIMENSIONS

- Width under vacuum: 4200 mm
- Length under vacuum: 35000 mm
- Total width (without drive unit): 5520 mm
- Total length: 41385 mm
- Total height (without slurry distributor): 2910 mm

1.3. WEIGHT

- Weight of the filter: See General Assembly

2. UTILITIES

2.1. ELECTRICITY

Belt drive electrical motor

- Voltage: 3 x 400V (HASLER' standard)
- Frequency: 50 Hz (HASLER' standard)
- Control/instrumentation voltage to be confirmed Refer to the part "ELECTRICAL CONTROL CABINET"

2.2. WATER

- Filter cloth washing. One spray bar and one high pressure ramp in operation.
- Minimum pressure at manifold: 3 & 100bars
- Flow in operation:
 - Cake side flow: 5,4 m³/h
 - Opposite side flow: 3,24 m³/h
 - Rubber belt washing: 6,19 m³/h
 - Vacuum box wear belts lubrication (1 bar): 175 L/h to 700 L/h
 - Belt support wear belts washing (1bar): 193,2 L/h
 - Belt support wear belts lubrication (1 bar): 588 L/h

NOTE: For belts lubrication, free solids clean water is required.



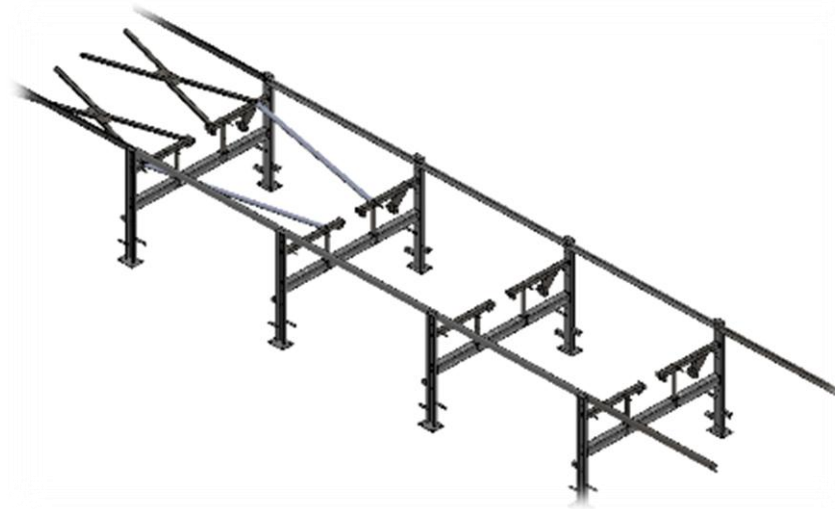
2.3. COMPRESSED AIR

Vacuum box tilting, cloth guiding and tensioning

- Flow: 4 Nm³/h - Pressure 5 bars
- Quality: filtered - oil free

3. FILTER SPECIFICATIONS

3.1. FRAME



The filter included consists of a high quality steel frame constructed of standard structural sectional members and sheet steel sections bolted and welded to form a composite structural framework.

- Material of the frame: 316L
- Material of the sheet: 316L
- Material of the bolt and nuts: 316

The frames includes:

- Two modules at each end of the filter support the head and tail pulleys, the drive unite, the cake disposal elements, the cloth and belt washing system, the cloth tracking equipment.
- Intermediate frames evenly spaced support the belt support table, the vacuum box and its tilting system, the filter cloth and belt return rollers, guide and rails for the movable devices (feed distributor, dams, wash throughs).

Special features

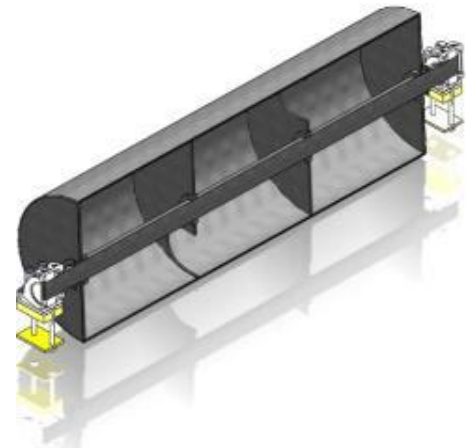
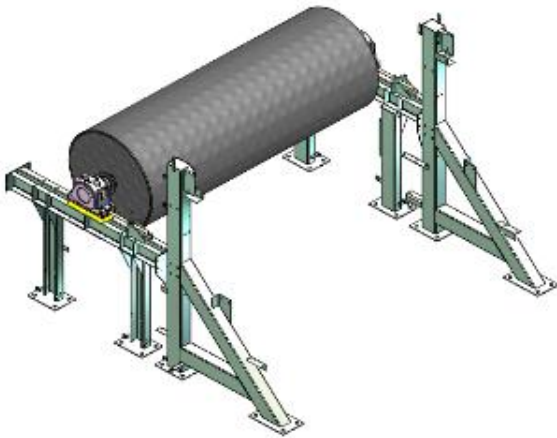
- **The frame is made of standard profiled structural steel and is fully bolted. This allows the easy replacement of structural members if needed.**
- **Frame can be mounted and dismantled without any risk of change in final result.**
-

This technology allows the supply of an endless belt for the first mount as well as replacement.



3.2. TAILS AND HEAD PULLEYS

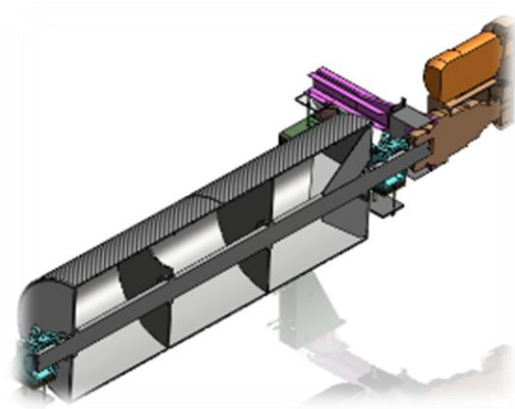
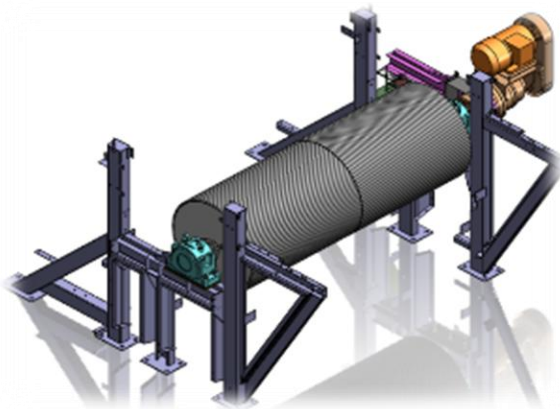
3.2.1. Tail pulley



Supported by two tensioning and water - tight swivel- bearing blocks

- Diameter of pulley: 1400 mm
- Material of pulley body: S235JR / A570Gr33
- Material of shaft: EN C22E / AISI 1020
- Drip proof disc to protect the bearing blocks
- Lining: Rubber SBR - 65 shore
- Thickness
 - Shells: 10 mm
 - Flanges: 5 mm

3.2.2. Head pulley



Supported by two water-tight swivel - bearing blocks

- Diameter of pulley: 1400 mm
- Material of pulley body: S235JR / A570Gr33
- Material of shaft: EN C22E / AISI 1020



- Drip proof disc to protect the bearing blocks
- Lining: Rubber SBR - 65 shore with a chevron design for belt driving
- Thickness
 - Shells: 10 mm
 - Flanges: 5 mm

Special features

- **One single through steel shaft :**
 - Provides stiffness of the assembly
 - Eliminates torsion on the external surface
- **External surface, side flanges & shaft covered with hot vulcanized rubber:**
 - Perfect adherence of the rubber and durable protection against corrosion
 - Allows final machining to have pulleys in a perfect horizontal position
- **Drip-proof discs mounted on shafts**
 - Protection of bearings from corrosion

3.3. FILTER DRIVE

The filter drive includes the following components:

3.3.1. Variable Frequency Drive (VFD)

Type: Frequency variator IP 2x, refer to the part "ELECTRICAL CONTROL CABINET"

- Brand
 - IEC standard: SCHNEIDER or ABB, SIEMENS
 - NEMA standard: WEG or ALLEN BRADLEY
- Rated power: 90 kW
- Index: IP 2x
- Application: Constant torque
- Power supply: 3 x 400V (HASLER' standard)
- Output voltage: Internal supply of logic inputs
- Remote control inputs (*):
 - 1 Logic input: Stop
 - 1 Logic input: Start
 - 1 Logic input: Input status)



- 1 Logic input: Input status)
- 1 Logic input: Fault reset
- 1 Logic input: Local/remote selection
- 1 analog input: 4-20mA speed setpoint (selectable on Local/remote input status)

(Local / remote status change 0 to 1 or 1 to 0 will never change the actual speed)

Remote control outputs (**):

- 1 analog output: 4-20 mA actual speed (10 to 60 Hz)

Accessories:

- 1 EMC compatibility filter
- 1 OIM (operator interface module)

Frequency setting limits:

10 to 60 Hz

3.3.2. Electric motor

- Absorbed power: 77,04 kW
- Installed power: 90 kW
- Type: Cast-iron body – TEFC – IM1001 (B3) – 4 poles - IP 55 – CI F/B 3 x 400V (HASLER' standard) F/B (HASLER' standard)
- Voltage:
- Insulation:
- Brand:
 - IEC standard: WEG or ABB, SIEMENS
 - NEMA standard: WEG or TECO WESTINGHOUSE
- Painting: Refer to Part "4. Painting Specifications"
- Belt speed: From 4,7 m/min to 28,2 m/min

3.3.3. Planetary gear box

It is fixed on the shaft of the filter head pulley. The gear box is locked in rotation by means of torque handle. The torque is controlled by the dynamometric handle acting on a limit switch in order to protect the gear box and the filter against overload.

Gear unit is design for 50 000 hours / 77,04 kW

- Constant output torque: 100238 Nm
- Safety factor: 1,3 x Power installed
- Brand: BREVINI, (or equivalent.)
- Painting: Refer to Part "4. Painting Specifications"

NOTE

If other choices are requested, an option will be offer and price adjusted.



3.4.

RUBBER BELT



On its upper surface, the belt presents transversal grooves which allow the liquid to flow towards oblong holes drilled in their axis (one oblong hole per groove).

- Number of belt per filter:	1
- Material:	SBR
- Width (Useful):	4200 mm
- Top cover thickness:	21 mm
- Bottom cover thickness:	8 mm
- Overall thickness:	35 mm
- Material of the carcass:	Polyester
- Drilling zone:	without carcass
- Number of plies:	4
- Weight of the rubber belt:	12286 kg

Special features

- **The belt is delivered endless; it is fully machined in HASLER Group factory, controlled and ready to run.**
 - **The belt is installed on our dedicated machine and run to remove mechanical stress.**
 - **Carcass is located via our dedicated machine, so that holes are drilled in the centre of the belt, not overlapping with the carcass. Holes are perfectly aligned.**
- **Drilling and grooving are made according to customer's process requirements.**
 - **Width and depth of slopes as well as step of grooves and belt thickness are optimized according to customer's requirements. Dimensions of holes also follow that rule.**
 - **Oblong holes are preferred to round holes in order to avoid fragility in the centre of the belt.**



3.4.1. Grooving

Manufactured in our plants with a slope towards the oblong holes.

- Pitch: 22 mm
- Width: 11 mm
- Depth: 5 - 17 mm
- Drilling oblong holes: 10 x 30 mm

3.4.2. Belt curbs

- The curbs are made of Natural Rubber and cold bonded on the belt sides to form a containing wall.
- Type: Undulating section with and high flexibility obtained from casting. The design was patented by HASLER Group/Filtres Philippe. It's "accordion" shape provides a good support of the filter cloth, a good tightness at the bottom as well as high flexibility when passing over the pulleys.
- Height of rubber curb bonded to the belt: 70 mm

3.4.3. Belt support on upper side (active part)

The rubber belt support device ensures any contact between the rubber belt and the frame support and protects the rubber belt against wear. The support table is constituted by set of steel sections. The top of these steel sections is covered by HMWPE sliding strips and a set of endless wear belts driven by the rubber belt, slide on. An automatic take-up device allows to compensate the stretch and maintain each belt under tension.

- Steel frame sections: 316L
- Sliding strips: HMWPE
- Endless wear belts: Polyester reinforced rubber with PE sliding side
- Dimensions of belts (W x T): 50 mm x 5,8 mm
- Support distribution : 2 x 7 sections (on each side of the vacuum box)

Special features

- **Belt supporting system provides optimum flatness, hence maximizing cake washing efficiency and recovery of filtrates.**
- **Best solution to reduce belt wear and low cost of spare parts (wear belts and sliding rules).**
- **Doesn't require blowers and air boxes (air support table) nor important amount of water (water support table).**



3.4.4. Belt support on return side

By rollers supported by water-tight ball bearing blocks.

- Material of roller: 316L
- Diameter of roller: 355 mm

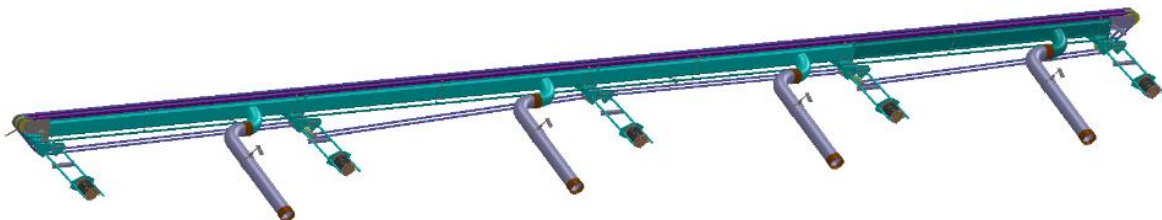
3.4.5. Belt tracking

- Roller made of HMWPE fitted on shaft.
- Diameter of roller: 100 mm
- Shaft: 316L

3.4.6. Rubber belt washing

- 2 wash headers fitted with spray nozzles
- Construction:
 - Wash pipes: 316L
 - Spray nozzles: PVDF
- Wash collection trough
 - Material: Rubber lined carbon steel
 - Outlet pipe connection: DN50, flexible hose to cloth trough

3.5. VACUUM BOX



- Number: 1
- Type: Omega section with special articulated support mechanism
- Body is constituted of several pieces, flange-jointed.
- Construction:
 - Body of the box: FRP
 - Supporting parts: 316L
 - Sliding strips, made of UHMWPE, and supporting :
- Endless wear belts, made of rubber, with polyester down sliding side
 - Number: 2
 - Wear belts supporting rollers: UHMWPE



- Size of wear belts
 - Width: 48 mm
 - Thickness: 10 mm
- Filtrate / gas nozzles
 - Number: 28
 - Connection: DN150
- Connection from vacuum box nozzles to the external frame side made by means of :
 - Elbows to allow the rotating during vacuum box tilting operation.
 - Material of pipe connection: FRP
 - Connection with the others: EPDM sleeve
- Maintenance:

The tilting system for the vacuum box allows the access for inspection, cleaning and parts replacement. Powered raising and lowering mechanism consist of an articulated frame pneumatically driven. It is operated by a pneumatic bellow after unclamping. During operation the vacuum box is clamped in the normal working position.
- If required by process, vacuum box is equipped with movable internal baffles for separating the filtrate ports. The number of baffles is equal to the number of sections minus one.

3.6. FILTER CLOTH

- Type: Monofilament or/and multifilament
- Material: Polyester or polypropylene

Endless joining of the cloth is made by means of ultrasonic welding process. The welded cloth is installed with the help of a fitting up constituted by a winding with a tension-ratchet, fitted on of the filter feed end frame.

3.6.1. Cloth rollers, supported by water-tight ball bearing blocks, consisting of:

- One cloth positioning roller with caps at the ends to bend the cloth on each side.
 - Diameter of roller: 273 mm
 - Material of roller : Rubber lined carbon steel
- One set of exit rollers.
 - Diameter of roller: 273 mm
 - Material of roller : Carbon steel rubber lined
- One set of cloth rollers on return circuit.
 - Diameter of roller: 273 mm
 - Material of roller : 316L



3.6.2. Cloth tensioning



Obtained by a framework supporting a cloth roller pneumatically driven.
Regulation and operating of this system by means of adjustment of the air pressure in the pneumatic bellow.

- Number: 1
- Framework: 316L

Special features

- **Fully automatized system, high accuracy and reliable adjustment.**
- **No counterweights required.**

3.6.3. Take-up device

Obtained by means of a roller fitted on set of rails at the feed end of the filter and moving vertically.
Take up length is approximately 800 mm.

3.6.4. Cloth tracking



Roller with angular displacement. The system is driven by a pneumatic bellow.

- Number: 1
- Diameter of roller: 273 mm
- Material of roller : Carbon steel rubber lined, shell rubber lined



Special features

- **Long operational life, no bearing wear as bearing blocks are not used as pivot.**
- **Pneumatically driven, very soft action on the cloth.**

3.6.5. Filter cloth washing

- 3 wash headers fitted with spray nozzles
- Construction:
 - Wash pipes: 316L
 - Spray nozzles: PVDF
- Wash collection trough
 - Material: Rubber lined carbon steel
 - Outlet pipe connection: Flat welding flange, norm according to Eurochem's requirement.

3.7. CAKE DISCHARGE

- Discharge roller
- Diameter of roller: 168,3 mm
- Construction:
 - Cake discharge hopper: Rubber lined carbon steel
 - Scraper: Polyurethane

3.8. FLUIDS DISTRIBUTION

3.8.1. Compressed air circuit

1 cabinet for control of the cloth tracking, cloth tensioning and vacuum box tilting.

- Marina IP 55
 - Compressed air connection on cabinet: 1/4 " threaded hole or 1/2 " NPT
 - Air pressure regulator: Brand NORGREN
 - Valves: Polypropylene
- Distribution pipes inside the filter
 - Material of pipes: Polyethylene
 - Material of fittings: Polypropylene



3.8.2. Belt and cloth washing

- A manifold piping with outlets and valves
 - Manifold connection:

Flat welding flange, norm according to customer requirement.

- Manifold:
- Valves:
- Hoses:

316L

Membrane type, body made of cast iron, EPDM membrane.

High quality rubber hoses

- Outlets distribution:

- Cloth and belt washing:
- Wear belts lubrication:

5

2

3.8.3. Vacuum piping

3.8.3.1. Filtrate internal pipes for connection from vacuum box to the filter side

- Diameter:
- Quantity:
- Material:
- Connection:

DN150

28

FRP

Pipes with EPDM sleeve, smooth pipe

3.8.3.2. Vacuum manifold between above pipes and filtrate receivers

It is divided in tight zones by an obturator between two flanges.

- Number of section:
- Diameter:
- Inlet connection:
- Outlet connection:
- Material:

3

DN800

28 x DN150

3 x DN700

FRP

Pipes with EPDM sleeve for connection.

3.9. PROCESS EQUIPMENT

3.9.1. Slurry entrance dam and apron

- Apron:
- Support:
- Number:

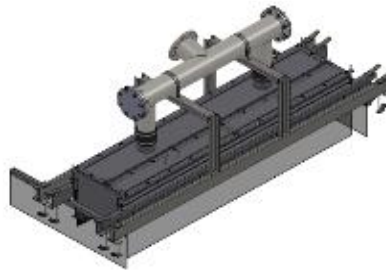
Rubber

FRP

1



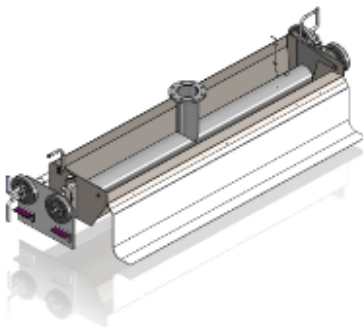
3.9.2. Slurry distributor



High flow slurry box feeder with internal baffles especially designed to spread Gypsum slurry product on the filter width.

- Material: FRP
- Number/Connection: 2 x 200 mm
- Lateral protections of the feeding area by rubber aprons.

3.9.3. Cake wash distributor



Through with overflow feeding on synthetic cloth apron to spread the flow on the filter width. The distributor is adjustable and supported by trolley, with polyethylene rollers and a wheel to move it. It is locked in position on the frame by clamps.

- Material: FRP
- Connection: 3 x 150 mm
- Number: 3

OPTION

Fish tail cake wash distributor :



Easier maintenance.



3.9.4. Pendular dam (separation dam)

- Type:	Pendular
- Apron:	Rubber
- Support:	FRP
- Number:	4

3.10. STANDARDS FOR CONNECTION

- With Eurochem:	According to Eurochem's requirement.
- Internal:	EPDM sleeve on smooth

3.11. SITE CONDITIONS

As per request or to be defined later.

- Geographic zone:	
- Altitude:	
- Temperature:	+5 to +40°C
- Humidity:	60%

NOTE: The complete filtration unit (filter with associated equipment) has to be installed in a non - freezing zone with a minimum ambient temperature of 5°C (41°F).



3.12. ELECTRICAL CONTROLS AND SECURITIES

3.12.1. List of sensors included into the filter

- Emergency stop rope (left/right)	NB : 2 – HS01/HS02	Code 1-5
- Cloth misalignement (left/right)	NB : 2 – ZS03/ZS04	Code 1
- Cloth tension (min./max.)	NB : 2 – ZSL01/ZSH02	Code 2
- Belt drive unit overtorque	NB : 1 – WSH01	Code 1
- Belt misalignement (left/right)	NB : 2 – ZS05/ZS06	Code 1
- Ultrasonic cake measure thickness	NB : 2 – LT01/02	Code 7
- Slurry level control	NB : 1 – LSH01	Code 7
- Cloth run-off	NB : 1 – SSL01	Code 2
- Vacuum box wear belt breaking	NB : 2 – ZS07/ZS08	Code 6
- Pressure gauge		
• Compressed air circuit	NB : 1 – PSL02	Code 3
• Water circuit	NB : 1 – PSL01	Code 3
- Flow indicator		
• Vacuum box and table wear belts lubrication	NB : 4 – FISL01/02/03/04	Code 4
• Type:	Gyrometer with floater	

Signal codification

Code 1 – 1 SPST (NC if not acted)

Code 2 – inductive sensor 2 wires (NC if not acted)

Code 3 – 1 SPST (NO if pressure < set point)

Code 4 – reed switch (NO if flow < set point)

Code 5 – include one second SPST to be separately and directly wired in the belt drive motor main contactor coil control circuit.

Code 6 – capacitive sensor 2 wire (NO if not acted)

Code 7 – 4/20 mA dc

The here above controls will be wired on one junction box fitted on the belt filter frame. This box will include one terminal block, one grounding copper bar and cable gland fittings.

Cables and terminals labelling will be in accordance with the electrical scheme identifications numbers.

LIMIT OF SUPPLY

Security and functioning of the equipment controlled by the customer's PLC/DCS according to the logic diagrams supplied by HASLER Group. Software programming works by the customer.

All the control and instrumentation cables, conduits and gland fittings not installed in the HASLER Group's workshop will be supplied and installed on site by the customer.



3.12.2. Standard list of suppliers

MATERIAL	TYPE	BRAND	REMARKS
Emergency stop trip wire switch	XY2-CE1A270TK XY2-CE2A270TK	Schneider Electric Télémécanique	
Electromechanical limit switch	ZCK-J1TK ZCK-E61TK	Schneider Electric Télémécanique	
Inductive sensor	IB0016	IFM Electronic	20 ... 250 Vca/cc
Pressure switch	B4	Ashcroft Dresser	Wetted parts st. steel 316
Variable area flowmeter	865	Gemü	With reed switch sensor Type 1251/1256
Junction box enclosure (JB)	Série KS	Rittal	GRP IP66 (IEC 529) Nema 4x
Terminal blocks (JB)		ENTRELEC or WEIDMÜLLER	
Cable gland fittings	Polyamide	Capri or Lutze	JB and sensors
Control and instrumentation cables	1,5 mm2 (AWG16)	HELUKABEL	300/500V DIN/VDE - SEV 600V-90° UL / CSA



4. PAINTING SPECIFICATIONS

According to Hasler Group and sub-suppliers standard.

NOTE: In case of modification of the process or the colour, HASLER Group will have to be notified no later than 1 month after the order (can be subject for extra prices).



5. BATTERY LIMITS AND EXCLUSION

5.1. BATTERY LIMITS

The equipment includes everything necessary inside the battery limits for a normal operation of the filter. The battery limits shown on the general assembly drawing are:

- Flange of the slurry distributor
- Flanges of the wash distributors
- Rubber sleeves of the filtrate pipes
- Flange of the cake discharge hopper
- Flange of the filtrate manifold
- Flange of the water manifold
- Flange of the vacuum pump
- Flange of the filtrate pumps
- flange of the Filtrate receivers
- flange of the tanks
- Air inlet at the entrance of the pneumatic cabinet
- Terminals of the accessories electrical box

5.2. EXCLUSION

- Civil work
- Anchor bolts
- Support steelwork
- Operating platform
- Electrical, wiring and instruments
- MCC or electrical cabinet
- Inspection by independant authorities
- Unload, warehousing and handling on site
- Painting on site

5.3. MODIFICATIONS

The technical specifications described in this agreement cannot be modified without HASLER Group consent.

6. EC DECLARATION OF INTEGRATION & SAFETY PERSONNEL PROTECTION

HASLER Group will deliver an EC declaration of integration and not a certificate.

That means that the equipment described above is destinated to be integrated or assembled in a general arrangement or to be added to other equipment in integral running with each other.

In consequence, the start-up of this equipment is forbbiden as long as the general arrangement in which, it will be integrated or all of integral equipment in which, it must be assembled, are not in compliance with the provisions of directive 98/37/CEE or in compliance with the National provisions for transposition of this directive in the country of start-up.

According to EC standard, safety personnel protections have to be installed all around the filter.

HASLER GROUP will provide safety guards all around the filter



COMPLEMENTARY EQUIPMENTS & SERVICES FOR "PHILIPPE" VACUUM BELT FILTER

CLIENT	Eurochem
JOB REF	Module 4
QUOTATION N°	731693_147B42-02rev2
PRODUCT	Gypsum slurry
SELECTED FILTER	VACUUM BELT FILTER 147 m ²
WIDTH	4200 mm
TYPE	147B42 - SERIE 5
DATE	22/05/2025

TABLE OF CONTENT

COMPLEMENTARY EQUIPMENTS AND SERVICES

Appendix "Cloth Ultrasonic welding machine"
Appendix "Fume Hood & Drip pan"
Appendix "Filtrate receiver"
Appendix "Cyclone"
Appendix "Scrubber"
Appendix "Vacuum Pump"
Appendix "Filtrate Pumps"
Appendix "High Pressure Ramp"
Appendix "Cake washing pump"
Appendix "Cloth & Belt Washing Tank & Pump"
Appendix "Electrical Control Cabinet"
Appendix "Erection on site"
Appendix "Commissioning on site"
Appendix "Spare Parts - Maintenance Schedule"
Appendix "Water Quality"



Appendix "ULTRASONIC CLOTH WELDING MACHINE" / OPTION

SPECIAL TOOL

- ONE CLOTH ULTRASONIC WELDING MACHINE

The generator converts the power of the 220V/50Hz or 60Hz network (system) into a 35000 Hz electrical energy. The piezoelectric converter produces mechanical oscillations of the same frequency. The welding gun together with the converter, directs its high frequency oscillations in the plastic material and produces at the requested place an overheating due to friction. The plastic material melts in fractions of a second and forms a lasting molecular assembling.

The ultrasonic energy is started by the impeller incorporated in the hand apparatus. The welding time is controlled, either manually by maintaining the impeller in an unlocked position, or automatically by a timer incorporated in the apparatus. The choice is done by a switch on the frontal side of the generator.

- ONE U 200x50x5 - LENGTH 3550: support to proceed to ultrasonic cloth welding
- ONE CUTTER IRON DUVAUCHEL: to cut the cloth
- ONE WINCH ROLLER: to strength the cloth
- Tools for erection to be provided by the customer.



Appendix "FUME HOOD & DRIP PAN"

VAPOUR HOOD

It covers the whole or part of the filter active area. The housing structure is made of steel section number and supported by the filter frame. The top is made of polypropylene plate.

On each side, there is a full openings for easy access to wash through and dams. This openings are blinded by translucent PVC sheets.

- | | |
|------------------------------------|------------|
| - Frame material: | 316L |
| - Total length: | 41385 mm |
| - Exhaust flowrate to be foreseen: | 34300 m3/h |
| - Outlets | 6 x 500 mm |
| - Exhaust fan and piping: | Excluded |

DRIP PAN

- | | |
|--------------|--------------|
| - Material | PPH |
| - Dimensions | 36500 mm TBC |
| - Length | 5200 mm TBC |
| - Width | |



Appendix "FILTRATE RECEIVER"

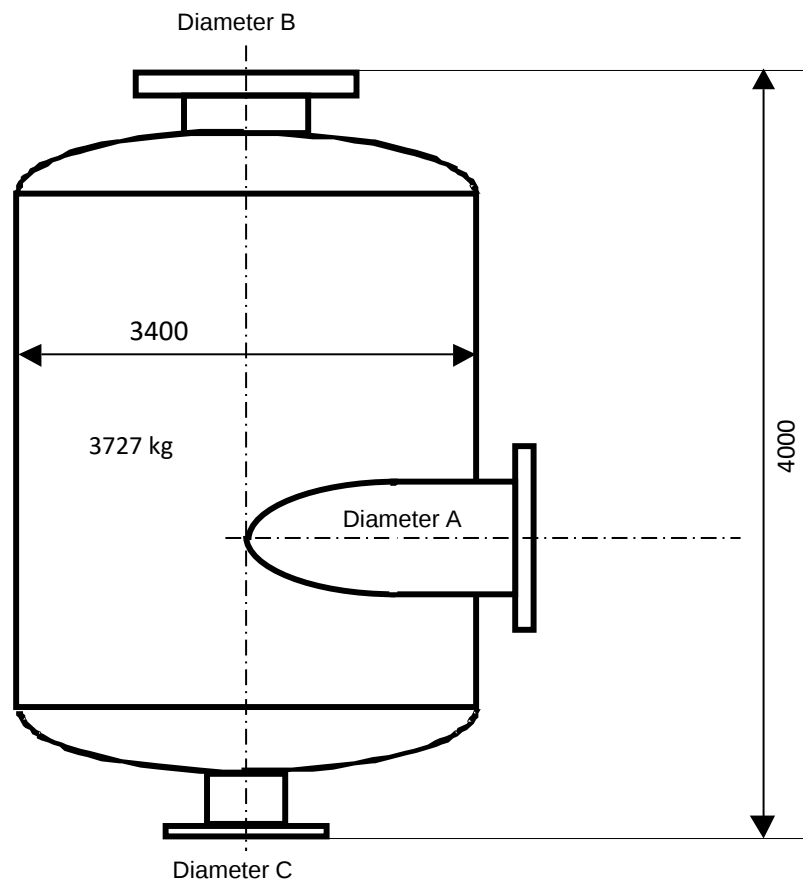
- Material: Rubber lined carbon steel
- Diameter: 3400 mm

Equipment

- Supporting legs: Excluded
- Connection "A": 800 mm
- Connection "B": 700 mm
- Connection "C": 350 mm

Other connections

- Level probe: DN50 (2") - Nbre: 2
- Pressure indicator transmitter: DN50 (2") - Nbre: 1



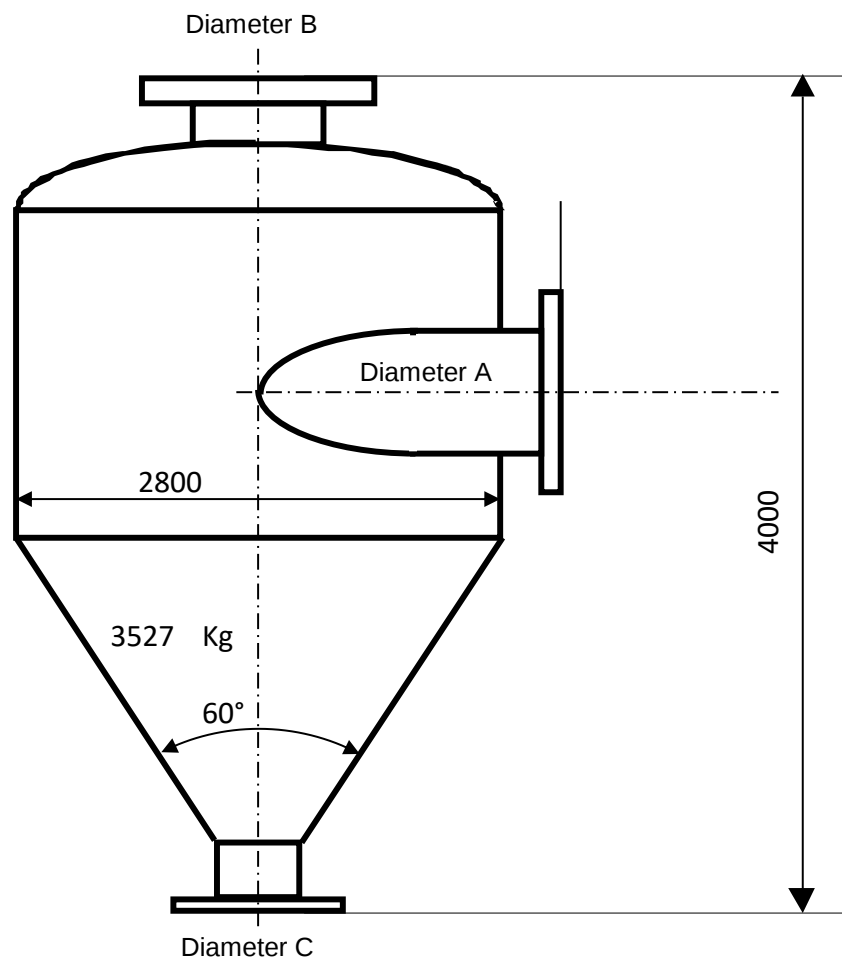


Appendix "CYCLONE"

- Material: FRP
- Diameter: 2800

Equipment

- Supporting legs: Excluded
- Connection "A": 700 mm
- Connection "B": 700 mm
- Connection "C": 40 mm





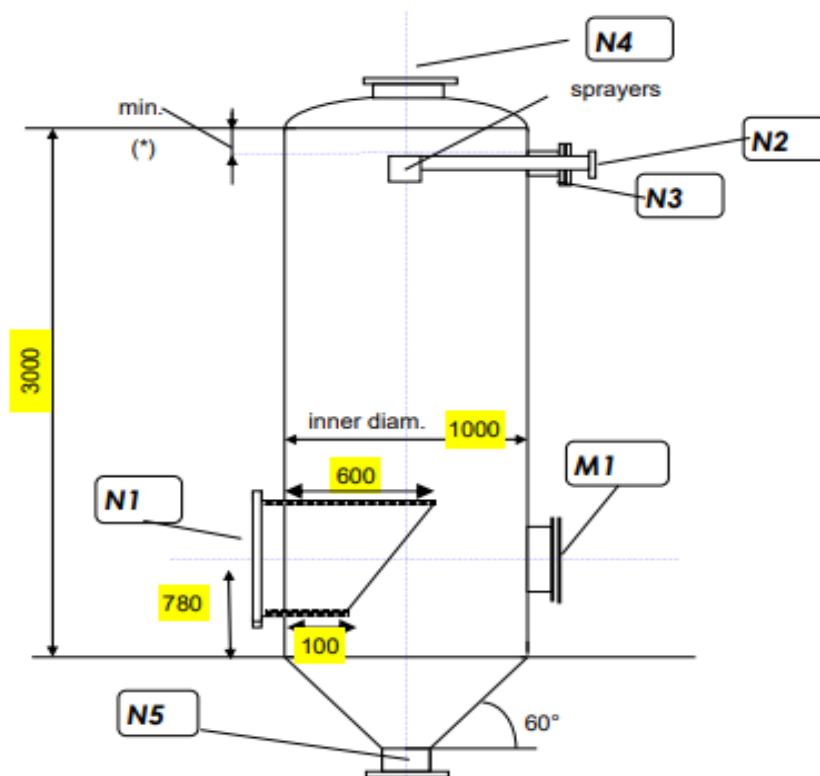
Appendix "SCRUBBER"

- Material: FRP
- Diameter: 1000

Equipment

- One spraying set
 - Pipe material: Polypropylene
 - Sprayer material: Polypropylene

Sketch :



Nozzles:

N°	Service	Diam. (mm)	Remarks
N1	Gas inlet	700	
N2	Water inlet	150	
N3	Support N2	(*)	(1)
N4	Gas outlet	700	
N5	Water outlet	300	
M1	Manhole	600	(2)



Appendix "VACUUM PUMP"

- Type: Liquid ring
- Quantity: 2
- Material: Carbon steel with ceramic coating
- Delta Pressure: -613 mbar rel
- Nominal pressure: 400 mbar abs

Sizing basis

- Gaz temperature: 50 °C
- Liquid ring temperature: 20 °C
- Elevation:

Characteristics

- Capacity (total) : 38220 m3/h
- Rotary speed:
- Absorbed power:
- Installed power (per pump) : 355 kW (TBC)
- Voltage 400 V
- Frequency 50 Hz
- Liquid ring requirements: Complete recirculation
- Noise level: 85 dB(A) at one meter

NOTE:

Noise measured in open field around pump and with exhaust air flange connected to an exhaust pipe (out of supply) without any reverberation/addition of the pipe or air sound exhaust. Injection water must be not corrosive, free solids, not hard water at a normal temperature. If not, the water must be treated.

Accessories

- Inlet seal water piping with instrumentation & valves as per P&ID
- Discharge separator in carbon steel
- Transmission per V-Belt
- Vacuum breaker
- Base plate
- Electrical motor 355 kW
- Exhaust silencer excluded
- Water piping
- Plate Heat Exchanger
- Temperature Indicator + their thermowell
- Recirculating pump with closed coupled motor
- Painting: according to supplier's standards



Appendix "FILTRATE PUMP 1" / OUT OF HASLER SCOPE

As requested by TCC, this filtrate pump is put out of HASLER scope.

However, and in order to correctly control the filter, electrical start-up and control of this item remains in HASLER scope.

In order to have something easily integrable in our cabinet, TCC must select a pump according to European standards and validate the selection of this pump with HASLER.

Appendix "FILTRATE PUMP 2 & 3"

- Type: Centrifugal
- Capacity: 35 m³/h
- H.M.T.: 20 m (Maximum)
- N.P.S.H. (required): 3,9 m
sum of maximum
permissible suction
- pressure drops: 0,60 m
- Material: C276 or equivalent
- Shaft sealing: Standardized Simple Mechanical Seal
- Absorbed power: 4,95 kW (*)
- Installed power: 5,5 kW (maximum)
- Weight (with motor): to be given by supplier

Accessories :

- Base for pump and motor.
- standard electrical motor
- Coupling and guard
- Painting: according to supplier's standards.

(*): to be confirmed depending on the final layout of the unit



Appendix "HIGH PRESSURE RAMP"

One high pressure ramp constituted with an articulated frame driven by a moto-reducer, supporting the washing ramp provided with spray nozzles made of hardened stainless steel.

The ramp has a reciprocating motion.

- Installed power: 2 kW (TBC) for reciprocating ramp motor
- Flow rate: 90 L/min (TBC) i.e 5 m³/h
- Working pressure: 50-100 bar

Connection accessories: HP flexibles and hose-couplings

Nota: Injection water must be not corrosive, free solids (< 90 µm) and not furring. Hardness not more 10° THF. If not the water must be treated.

- One high pressure pump with electrical motor:

- o Nominal Power: 30 kW (TBC)
- o Tension: According customer's requirements
- o Frequency: 50 Hz

- o Requested flow rate: 90 L/min at between 50 to 100 bar
- o Water pressure at inlet: 1 to 3 bar

MOC:

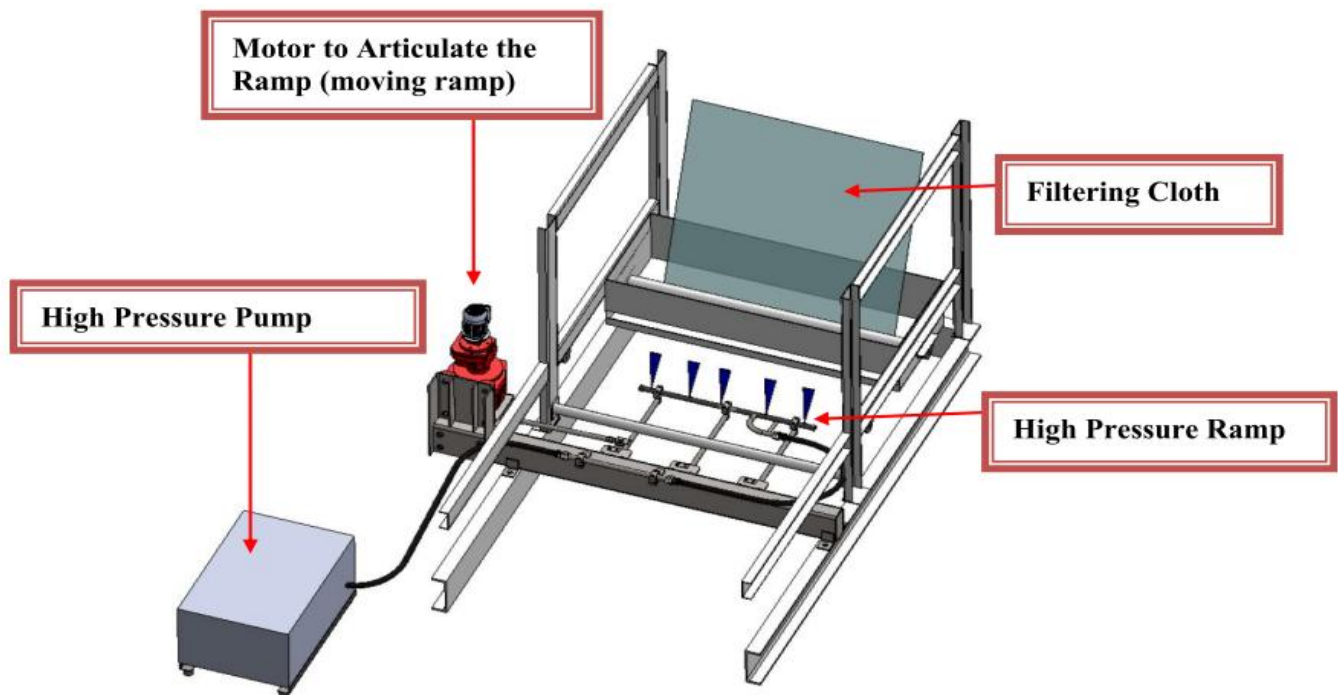
- Frame: Painted Steel
- Pump head: 316L
- Pistons: Ceramic
- Seals: NBR

Accessories:

- o One manometer in 316L
- o Pressure regulator in 316L
- o One anti-pulsating bottle

Coupling with pulley-belt guard.

Piping between High Pressure Pump & High Pressure Ramp, Electrical Cabinet EXCLUDED





Appendix "CAKE WASHING PUMP" / OUT OF HASLER SCOPE

As requested by TCC, this filtrate pump is put out of HASLER scope.

However, and in order to correctly control the filter, electrical start-up and control of this item remains in HASLER scope.

In order to have something easily integrable in our cabinet, TCC must select a pump according to European standards and validate the selection of this pump with HASLER.



Appendix "CLOTH AND BELT WASHING TANK & PUMP"

CLOTH & BELT WASHING PUMP

- Type: Centrifugal
- Capacity: 20 m³/h
- H.M.T.: 40 m (Maximum)
- N.P.S.H. (required): 3 m
sum of maximum
permissible suction
- pressure drops: 7,1 m (TBC)
- Material: CD4MCu or equivalent
- Shaft sealing: Standardized Simple Mechanical Seal
- Absorbed power: 6,75 kW (*)
- Installed power: 7,5 kW (maximum)
- Weight (with motor): to be given by supplier

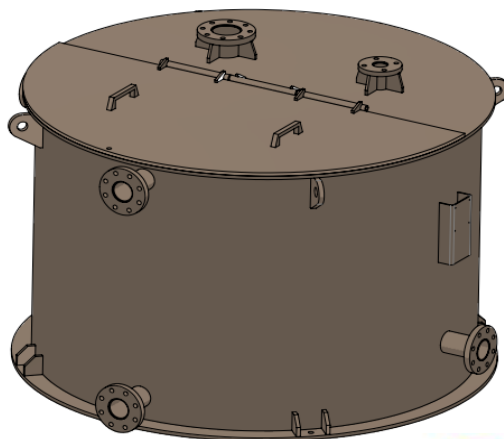
Accessories :

- Base for pump and motor.
- standard electrical motor
- Coupling and guard
- Painting: according to Hasler' standard

(*): to be confirmed depending on the final layout of the unit

CLOTH & BELT RECIRCULATION TANK

- Qty: 1
- Type: Cylindrical
- Capacity: 2m³ (TBC)
- Material: Rubber lined carbon steel
- Level detector: (Qty 1) Ultrasonic level transmitter





Appendix "ELECTRICAL CONTROL CABINET"

I - Electrical Control Cabinet

The Electrical Control Cabinet is used for controlling and providing power to the belt filter equipment's and auxiliary equipment like vacuum pump, filtrate pumps, cloth and belt washing water pump, cake washing water pumps, ...

The Electrical Control Cabinet will be fixed vertical type. It will be painted steel enclosure IP55, RAL 7035 paint manufacturer RITTAL or similar, size 2000 mm high, 3200 mm wide, 800 mm deep, mounted on 100 mm plinth (the cabinets are equipped with front and rear doors), and will be installed by the Customer, inside Customer's Technical Room.

The area classification is non-hazardous.

The Electrical Control Cabinet includes:

- 04 sections 2000 mm high x 800 mm wide x 800 mm deep, mounted on 100 mm plinth, with front door equipped with handle and lock and key.
- 01 main power isolator switch with external pad lockable handle on the cabinet front door.
- 01 set of panel lighting 230Vac interlocked with door switches.
- 01 set of cooling fan with thermostatic switch and inlet-outlet filter grid.
- 01 transformer 400Vac/230Vac with protection by circuit breakers for cabinet lighting and cooling fan.
- 01 transformer 400Vac/230Vac with protection by circuit breakers for control circuit (for contactors coils circuits)
- 01 set (*) of power supplies 230Vac/24Vdc with protection by circuit breakers for PLC voltage supply, Human Machine Interface (HMI), digital and analog inputs/outputs modules, managed Ethernet switch, control and signalling circuits and instrumentation circuits.
- 01 set of relays for control circuits and interlocks.

Note (*): The set of power supplies configured for a redundant system includes:

- 02 power supplies 230Vac/24Vdc with protection by circuit breakers
- 02 voltage control modules 230Vac
- 01 redundant power supply 24Vdc/24Vdc
- 01 motor electrical starter 3x400Vac - 50HZ - 90KW with Variable Frequency Drive, model Altivar ATV930 (Schneider Electric or similar), equipped with circuit breaker and contactor for the belt filter motor.
- 01 motor electrical starter DOL 3x400Vac - 50HZ - 15KW (Schneider Electric or similar), equipped with circuit breaker and contactor for high pressure cloth washing water pump motor.
- 01 motor electrical starter DOL 3x400Vac - 50HZ - 0,18KW (Schneider Electric or similar), equipped with circuit breaker and contactor for high pressure cloth washing water ramp moving motor.
- 01 motor electrical starter DOL 3x400Vac - 50HZ - 7,5KW (Schneider Electric or similar), equipped with circuit breaker and contactor for cloth and belt washing water pump motor.
- 02 motor electrical starter 3x400Vac - 50HZ - 350KW with Soft Electronic Starter, model Altistar ATS480 (Schneider Electric or similar), equipped with circuit breaker and contactor for the vacuum pumps motor.
- 01 motor electrical starter DOL 3x400Vac - 50HZ - 1,1KW (Schneider Electric or similar), equipped with circuit breaker and contactor for vacuum pump liquid ring water recirculating pump motor.
- 01 motor electrical starter 3x400Vac - 50HZ - 18,5KW (TBC) with Variable Frequency Drive, model Altivar ATV930 (Schneider Electric or similar), equipped with circuit breaker and contactor for the primary filtrate pump motor.
- 01 motor electrical starter 3x400Vac - 50HZ - 11KW with Variable Frequency Drive, model Altivar ATV930 (Schneider Electric or similar), equipped with circuit breaker and contactor for the first wash filtrate pump motor (the first wash filtrate are used for the first area of the cake washing).



- 1 motor electrical starter 3x400Vac - 50HZ - 11KW with Variable Frequency Drive, model Altivar A1V93U (Schneider Electric or similar), equipped with circuit breaker and contactor for the second wash filtrate pump motor (the second wash filtrate are used for the second area of the cake washing).
- 1 motor electrical starter DOL 3x400Vac - 50HZ - 11KW (TBC) (Schneider Electric or similar), equipped with circuit breaker and contactor for the third area cake washing pump motor.

-1 Programmable logic Controller (PLC) with redundant configuration SIEMENS Simatic S7-1500HF, composed of:

- 2 processors CPU-1518HF-4PN equipped with 4 ports Profinet
- 2 memory cards
- 4 synchronization modules (2 synchronization modules per CPU HF)
- 2 redundant connections (2 fiber-optic cables)
- 2 ethernet communication modules for communication with Customer's control system DCS
- 1 distributed I/O system ET 200SP included:
 - 2 Safety digital Input module (Type 16 x DI – 24 Vdc)
 - 2 Safety digital Output module (type 8 x DO - 24 Vdc)
 - 2 Digital Input modules (type 32 x DI - 24 Vdc)
 - 2 Digital Output module (type 16 x DO - relays)
 - 2 Isolated Analog Input modules (8 x AI - 4-20 mA)
 - 2 Isolated Analog Output modules (4 x AO - 4-20mA)
- 3 managed Ethernet switches (equipped with 3(x) copper ports and 1(x) fiber optic port)
- 1 set of connection sub-bases for distribution of digital inputs channels
- 1 set of connection sub-bases for distribution of analog inputs channels
- 1 set of connection sub-bases for distribution of analog output channels
- 1 pilot light 'Power on' on the cabinet front door.
- 1 "Emergency stop" push button on the cabinet front door.
- 1 terminal block set allowing the internal components wiring connections with the external wiring connections between the motors, the field instruments, the Local control panel, the junction box and the customer's control system DCS.
- 1 Internal wiring will be laid with PVC wiring ducts.
- 1 Wiring and parts labelling will be in accordance with electrical scheme identification numbers.
- 1 Each end of wire will be provided with vinyl sleeve type marker for numbering identification.



The PLC allows to control and operate the belt filter motor, the high-pressure cloth washing water pump motor, the high-pressure cloth washing water ramp moving motor, the cloth and belt washing water pump motor, the vacuum pump motor, the vacuum pump liquid ring water recirculating pump motor, the primary filtrate pump motor, the first wash filtrate pump motor, the second wash filtrate pump motor, the third area cake washing pump motor... and all the instruments.

Motors status, process values, alarms status... are exchanged between the Electrical Control Cabinet and the customer's control system DCS by Ethernet Modbus TCP/IP redundant network communication, only for display.

The PLC will be programmed according to safeties and logic sequences defined by HASLER Group.

The Electrical Control Cabinet will be completely assembled, wired, adjusted, programmed and tested at HASLER Group's factory.

II - LOCAL CONTROL PANEL

The Local Control Panel (LCP) is used for control and monitoring the belt filter equipment's and auxiliary equipment. It will be 304 Stainless steel IP66, manufacturer RITTAL or similar, size 500 mm high, 500 mm wide, 210 mm deep (wall mounting) and will be installed on site by customer close to the belt filter.

The area classification is non-hazardous.

The Local Control Panel includes:

- 1 panel 500 mm high x 500 mm wide x 210 mm deep with front door equipped with handle and lock and key.
- 1 "Emergency stop" push button on the LCP front door.
- 1 "Emergency stop Reset" push button on the LCP front door.
- 1 Human Machine Interface, model SIEMENS SIMATIC TP1200 Comfort (12-inch screen) or similar, with Colour Screen and Touch screen, located on the Local Control Panel front door.
- All texts on Human Machine Interface will be displayed in: English or Russian selection.
- 1 managed Ethernet switch (equipped with 3(x) copper ports and 1(x) fiber optic port

This Human Machine Interface allows to:

- Select the Automatic mode, Manual mode, Cloth changing mode
- Control the start-up and the shutdown sequences of equipment
- Control and monitor the Start/Stop of the belt filter motor
- Adjust and monitor the Speed of the belt filter motor
- Control and monitor the Start/Stop of the high-pressure cloth washing water ramp moving motor
- Control and monitor the Start/Stop of the high-pressure cloth washing water pump motor
- Control and monitor the Start/Stop of the cloth and belt washing water pump motor
- Control and monitor the Start/Stop of the vacuum pump motor
- Control and monitor the Start/Stop of the vacuum pump liquid ring water recirculating pump motor
- Control and monitor the Start/Stop of the primary filtrate pump motor
- Adjust and monitor the Speed of the primary filtrate pump motor
- Control and monitor the Start/Stop of the first wash filtrate pump motor
- Adjust and monitor the Speed of the first wash filtrate pump motor
- Control and monitor the Start/Stop of the second wash filtrate pump motor
- Adjust and monitor the Speed of the second wash filtrate pump motor
- Control and monitor the Start/Stop of the third area cake washing pump motor
- Control and monitor the set points for third area cake washing flow
- Display the cake thickness and filtrate receivers pressure
- Display the seal tanks level and to set low- and high-level set-point for process interlocks
- Monitor the status of the field instruments
- Display the faults and alarms presents on the installation
- 1 Horn for belt filter alarm start-up.
- 1 Terminal block set allowing the internal components wiring connections with the Electrical Control Cabinet.
- 1 set of polyamide cable glands fitting.
- Internal wiring will be laid with PVC wiring ducts.
- Wiring and parts labelling will be in accordance with electrical scheme identification numbers.
- Each end of wire will be provided with vinyl sleeve type marker for numbering identification.

The Local control panel will be completely assembled, wired, adjusted, programmed and tested at HASLER Group's factory.

NOTE:

This local control panel is located near the belt filter equipment, for control and monitoring the unit locally, by using Human Machine Interface.



III - VACUUM BELT FILTER JUNCTION BOX FOR DIGITAL SIGNAL

The Vacuum Belt Filter Junction box for digital signal is used to wire all digital instruments located on the vacuum belt filter.

It will be 304 Stainless steel IP66 manufacturer RITTAL or similar, size 500 mm high, 500 mm wide, 300 mm deep and will be installed on the vacuum belt filter.

The area classification is non-hazardous.

The Vacuum Belt Filter Junction box includes:

- 1 cabinet 500 mm high x 500 mm wide x 300 mm deep with front door equipped with lock and key.
- 1 terminal block set allowing the internal components wiring connections with the external wiring connections between the vacuum belt filter instruments.
- 1 set of polyamide cable glands fitting.
- Internal wiring will be laid with PVC wiring ducts.
- Wiring and parts labelling will be in accordance with electrical scheme identification numbers.
- Each end of wire will be provided with vinyl sleeve type marker for numbering identification.

The Vacuum Belt Filter Junction box for digital signal will be completely assembled, wired, adjusted, and tested at HASLER Group's factory.

IV - VACUUM BELT FILTER JUNCTION BOX FOR ANALOG SIGNAL

The Vacuum Belt Filter Junction box for analog signal is used to wire all transmitters instruments located on the vacuum belt filter.

It will be 304 Stainless steel IP66 manufacturer RITTAL or similar, size 300 mm high, 200 mm wide, 150 mm deep and will be installed on the vacuum belt filter.

The area classification is non-hazardous.

The Vacuum Belt Filter Junction box includes:

- 1 cabinet 300 mm high x 200 mm wide x 150 mm deep with front door equipped with lock and key.
- 1 terminal block set allowing the internal components wiring connections with the external wiring connections between the vacuum belt filter transmitters instruments.
- 1 set of polyamide cable glands fitting.
- Internal wiring will be laid with PVC wiring ducts.
- Wiring and parts labelling will be in accordance with electrical scheme identification numbers.
- Each end of wire will be provided with vinyl sleeve type marker for numbering identification.

The Vacuum Belt Filter Junction box for analog signal will be completely assembled, wired, adjusted, and tested at HASLER Group's factory.

V - INSTRUMENTATION CABLES, CONDUITS AND TAGS

- All the instrumentation cables and conduits between the Junction boxes located on the vacuum belt filter and the instruments located on the vacuum belt filter will be supplied by HASLER Group.

- All the instrumentation cables labelling supplied by HASLER Group will be in accordance with electrical scheme identification numbers.

- Fitting and wiring of these instrument cables will be done by the Customer under HASLER Group's supervision.



VI - TECHNICAL DOCUMENTATION

The Technical Documentation in English or French includes:

- The Electrical scheme.
- The Electrical Control Cabinet equipment with part list.
- The Local Control Panel equipment with part list.
- The Vacuum Belt Filter Junction box equipment with part list.
- The Instrument list.
- The Instrument data sheets.
- The Functional analysis.
- The PLC and Human Machine Interface programs.
- The technical documentation of instruments and electrical components (PLC, Human Machine Interface, Variable Frequency Drive, ...)

VII - LIMIT OF SUPPLY

Not included in our offer:

- The power supply 400Vac, 3 phases 50Hz for Electrical Control Cabinet will be supplied by the customer.
- The 230V-50HZ UPS voltage supply will be supplied by the Customer.
- All the power supply cable, motors cables, control cables, instrumentation cables, network cables and conduits between the Junction boxes located on the vacuum belt filter, the local control panel, the Electrical Control Cabinet, the motors, the field instruments (not located on the belt filter), the Customer's DCS and MCC will be supplied and installed on site by the Customer.
- Cable glands fitting (or conduit fitting) for the Customer's cables will be supplied and installed on site by the Customer.

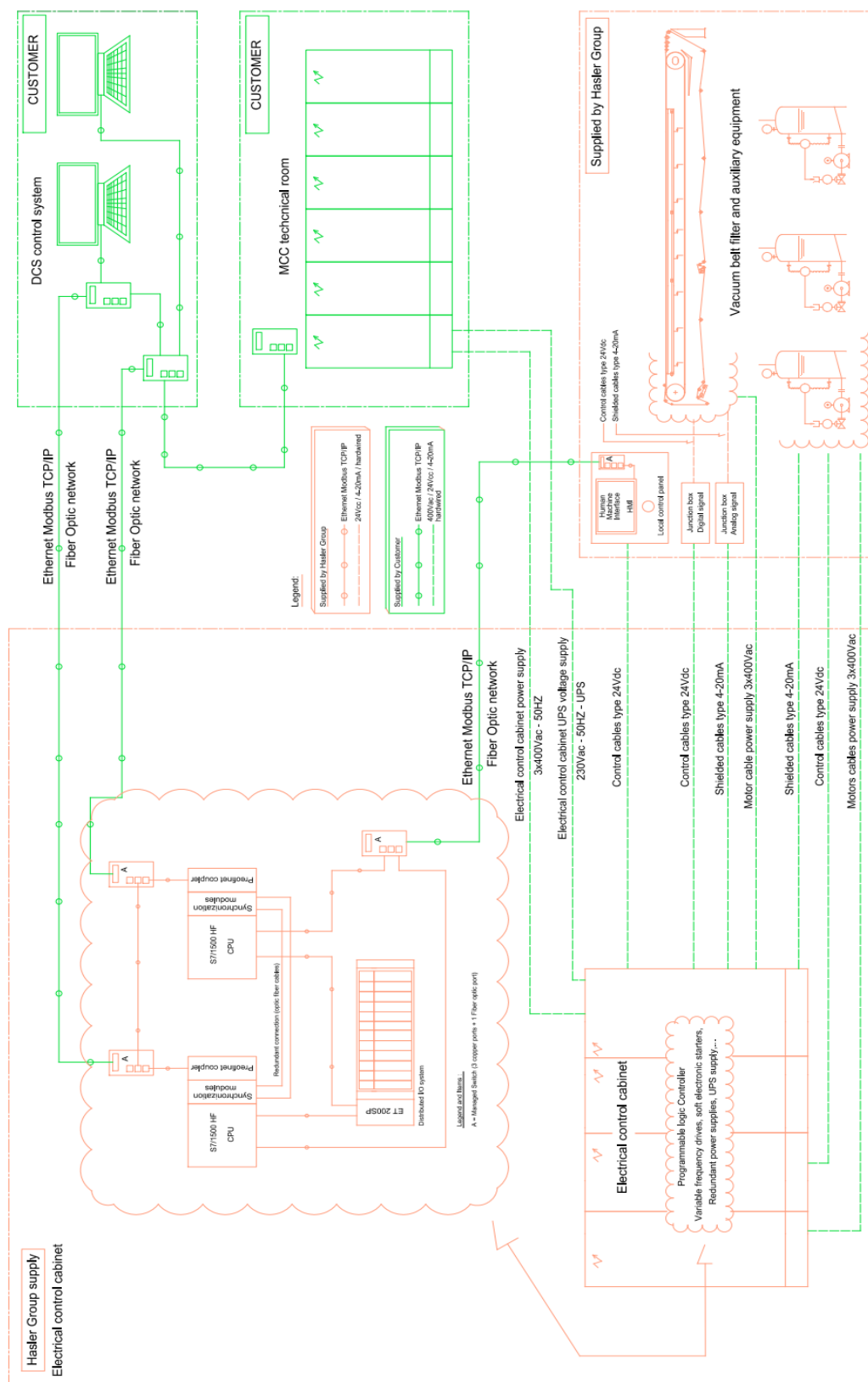


VIII - LIST OF ELECTRICAL SUPPLIER

ELECTRICAL CONTROL CABINET			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Enclosure	Type VX25	Rittal	painted steel enclosure IP55, RAL 7035
Main isolator switch	Type Sirco	Socomec	Handle lockable on front door
Circuit breaker	Type C60N	Schneider Electric	
Control voltage transformer		Legrand	
Relay, contactor		Schneider Electric	
Variable frequency drive	Type Altivar ATV930	Schneider Electric	
Soft Electronic Starter	Type Altistar ATS480	Schneider Electric	
Pushbuttons, hand switches, signalling pilot lights	Type XB4-XB5...	Schneider Electric	IP66
Programmable Logic Controller PLC	SIMATIC FAIL-SAFE	SIEMENS	Processor: Redundant S7-1500HF-4PN
Terminal blocks	S7-1500F	ABB - Entrelec	
Internal control wiring			Execution according to EN 60204
LOCAL CONTROL PANEL			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Enclosure	Type AX	Rittal	Stainless steel 304 IP66 NEMA 4X
Pushbuttons, hand switches, signalling pilot lights	Type XB4-XB5...	Schneider Electric	IP66
Human Machine Interface	SIMATIC TP1200 Comfort	SIEMENS	with Colour Screen and Touch screen (12-inch screen)
Horn	Type T100	AET	IP66
Terminal blocks		ABB - Entrelec	
Cables glands	Polyamide		Iso Metric
Internal control wiring	Isolated wires and ferrules		Execution according to EN 60204
JUNCTION BOX			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Enclosure	Type AE	Rittal	Stainless steel 304 IP66 NEMA 4X
Terminal blocks		ABB - Entrelec	
Cables glands	Polyamide		Iso Metric
Internal control wiring	Isolated wires and ferrules		Execution according to EN 60204
INSTRUMENTATION CABLES FOR VACUUM BELT FILTER			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Instrumentation cables	Control cable JZ-500 black (digital signal) Shielded cable JZ-500-C black (analog signal)	Helukabel Lappkabel	PVC flexible control and Cu-screened cable, 300/500V Temperature range: -5 to +80°C



IX - GENERAL SYNOPTIC OF THE FILTRATION ELECTRICAL EQUIPMENT





Appendix "ERECTION ON SITE"

ERECTION ON SITE

According to HASLER Group's enclosed daily contractual fees.

Depending of the means, manpower supplied by the client and the site conditions. The here after estimations should be discussed.

For erection, customer will provide all specified equipments for lifting, handling, power.

	HASLER Group manpower	Customer manpower per filter
Erection	One supervisor	See planning

Estimated duration: 8 weeks - to be confirmed during KOM

Special tools for erection supplied by HASLER Group

- Special tools and accessories (which are specific to HASLER Group) for cold bonding of the curbs. These equipments are imported temporary by HASLER Group.
 - Specific supports according HASLER Group drawing
- NOTE:** Transportation cost for these equipments will be charged to Customer.

Tools for erection to be provided by customer

- Means of lifting, cranes, pulley block.... Heavy piece = 2000 kg.
- One (1) theodolite.
- One (1) welding generator (TIG).
- Standard tools and safety accessories necessary for each filter.
- Two (2) Wooden floor length 10 meters for each filter.
- Two (2) Textil slings length 2 meters, 2 tons.
- Two (2) Textil slings length 1 meters, 2 tons.
- Two (2) Textil slings length 2 meters, 4 tons.
- Two (2) Textil slings length 4 meters, 6 tons.
- Three (3) Textil slings length 6 meters, 6 tons.
- Four (4) shackles 10 tons.
- Two (2) Pulley blocks 1 ton.
- One (1) lifting beam 10 ton according the HASLER Group specifications.
- Two (2) ladders 3 meters.
- One (1) jacks 6 tons.
- Two (2) winch cables 5 tons.
- Two (2) pneumatic machine bolts
- One (1) dynamometrical spanner machine bolts

Utilities for filter erection

- Compressed air: 7 bar.
- Electricity: 240 V with electrical junction box.
- Power electricity with inverter at disposal 3 weeks after the beginning of filter erection.
- Storage for small equipments as screws, nuts..... near each filter.
- Lifting.



Appendix SPARE PARTS - MAINTENANCE SCHEDULE

We offer following spare parts:

Commissioning spare parts

Description	Qty on filter	Recommended qty
Filter cloth	1	1
Table wear belt	14	2
Vacuum box wear belts	2	2
Spray nozzle	221	30

In option are offered 2 years recommended spare parts:

Description	Qty on filter	Recommended qty
Cloth tracking edge sensor	1	2
Filter cloth	1	3
Table wear belt	14	14
Set of V-Belt	1	1
Vacuum box sliding rules	1	1
Vacuum box wear belts	2	2
Rubber sleeve	28	4
Scraper	1	2
Spray nozzle	221	221



Below an estimation schedule for maintenance operations

FRAME

Once a week, in the case of pulp overflow, wash the framework completely, taking care not to splash the bearing blocks

BELT SUPPORT TABLE

Check the wear of the wear belts and the absence of cuts. If the wear belts are damaged, replace them.

If necessary, retighten the wear belts with the clevis tensioner rods located at the ends of the longitudinal support rails

Check the state of wear of the sliding strips and replace them if they are too worn

CONVEYOR BELT

The definitive tension of the belt is obtained after a certain operating time, necessary to release internal manufacturing stress

For at least a month, make sure that the belt turns correctly.

It is necessary to act on the screw of the tensioner slides of the tail pulley and on the lateral belt guiding rollers in order to tension and stabilize the lateral movement of the belt.

Regularly do the following:

check that the belt is properly washed by the spray bars

check the state of the curbs as they are quite fragile

adjust the belt tension and correct position of the lateral guiding rollers

TAIL and HEAD PULLEY

Check that the bearing block lubrication is correct

Coat the threaded rods on both sides of the drum with grease

Once a year, check the state of the rubber lining.

ROLLERS

Check that the rollers are horizontal and parallel to one another

Every day, check that the rollers do not clog

Check that the lubrication is correct

DRIVING GROUP

Check that the oil level of the gear box is correct

CLOTH AND BELT WASHING

Regularly ensure that the spray nozzles are not blocked and, if necessary, change them

CAKE SCRAPER BLADE

Verify that all of the scraper blades are aligned and in contact with the filter cloth.

Every year, check the scraper's fixing sets.

UPPER ACCESSORIES : Feeder, dams, washing pipes

In the case of overflow and at each stop, thoroughly wash the internal and external feeder parts.

Check the wear of the rubber flaps



Mechanical Operations	Cloth Replacement	Weekly	Fortnightly	Monthly	Half Yearly	Yearly
Cloth replacement						
Cloth tension adjustment and cleaning						
Cloth guiding adjustment and cleaning						
Clean the cloth and belt spray nozzles						
Scraper adjustment						
Clean the cloth and belt washing recovery tray						
Clean all parts (frame, rollers)						
Check the lubrication of the plummer blocks (*) = if the Automatic Lubricator is not supplied		(*)	(*)			
Clean the feeder						
Tilt and check the vacuum box						
Check the vacuum box and table sliding belts for fraying, cuts and wear						
Check the vacuum box and table sliding strip for wear						
Replace the upper accessories rubber flap						
Check the lubrication of the vacuum box and table sliding belts						
Survey the state of the guiding roll rubber lining						
Check all bearings						
Check the rubber belt tension						
Drain the reducer oil						
Check the paint and repair if necessary						



Appendix "COMMISSIONING ON SITE"

Estimated duration: 2 weeks

During the period provided for commissioning, our engineer with customer technicians will do:

- Mechanical start-up.
- Check all components.
- Adjust technical parameters.
- Feed filter with slurry.
- Optimize technical parameters.

Training of customer technicians:

- Theory of vacuum filtration, explanation and questions-and-answers.
- Description of the installation
 - General description of the main components.
 - Filter.
 - Receivers, vacuum pump, filtrate pumps...
- Details of filter
 - Description of the main components and their function.
 - Theoretical.
 - Practice on site including demonstration.
- Start-up – Commissioning of the filter
 - Without product
 - With product
- Comments and verification of people knowledge



Appendix "Water Content quality - Vacuum Wear Belt and Table Wear Belt lubrication"

Water Content quality - Vacuum Wear Belt	Range
Floating particles mg/l	<200
Temperature in °C	<45
Conductivity , $\mu\text{S}/\text{cm}$	1 - 1000
pH	8,5 > > 6,5
water hardness in °dH	5 - 15
carbonate hardness in °dH	<15
Chloride (Cl-) mg/l	<250
Sulphate (SO ₄ 2-) mg/l	<350
free carbonic acid mg/l	0
Nitrate (NO ₃ -) mg/l	<50
Potassium permanganate usage mg/l	25
ammonium NH ₄ ⁺ mg/l	<5
Organics - Hydrocarbures	Forbidden
Demineralized water	Forbidden
Belt support wear belt lubrication water flow in l/hr for 147B42 Filters	588
Vacuum box wear belt lubrication water flow in l/hr for 147B42 Filters	700
Pressure for Vacuum box and Table lubrication in bar	1 (<4 mandatory)



Appendix "Water Content quality - Cloth and Belt washing water"

Water Content quality - Cloth and Belt washing water	Range
Floating particles mg/l	<200
Temperature in °C	<45
Conductivity , µS/cm	1 - 1000
pH	8,5 > > 6,5
water hardness in °dH	5 - 15
carbonate hardness in °dH	<15
Chloride (Cl-) mg/l	<250
Sulphate (SO4 2-) mg/l	<350
free carbonic acid mg/l	0
Nitrate (NO3-) mg/l	<50
Potassium permanganate usage mg/l	25
ammonium NH4+ mg/l	<5
Organics - Hydrocarbures	Forbidden
Demineralized water	Forbidden
Belt and Cloth washing water flow in m3/hr for 147B42 Filters	18,07
Pressure for Cloth and Belt washing water in bar	> 3