

Putzmeister Industrial Technology in Mining

Putzmeister

1



Tailings pumping

2

24 hours a day and 365 days a year, Putzmeister double piston pumps transport tailings material through pipeline systems to deposition areas. Our hydraulically driven positive displacement pump units transfer tailings from mining operations to either a backfill system underground, or to a deposition area within 2 – 3 kilometres or more of the site.

The gold mine Bulyanhulu, located in Tanzania, has both an underground operation where backfill takes place, and a separate paste deposition site for the tailings. This operation began production in 2001.

The two HSP 25100 double piston pumps with two 315 kW hydraulic power packs are designed for an output of 80 m³/h each and a delivery pressure of 8 MPa (1160 psi).

The two pump systems are installed side by side and are connected to one 200 mm delivery line. A high pressure dampener is integrated in the delivery line to reduce pressure peaks.



Pump station at Bulyanhulu/Tanzania

3

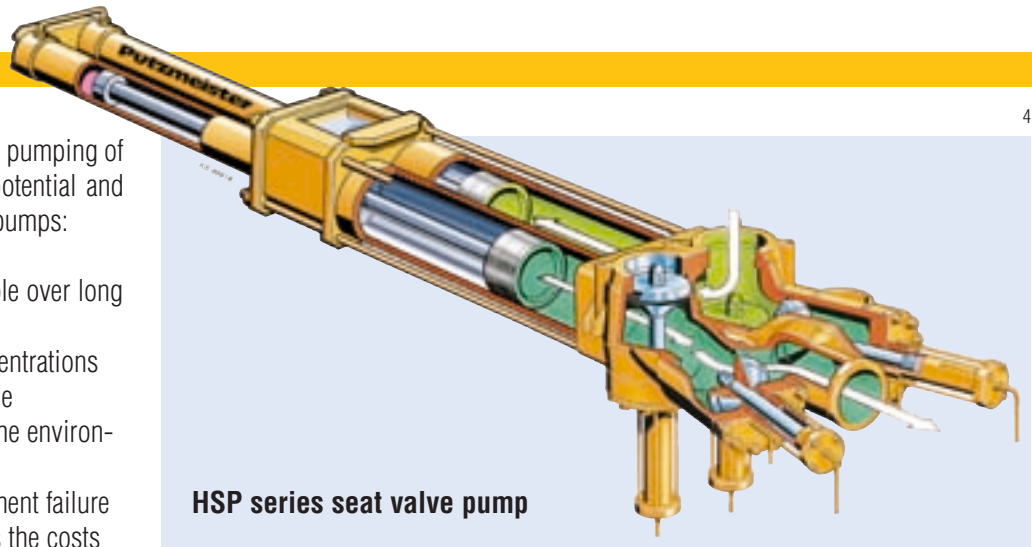


Tailing material



This kind of operation for the pumping of tailing material shows the potential and possibilities of Putzmeister pumps:

- Paste material is pumpable over long distances
- Transferring at high concentrations minimizes the water usage
- Low water seepage into the environment
- Reduced risk of embankment failure
- Stability of Paste reduces the costs associated with the construction of a conventional tailings facility
- Paste pumping reduces the required tailings disposal area compared to conventional slurry embankments



High pressure dampener



Tailings transport pipeline

Backfilling

Advanced mining methods such as “Cut and Fill”, safety considerations, environmental aspects as well as economic reasons are some of the main arguments for backfilling. At the heart of any backfill system is the Putzmeister double piston pump with S-transfer tube (KOS type) or with seat valves (HSP type), and also the accompanying ZX delivery pipeline system. For paste backfilling projects Putzmeister pumps allow high pressures in the pipeline system and therefore long transport distances.

Pumping distances up to 11 km from the central surface mixing plant to the underground backfilling area can be achieved without intermediate pumps.

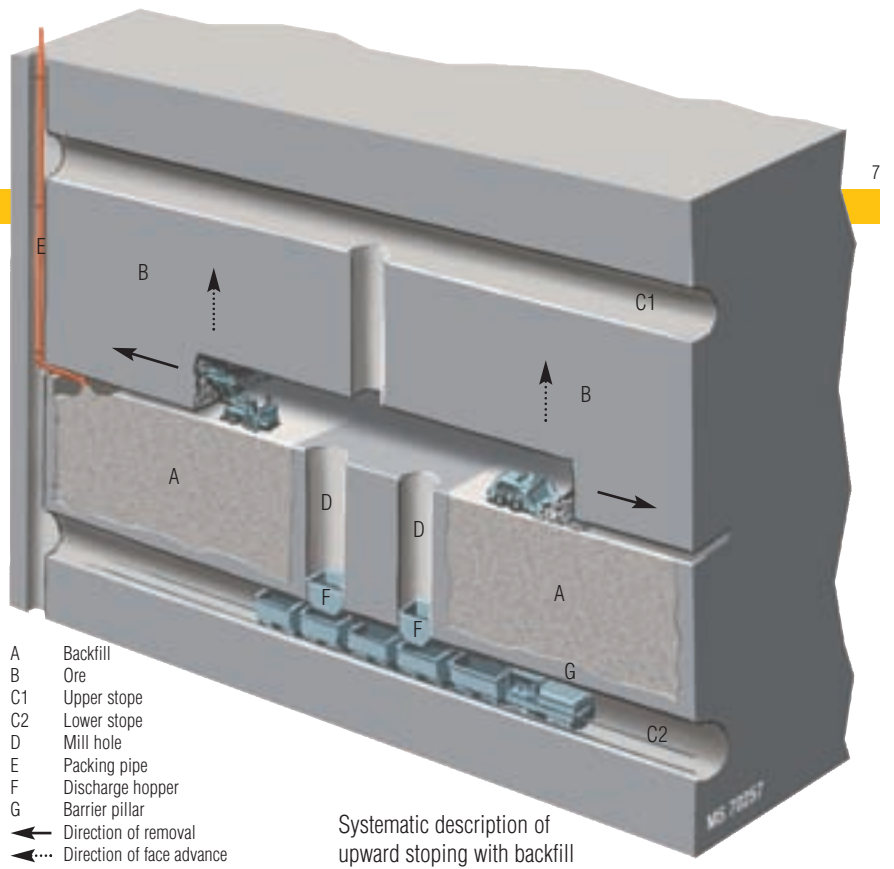
Some other system capabilities are:

- Output up to 500 m³/h.
- Operating pressures in the conveyed medium of up to 15 MPa (2176 psi).
- Pipeline systems designed up to 25 MPa (3626 psi)
- Suitable for abrasive material

The advantages of the method:

- Closed mine waste circuit ‘mine → processing → mine’
- Improved stabilisation of mine working areas
- Increase of cut-off-grade
- Hermetically sealed conveying path for material within the pipeline
- Increased working and operation safety

Two HSP 25100 pumps with PCF control to reduce pressure peaks (Lisheen Lead/Zinc Mine, Ireland)



Pump with intake shaft at Plutonic Gold Mine/West Australia



HSP Triplex and Duplex pumps with PCF for fine grained slurries and paste

HSP Triplex pump

To achieve higher outputs Putzmeister offers the HSP Triplex Pump: Three single cylinder pumps are combined to form one Triplex pump unit.

Beside higher output capacity the Triplex pump can operate as a Duplex pump. One cylinder can be taken out of operation during maintenance while the other two cylinders continue working. Due to this a separate stand-by system is not required.

Putzmeister Constant Flow – PCF

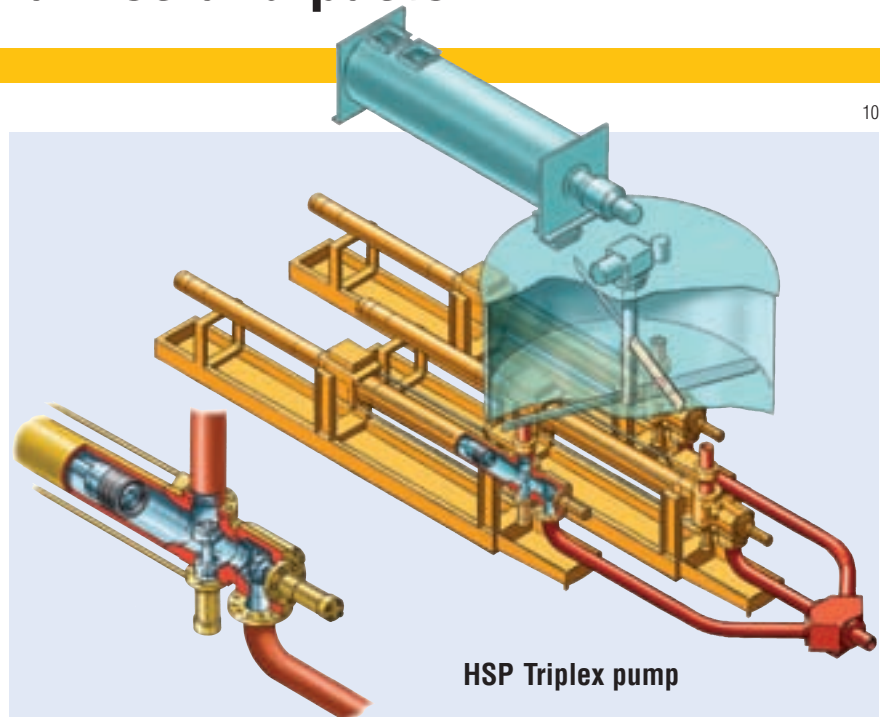
For reduction of pressure differences during the switchover of poppet valves, the Putzmeister HSP pumps can be equipped with a “PCF” control system.

Advantages of PCF:

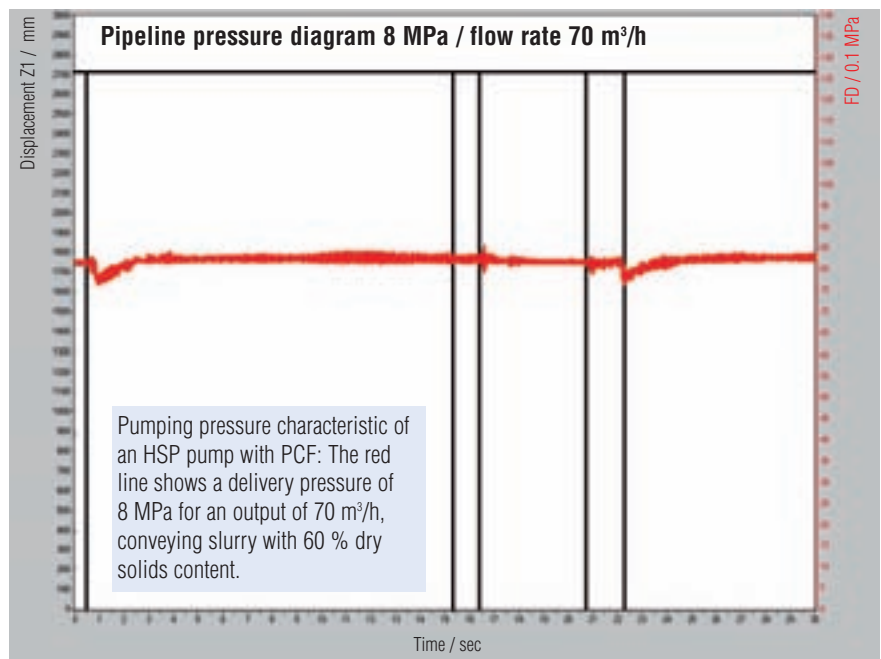
- Constant flow with low pulsation in the pipeline in a pressure loss range of up to 15 MPa (2176 psi)
- Provides precompression to reduce the gap in delivery
- Ensures almost constant output flow rate
- Minimizes water hammer, especially with slurries
- Increases lifetime of the delivery line and fastenings

HSP pumps with PCF are suitable for conveying many materials such as:

- Mineral-based high-density solids (tailings) with a grain size below 1000 μm at a concentration of dry solids up to 80 %
- Liquids with an abrasive material content, such as mine water, kimberlite slurries and pastes
- Electrostatic precipitator (ESP) ash, both as thick paste and as slurry



10



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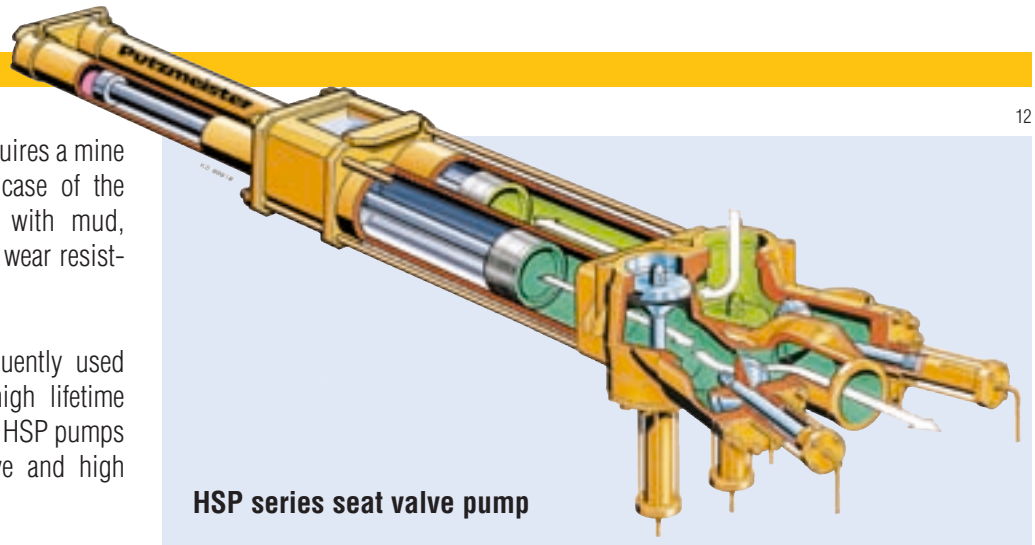


Mine dewatering

Every underground mine requires a mine dewatering system. In the case of the mine water being loaded with mud, Putzmeister offers a reliable wear resistant solution.

In this application the frequently used centrifugal pumps create high lifetime operating costs. Putzmeister HSP pumps however are a cost-effective and high performance solution:

- The pumps are fully automated and are reliable in continuous operation 24 hours/day and 7 days/week
- Reliable technology reduces maintenance costs and guarantees low life cycle costs
- Reduced sump dewatering costs



HSP series seat valve pump



HSP 3080 high-density solids pump

Coal Sludge Handling

14

The majority of coal that is mined from surface or underground mines is used for the generation of electricity in power plants.

Putzmeister Industrial Technology (PIT) supplies complete systems for handling coal or other sludges for combined combustion in conventional power plants.

Together with internationally operating engineering companies, Putzmeister has supplied many reliable sludge handling systems for the power industry. Our global presence allows us to do this through the supply of technology and service to projects anywhere in the world.

Fuel costs are the most important economic factor in the operation of power plants. Therefore secondary fuels become more and more important to reduce the usage of primary fuel. Secondary fuels in bituminous or lignite power plants could be:

- Coal sludge from coal processing plants or
- Sludge from sewage treatment plants as well as
- Other materials from industrial processes with a suitable heating value

Depending on the sludge origin Putzmeister designs together with the customer the most reliable and cost efficient solution based on the following equipment set:

- Reception facilities (e.g. if sludge is trucked in from another location)
- Storage silos to ensure a continuous feed to the combustion process
- Conveyance of the sludge through pipes which allows complete flexibility of routing



High-density solids pump in Jaworzno Power Plant, Katowice/Poland



15

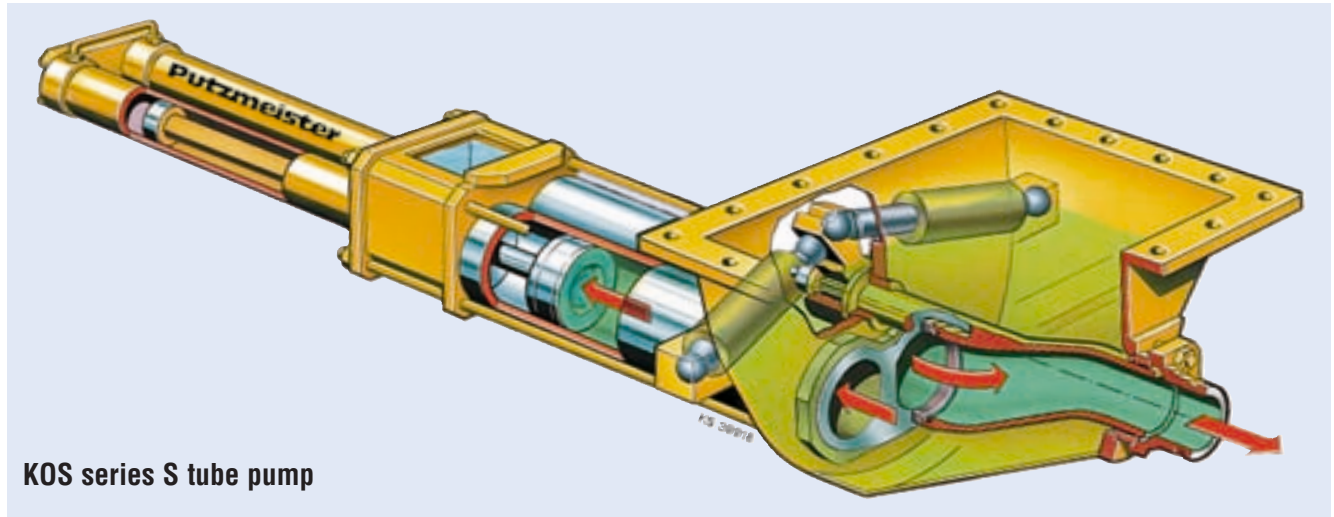


16

Coal sludge with density up to 70 %

- Foreign-body separator to ensure that oversized material is caught that would interfere with the combustion process
- Lubricant injection system to reduce pressure loss for long transport distances

Ash transport



KOS series S tube pump

Most fly and bottom ashes are pumped into embankments. Disposing of these ashes as a paste with a lower water content has a lot of environmental benefits:

- Reduced risk of embankment failures
- Reduced water loss due to seepage and evaporation
- Reduced fresh water usage
- Reduced dust potential
- Reduced footprint size of the embankment facility

This results in an increased public acceptance for coal fired power plants.

Fly ash and bottom ashes with a grain size up to 50 mm can be pumped and disposed together.



Two KOS 25100 are pumping fly and bottom ash / Kogan Creek, Australia



Fly ash hardens within a short time



HSP 25100 fly ash pump at Colstrip power plant

Concrete and mortar systems for coal mines

21

The BSM 1002 E is a multi-purpose mortar and concrete pump fitted with an S-transfer tube system for use in coal mining. It is specially designed for high pressure pumping over long distances, and is used for spray application of mortar and concrete, backfilling and injection. The pump is equipped with a continuous mixer to handle dry construction material.

The BSM 1002 E is used for the following applications:

Construction of roadway dams to increase mine safety

- Reduced methane gas emission from the goaf into the roadways
- Supports gas drainage systems
- Reduced danger of goaf fire
- Increased lifetime of the roadway double use
- Concrete instead of timber as construction material

Immediate mortar backfilling of steel support while roadheading

- Fast stabilizing with stiff construction material reduces deformation of arches
- Good contact between arch and rock
- Control of place where longwall face and gallery junction is improved

Wet Shotcrete

- Immediate support while road heading
- Increased safety
- No spray dust
- Little rebound



BSM 1002 E ready for roadway support

22



BSM 1002 E concrete pump with mixer built to Atex specification

Shotcrete systems

23



Systems for the following mining applications are part of the Putzmeister program:

Underground hard rock mining

- Mobile shotcrete equipment
- Stationary transport systems
- Mobile transport systems
- Ground consolidation, injection and rock bolting
- Sealing

Surface mining

- Bench stabilization

For the mining industry today the utilization of various construction materials is essential to create a safe environment and achieve high productivity even in challenging geological strata. Cement based construction materials are used predominately for ground consolidation, ventilation sealing and different civil works in mines.

Putzmeister is the competent partner for the Mining Industry, providing reliable customer orientated product solutions for owners and operators. Together with our alliance partners we are able to offer the total package in preparation, transportation and usage of construction material.

Solutions for underground shotcreting

In mining, sprayed concrete has become more and more relevant for ground support. The usage for shotcrete in underground workings starts with the logistical problem of supplying the spraying equipment with the required construction material, and finishes with the demands of placing the material exactly where required on the mine walls. Putzmeister is the only system provider who offers total package solutions from the concrete mixing plant on the surface, to the shotcreting lining of the galleries in the mine below.



24

PM Lorenzana mover



25

Sika®-PM 702



26

Sika®-PM 407 P

Complete systems for the mining industry

In addition to pump systems, Putzmeister is providing complete project solutions for the mining industry. Buffer silos, mixing plants, pig in gates and pipelines supplement the range of pumps.

A team of technicians and engineers will cooperate with the customer in identifying the most suitable solution, which frequently leads to the existing components of a customer's site providing the basis for new constructions.

The Putzmeister team will assist the customer with the implementation of specific solutions and the coordination of all procedures.

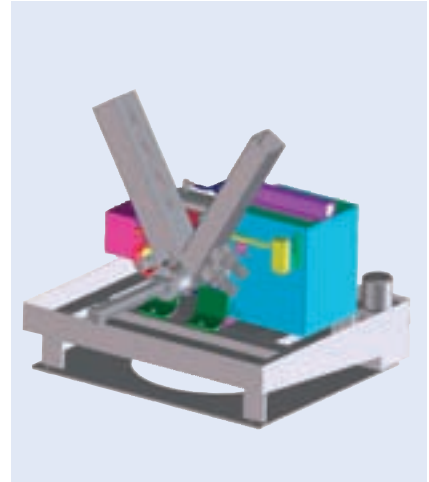
However, our involvement does not end with the supply and commissioning of the plant. The training of local staff at the plant, the setting up of storage facilities for wear parts at the mine and the supply of specific service and maintenance manuals for the operation are all part of the deal, underpinning Putzmeister's image as the reliable supplier for complete systems.

27



Receiving container with agitator

28



Automated scraper pig gate with two different containers

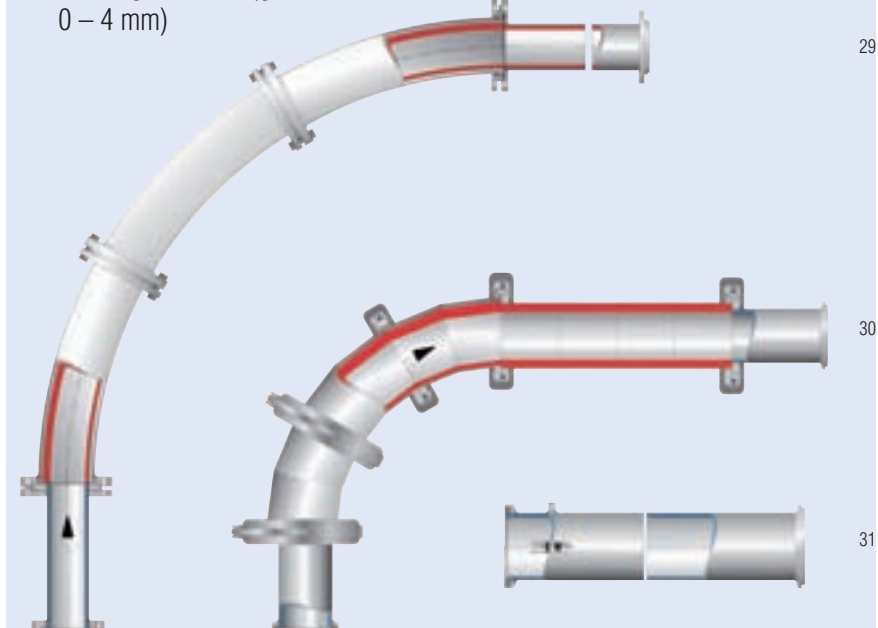
Within the Putzmeister group of companies "Esser-Werke" provides the pipeline systems.

Delivery lines for building material transport

- Designed for installation in the shaft
- Brackets 200 m apart
- Flanged line
- Operating pressure maximum 0.45 MPa (65 psi)
- Pneumatic transport of abrasive building materials (granulation 0 – 4 mm)

Delivery lines for pneumatic stowing

- Designed for installation in the drift
- Delivery line lengths approx. 800 m
- Centred coupling
- Pneumatic delivery
- Transport of sand and limestone
- Granulation 0 – 8 mm
- Low levels of oversized grains, max. 32 mm

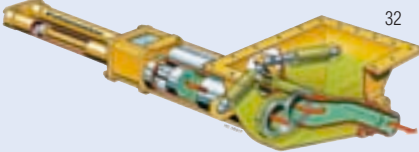
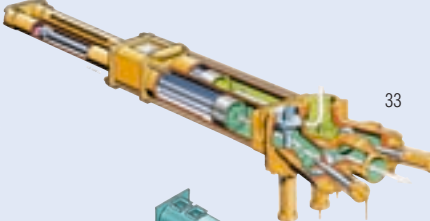
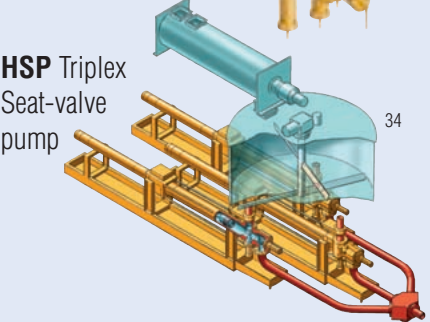

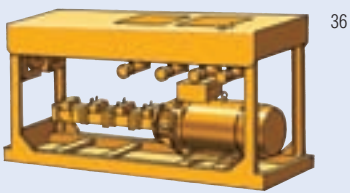


29

30

31

The right pump for every application

Pump type	Field of application	Output	Pressure
KOS-Series S-tube pump 	Backfilling and muck pumping of coarse grained slurries and paste with particles of up to 80 mm	10 – 500 m ³ /h	up to 13 MPa (1886 psi)
HSP-Series Seat-valve pump 	Transport of fine grained slurries and paste like tailings, mine water, fly ashes	10 – 250 m ³ /h	up to 15 MPa (2176 psi)
HSP Triplex Seat-valve pump 	Transport of fine grained slurries and paste like tailings, mine water, fly ashes	30 – 440 m ³ /h	up to 15 MPa (2176 psi)
KOV-Series Ball-valve pump 	High pressure pumping of fine slurries like waste coal, tailings, mortar and sump sludge.	0 – 50 m ³ /h	up to 10 MPa (1450 psi)
Hydraulic power pack 	All Putzmeister pumps are driven by a hydraulic power pack.	Performance:	15 – 1,000 kW

The Putzmeister Group

Concrete Technology PCT · Mortar Technology PMT
 Pipe Technology PPT · Water Technology PWT
 Industrial Technology PIT · Belt Technology PBT
 Underground Technology PUC

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