

Since 1947
Heavy duty Mining Pumps
Made in Germany



Positive Displacement Pumps Characteristics

The main feature of positive displacement pumps is their constant flow which is independent of the operating pressure. At every stroke of the pump, a given volume of media is displaced. The main parameters involved in pumping are:

Solid content

Changes of the density of the pulp being pumped do not affect the volume displaced at each stroke

Viscosity

Ability to handle viscous fluids with a maximum feed efficiency. A constant flow rate is achieved when slurries are pumped.

Efficiency

Maximum efficiency independent of the current operating point of the pump. ABEL develops pumps with an efficiency of over 90%.

Temperature

Due to variable temperatures during the process, the fluidity of the product may be altered. However, this is not a problem for ABEL, thanks to its positive displacement pumps.

Pressure

High and independent of the current flow rate. ABEL pumps can deliver pressures up to 250 bar while keeping the flow rate constant.

FLOW

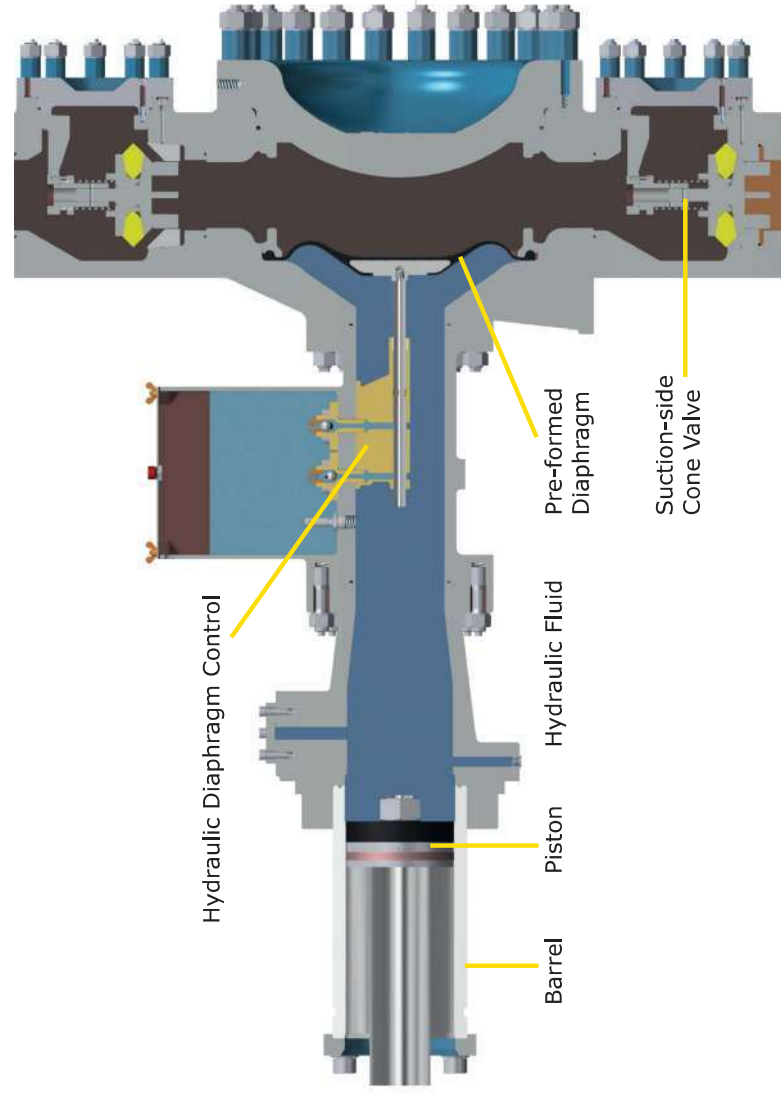
Viscosity

Solids
Content

Temperature

Pressure

Efficiency



Thickener Underflow, Concentrates and Tailings

ABEL HM

Positive displacement pumps (PDP) are particularly well suited for applications such as the discharge of thickeners (underflow). They allow highly concentrated and viscous slurry to be pumped efficiently. Changes of the parameters of the fluid pumped do not affect the flow achieved by the pump.

The advantage of ABEL HM piston diaphragm pumps is that they do not have any moving rotary metallic parts in direct contact with the slurry. This allows for strong abrasion wear to be avoided. Thanks to their low operating speed, they are much more resistant against wear than other alternative technologies.

The high solid content that ABEL HM pumps can handle allows for a reduction in the amount of water used as a transport medium for the tailing or the mineral concentrate and so to achieve a highly efficient thickening process.

Furthermore, the use of the ABEL HM technology allows the overall production process efficiency to be increased and leads to:

- Shorter filtering cycles
- Increased useful life

Key features:

- Flow rates up to 130 m³/h
- Pressures up to 100 bar

Benefits:

- Pre-formed diaphragm
- Hydraulic stroke control system
- Optimised flow rate of the mineral in the valves
- Piston size adapted to every specific application in order to optimise the speed of the pump
- Constant flow rate despite changes of the properties of the slurry



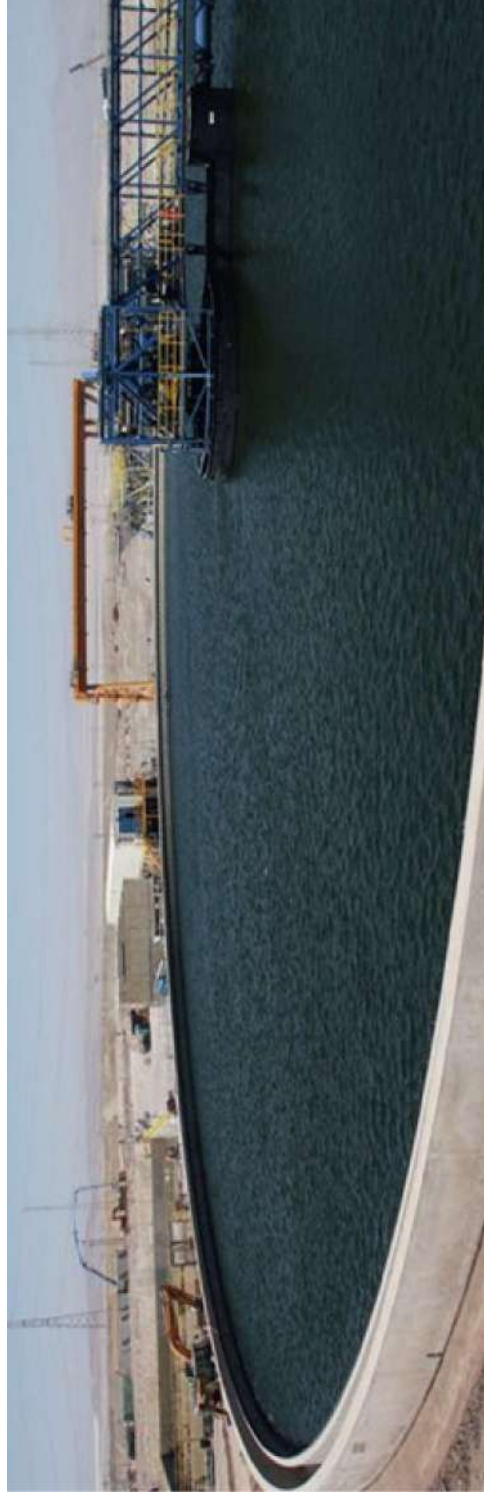
ABEL HM for the Discharge of Tailings Thickeners



ABEL HM for the Discharge of Acid Thickeners



ABEL HM for the Discharge of Jarosite Thickeners



Thickener Underflow, Concentrates and Tailings

ABEL HM

Maximum efficiency without seal water.

The separation between the product side and the drive on ABEL HM pumps is ensured by means of the diaphragm, a technology that makes the costly seal water system entirely superfluous and allows the OPEX of the pumping process to be reduced by decreasing the amount of non-recovered water, the spare parts consumption and the electric energy consumption.



Slurry & Hydraulic Side Separation

The absence of seal water impacts the control and the efficiency of the mineral thickening process positively. The ABEL HM piston diaphragm pumps technology allows tons of water to be saved and does not require water to be added to the product as long as the fluidity of the product to be pumped is within the rheological limits that this technology permits.

Dry ton (Tn)	180.00	180.00
Solid content (%) in terms of weight	50.00%	69.23%
Slurry flow rate (m ³ /h)	200.00	100.00
Water flow rate (m ³ /h)	180.00	80.00

Mass Balance with a Solid Content around 70%



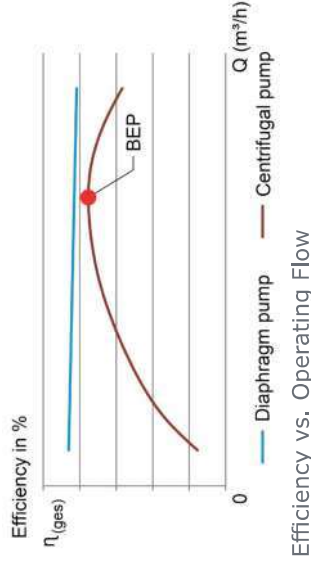
Deposited Copper Tailings

ABEL HM. Maximum efficiency

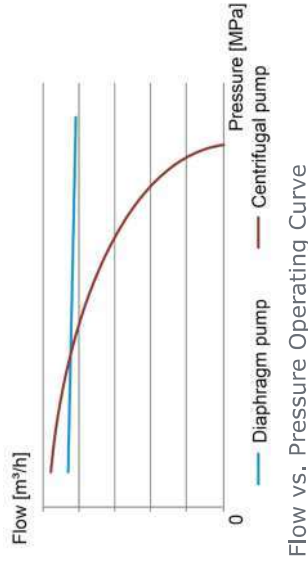
In financial terms, the additional advantage of ABEL HM positive displacement pumps over centrifugal pumps resides in their major level of efficiency. In general, the efficiency of a positive displacement pump is higher than 90%, independent of the operating point of the pump and the characteristics of the slurry which is being pumped. Centrifugal pumps achieve levels of efficiency comprised between 20% and 80% depending on the operating point (Best Efficiency Point) at which they are operated. Any variation of the discharge pressure in the line affects this operating point due to fluctuations in:

- Solids content
- Viscosity
- Temperature
- Density of the mineral
- Yield stress

ABEL HM ensures a maximum efficiency independent of upstream characteristics.



This is the reason why the use of ABEL HM technology can offer a mineral thickening process with a significantly lower OPEX than conventional technologies.



Thickened Tailings Transfer

High Solids Content & high Level of Sedimentation

The transfer of mining slurries can impact the wear of various types of pumps negatively. Together with the grain size and the density of the product, the solid content of the tailings is a critical parameter when it comes to ensuring a transfer with a maximum efficiency. ABEL HMQ piston-diaphragm pumps are the most reliable alternative for the handling of thickened tailings with varying rheological properties.

For thickened tailings with a critical sedimentation speed, it is possible to opt for the ABEL solution with a reverse valve design. Both gravity and the tailings' own weight naturally eliminate any defects that could be encountered with conventional pumps.

Thanks to their ability to pump thickened products with a solid content (in terms of weight) above 70% easily, ABEL HMQ pumps allow tailings thickening plants to operate at their maximum efficiency.

The use of ABEL technology allows an optimal mass balance in pumping thickened tailings to be achieved. It also allows for an increased useful life and operating expenses of the transfer process to be reduced thanks to:

- High energy efficiency
- Low spare parts consumption
- Low flow rates inside the valves

Furthermore, ABEL offers customised solutions for each case, which are designed by carrying out a comprehensive study of the optimal pumping rheology for each project and by adapting the size of the piston and the main gear unit accordingly. The constant cooperation with our clients and engineering companies allow us to fully comply with legal specifications applicable to the deposit of tailings.



Transfer of Copper Tailings on 7 km



Thickened Copper Tailings at 77 bar



Gold Tailings in South America



Paste Tailings Transfer

ABEL HM: Piston Diaphragm Pumps

Since the launch of the HM series, ABEL has been specialising in the control and transfer of thixotropic products occurring in paste tailings management.

The different types of mineralogy of our different clients have allowed us to acquire sufficient experience and knowledge to adapt the design of our pumps to the specificities of each application.

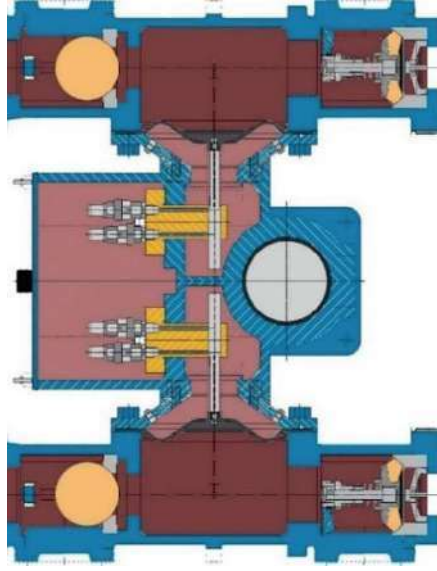
ABEL HM piston-diaphragm pumps are dimensioned specifically for each application by increasing the flow passage between the sealing surface of the valve and its corresponding seat.



ABEL HM for transfer of PbSO₄

Benefits:

- Cone valve or ball valve design based on the specific operating characteristics of the application.
- Complete rheological study for optimising the pumping.
- Flow speed inside the pump <1.5 m/s



ABEL HM Cone Valve and Ball Valve Design

The use of the ABEL HM technology for pumping paste tailings significantly reduces the effect of shearing compared to other conventional technologies and allows an optimal slope for the deposit of paste tailings to be adopted, hence reducing the risks of geomechanically faults.



ABEL HM. Deposit of Paste Tailings

For ABEL, the safety of the transfer of tailings is a priority. ABEL piston-diaphragm pumps are equipped with two independent safety devices that are triggered in case of blockage of the pressure line of the pump: hydraulic safety valves and pressure transmitter with two alarms: warning and power shut-off.

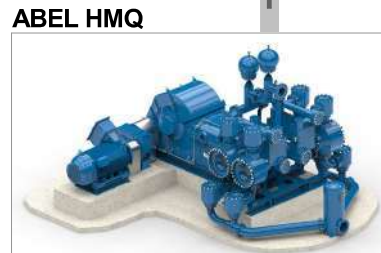
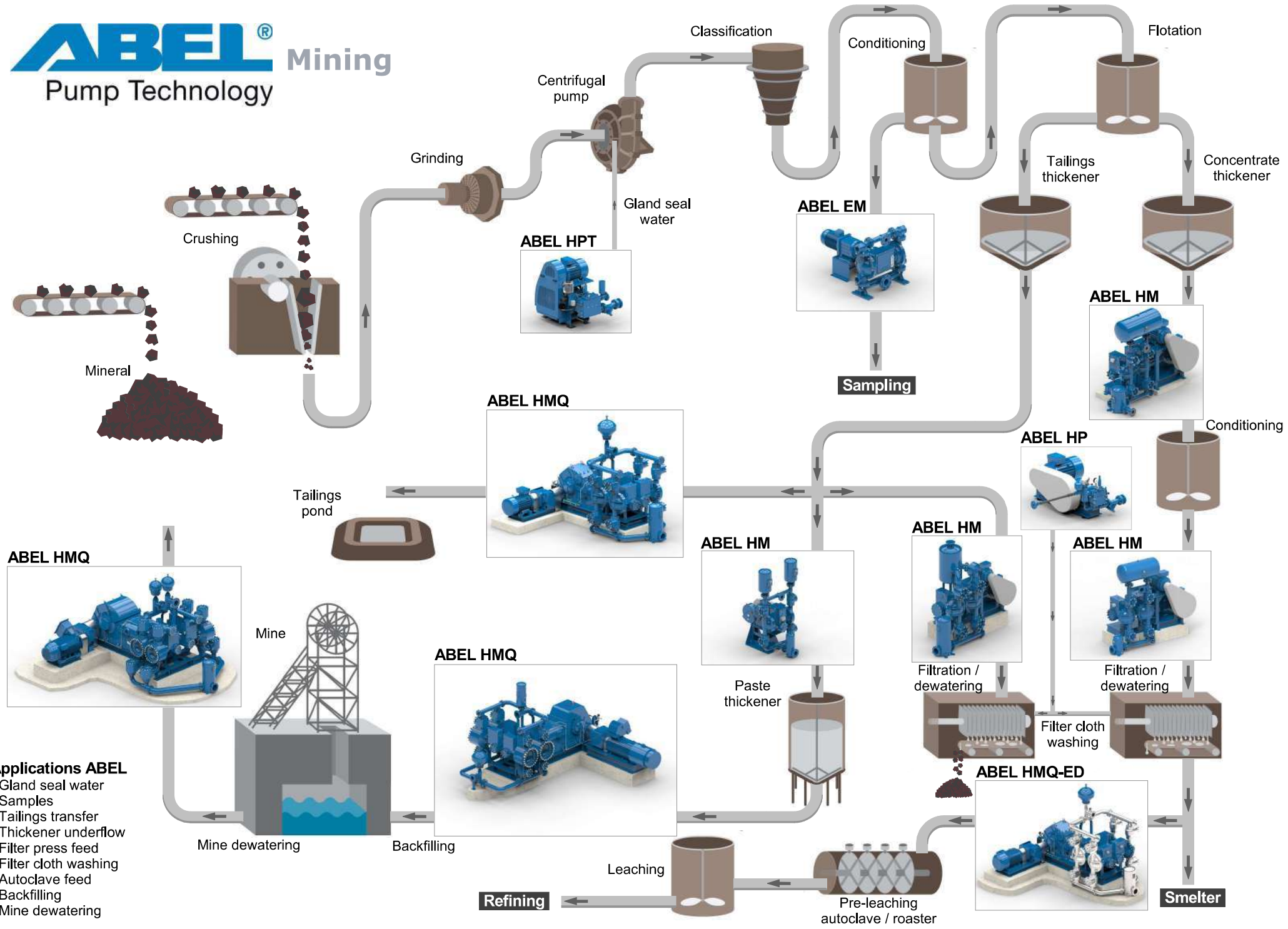
In the event of an electronic error in the signal received, ABEL pumps are equipped with certified safety valves which are independent for each pump chamber and set to a safety pressure of 110% of the nominal operating pressure.

If, during the service life of the pumping plant, the valves become clogged with tailing deposits, they can be rapidly replaced thanks to the continuous support ensured by our service engineers.



ABEL HMQ pumping Paste Tailings

ABEL[®] Mining Pump Technology



- Applications ABEL**
- Gland seal water
 - Samples
 - Tailings transfer
 - Thickener underflow
 - Filter press feed
 - Filter cloth washing
 - Autoclave feed
 - Backfilling
 - Mine dewatering



Refining

Smelter