ABEL® Pump Technology

Since 1947

Mine Backfilling

Made in Germany

Diaphragm Pumps
Solids Handling Pumps
High Pressure Pumps
Marine Pumps

www.abelpumps.com

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:

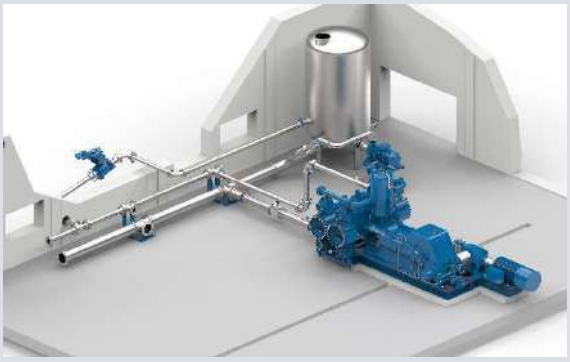
- The best material to be used for the pump and those parts which come into contact with the product
- The most suitable material from a mechanical point of view for pumping abrasive slurry
- The optimal solid concentration for a transfer over a long distance
- Slump test and tests for making the paste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

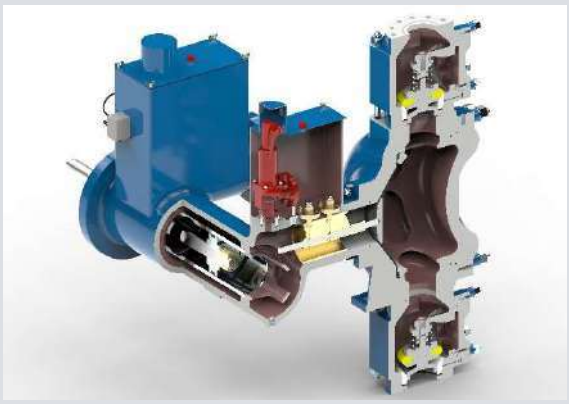
Test Bench Pumping
General Test Procedure

The test procedure is run to verify the following: pump functionality (mechanical and volumetric efficiency), leak testing of the complete pump unit, set up of all safety and control elements and to carry out the hydraulic performance testing.

Each pump unit is tested with an original pulsation dampener and, when possible, with the original motor. The pumps are always tested once they are primed. All the accessories necessary for the proper functioning of the unit (except for the pressure gauge) are mounted before the bench test is carried out.

The required performance data based on the order are tested and ensured according to the VDMA (German Mechanical Engineering Industry Association) Standard 24284 group II. Furthermore, every acceptance test is documented with a test certificate.





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.

This service allows the backfill plants to be always operated in a safe and reliable manner, avoiding possible blockages or sedimentation in the lines and preventing the most critical component of the plant, the mine pipework, from being exposed to unnecessary risks.

Global preventive maintenance

Online monitoring system

ABEL Smart Pump Assistant
Comprehensive remote Service

Pump operators reduce their operating expenses in a quite intelligent manner.

Just like people use monitoring applications, pump operators use ABEL Smart Pump Assistant. By providing a continuous view (24 hours a day, 7 days a week) on positive displacement pumps operating values, the Smart Pump Assistant ensures that the pumps remain available and functional in the long term. Furthermore, in certain cases, the intelligent solution by ABEL allows significant optimization potential for clients using diaphragm pumps to be identified and to be translated into a performance increase.

Mine Backfilling
Experts on 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

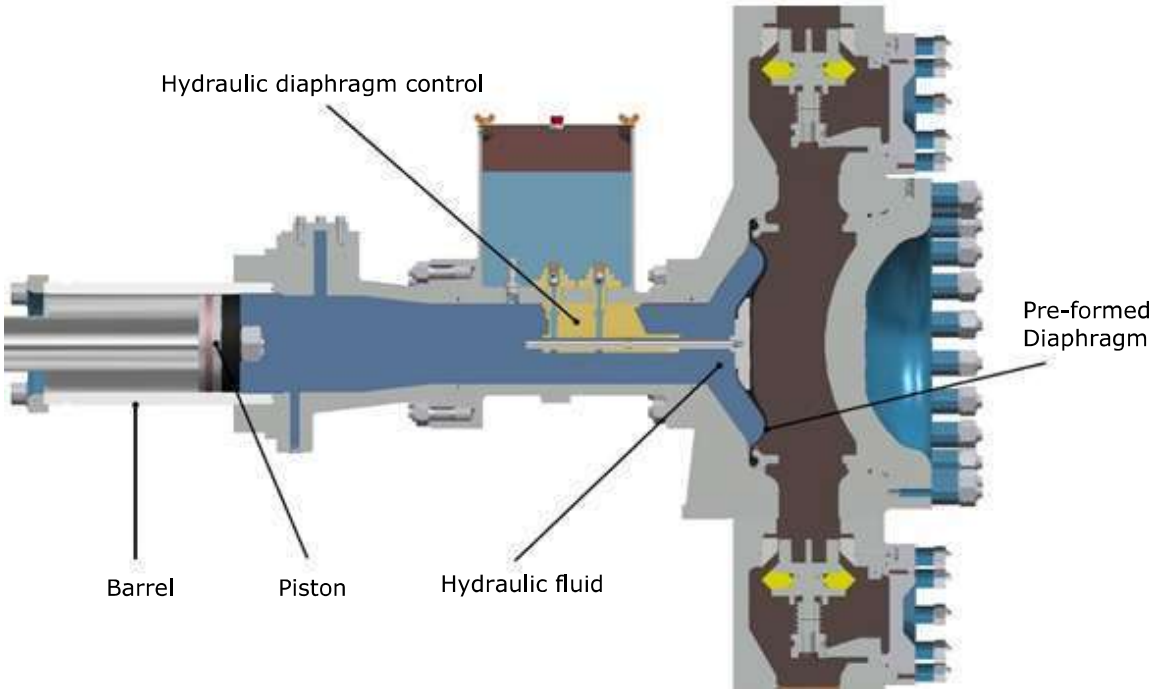
ABEL HMQ piston diaphragm pumps allow their users to perform their backfilling task in the most efficient manner and to reduce the operating expenses of the pumping process significantly at the same time.

Its durability is attributable to its special design, which is particularly suited for this application. Wear is reduced and the paste feed into the pump chamber is improved.

ABEL HMQ for cement paste, solid content > 75%

Slump test, solid content > 75%

Piston diaphragm pumps designed by ABEL for each specific backfilling application and rheological property allow extraordinary slump limits and compared to conventional technologies, a much higher operating efficiency to be achieved. Even when operated at high performance, the service life of the diaphragms usually exceed one year.



Mine Backfilling
Experts on Piston Diaphragm Solutions

ABEL HMQ, piston diaphragm pump

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.

Intelligent systems of pulsation dampeners offered by ABEL allow the discharge pressure fluctuations of the pump to be adapted to any variation of the paste parameters which critically affect the rheological properties of the product that is being pumped. Thanks to this solution, the client can count on an intelligent and reliable piece of equipment which treats - gently and without pulsations - the most critical component of the backfilling process: the pipework.

Paste discharge, continuous flow 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

The presence of cement in the paste does not represent a problem of any kind for the pump operation and it does not have any impact on the pump's maintenance.

ABEL has developed a special solution for pump components which come into contact with cement. This solution allows the pump to be operated for 6 months without having to open up the components. The cement compaction inside the pump is easily avoided by means of a special design for cement paste backfilling applications. Thanks to this technology, there are no longer any limits to backfilling.

Main characteristics:

- Flow rates up to 275 m³/h
- Pressures up to 160 bar
- Special cement handling design

Mine Backfilling
Hydraulic Piston Pumps

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.

ABEL SH for mine backfilling at an altitude of 4800 m

ABEL solids 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 to be avoided.

ABEL SH, cone valve design

The SH series confers the backfill plant robustness and the ability of integrating the control of different series of machines into the operating logic of the pump by relying on an autonomous and highly efficient system.

Main characteristics:

- Flow rates up to 100 m^3/h
- Pressures up to 160 bar

Advantages:

- Pumping of large solid particles thanks to slow suction and discharge valve strokes.
- Operating stroke rate reduction thanks to the simultaneous hydraulic de-synchronization of the pistons.
- Chrome casing for a longer component service life.
- The hydraulic units used are from globally recognized brands and spare parts are easily available.
- Body designed so as to ensure full separation between paste and drive side.
- Cone valves are easily accessible in order to allow visual inspection without needing to be opened.
- Sealing elements can be adapted to a higher or lower paste fluidity.

Different hermetic paste sealing options

Mine Backfilling
Complete Solution for the Plant

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.

Disc filter feed

In order to feed disc filters continuously, the pump used must be able to work at a nominal flow and at operating pressures of around 6 bar due to the height at which the disc filter is located. The most reliable solution for such an application is a high flow rate piston diaphragm pump: ABEL HMD.

Wet cement dosing

Cement grout is an alternative technique to dry cement dosing. It has the advantage of allowing a more stable and blockage-free process as well as achieving more homogeneous paste composition. For this application, ABEL offers small-sized compact piston diaphragm pumps specifically designed for cement handling: ABEL CM.

Polyelectrolyte injection. Reduction of rheological properties

With the objective of obtaining a product with lower operating risks but without reducing paste resistance by adding water. ABEL relies on the specific diaphragm technology for dosing fluidizing additives in order to reduce the yield stress of the paste: ABEL EM.

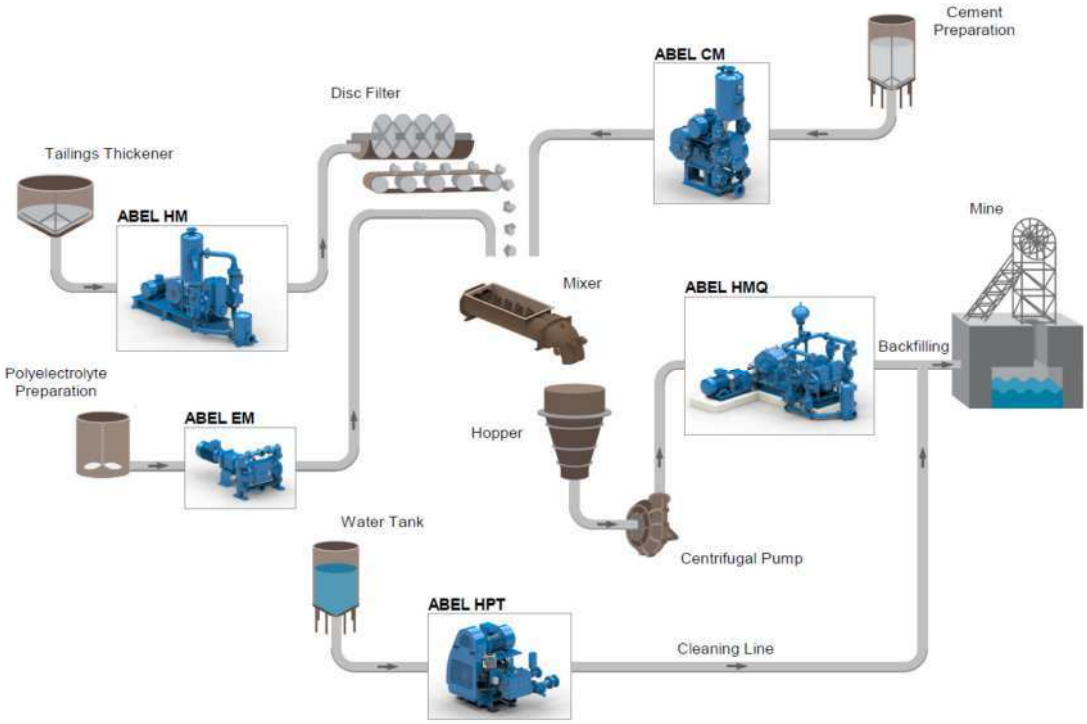
Gravitational backfilling: an obsolete process

ABEL recently developed an HMQ model allowing gravitational backfilling and, consequently, all operating risks that this process implies to be avoided. This model allows for continuous backfilling without flow rate fluctuations and with a high fill level for applications requiring the paste to be jammed.

ABEL HMQ Performance Range

Pipework flushing

Given the high level of availability of the ABEL HMQ piston diaphragm pump used for backfill paste pumping and the short interruptions for pump maintenance, there are cheaper solutions as alternatives to keeping one paste pump in operation and the other one in stand-by. The solution consists in integrating an emergency pipework flushing system with an ABEL HPT (high pressure triplex) plunger pump into the backfill plant. This solution has shown to be reliable and cost effective.



The pumping solution for your industry:

- Mining
- Water and Wastewater
- Ceramics
- Chemistry
- Oil and Gas
- Energy Industry
- Corrugated Media
- Paint and Varnish
- Petrochemical

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