

WE CARE ABOUT **YOUR PERFORMANCE**

DOSING | FILTRATION | MIXING | KNEADING | SERVICES



HASLER
GROUP

Filtration system

Horizontal Vacuum Belt Filter Philippe

Sales Offer N°

760895 – rev2

Project

HVBF for PKT 300KTA Soda Ash Project

Customer

PKT

Date

17/10/2025



Modification History

REV	Date	written by	checked by	approved by	comments
1	18/09/2025	BJOL	AGIB	ABIG	First issue of offer
2	08/10/2025	BJOL	AGIB	AGIB	Update following process discussion
3					
4					

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I. YOUR REQUIREMENTS



You are planning to build the first Soda Ash plant in Indonesia for 300KTA. So, you requested HASLER to design the appropriate vacuum belt filter 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 ?

Slurry flowrate: 410 m³/h

Dry solids flowrate: 69,95 t/h

Solid percentage in the slurry: 14,04 %

Density: 1,214 t/m³

Temperature: 40 °C

Percentage of residual moisture in cake: 16 %

Salinity of sodium bicarbonate : < 0,12 %

Number of washing steps: 4

Wash water for the cake: 15,4 m³/h for last step, 10,8 m³/h for third step and 36,2 m³/h for first and second step

Thanks to our strong experience in soda ash, we can confirm that your objectives in terms of moisture and chloride content are achievable and usual in soda ash market.



II. HASLER GROUP SOLUTION



a. A solution optimized for your project

Hasler Group and TCC were in contact early in April this year. The purpose was to go through our opportunities to cooperate. It turns out that HASLER is the perfect partner to support the client in this project.

On the 11th of June, we set up a meeting between our engineering team and TCC team to clarify technical points to finalize the technical proposal. We are now in the position to send you here enclosed our best technical offer with the data we collected, and you have confirmed.

The HASLER Group is a leader in the field of vacuum belt filtration with our brand Filter Philippe, we have more than 100 references worldwide and more particularly equipment for Soda Ash using the HOU process, and SOLVAY too.

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 (1.4462, ...) for all the parts in contact according to materials indicated in your specification. Please keep in mind that material choice is customer responsibility.

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 of our expertise and will be quickly efficiently running your unit.

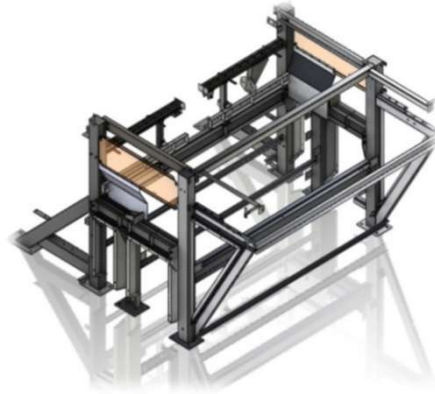


b. Key points of our design



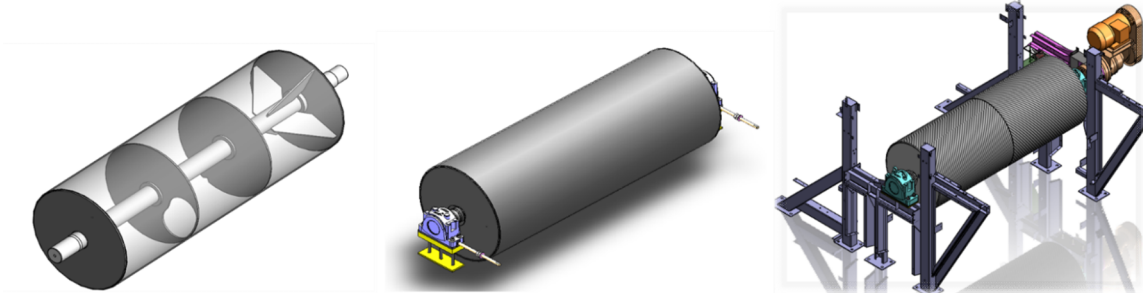
Our equipment is described in technical specifications in part VII of this technical offer.
The main operational advantages of our design are listed here below:

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**

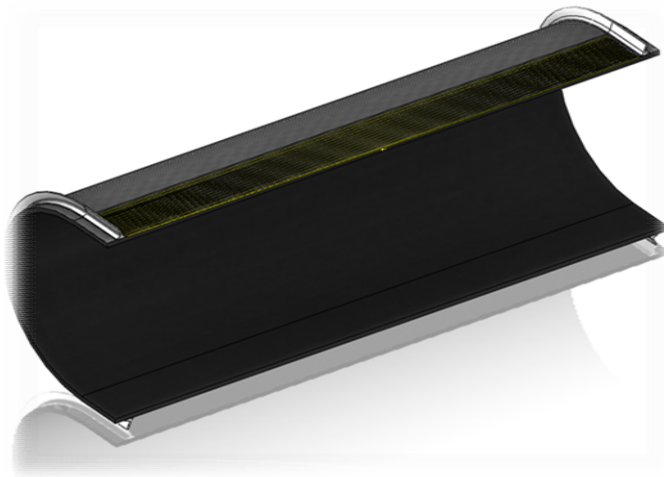
Drive and head pulleys



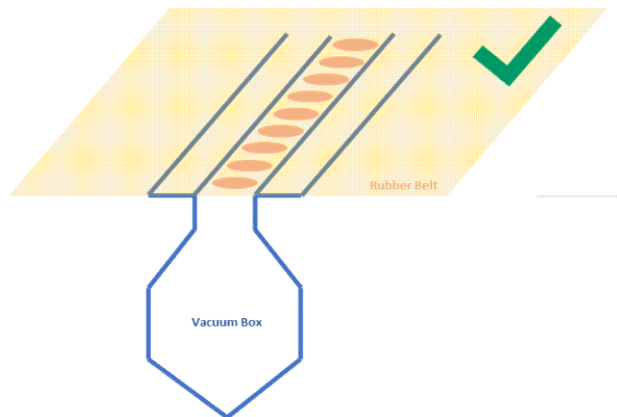
- **High rigidity design** : erases bending phenomenon on external surface
- Rubber lining on drums, flanges, and shaft offering:
 - **Durability of rubber adherence**. It limits the risk of slipping between the belt and the drums
 - Excellent **protection against corrosion** and abrasion.
- Chevron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



Belt

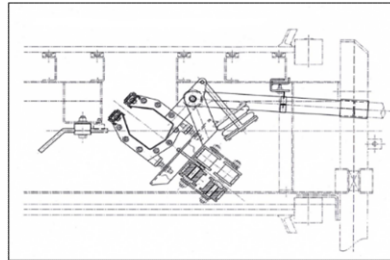


- Stabilizing, edge cutting, grooving and hole punching are done in Hasler Group French factory :
 - Endless belt ready to be installed **without any onsite stabilization**
 - **Holes on belt are perfectly aligned with vacuum box**
- Grooves sloped towards the center of the belt: **Filtrate's flow is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



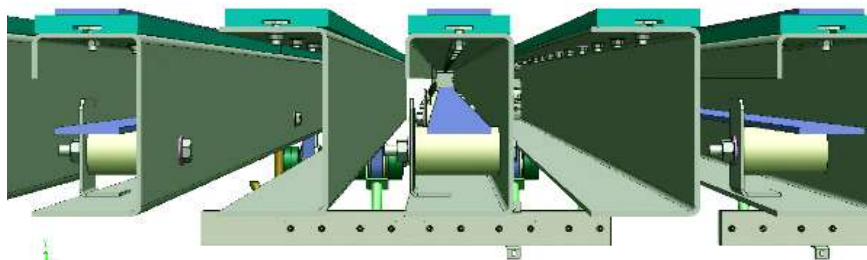


Vacuum box



- 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**)

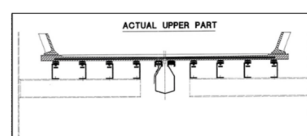
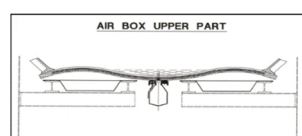
- Excellent flatness (+/- 1mm)
- No friction between table and belt with wear belt design
- **Uniform cake thickness** on all length of filter, **washing efficiency** and **filtrates recovery** are optimized



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 and 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 complies with HSE requirements



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

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

The area classification for filter, accessories & electrical devices is **non-hazardous**.



VI. 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 solution 4.0 ready



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

VII. Technical specifications

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"

Appendix "Filtrate receiver"

Appendix "Cyclone"

Appendix "Scrubber"

Appendix "Vacuum Pump"

Appendix "Filtrate Pump 1"

Appendix "Filtrate Pump 2&3"

Appendix "High pressure washing ramp"

Appendix "Cloth & Belt washing tank"

Appendix "Cake washing pump"

Appendix "Cake pressure roller"

Appendix "Electrical parts"

Appendix "Hydrocyclone"

Appendix "Erection on site"

Appendix "Commissioning on site"

Appendix "Spare Parts – Maintenance Schedule"

Appendix "Factory Acceptance Test (FAT)"

Appendix "Water quality"

Appendix "Process performance guarantee"



TECHNICAL SPECIFICATION FOR "PHILIPPE" VACUUM BELT FILTER

CLIENT	PKT
JOB REF	Soda ash filter
QUOTATION N°	760895_90B30-01rev2
PRODUCT	Soda ash
SELECTED FILTER	VACUUM BELT FILTER 90 m²
WIDTH	3000 mm
TYPE	90B30 - SERIE 4
DATE	17/10/2025

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DRAWINGS FOR "PHILIPPE" VACUUM BELT FILTER

P&ID
General assembly drawing for information only



TECHNICAL DESCRIPTION OF "PHILIPPE" VACUUM BELT FILTER

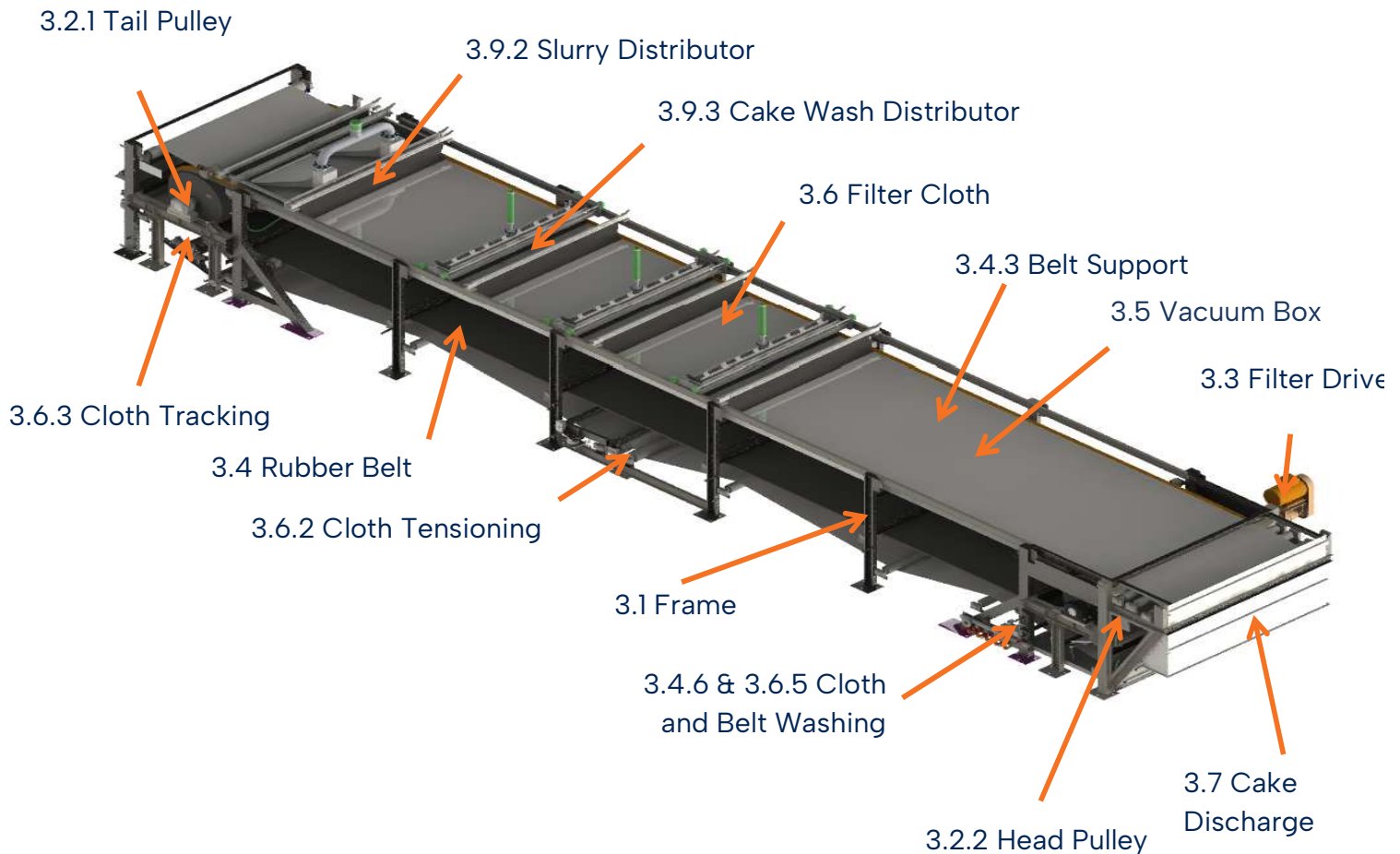
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JOB REF	Soda ash filter
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1. Main features
2. Utilites
3. Filter specifications
 - Frame
 - Pulleys
 - Drive
 - Rubber belt
 - Vacuum box
 - Filter cloth
 - Cake discharge
 - Fluid distribution
 - Process equipments
 - Electric & control equipments
 - Standard for connection
4. Painting specifications
5. Battery limits & exclusions
6. EC declaration of integration & safety personnal protections
7. Standard list of documentation



TECHNICAL DESCRIPTION OF "PHILIPPE" VACUUM BELT FILTER





1. MAIN FEATURES

1.1. ACTIVE FILTERING AREA: 90 m²

1.2. GENERAL DIMENSIONS

- Width under vacuum: 3000 mm
- Length under vacuum: 30000 mm
- Total width (without drive unit): 3850 mm
- Total length: 35970 mm
- Total height (without slurry distributor): 2710 mm

1.3. WEIGHT

- Weight of the filter: See General Assembly

2. UTILITIES

2.1. ELECTRICITY

- Belt drive electrical motor
- Voltage: 3 x 380V (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. Three spray bars in operation.
- Minimum pressure at manifold: 3 bars
- Flow in operation:
 - Cake side flow: 4,08 m³/h
 - Opposite side flow: 2,38 m³/h
 - Rubber belt washing: 4,46 m³/h
 - Vacuum box wear belts lubrication (1 bar): 150 L/h to 600 L/h
 - Belt support wear belts lubrication (1 bar): 360 L/h

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



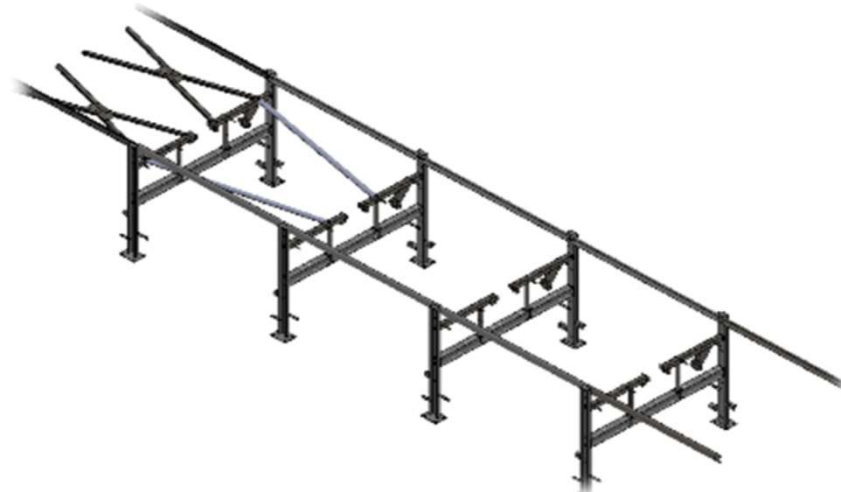
2.3. COMPRESSED AIR

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).

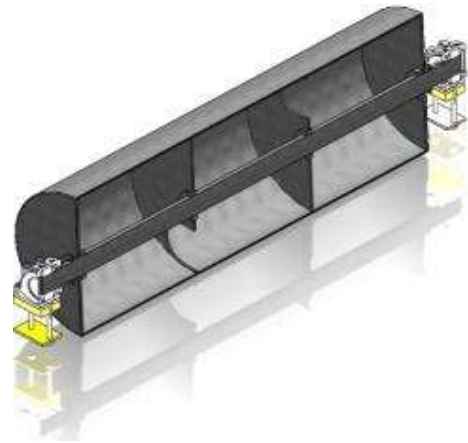
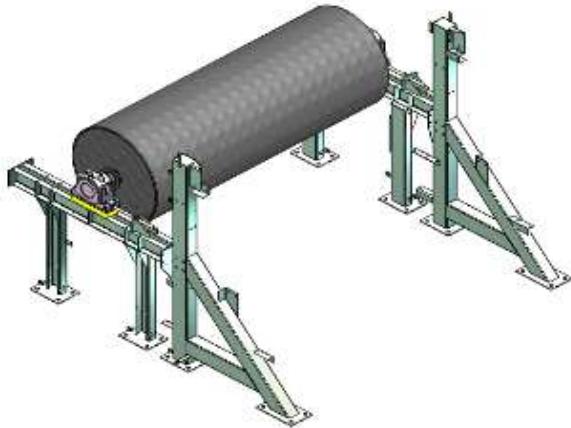
Special features

- **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.**



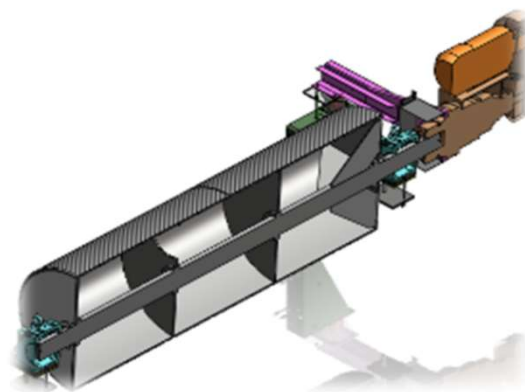
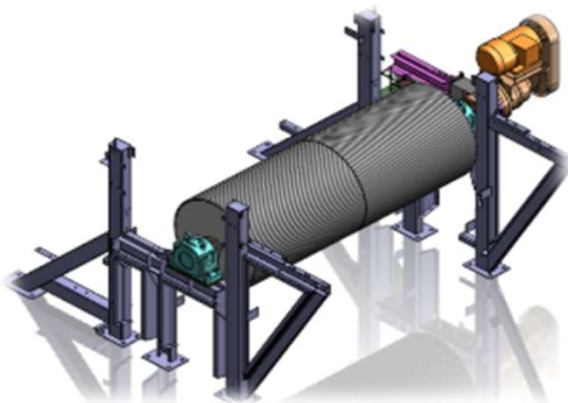
3.2. TAILS AND HEAD PULLEYS

3.2.1. Tail pulley



- Supported by two tensioning and water – tight swivel- bearing blocks
- Diameter of pulley: 1210 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
- Weight 2500 kg

3.2.2. Head pulley



- Supported by two water-tight swivel – bearing blocks
- Diameter of pulley: 1210 mm
- Material of pulley body: S235JR / A570Gr33
- Material of shaft: EN C22E / AISI 1020



- Drip proof disc to protect the bearing blocks
- Lining: a chevron design for belt driving
- Thickness
 - Shells: 10 mm
 - Flanges: 5 mm
- Weight 2800 kg

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 380V (HASLER' standard)
 - Output voltage: Internal supply of logic inputs
- Remote control inputs (*):
- 1 Logic input: Stop
 - 1 Logic input: Start
 - 1 Logic input: Faster (selectable on Local/remote Input status)



- 1 Logic input: Slower (selectable on Local/remote 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: 71,02 kW
- Installed power: 90 kW
- Type: Cast-iron body – TEFC – IM1001
(B5 or B3) – 4 poles – IP 55 – CI
F/B
3 x 380V (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 4,3 m/min to 25,5 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 / 71,02 kW

- Constant output torque: 88239 Nm
- Safety factor: 1,3 x Power installed
- Brand: ROSSI
- 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):	3000 mm
- Top cover thickness:	18 mm
- Bottom cover thickness:	7 mm
- Overall thickness:	31 mm
- Material of the carcass:	Polyester
- Drilling zone:	without carcass
- Number of plies:	4
- Weight of the rubber belt:	6826 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 – 14 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: 120 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
- Dimensions of belts (W x T): 50 mm x 5,8 mm
- Support distribution : 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.

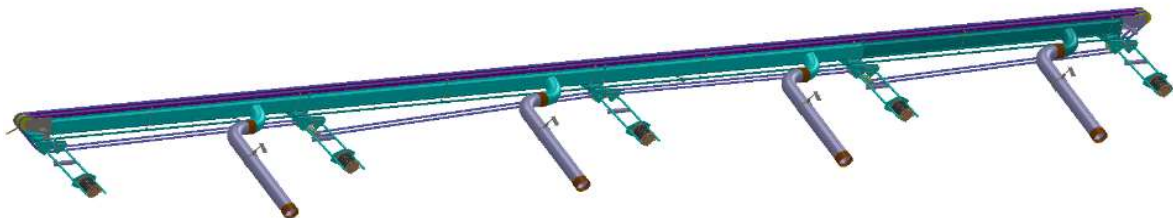
- Material of roller: 316L
- Diameter of roller: 355 mm

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: 316L
 - 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: U45N
 - 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: 38 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: 168,3 mm
 - Material of roller : U45N
- One set of exit rollers.
- Diameter of roller: 168,3 mm
 - Material of roller : 316L
- One set of cloth rollers on return circuit.
- Diameter of roller: 168,3 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: 168,3 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: 316L
 - Outlet pipe connection: Flat welding flange, norm according to PKT's requirement.

3.7. CAKE DISCHARGE

- Discharge roller
- Diameter of roller: 168,3 mm
- Construction:
 - Cake discharge hopper: 316L
 - 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: 316L
 - Valves: Membrane type, body made of cast iron, EPDM membrane.
 - Hoses: High quality rubber hoses
- Outlets distribution:
 - Cloth and belt washing: 5
 - Wear belts lubrication: 2

3.8.3. Vacuum piping

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

- Diameter: DN150
- Quantity: 28
- Material: FRP
- Connection: 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: 3
- Diameter: DN700
- Inlet connection: 28 x DN150
- Outlet connection: 3 x DN800
- Material: SVR

Pipes with EPDM sleeve for connection.

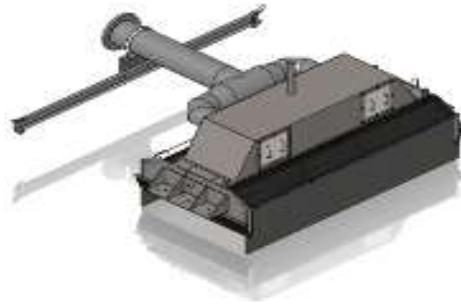
3.9. PROCESS EQUIPMENT

3.9.1. Slurry entrance dam and apron

- Apron: Rubber
- Support: U45N
- Number: 1



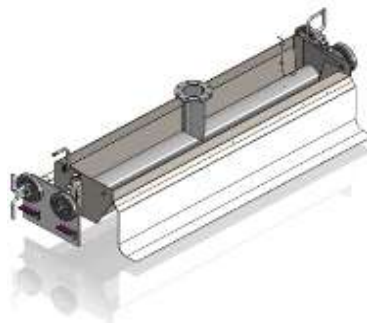
3.9.2. Slurry distributor



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

- Material: U45N
- Number/Connection: 2 x 250 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: U45N
- Connection: 4 x 100 mm
- Number: 4

3.9.4. Pendular dam (separation dam)

- Type: Pendular
- Apron: Rubber
- Support: U45N
- Number: 5



3.10. STANDARDS FOR CONNECTION

- With PKT: According to PKT'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: up to 95%

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 misalignment (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 misalignment (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	NB : 4 – FISL01/02/03/04	Code 4
wear belts lubrication		
• 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-JITK 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 mm ² (AWG16)	HELUKABEL	300/500V DIN/VDE - SEV 600V-90° UL / CSA



4. PAINTING SPECIFICATIONS

According to TCC painting specification except for elements listed in deviation list send with this offer.

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
- Anchor bolts
- Terminals of the accessories electrical box

5.2. EXCLUSION

- Civil work
- 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 destined 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 forbidden 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.

7. STANDARD LIST OF DOCUMENTATION

The following list corresponds to the document send by HASLER to the customer during project execution.

- Supplier documentation (user, installation and maintenance manuals)
- Functional analysis
- General arrangement
- PID (Process & Instrumentation Diagram)
- Electrical diagrams
- Declaration of incorporation
- Declaration of conformity
- Operation & maintenance manual
- Packing list / Shipping details
- ATEX certificate (if applicable)

Please refer to deviation list about the files you requested and what can be done (or not) by HASLER GROUP



FOR "PHILIPPE" VACUUM BELT FILTER

CLIENT	PKT
JOB REF	Soda ash filter
QUOTATION N°	760895_90B30-01rev2
PRODUCT	Soda ash
SELECTED FILTER	VACUUM BELT FILTER 90 m²
WIDTH	3000 mm
TYPE	90B30 - SERIE 4
DATE	17/10/2025

TABLE OF CONTENT

COMPLEMENTARY EQUIPMENTS AND SERVICES

Appendix "Cloth Ultrasonic welding machine"
Appendix "Fume Hood"
Appendix "Filtrate receiver"
Appendix "Cyclone"
Appendix "Scrubber"
Appendix "Vacuum Pump"
Appendix "Filtrate Pump 1"
Appendix "Filtrate Pump 2&3"
Appendix "High pressure washing ramp"
Appendix "Cloth & Belt washing tank"
Appendix "Cake washing pump"
Appendix "Cake pressure roller"
Appendix "Electrical parts"
Appendix "Hydrocyclone"
Appendix "Erection on site"
Appendix "Commissioning on site"
Appendix "Spare Parts - Maintenance Schedule"
Appendix "Factory Acceptance Test (FAT)"
Appendix "Water quality"
Appendix "Process performance guarantee"



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"

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.

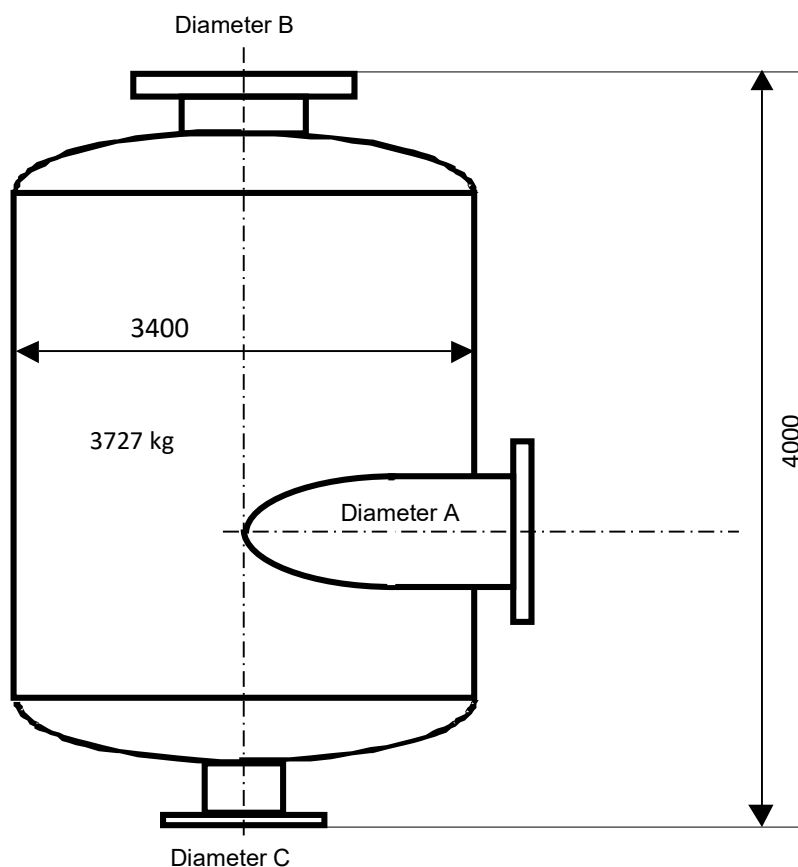
On each side, there is a full openings for easy access to wash through and dams. This openings are blinded by translucid PVC sheets.

- | | |
|------------------------------------|------------------------|
| - Frame material: | 316L |
| - Total length: | 7000 mm |
| - Exhaust flowrate to be foreseen: | 4100 m ³ /h |
| - Outlets | 2 x 300 mm |
| - Exhaust fan and piping: | Excluded |



Appendix "FILTRATE RECEIVER"

- Material: 316L*
 - Diameter: 3400 mm
 - Quantity: 3
- Equipment
- Supporting legs Excluded
 - Connection "A": 700 mm
 - Connection "B": 800 mm
 - Connection "C": 500 mm
- Other connections
- Level probe: DN50 (2") - Nbre: 2
 - Pressure indicator transmitter DN50 (2") - Nbre: 1



- * For this kind of product, we usually propose FRP for receivers. According to your specification, receivers are in SS316L. As a reminder, material choice is customer's responsibility.

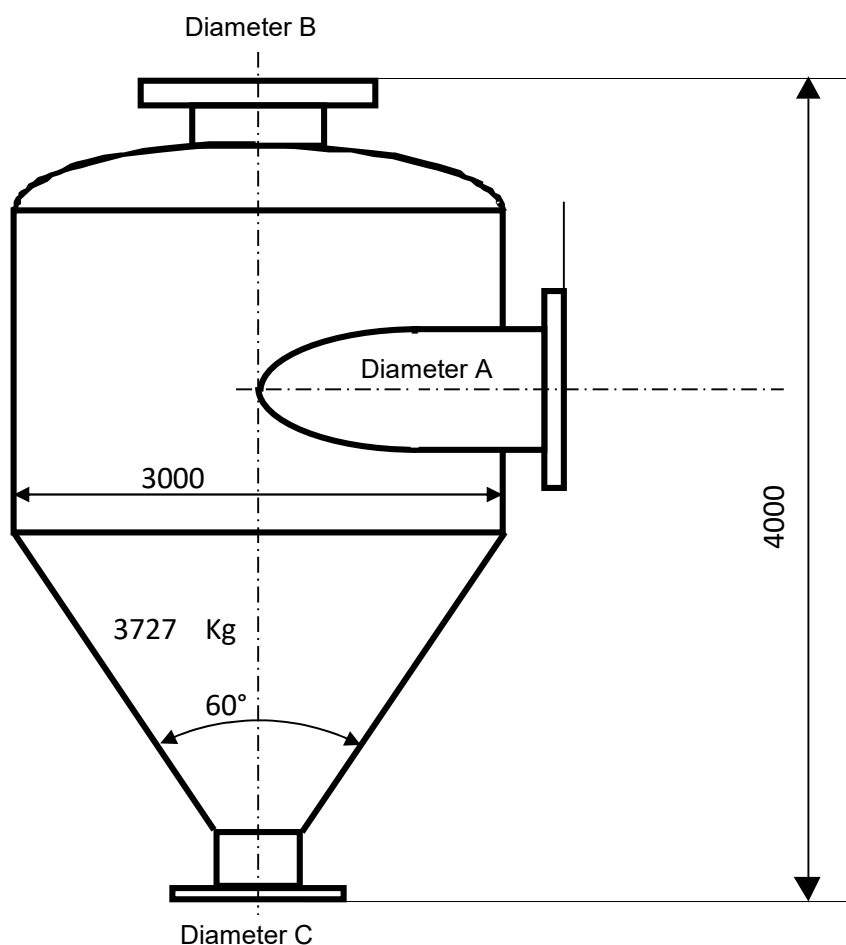


Appendix "CYCLONE" / **OPTION**

- Material: 316L*
- Diameter: 3000 mm

Equipment

- Supporting legs
- Connection "A": Excluded
- Connection "B": 800 mm
- Connection "C": 800 mm
- Connection "D": 40 mm



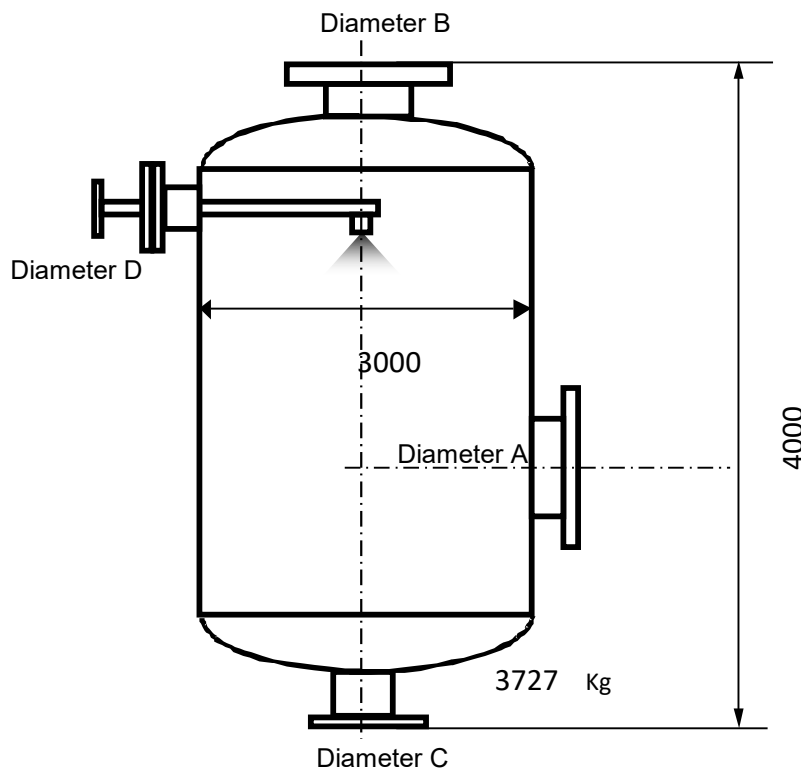
PS : We know that this item isn't part of the scope of supply you requested. But, according to our knowledge, we strongly advise you to install this equipment to protect the vacuum pump.

- * For this kind of product, we usually propose FRP for cyclone. According to your specification, cyclone is in SS316L. As a reminder, material choice is customer's responsibility.



Appendix "SCRUBBER"

- Material: 316L
- Diameter: 3000 mm
- Equipment
- One spraying set
 - Pipe material: Polypropylene
 - Sprayer material: Polypropylene
- Supporting legs: Excluded
- Connection "A": 800 mm
- Connection "B": 800 mm
- Connection "C": 250 mm (TBC)
- Connection "D": 150 mm (TBC)



- * For this kind of product, we usually propose FRP for scrubbers. According to your specification, scrubber is in SS316L. As a reminder, material choice is customer's responsibility.



Appendix "VACUUM PUMP"

- Type:	Liquid ring
- Quantity:	2 per filter
- Material:	Carbon steel & cast-iron
- Delta Pressure:	-613 mbar rel
- Nominal pressure:	400 mbar abs
Sizing basis	
- Gaz temperature:	20 °C
- Liquid ring temperature:	20 °C
- Elevation:	500 m
Characteristics	
- Capacity:	43020 m3/h total
- Rotary speed:	
- Absorbed power:	
- Installed power:	450 kW per pump
- Voltage	6600 V
- Frequency	50 Hz
- Liquid ring requirements:	Total 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 in stainless steel
- Base plate in SS316L
- Electrical motor 1000 kW
- Exhaust silencer excluded
- Water piping in carbon steel
- Plate Heat Exchanger
- Temperature Indicator + their thermowell
- Recirculating pump with closed coupled motor
- Painting: according to deviation list



Appendix "FILTRATE PUMP 1" / **OPTION**

- Type: Centrifugal
- Capacity 442 m³/h
- H.M.T.: 30 m (Maximum)
- N.P.S.H. (required): 3,5 m
- Maximum head loss ac 7,5 m
- Material: CD4Mcu or equivalent
- Shaft sealing: Standardized Simple Mechanical Seal
- Absorbed power: 81 kW (*)
- Installed power: 90 kW (TBC)
- Weight (with motor): to be given by supplier

Accessories :

- Base for pump and motor.
- standard electrical motor
- Coupling and guard
- Painting: according to devaiiton list

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

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DOSING | FILTRATION | MIXING | KNEADING | **SERVICES**



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Appendix "FILTRATE PUMP 2" / **OPTION**

- Type: Centrifugal
- Capacity: 37 m³/h
- H.M.T.: 30 m (Maximum)
- N.P.S.H. (required): 3,5 m
- Maximum head loss: 7,5 m
- acceptable:
- Material: CD4Mcu or equivalent
- Shaft sealing: Standardized Simple Mechanical Seal
- Absorbed power: 13,5 kW (*)
- Installed power: 15 kW (TBC)
- Weight (with motor): to be given by supplier

Accessories :

- Base for pump and motor.
- standard electrical motor
- Coupling and guard
- Painting: according to deviation list

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

Appendix "FILTRATE PUMP 3" / **OPTION**

- Type: Centrifugal
- Capacity: 37 m³/h
- H.M.T.: 30 m (Maximum)
- N.P.S.H. (required): 3,5 m
- Maximum head loss: 7,5 m
- acceptable:
- Material: CD4Mcu or equivalent
- Shaft sealing: Standardized Simple Mechanical Seal
- Absorbed power: 13,5 kW (*)
- Installed power: 15 kW (TBC)
- Weight (with motor): to be given by supplier

Accessories :

- Base for pump and motor.
- standard electrical motor
- Coupling and guard
- Painting: according to deviation list

(*): 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: 0,18 kW (TBC) for reciprocating ramp motor
- Flow rate: 68 L/min (TBC) i.e 4,08 m3/h
- Working pressure: 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: 15 kW (TBC)
- o Tension: According customer's requirements
- o Frequency: 50 Hz
- o Requested flow rate: 68 L/min at between 50 to 100 bar
- o Water pressure at inlet: 1 to 3 bar

MOC:

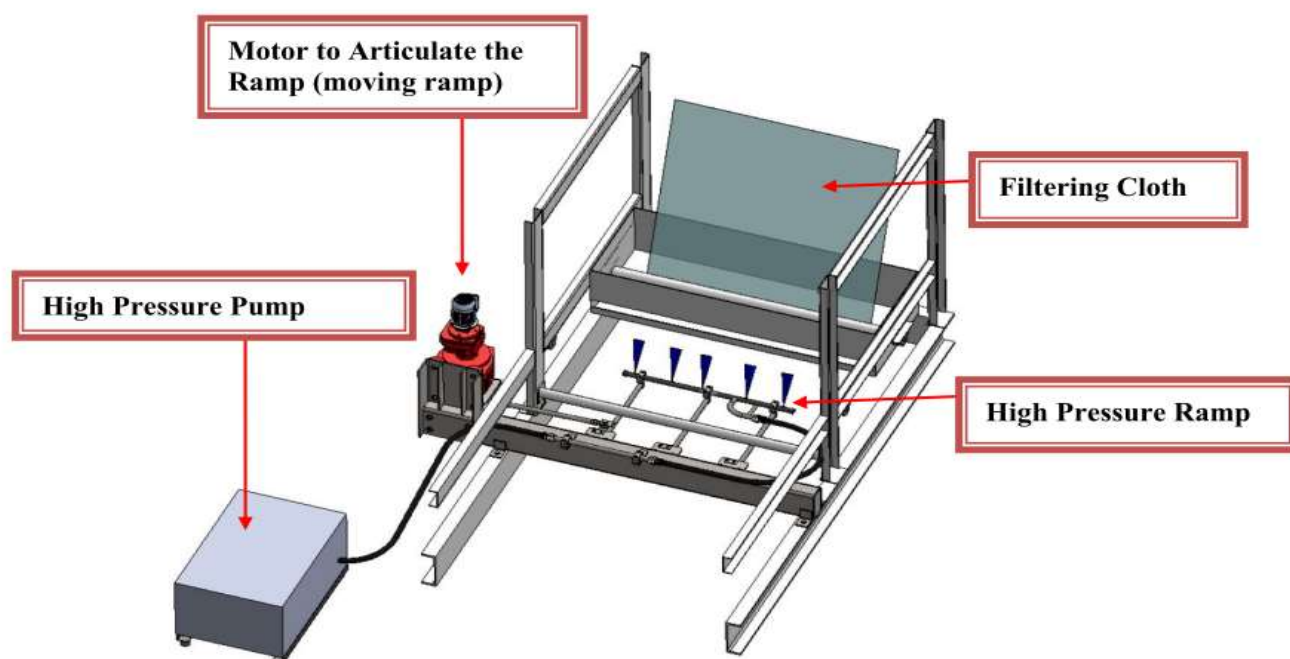
- Frame: Painted Steel
- Pump head: 316L
- Pistons: Ceramic
- Seals: NBR

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

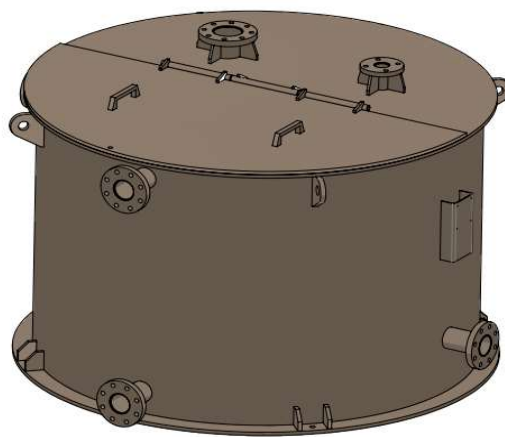




Appendix "CLOTH AND BELT WASHING TANK"

CLOTH & BELT WASHING TANK

- Qty: 1
- Type: Cylindrical
- Capacity: 2m³ (TBC)
- Material: SS 316L
- Level detector: (Qty 1) Ultrasonic level transmitter



Appendix "CAKE WASHING PUMP" / **OPTION**

- Type: Centrifugal
- Capacity: 11 m³/h
- H.M.T.: 30 m (Maximum)
- N.P.S.H. (required): 2 m
- Maximum head loss acceptable: 8 m
- Material: CD4MCu or equivalent
- Shaft sealing: Standardized Simple Mechanical Seal
- Absorbed power: 4,95 kW (*)
- Installed power: 5,5 kW (TBC)
- Weight (with motor): to be given by supplier

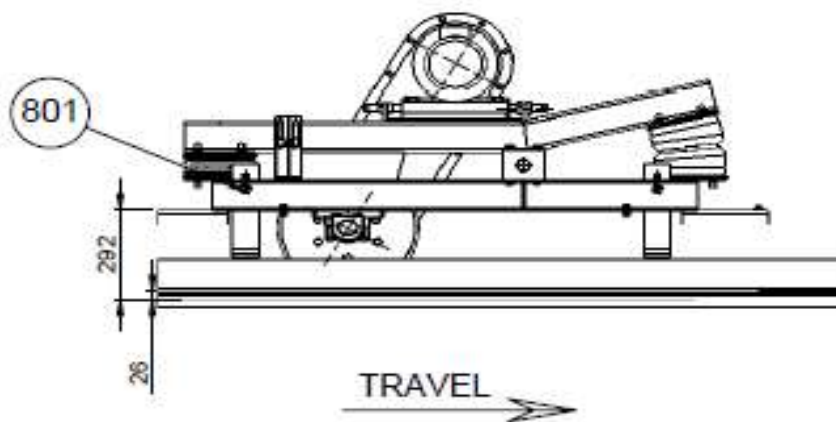
Accessories :

- Base for pump and motor.
- standard electrical motor
- Coupling and guard
- Painting: according to deviation list

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



Appendix "CAKE PRESSURE ROLLER"



Cake Pressure roller system includes :

- | | |
|-------------------|------------|
| - Pressure roller | U45N |
| - Motor and drive | 3 kW (TBC) |
| - Support frame | 316L |
| - Pneumatic box | 500 mm |





Appendix "Electrical parts"

I – LOCAL CONTROL PANEL / **OPTION**

The Local Control Panel is used for control and monitoring the belt filter equipment's and auxiliary equipment.

It will be polyester enclosure IP66 Nema 4X, manufacturer RITTAL or similar, size 600 mm high, 600 mm wide, 200 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 600 mm high x 600 mm wide x 200 mm deep with front door equipped with handle and lock and key.

Components located on the front door:

- 1 "Emergency stop" push button.
- 1 belt filter motor "START" push button.
- 1 belt filter motor "STOP" push button.
- 1 belt filter motor "FASTER" push button.
- 1 belt filter motor "SLOWER" push button.
- 1 "BELT FILTER SPEED" push button.

Components located inside the control panel:

- 1 "CLOTH CHANGE" key operated handswitch selector.
- 1 Horn for belt filter "ALARM START-UP" located on the top of the control panel.
- 1 Terminal block set allowing the control panel internal components wiring connections of the hereabove signals and the external wiring connections between the Local Control Panel and the Customer's PLC/DCS inputs/outputs.
- Analog input signal for numeric indicator: 4–20 mA from Customer's PLC/DCS or Variable Frequency Drive.
- Voltage supply for numeric indicator: 230 Vac-/50HZ or 24 Vdc supplied by the Customer.
- 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: The use of "CLOTH CHANGE" key operated handswitch selector is allowed only in maintenance mode and local mode, and at fixed minimum belt filter speed, and reserved only for authorized personnel.



II – VACUUM BELT FILTER JUNCTION BOX

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

It will be Polyester enclosure IP66 Nema 4X manufacturer RITTAL or similar, size 530 mm high, 430 mm wide, 200 mm deep and will be installed on the belt filter.

The area classification is non-hazardous.

The Vacuum Belt Filter Junction box includes:

- 1 cabinet 530 mm high x 430 mm wide x 200mm 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 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 will be completely assembled, wired, adjusted, and tested at HASLER Group's factory.

III – INSTRUMENTATION CABLES, CONDUITS AND TAGS

- All the instrumentation cables and conduits between the Junction box located on the belt filter and the instruments located on the 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.



IV – TECHNICAL DOCUMENTATION

The Technical Documentation in **English** 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, ...)

V – LIMIT OF SUPPLY

- The power supply 400 Vac, 3 phases 50Hz for Electrical Control Cabinet will be supplied by the customer.
- All the power supply cable, motors cables, control cables, instrumentation cables, network cables and conduits between the Junction box located on the 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.



VI – LIST OF ELECTRICAL SUPPLIER

ELECTRICAL CONTROL CABINET			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Enclosure	VX25	Rittal	painted steel enclosure IP55, RAL 7035
Main isolator switch	Sirco	Socomec	handle lockable on front door
Circuit breaker	C60	Schneider Electric	
Safety module	Preventa	Schneider Electric	
Control voltage transformer		Legrand	
Relay, contactor		Schneider Electric	
Variable frequency drive	Altivar ATV340...N4E	Schneider Electric	
Soft Electronic Starter	Altistar ATS48	Schneider Electric	
Pushbuttons, hand switches, signalling pilot lights	XB4-XB5...	Schneider Electric	IP66
PLC	SIMATIC FAIL-SAFE S7-1500F	SIEMENS	Processor: CPU-1515F-2PN
Terminal blocks		ABB - Entrelec	
Internal control wiring	Isolated wires and ferrules		Execution according to EN 60204
LOCAL CONTROL PANEL			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Enclosure	AX	Rittal	Polyester IP66 NEMA 4X
Pushbuttons, hand switches, signalling pilot lights	XB4-XB5...	Schneider Electric	IP66
Human Machine Interface	SIMATIC TP900 Comfort 9 pouces	SIEMENS	with Colour Screen and Touch screen
Horn	T100	AET	IP66
Terminal blocks		ABB - Entrelec	
Internal control wiring	Isolated wires and ferrules		Execution according to EN 60204
JUNCTION BOX			
DESIGNATION	TYPE	MANUFACTURER	REMARKS
Enclosure	AX	Rittal	Polyester IP66 NEMA 4X
Terminal blocks		ABB - Entrelec	Terminal blocks
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 (Analog and digital signals)	Control cable JZ-500 black Shielded cable JZ-500-C black	Helukabel	PVC flexible control and Cu-screened cable, 300/500V – Temp. Range: -5 to +80°C



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 = 7000 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	10	2
Vacuum box wear belts	2	2
Spray nozzle	161	20

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	10	10
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	161	161



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

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

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: 4 weeks

Cold commissioning: 1 week

Hot commissioning: 3 weeks as requested by customer in his specification

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 "FACTORY ACCEPTANCE TEST (FAT)"

Estimated duration: 1 day in HASLER GROUP factory

Details of works covered by the FAT:

1. Visual and dimensional inspection of the rubber belt

2. Visual inspection of the belt filter's parts

- Frame
- Belt supporting irons
- Vacuum box
- Pulleys
- Rollers
- Slurry distributor parts
- Wash distributor parts
- Cake discharge hopper
- Splash protection
- Wash collection trough
- Washing manifold
- Washing ramps
- Pillow block bearing
- Pneumatic cabinet
- Electrical junction boxes
- Instrumentation

Note: Filter will NOT be mounted during FAT (as filter is delivered in spare parts)



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	<360
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 90B30	360
Vacuum box wear belt lubrication water flow in l/hr for 90B30	600
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 , $\mu\text{S}/\text{cm}$	1 – 1000
pH	8,5 > > 6,5
water hardness in °dH	5 – 15
carbonate hardness in °dH	<15
Chloride (Cl^-) mg/l	<360
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 and Cloth washing water flow in m^3/hr for 90B30 Filters	10,92
Pressure for Cloth and Belt washing water in bar	> 3

Appendix "PROCESS PERFORMANCE GUARANTEE "

According to the technical specifications of the inquiry and the enclosed general flow-sheet (based on the nominal flow rates) and provided that main characteristics the slurry shall be as follows:

Slurry – Soda Ash (HOU Process)		
Slurry Characteristics (for performances guarantee)	Production (m3/h)	410,4
	Density (T/m3)	1,214
	Solids Concentration (%w/w)	14,04%
	Production Dry Solids (T/h) – NaHCO_3	69,95
	Temperature (°C)	40
	Dry Solid SG (T/m3)	TBC
Soda Ash Production from Belt filter	Production Dry Solids (T/h) – Na_2CO_3	43,7
	Production Dry Solids (T/day) – Na_2CO_3	1048,8
Wash Water Characteristics (for performances guarantee)	Nature of fluid	Process water
	Density (T/m3)	1,0
	Wash ratio (total) m3/h of water per Ton of dry solids (direct water + cloth & belt wash water)	0,6
	Type of cake washing	2x Direct Wash (1 fomr cloth & belt washing) + 2x counter-current wash.
Customer Goals (client expectations & HASLER GROUP's usual targets for this market)	Solid recovery	> 98 %
	Final cake moisture	< 16 %
	Washing water guarantee value	< 0,6 m3/T
	Salinity of sodium bicarbonate	< 0,12 %
HASLER GROUP Process Guarantees	Equipment Selected	90m ²
	Solid recovery	> 98 %
	Final cake moisture	< 16 %
	Washing water guarantee value	< 0,6 m3/T
	Salinity of sodium bicarbonate	< 0,12 %

All the Process performances guarntees given by HASLER will be guaranted only if the slurry during hot commissioning corresponds to slurry characteristics indicated in the table above.



A. GENERAL RULES

The conditions of performance control are established in direct collaboration with the customer who must have:

- Operational production staff
- Available maintenance staff
- Available laboratory for analyses with technical means and technicians

For the filter commissioning, HASLER GROUP will supply a qualified engineer who will make the training of customer's staff and manage all operations. (HASLER GROUP is ready to discuss other alternatives).

B. PROCESS DATA

As per the process specifications of the contract and the design criteria.

C. PROCESS GUARANTEE

As per the process specifications of the contract and the design criteria.

The process performance will be conducted during the commissioning of the filters. The procedure for acquiring the samples will be mutually agreed upon by both parties or according to:

Sampling:

Sampling will be started no sooner than one hour after continuous and satisfactory operation of the filter at nominal capacity. Nominal capacity will be defined as the tonnage listed in the Design criteria / process data section.

Samples will be taken every two (2) hours.

Test work period:

The period of the performance test will be started after satisfactory mechanical operation of the filtration unit and after insuring that the production plant can feed the filter continuously at the nominal contractual throughput.

The period of the performance test will be one week, including production shutdown not caused by HASLER GROUP equipment.

During a three-day period of continuous operation, supervised by our engineer, the customer's shifts will assume a continuous run of the plant. The production capacity, and quality of the product therein, all based on condition as described in the appendix – "Process data" will be controlled.



D. MEASUREMENTS

1. THROUGHPUT (T solids / h)

Independently of the classical means (1) (flowmeter–densimeter weighing), the throughput of solids could be controlled as follow:

- a) Measure the cake thickness (**T**) in several parts on the filter (minimum 6 measurements and make the average).
- b) Cake width (**W**)
- c) Measure the speed of the belt (**V**)
- d) Determine the specific weight (D) of the filter cake (by Buchner funnel test) calculated in dry solid for a humid cake thickness. $D = T/m^3$ for a dry solid at 0% cake moisture content.
- e) Calculation

2. THROUGHPUT (slurry – mother liquors – cake wash water)

All flows will be controlled after pumps by classical means. **(1)**

3. CAKE MOISTURE CONTENT

On the full width of the filter a sample of cake will be taken after the cake discharge roller. This sample will be properly mixed and a part of it taken for analysis.

Measurement

- a) Weight approx. 100 g of wet cake (required precision 0,1 g)
- b) Put this sample into an oven heated at 60°C during 12 to 36 hours, the drying time depending to the cake thickness **(2)**
- c) Weigh the dried cake
- d) Calculation % Moisture = $((\text{Wet cake} - \text{Dry cake}) / \text{Wet cake}) \times 100$

(1) All control and measurement equipment if needed will be supplied by the customer.

(2) The drying procedure shall be adapted to the specific client's procedure

4. WASH EFFICIENCY

On the full width of the filter a sample of cake will be taken after the cake discharge roller and a sample of slurry at filter feed.



Measurement

The analysis and the measurement of the water soluble material in the cake and the soluble material concentration in the slurry and filtrate will be done according to the client procedure mutually agreed.

The soluble material value will be expressed in g/l in the liquid and % weight in the cake.

E. MEASUREMENTS CONTROL AND PROCEDURE

In case of discrepancies between the customer' process specifications and actual filter process performances, a confirmation filtration test shall be made according to the filter "Leaf test procedure".

If such a test shows that the guarantee above was not met, resulting from deficiencies due to HASLER GROUP , the parts will cooperate so that the reasons of such a failure is corrected, if possible without substantial expenditure by the customer. A second test will then be carried out.

HASLER GROUP will support the expenditure of the engineers of HASLER GROUP for the period for the second test.

If the guarantee is not met, resulting from deficiencies due to the customer, the guarantee nevertheless will be regarded as being accomplished.

At the end of first and second test run, if any, the parties hereto shall draw up and sign a statement on the performances obtained, showing all the data collected.

If a test run is not required by customer within (3) three months after start-up date the warranty shall be deemed satisfied and customer shall sign a statement accordingly.



F. LEAF TEST PROCEDURE

1. FILTER LEAF TEST PROCEDURE

The quantity of feed slurry should produce a cake of approximately the same thickness as that on the industrial filter. The procedure will be adjusted to reflect the quantity, volume and concentration, the washes and other conditions in the plant.

The pulp is poured in the lab test filter **(1)** (Buchner) and the vacuum is adjusted and applied.

When the liquid disappears from the cake surface, the time is noted and called the form time.

Few seconds of delay is allowed, then the wash water is added and the wash time is noted. After the liquid disappears from the cake surface, dry time starts, the time is noted to complete the filtration cycle.

(1) Lab test filter: Buchner 3 pieces allowing setting a filtering cloth

2. MEASUREMENTS

a. THROUGHPUT (T solids / h)

The following is the laboratory procedure :

The cake is weighed and dried as per section 4.3. Solids are weighed and filter capacity is :

Metric tons Cake / m² hour = (Scale factor 0,9) x Dry Wt. Cake in gr x 3600

(Lab test filter surface in m²) (total cycle time in sec)

b. CAKE MOISTURE CONTENT

According to the procedure section 4.3 of the appendix "Process Performance Guarantee". The difference between industrial filter and test filter values should not be more than 0,5% of the Buchner test moisture.

(Moisture content in the filter cake = moisture content in the Buchner cake + 0,5%).



c. WASH EFFICIENCY

Customer laboratory will analyze the water soluble material content in the sample from the cake discharge (E1) and in the sample from the feed of the belt filter which will be filtered and washed in the laboratory (E2), according to a procedure to be mutually agreed. The values E1 & E2 will be compared. The value of the industrial filter will not be inferior of 10% of the Buchner test.

(Industrial filter material soluble value = Buchner material soluble value x 1.10)