



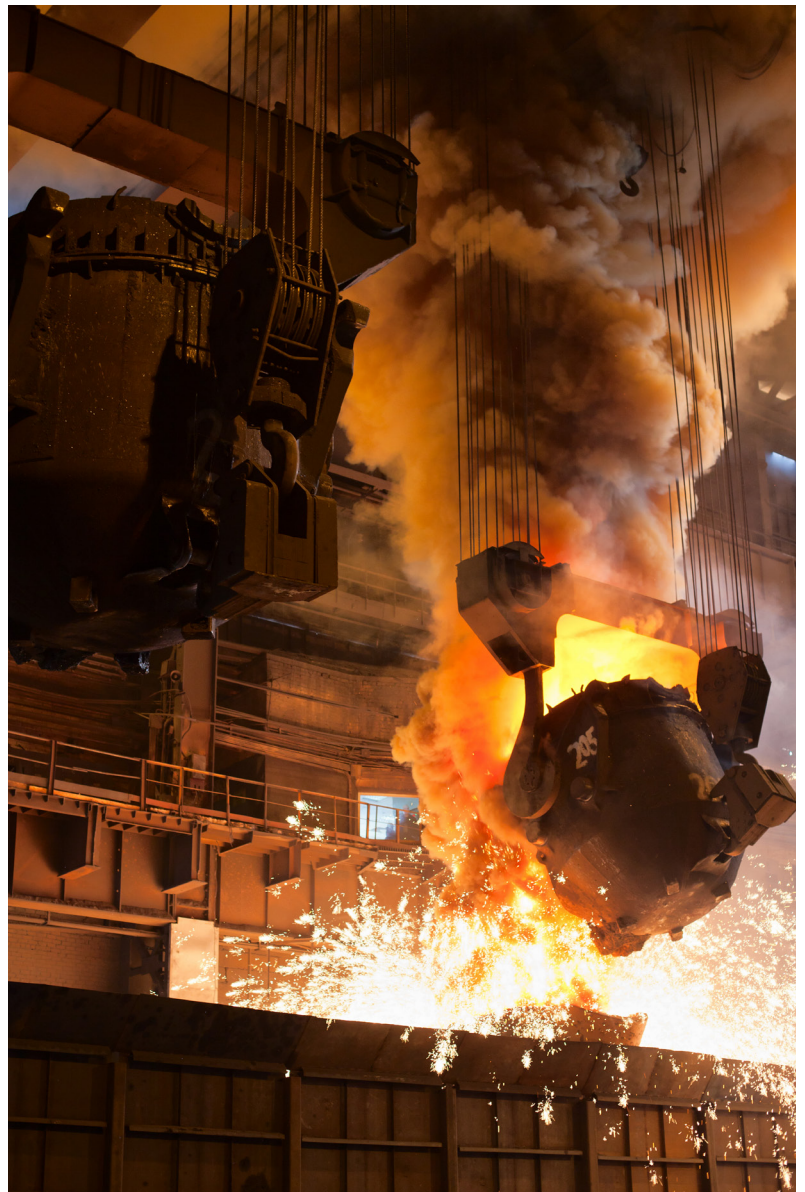
Acids



Acids and acidic agents are perhaps the most crucial fluids in industry with roles in manufacturing, materials finishing, as reagents, catalysts and in a multitude of products. The nature of acids varies immensely with weaker, food-grade types through to highly poisonous, corrosive compounds. The safe handling and protection of employees and facilities should form the basis of how acids are handled.

Industry Sectors

- Battery production
- Chemical reagents
- Chemicals and water treatment
- Explosives
- Fertilizers
- Foods, beverage and animal feed
- Inks, dyes, pigments and paints
- Insecticides/Pesticides
- Lubricants
- Metals and rust-proofing
- Paper production
- Petroleum industries
- Pharmaceuticals and cosmetics
- Plastics
- Process
- Rubber products and resins
- Soaps, detergents and cleaning products
- Textiles
- Waxes and polishes
- Wood treatment



Acids play a crucial role in heavy industry and steel making



Common acids

- Acetic acid
- Adipic acid
- Ascorbic acid
- Boric acid
- Carbonic acid
- Chromic acid
- Fatty acids
- Fluoroantimonic acid
- Fluoroboric acid
- Fluorosulphuric acid
- Formic acid
- Fruit juices
- Gluconic acid
- Hexafluorophosphoric acid
- Hydrochloric acid
- Hydrofluoric acid
- Nitric acid
- Oxalic acid
- Perchloric acid
- Phosphoric acid
- Sulphuric acid
- Tartaric acid

Process Points

Containment

Employee safety is of paramount consideration when handling acids. Contact with the fluid or as a vapour in the atmosphere can range from irritable reactions to catastrophic or fatal cases through inhalation, contact burns and even volatile chemical reaction.

The design goal of the pump must be one of containment and absolute separation of the fluid and environment.

Where pumps leak, the factory downtime may be costly to clean up, replace and repair the pump and surrounding machinery, possible decontamination of the area and the reporting of the accident. Where an employee is injured the personal cost, bureaucracy and litigation can run into very high costs.

Acidic character

Acids attack many wet-side materials due to their aggressive chemical make-up. Particular attention must be paid to the concentration, temperature and pressure of the acid as this can change the corrosive character at an exponential rate.

Wet-side materials that may need to be considered include the drive, seal and construction parts.

Many acids can change in viscosity - From water thin to an oily, viscous fluid or with a higher S.G. Fatty acids, fruit juices and higher concentrations of strong acids can provide greater demands on pump motors to deliver the acid or mixture at the desired discharge rate along process lines.

Solids

Acidic slurries and mixtures containing solids can pose a particular problem, such as food waste and the food industry as well as wastewater and sewage plants.

Hygienic areas

Acids may need to be handled in areas which are subject to hygienic controls or FDA standards such as food production, breweries, wineries and meat or poultry processing plants.

Mixing

Many acidic mixtures are blended or mixed in both tank and inline. The control and containment of this process between the environment and employees as well as the regular maintenance of tanks must be considered with regards to the cost of decontamination and downtime.

Pumping solutions

Verdermag

- 100% leak-free
- Flows of up to 300m³/h
- Acid compatible materials
- Modular design
- Built without compromise
- Tried and tested
- High pressures, temperatures and concentration compatible

The Verdermag range of magdrive centrifugal pumps are a highly effective solution for many industrial applications such as acid transfer between tankers and storage and through the process line.

The mag-drive working principle allows the pump to be seal-less and therefore totally contained from the workforce and environment.

For most acid applications the Verdermag range uses the highest grade of fluoroplastic resins including ETFE, which has excellent corrosion resistance and is very cost-effective. Standard Verdermag pumps are all available in acid compatible materials with flow rates of up to 300m³/h and temperatures of up to 120°C.

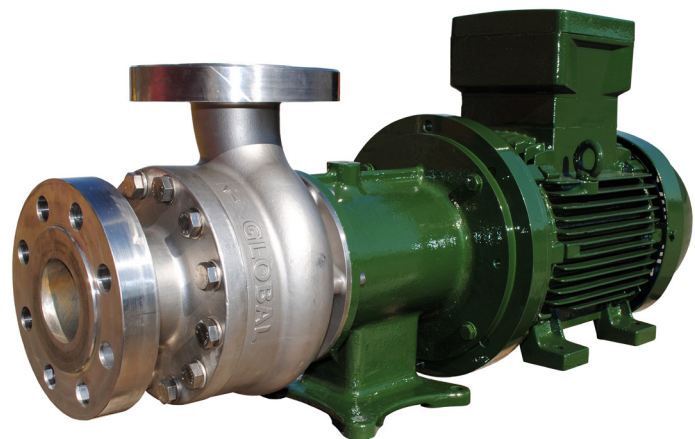
The TB thrust-balancing range allows small solids of up to 3.2mm to be pumped.

Where concentrated solutions and higher pressures exist, the Verdermag Global range of metallic centrifugal magdrive pumps can provide a high quality, robust solution. Using SS 316, Hastelloy, Titanium, Duplex and other specialist alloys. Verdermag Global can handle very aggressive acids.

Verdermag pumps are used at many of the most prestigious chemical and manufacturing facilities in the UK and around the world as their quality is proven and trusted.



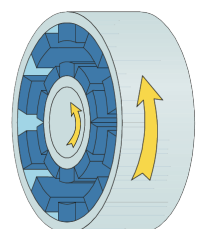
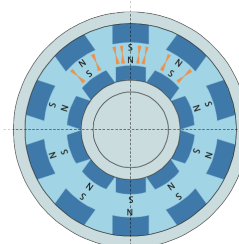
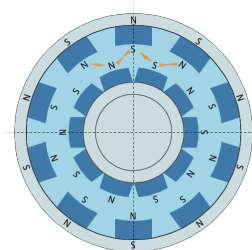
Verdermag models are extremely well suited to industrial acid applications



The Verdermag Global metallic centrifugal magdrive range:

Built without compromise with the highest quality components, material specifications and a simple modular design.

Verdermag Global pumps are energy-efficient and have a very long and economical product life cycle.



Verderair

The Verderair range of AODD pumps is suitable for many acids. Verderair pumps have many compatible materials suitable for acid transfer with the added bonus that they are portable, easy to install and service and are seal-less with a leakproof design.

Verderair Hygienic AODD pumps can be found in food and pharmaceutical sites as well as heavy industry plants.

In addition to their corrosion resistance, the Verderair range is suitable for pumping fluids, abrasive fluids or slurries with small solids.

Where fuming acids and hostile atmospheres exist, such as in manufacturing plants for batteries, photovoltaic solar panels and electronics, the Verderair Pure range of pumps can handle both the aggressive acids and the harsh environments.

The Verderair Pure range is a robust series of double diaphragm pumps, produced from one-piece solid, pure PE or PTFE (also conductive).

Verderair pumps are not just capable of handling extremely hazardous substances such as acids; the range features an incredibly efficient design using quick-acting air valves so costs can be reduced through lower air consumption.

Verderair pumps are simple to build into skid units and portable systems for use in multiple locations. The Verder project team can design, build, install and maintain a skid for pumping hazardous and aggressive fluids to your requirements.



Above: The Verderair AODD range is an exceptional acid pump and the most efficient AODD pump on the market.

Right: The Verderair Pure is designed to keep pumping in our customer's harshest process conditions



Verdermix

The Verdermix range is superb for mixing acids in processes e.g.

- Diluting concentrated acid flow
- Mixing acids into the main product stream
- Creating a 100% homogeneous mixture

Different types of material are used for our mixers depending on the type of acid. For low pressure applications (1-10bar) complete plastic mixers are specified in

- PVC
- HDPE
- PP
- PVDF

For very high acid concentrations a metal pipe with a PTFE lining is needed. The mixing elements are also made out of metal with a HALAR (ETFE) coating. In this way all wetted parts are PTFE/ETFE.

Complete metal construction using premium alloys is also possible.

- Stainless Steel
- (Super)Duplex
- Hastelloy B or C



Left: A Verdermix Static Mixer in standard metallic construction.

Below: A Verdermix static mixer inserted into a pipeline with ETFE lining for acid processes.

- Total containment from workforce and environment
- No need for tank or motors
- Flows of up to 1000m³ p/h
- Each unit is built into a pipeline ready for installation
- High pressure, temperature and concentration
- Safe for ATEX environments
- No maintenance required
- Uses the energy from the flow with a low drop in pressure upon exiting the mixer.



Left: A Verder dynamic mixer in non-metallic coating for tanker mixing of acidic fluids

Right: Axial impeller designs for fluid circulation applications. Radial designs for shearing and blending applications are also available.

Verder dynamic mixers are specified for use in acidic processes.

All wetted parts will be coated with a rubber or Halar (ETFE) coating. If preferred, a special (mechanical) seal between the mixer and the tank can be applied.

The direct driven mixers (high speed) are normally used to prepare an acid solutions. The indirect driven mixers (low speed) are normally used for keeping a homogeneous mixture or for tanks with a high capacity.



Verderflex

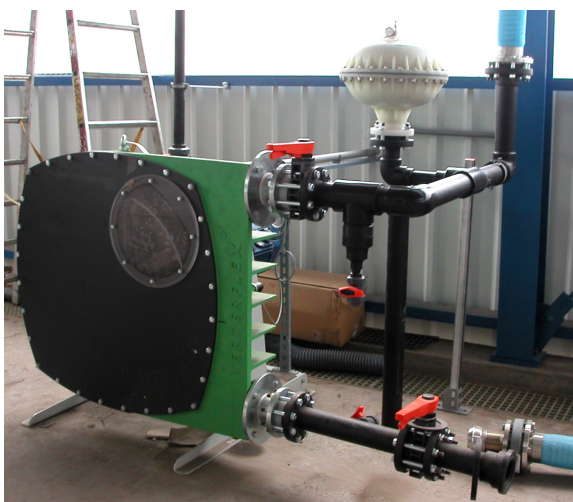
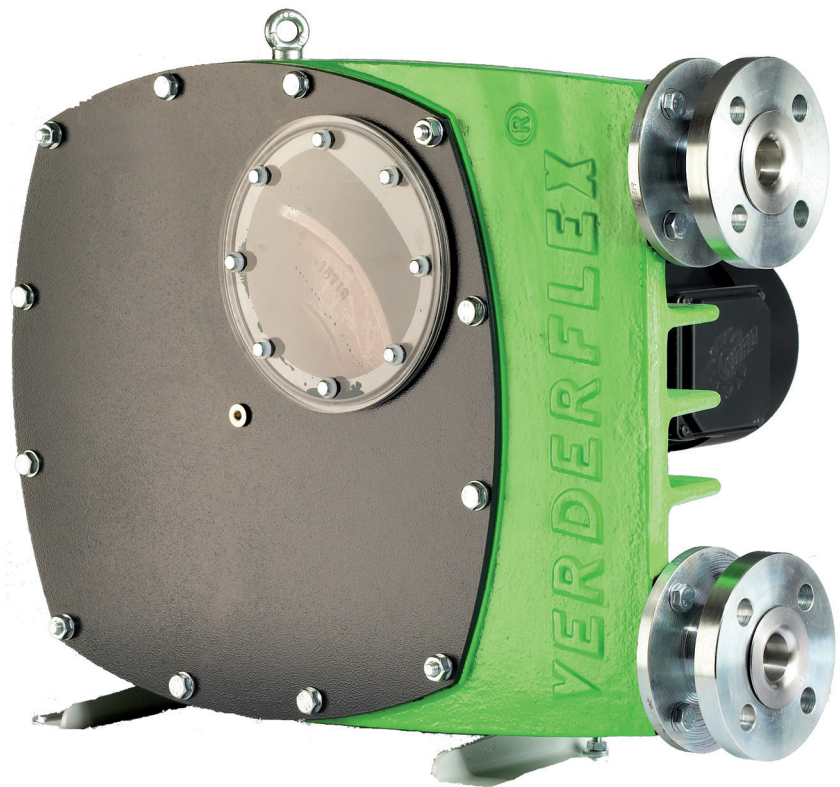
For pumping acidic slurries and sludge-like fluids the Verderflex range of peristaltic pumps is ideal and established across the globe.

The Verderflex range is also suitable for a pump may need to run dry, where a suction lift is required or the pump needs to be self-priming. The VF range is also an excellent solution should the fluid potentially contain small solids.

The VF80 pump pictured below unloads tankers of hot (35 to 40°C) Hydrochloric Acid from trains. The elevated temperature requires use of a Hypalon® hose and PVDF inserts.

Due to the reach into the tanker, a long suction hose is used, requiring the pump to have both good suction and dry priming capabilities.

The pumping system transfers the acid into the chemical complex and has long discharge lines requiring use of a discharge side pulsation damper.



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VERDER
passion for pumps