ABEL®
Pump Technology

Since 1947

Heavy duty Mining Pumps

Made in Germany



Diaphragm Pumps
Solids Handling Pumps
High Pressure Pumps
Marine Pumps

www.abelpumps.com

Heavy Duty Pump Solution for all abrasive Media in Mines

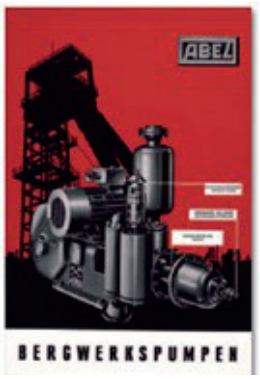
ABEL Pumps

The beginning of everything

In 1947, ABEL was founded by Wilhelm Abel in Düsseldorf as an engineering company specialised in pumping technology.

As it was located very close to the Ruhr valley, where coal mining was the major industry, the fledging company quickly began to set the industry standards of pumping technology for abrasive products. Mining applications required resistant and safe pumps for extracting water from the bottom of mines and the equipment used was expected to offer high overall reliability. The lives of miners working at depths of hundreds of meters depended on these pumps.

Starting from its origins in mining, ABEL has diversified its operations over the years and currently offers a complete range of positive displacement pumps for the mining industry. Nowadays, there are very few pump manufacturers in the world capable of offering a suitable and complete range of pumps for the mining industry.



ABEL Mining Flyer from 1949

Pumps for challenging applications: Engineered and made in Germany

ABEL pumps are being constantly technologically innovated and optimized. Nevertheless, their solid design has remained consistent throughout the decades, keeping the ABEL core characteristic untouched. In this regard, the solidity of the pump's components is the perfect example.

ABEL engineers continue designing our products by following this same principle of robustness on which we founded our company to become a leader in the field of pumping technology in the ceramics industry.

This company, headquartered in Büchen, near to Hamburg, satisfies the requirements of the quality standard DIN EN ISO 9001 since 1991 and was one of the first companies in Germany to obtain the certification from Germanischer Lloyd.

Specialists for transfer of highly abrasive and viscous media with a high solid content.

ABEL is expert in applications where it is necessary to pump abrasive and aggressive media in extreme conditions and under high pressure and which frequently requires transfer over long distances. The SH series pumps for solid media handling are able to ensure the transfer of slurries with a high solid content (up to 80 %) at pressures up to 16.0 MPa (2320 psi). Mining companies worldwide rely on ABEL as their main supplier for fulfilling their needs in the transfer of abrasive media.

ABEL has suitable pumps for any type of operation, ranging from the extraction of water containing solids from the bottom of the mine to the transfer at very high pressures of viscous and abrasive media used for mine backfilling. The acid slurry of minerals used in the refining processes in nickel, copper or gold mines represent an additional challenge. For these cases, ABEL has designed pumps whose components which enter into contact with the pumped product are made of materials such as polypropylene, stainless steel, duplex stainless steel or are provided with an acid-resistant and wear-resistant internal coating made of hard rubber.

Clients can choose from a wide range of diaphragm pumps and single, duplex, triplex and quadruplex piston diaphragm pumps. Our product range also comprises

piston pumps for the transfer of solids and triplex piston pumps for cleaning filter cloths of chamber filter presses or for the supply of sealing water for centrifugal pumps which handle high flow rates of abrasive media.

On every continent there are open-cast mines. Minerals are extracted and treated under very different climatic conditions. The mine pumps are operated outside in extreme heat, cold, humidity, dirt etc. Despite these conditions, they must stay operational and in perfect condition every day, 24 hours a day. Our job is to design and build pumps for challenging applications able to withstand such extreme conditions.

Why ABEL? Experts in Mining:

ABEL Piston Diaphragm Pumps provide...

Durability

One important advantage over other positive displacement pumps is the hermetical separation between the media pumped and the hydraulic side of the pump. The diaphragms safely separate the abrasive media from the piston of the pump. Furthermore, by means of regulation devices and safety valves, the service life of our pumps is extended and the perfect condition of the equipment is protected and maintained.

Flexibility

Suitable for different pressure ranges. All of our high-pressure pumps are equipped with API-compliant cone valves (a reversing valve design is available as well for the transfer of slurries with a high sedimentation rate). When low pressures are needed, the pumps are equipped with ball valves which stand out as having a long useful life even when the media pumped has a high content of coarse solid particles.

Safety

Our pumps' safety is directly attributable to their innovative design. ABEL pumps are able to run dry as well as at low speed without interruptions. Their construction features make them best suited for a reliable and low-wear transfer of mineral slurries at high pressures.

Resiliency

The robust HM pumps incorporate preformed diaphragms that do not stretch during stroking. Consequently, the useful life of these diaphragms is increased.

Reliability

For critical processes. The HM pumps feature truly effective preformed diaphragm technology. They are ideal for intensive operations that demand maximum 24/7 operational availability.



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 up to 90%.

Temperature

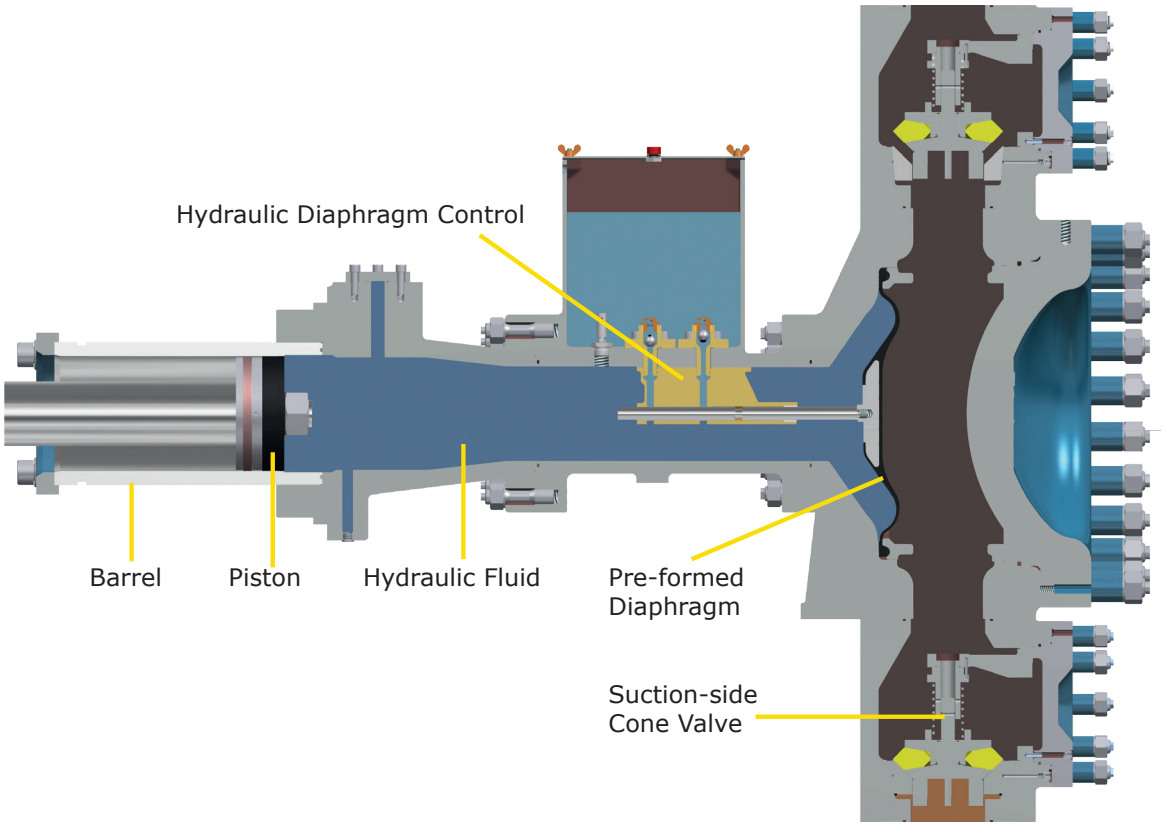
Due to variable temperatures during the process, the fluidity of the product may be altered. However, this is not a problem for ABEL, thanks to its positive displacement pumps.

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**



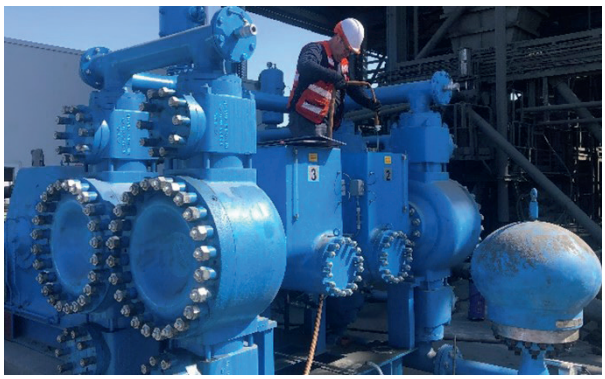
ABEL Customer Service

Full Trust in Production Processes

ABEL's after sales solutions are customer-oriented and designed based on many years experience in mining. Our technical service concepts provide services that offer maximum safety and efficiency as well as short response time. The technical service can be put together according to the specific requirements of the application and customer. This includes:

- Training in the factory
- Training and commissioning
- Preventative maintenance
- Optimization of pumping systems
- Creation of maintenance plans
- Comprehensive maintenance contracts
- Online monitoring

The technical service offered by ABEL allows the customer to achieve his mining work in an optimal and efficient manner because he can rely on a team of service engineers which monitors the pumps in operation continuously.



Global preventive Maintenance



Online Monitoring System



Complete Rheological Analyses



Optimisation of Materials

ABEL Lab

Optimization of Materials and Rheology for Pumping

ABEL can count on its facilities, which are equipped with the most modern technologies and allow a complete analysis of the product to be pumped, whatever its nature and other properties: concentrated mineral, thickened tailings, paste tailings, chemical products, mine water, etc.

Our facilities are provided with equipment which can determine:

- The best material to be used for the pump and those parts which come into contact with the product
- The most suitable material from a mechanical point of view for pumping abrasive slurry
- The optimal solid concentration for a transfer over a long distance
- Slump test and tests for making the paste more liquid
- Pump yield stress

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

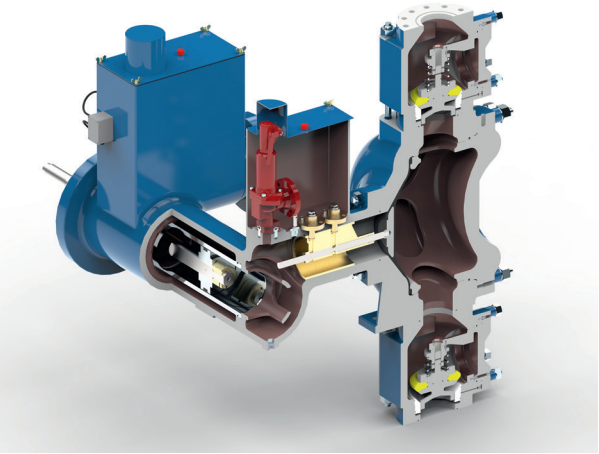


Thickener Underflow, Concentrates and Tailings

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 (m³/h)	200.00	100.00
Water flow rate (m³/h)	180.00	80.00

Mass Balance with a Solid Content around 70%



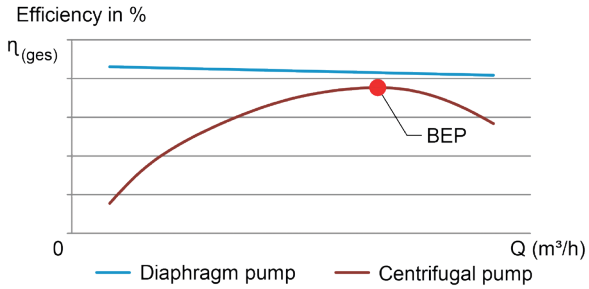
Deposited Copper Tailings

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 up to 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:

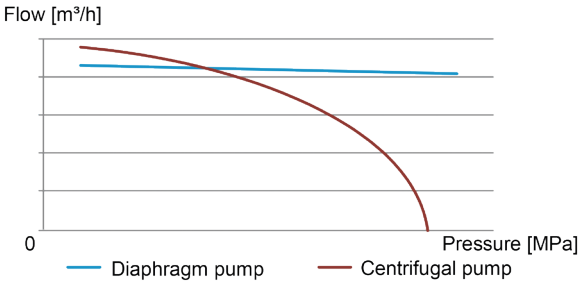
- Solids content
- Viscosity
- Temperature
- Density of the mineral
- Yield stress

ABEL HM ensures a maximum efficiency independent of upstream characteristics.



Efficiency vs. Operating Flow

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.



Flow vs. Pressure Operating Curve

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 $PbSO_4$

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

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.

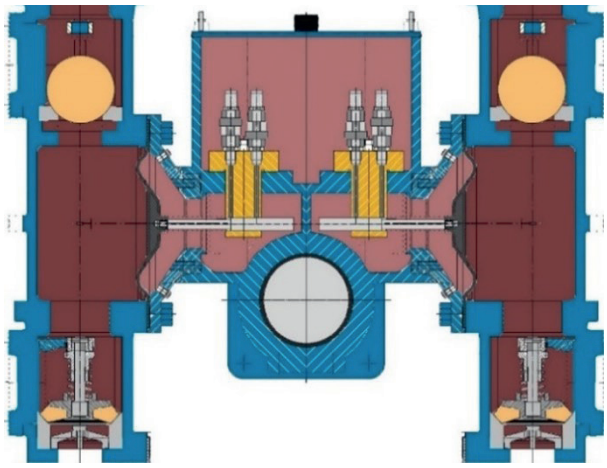


ABEL HM. Deposit of Paste Tailings

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 HM Cone Valve and Ball Valve Design



ABEL HMQ pumping Paste Tailings

ABEL® Mining
Pump Technology

Mineral
Crushing
Grinding
Centrifugal pump
Classification
Conditioning
Flotation
Gland seal water
ABEL HPT
ABEL EM
Tailings thickener
Concentrate thickener
Sampling
ABEL HM
ABEL HMQ
Conditioning
ABEL HP
Tailings pond
ABEL HMQ
ABEL HM
ABEL HM
Mine
ABEL HMQ
Paste thickener
Filtration / dewatering
Filtration / dewatering
Filter cloth washing
ABEL HMQ-ED
Mine dewatering
Backfilling
Leaching
Refining
Pre-leaching autoclave / roaster
Smelter

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

Mine Backfilling

Experts on Piston and Piston-Diaphragm Solutions

Paste backfilling with residues extracted from the mine to which a certain volume of cement base is added in order to obtain a certain level of resistance is the most complicated and challenging task in mining in terms of:

- Resiliency
- Maintainability
- Risk of failure
- Interruption time

Therefore, for backfilling applications, it is indispensable to carry out a comprehensive study in order to define the most suitable pump for the requirements of the specific process and the possible variations of the solid content in the paste and the cement base to be added to the backfilling residues. For this purpose, ABEL has developed an exclusive and customised pump design for the transfer of cement paste.

ABEL HMQ, the most reliable option

ABEL HMQ piston-diaphragm pumps allow their users to perform their backfilling task in the most efficient manner and to reduce the operating expenses of the pumping process significantly at the same time.

The long durability of this series of pumps is attributable to their low operating speed, below 50 strokes/min, which allows wear to be reduced and the supply of paste inside the pumping chamber to be improved.



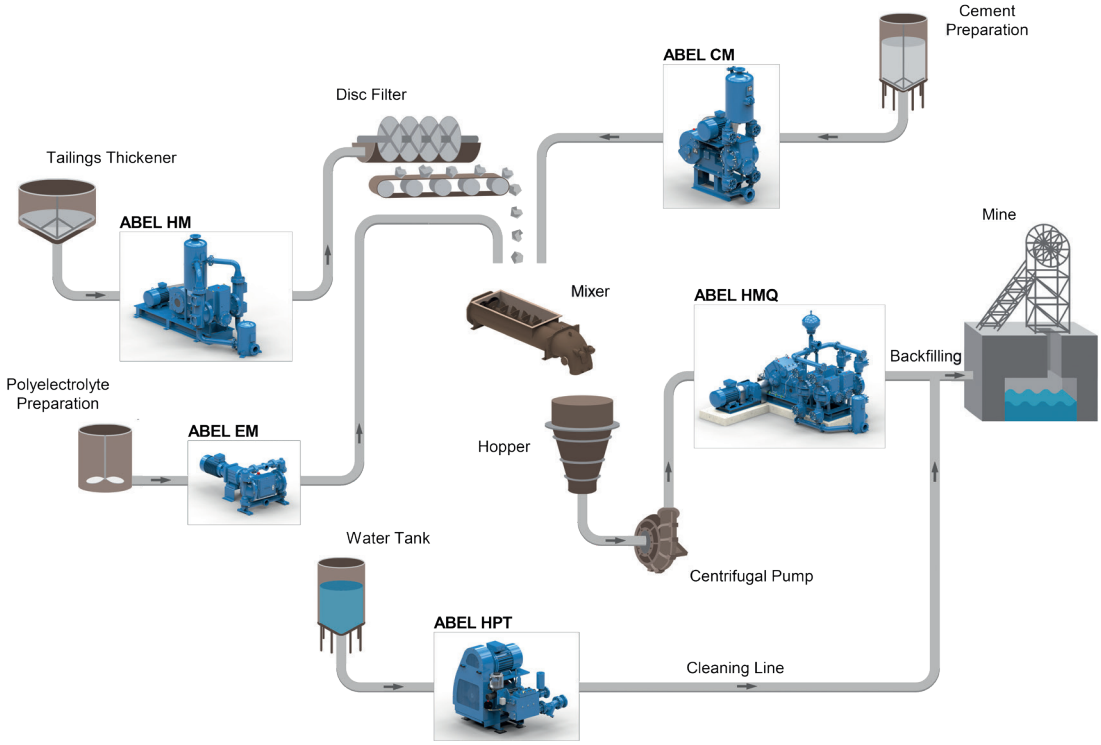
Transfer of Cement Paste, Solid Content > 75%



Slump Test, Solid Content > 75%

Backfill plant, integrated solution from ABEL

ABEL offers the possibility to integrate the complete solution into any pumping application required by a paste backfill plant, since this is the most reliable way to obtain a plant which has one single goal: not to fail.



Mine Backfilling

Experts on Piston and Piston-Diaphragm Solutions

ABEL HMQ, piston-diaphragm pumps

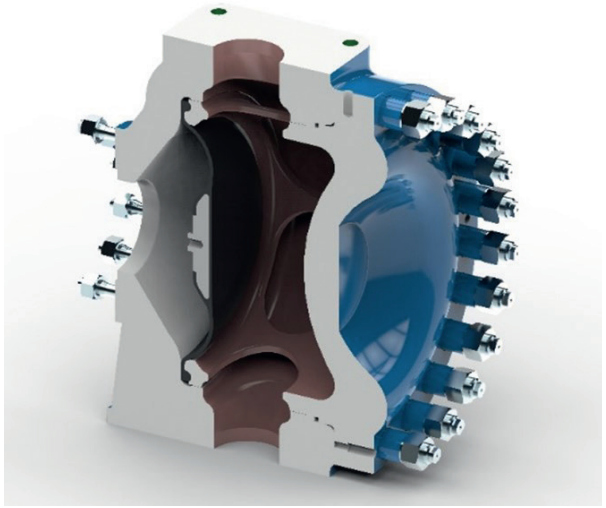
The separation between the paste and the compression chamber of the piston is ensured by a pre-formed diaphragm which operates at a low speed and can achieve a service life of more than 8,760 operating hours.



Paste Discharge without Pulsations

Advantages:

- Pre-formed diaphragm
- Separation between the paste and drive side by means of a diaphragm
- Design of maximum paste passage in the valves



Pre-formed Diaphragm for hydraulic Separation

ABEL SH, hydraulic piston pumps

ABEL SH pumps for solids handling are suitable for the handling of difficult fluids with a semi-solid consistence and a solid content of up to 80%. To meet the challenges of this type of transfer operations only low-speed hydraulic piston pumps come into consideration.

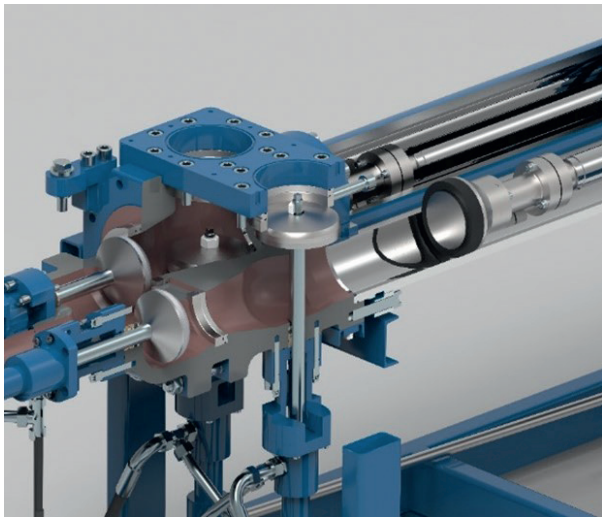


Mine Backfilling at an Altitude of 4800 m

ABEL SH solid handling pumps with cone valves allow flow rates up to 100 m^3/h and discharge pressures up to 160 bar to be achieved.

The hermetic design of the cone valve together with a set of sensors prevent backflows of the pumped paste.

The integrated logic allows problems attributable to the blockage of large size solids coming from the dosage of cement or pieces of cement detached from the pipework, feed hoppers or paste mixers upstream of the pumping system.



ABEL SH, Cone Valve Design

Diaphragm Filter Press Feed

ABEL HM for concentrated Mineral

The concentrated mineral dewatering process is one of the most challenging tasks of any mining plant. Self-adjusting ABEL HM piston-diaphragm pumps, both chamber and diaphragm pumps, have proven in thousands of situations that they are the most suitable for filter press feed.

These pumps maintain a constant flow rate during the entire filling phase of the filter. When the filter is full, the pump reduces its flow rate automatically for the pressure and maximum dewatering phase of the concentrate. The break-point between both phases is freely adjustable after commissioning and allows every ABEL solution of diaphragm filter presses to be adapted to the requirements and specificities of every mineral and filtration technology used.



ABEL HM for the Filtration of Iron Concentrate

When it comes to choosing the most suitable equipment for the filtration of concentrates, one of the most important factors is the operating speed. The low rpm of the motor and, consequently, the low frequency of piston strokes ensure a high filling flow rate and allow premature wear to be avoided.



ABEL HM used on a nickel concentrate filter press

Given that the operating pressure achieved does not depend on the level of the wear of the pump, every filtration is carried out completely. The technological principle of ABEL HM piston-diaphragm pumps therefore is the best option from the production process point of view as well as from a maintenance point of view.

Key features:

- Flow rate up to 130 m^3/h
- Pressures up to 16 bar in filter presses

Benefits:

- Pre-formed diaphragm
- PID control system
- Maximum pressure and cake dewatering
- Minimum speed at high pressures
- Same cake thickness achieved in every filtering cycle
- Handling of slurries with extreme sedimentation rates



High Pressure Filter Press Feed

ABEL HM: Tailings Management

The construction of ABEL HM pumps is dimensioned so as to ensure that they can operate at pressures up to 16 bar as standard. This constitutes a competitive advantage for the feed of chamber filter presses and allows a maximum efficiency dewatering of tailings containing different minerals to be achieved.

This feature, in conjunction with the low operating speed of the pump in the dewatering phase of the cake, gives the dewatering plant the capacity to increase the lifespan of tailings deposits.

Based on these considerations, the presence of fine particles does not affect the wear of the pump and its internal components achieve a useful life of up to 8,760 operating hours (1 year of 24/7 operation).

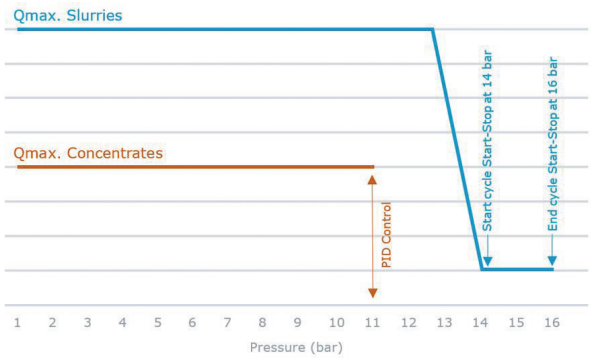
Finally, the valves used in the ABEL HM pumps are designed in a manner such as to ensure the minimum permissible operational speed which ensures that: V> sedimentation speed / V> laminar flow speed.

Key features:

- Flow rate up to 130 m³/h
- Pressures up to 16 bar in chamber filter presses

Benefits:

- Automatic flow rate control
- Start-up and shut-down cycle
- Maximum dewatering at 16 bar
- Increase of the lifespan of tailings deposits



ABEL HM, automatic Flow Rate Control

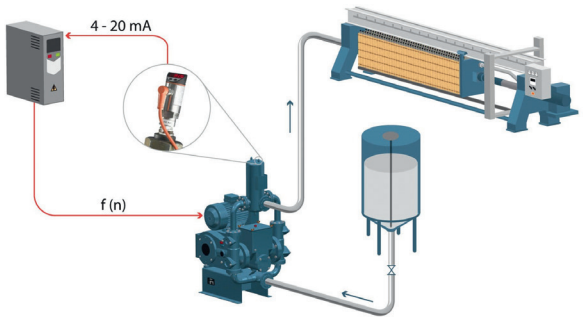


Betonite Tailings. ABEL HM



ABEL HM for large Filter Presses

ABEL HM piston-diaphragm pumps are designed for the handling of pulp with a solid content of up to 75%, which is a critical factor for the mineral dewatering, allowing the pump to achieve the maximum filter press performance and to reduce the filtration cycles.



Comprehensive and integrated Solution

Filter cloth washing

ABEL HP: Dynamic in Pressure and Flow Rate

In applications such as the dewatering of mineral slurries with chamber filter presses or membrane filter presses, apart from facilitating the achievement of an excellent filtration with shorter cycles (and, most likely, a better cake discharge), the pump and all its components must also ensure a high degree of reliability.

This applies to the filter cloth cleaning system as well. For many years now, ABEL has supplied high-pressure pumps for cloth cleaning to the main filter press manufacturers all over the world.



ABEL HP-K-25 for Filter Cloth Cleaning

Used as a cleaning system with spray nozzles that move between two filter plates or clean the plate from both sides, the ABEL HP is a pump used in innumerable mines all over the world for high-pressure cleaning of filter cloths.

The HP series is characterised by a high robustness, a long useful life and a flow rate of up to 28 m³/h at a pressure up to 16.0 MPa. This high pressure pump is suitable for challenging applications and regions with difficult climatic conditions.

Key features:

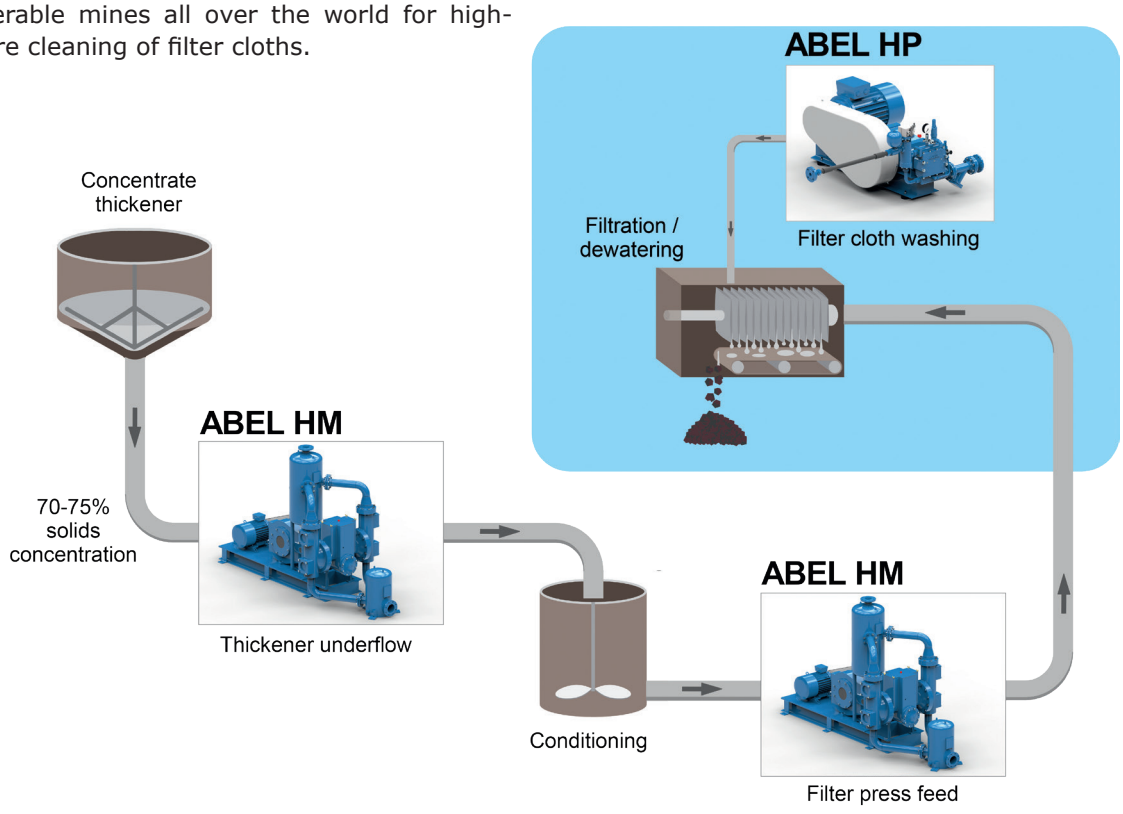
- Flow rates up to 28 m³/h
- Pressures up to 160 bar

Benefits:

- The 3/2-way bypass valve specifically designed for filter cloth cleaning works as a bypass valve when filter plates are being replaced. This avoids wasting water.
- Manual setting valve for the discharge pressure in case of wear of the cleaning nozzles.



ABEL HP-K-25 for Filter Cloth Cleaning



Gland Seal Water Supply

Always reliable, constant and highly efficient Flow Rate

In the mining industry, centrifugal pumps are often used for managing very high flow rates at low to moderate discharge pressures. The shaft seals of these pumps often require the supply of clean water under pressure in order to reduce wear and product leakage to the outside.

The gland water is used for cleaning the sealing area of solid particles and cooling components such as the shaft, it if the slurries transferred are hot. It is crucial that the pressure of the water injected into the seal is slightly higher than the discharge pressure of the centrifugal pump in order to form an effective water film inside the seal. Once more, mining companies will find the ideal pump for this application among ABEL's product range. Depending on the required pressure and flow rate, the suitable pumps are models ABEL HP or HPT.



Gland Seal Water Pumps on a Phosphate Mine

Both models are very efficient positive displacement pumps, i.e. their flow rate does not depend on the pressure. The water flow inside the sealing of the shaft is maintained at a constant level and within defined parameters, independently from the operating point of the centrifugal pump. Thanks to this capability, it is possible to supply seals and sealings of several centrifugal pumps simultaneously.

The ABEL HP is a solid triple-action plunger pump is even more powerful, provides more options and, like its smaller sibling, is suitable for use around the clock.

ABEL HPT triplex plunger pump for high pressures is more powerful, has a higher operating range and, like the previous model, can be operated 24 hours a day.

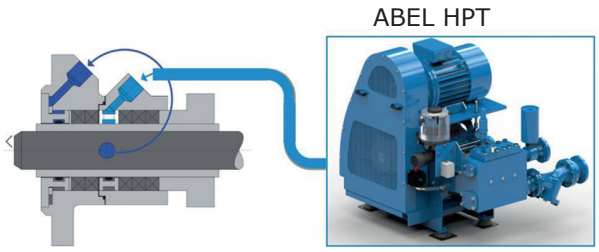
Key features:

ABEL HP

- Flow rates up to 28 m³/h
- Pressures up to 160 bar

ABEL HPT

- Flow rates up to 50 m³/h
- Pressures up to 250 bar



ABEL HPT, Solution for Centrifugal Pump Seals

Benefits:

- Reliable and constant seal water supply, due to true positive displacement pump technology
- Simultaneous supply of several centrifugal pumps at the same time



HPT-K-32 to supply Gland Water to up to 5 Centrifugal Pumps in parallel

Mine dewatering

ABEL HMQ without Room for Failure

There is no doubt that mine dewatering is a high-risk and crucial task, since, in the case of underground mines, a failure in the water pumping system has irreversible consequences.

For ABEL HMQ piston-diaphragm systems designed for high-density pulp handling, mine water is a light slurry with a solid content far below the limits of this technology and therefore, it is not necessary to filter or sediment it before pumping.

The service factor and design of the gear units installed on ABEL HMQ pumps allow the pumping process to be carried out in one single step. Particularly in the case of deep mines especially, this translates as a huge saving in terms of time and resources.

Key features:

- Flow rates up to 410 m³/h
- Pressures up to 250 bar

Benefits:

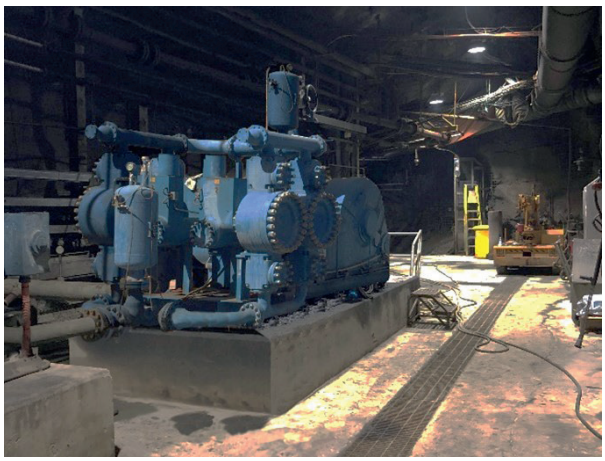
- Pumping in one single step
- Mine water with suspended solids
- Pump synchronisation

High flow rates, parallel solutions

On mining sites located in areas with heavy rains, the flow rates required during rain season can reach 1,000 m³/h.

For such cases, ABEL has developed a comprehensive solution by installing ABEL HMQ pumps in parallel and by running them in an intelligently synchronised manner thanks to control technology entirely developed by ABEL.

This system avoids two pistons carry out the same pumping movement at the same time. This feature - in conjunction with the pulsation dampeners installed on the pumps - ensures an absolutely stable dewatering without pulsations.

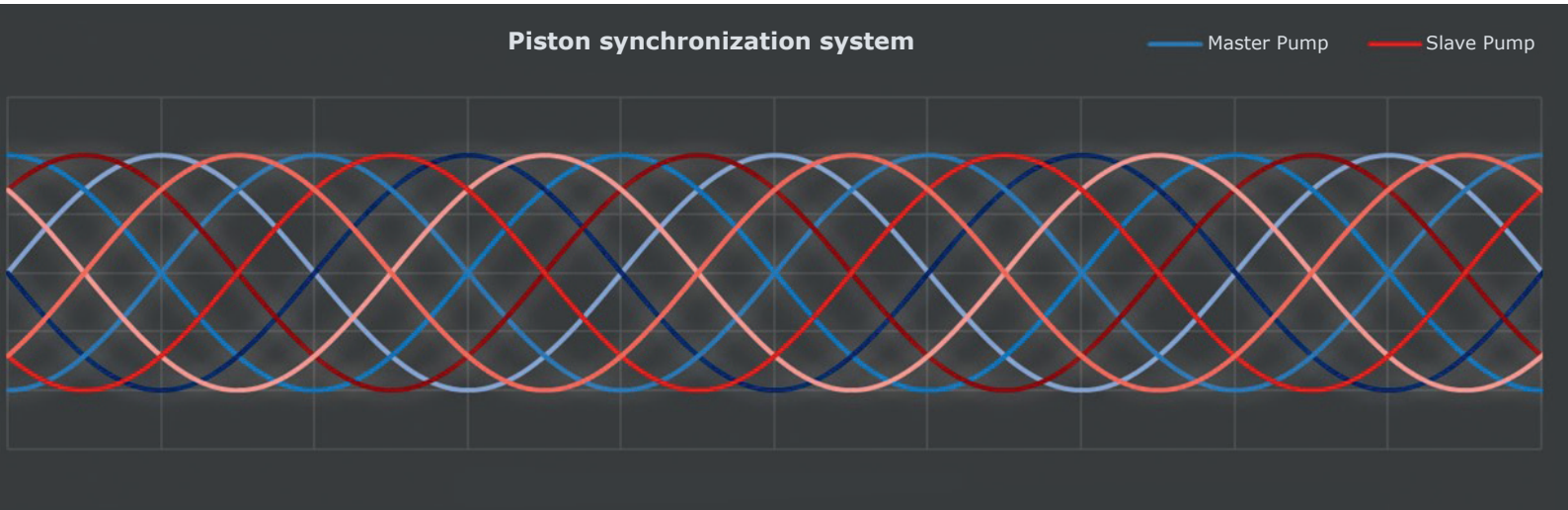


Cone Valve on the ABEL HMQ Series, large Pressures

Large dimensions. Less space

Compared to other conventional technologies used for this multistage task, ABEL HMQ pumps are larger. Beforehand, this could represent a disadvantage compared to conventional pumping equipment.

However, the actual footprint of HMQ pumps inside the mine is much smaller than that of conventional systems, given that ABEL pumps do not require building slurry decantation basins for subsequent dewatering, nor additional equipment for slurry treatment by means of filter presses. The entire solid content being received by the pumping system has one destiny only: evacuation in one single step.



Autoclave Feed

Transporting hot abrasive Media without impacting its Useful Life

Specific metallurgical processes of gold, molybdenum, copper, zinc, nickel or uranium extraction require high pressures and high temperatures and, in certain cases, a low pH. For these purposes, mining companies use autoclaves (also called blast furnaces) which are loaded with slurries at different temperatures, depending on the mineral and the specific process.

ABEL hydraulic piston diaphragm pumps are particularly suited for this application. Their tightness in conjunction with the design of the diaphragm allows extremely high pressures and high temperatures to be achieved. Thanks to the low operating speed of the piston and the large size of the gate valves, ABEL pumps of the HMQ and HMD series are well suited for feeding autoclaves even if the media transported are highly abrasive mineral slurries.

Distinction from other alternatives: large range of flow rates

The self-lubricated design of the reduction gear installed on the HM and HMQ series allows an extremely large operational range of flow rates to be achieved and, consequently, the autoclave to be fed at 15 to 100% of the pump speed, which clearly differentiates these pumps from other alternative technologies of positive displacement.

Key features:

ABEL HMQ

- Flow rates up to 410 m³/h
- Pressures up to 250 bar

ABEL HMD

- Flow rates up to 70 m³/h
- Pressures up to 100 bar

Both options are suited to operate with media at temperatures up to 100°C.

ABEL, as a specialist in mining, uses pre-formed diaphragms for both types of pumps, given that, unlike conventional diaphragms, pre-formed diaphragms do not stretch during the pump strokes. Consequently, the diaphragms are subjected to less stress which translates to a much longer useful life.

Benefits:

- Pre-shaped diaphragms (HMQ, HM) for very long diaphragm service life
- Slurry valves as ball or cone valves
- Generously dimensioned pulsation dampeners for low residual pulsation



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- Water and Wastewater
- Ceramics
- Chemical
- Oil and Gas
- Energy Industry
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