



Buffer tank



Neutralised water flows over the edge of the tank

## Processing of acidic wastewater at a metal processing plant

**At a metal processing company in Belgium hydrochloric acid (HCl) is used in the pickling of steel. Acidic water mixed with dust, mud and iron particles is collected from several sources in the plant. This mixture is neutralised and the solids are separated as mud.**

In several processes across the entire plant plastic centrifugal pumps from MUNSCH are used to circulate the hydrochloric acid. Beside the corrosive nature of the hydrochloric acid, there is also an abrasive effect due to the iron particles originating from the pickling process.

Rain from the containment of the tanks, leaks from the process installation and process water (e.g. coming from flushing systems) is collected in a buffer tank. The resulting mixture of acidic water also contains dust, mud and to a lesser degree iron particles. The wastewater is neutralized before the solids are separated as mud after which the

different waste streams are disposed.

### Neutralization and separation

In the first step slaked lime ( $\text{Ca}(\text{OH})_2$ ) is added in a mixer tank. The slaked lime is made by mixing lime with water. To ensure a neutral solution, the concentration of the slaked lime is adjusted according to the measured pH value of the acidic water. During the neutralisation process, flakes are also formed.

In the second step air is added in an oxidation tank. The oxygen in the air oxidises the iron particles making them heavier which causes them to sink. The addition of air also causes foam formation. To control this, defoamers are used.

In the third step a flocculation agent is added to accelerate the formation of larger flakes. The entire mixture subsequently flows to a sedimentation tank.

In this tank the flakes (solids) sink to the bottom. As a consequence, neutralised water remains at the surface. Because of the continuous feed, this water flows over the edge of the tank and is finally disposed.

The mud that accumulates at the bottom of the tank is pumped to a

filter which removes the remaining water from the mud. To this end, Feluwa Multisafe pumps are used. These displacement pumps pump the slurry by means of two check valves and a piston that exerts pressure on a diaphragm (see working principle pictured in illustration 1). Feluwa has improved this working principle over the years. The classical design of a flat diaphragm has evolved into a double hose-diaphragm whereby the inner hose is positioned inside the outer hose (see illustration 1). Because of this arrangement, there is a double separation between the process fluid and the hydraulic oil and the pump can keep running when there is a leak. Both when there is a leak of the hydraulic oil through the outer hose as when there is a leak of the process fluid through the inner hose, the working principle is still guaranteed and the pump can keep working.



Munsch-pumps



Above: wet mud at the start of the drum rotation.

Below: dried out mud at the end of the rotation of the drum

By means of a pressure sensor monitoring the space between both hoses, an alarm is triggered when leakage occurs signaling the urgent need for maintenance. The double separation because of the double hose-diaphragm ensures that even in the case of a leak the process fluid only comes into contact with the hoses (and the check valves) and that the other pump parts such as the drive parts do not come into contact with the process fluid. Hence, these pumps can cope very well with the abrasive nature of the sand and iron particles and are ideally suited to pump slurry mixtures with a high solid content. The mud filter consists of a drum over which a cloth is pulled. Along the largest part of the drum circumference, water is sucked through the cloth by a vacuum. When the mud reaches the end of the drum rotation, most of the water has been removed.



Feluwa Multisafe pump

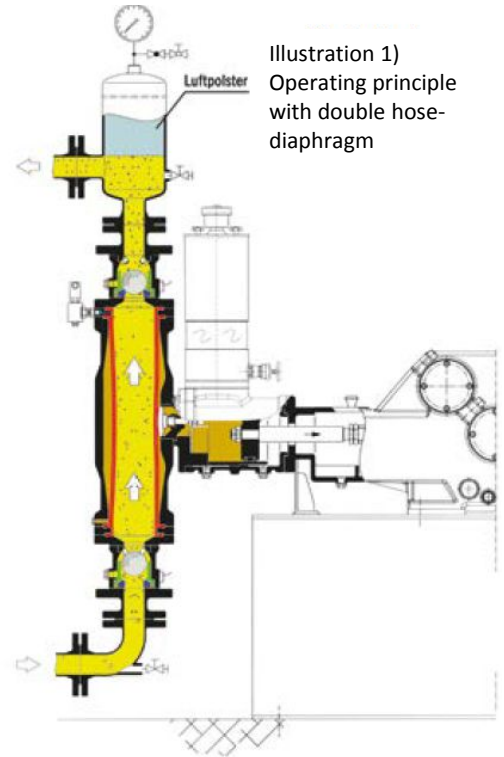



Illustration 1) Operating principle with double hose-diaphragm


The dried mud is subsequently blown from the drum by pressurised air. The mud is finally collected in a container

that is disposed.

• [www.bowipumps.be](http://www.bowipumps.be)



**OUR ACTIVITY: FLUID CONTROL SYSTEMS**  
Pumps, level and leak detection systems, for neutral to corrosive and abrasive liquids.

 <p><b>MUNSCH</b></p> <p>Horizontal or vertical centrifugal pumps with mechanical seal or magnetic-coupled, in PP, PE, PVDF or PFA.</p> <p>Robust construction, reliability, safety, high efficiency and low NPSH.</p>	 <p><b>Jola</b></p> <p>Level detection: Float switches, immersion probes, transparent by-pass, with counterweight, magnetic switches. Electrode rods, hanging electrodes</p> <p>Leak detection: Plate-, cable-, hang- or floating electrodes</p>	
---	--	---

**BOWI Pumps & Levels bvba Schriekbos 90 – 2980 Zoersel - Belgium**  
 Phone: +32 (0)3 663 86 - 64 Fax: - 69 GSM: +32 460 97 10 80 [info@bowipumps.be](mailto:info@bowipumps.be) [www.bowipumps.be](http://www.bowipumps.be)