Sundyne®

WHITEPAPER

Sealless Pumps for Chemical Processing Applications

The Chemical industry is an integral part of the global economy – contributing roughly $6 trillion annually, or almost 10% of the world's GDP. Every day, almost everyone on the planet touches items made from chemical processing. The food we eat, the water we drink, the buildings we live & work in, the vehicles that transport us, the medicines we consume, the energy we use for heating, cooling & lighting, and the packaging products that move goods from point A to B all require chemicals.

The production of chemicals requires high volumes of liquids that need to be pumped around a plant. Most of these raw materials are harsh in nature – presenting potential risks to the health & safety of plant personnel and the environment.

This report describes why Sealless Magnetic Drive Pumps are the preferred choice in managing risks, improving fluid handling efficiency and lowering pump maintenance costs for Chemical Processing Applications around the globe.

Market, Key Applications & Issues that Pumps Must Address

Chemical Processing permeates 34 different industries, and directly or indirectly supports more than 120 million jobs in 58 countries. Feedstocks such as oil, natural gas, water, metals and minerals are used to produce hundreds-of-thousands of products.

The world's most common chemical processing applications are:

1. **Chlor Alkali –** for the production of chlorine and caustic soda
2. **Polymers –** needed to make other chemicals and items such as rubber
3. **Pharmaceuticals –** for drugs and biologics
4. **Purified Terephthalic Acid (PTA) –** for polyester/clothing
5. **Acids –** such as sulfuric, phosphoric and nitric
6. **Peroxides –** for bleaching agents
7. **Plastics –** for bottles, packaging and thousands of other uses
8. **Ammonia & Urea –** for fertilizers and hundreds of other products
9. **Insecticides & Herbicides –** for agriculture and consumer products

Many substances used in chemical processing are harmful to people and to the environment – so the pumps used to transfer these substances must be safe, reliable and leak-free.

Creating end-products requires complex reactions and proprietary combinations of distillation, absorption, filtration, extraction, drying and screening operations. The pumps used to move the chemicals & feedstocks through these processes must be corrosion-resistant and able to withstand elevated temperatures and pressures.

Many ingredients used in chemical processing are toxic, pungent, corrosive, extremely hot/cold, or crystallizing in nature. During processing, different ingredients mix together, creating substances that could be harmful to the environment, or deadly to plant personnel if exposed. As such, the pumps handling these substances must be safe, reliable and leak-free.

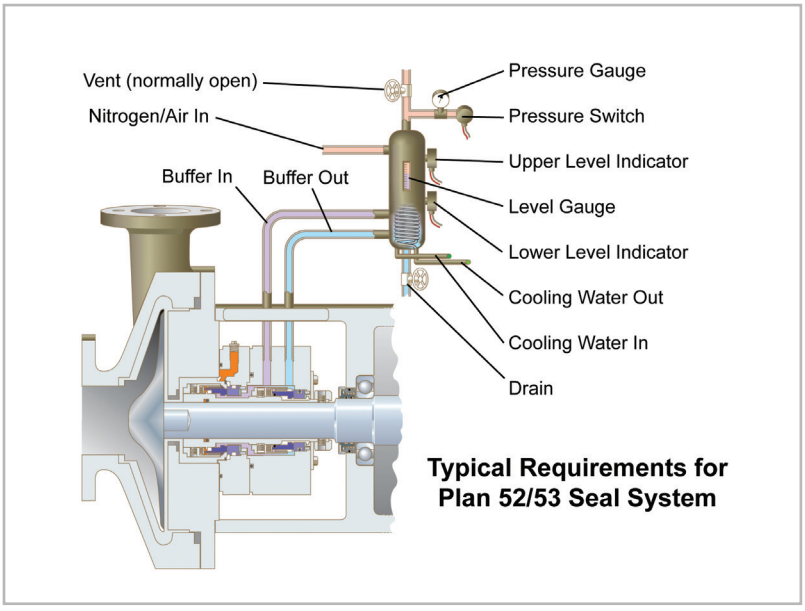
Why Sealless Pumps are Preferred for Chemical Processing Applications

While pumps utilizing mechanical seals play a key role in many applications, it's no secret that almost 85% of pump failures start with seal leaks, which cause problems elsewhere in the pump. When planning a new installation, CAPEX for the seal support system is considerable. After installation, OPEX for seal monitoring & maintenance activities is unavoidable.

Sealless pumps eliminate seals and associated support systems, providing an economical, reliable and leak-free solution for handling toxic or hazardous liquids.

The Top 10 Advantages that Magnetic Drive Sealless Pumps Offer Versus Sealed Designs:

1. No seals & no seal support systems
2. Complete fluid containment
3. Zero emissions
4. Reduced installation costs
5. Reduced maintenance costs
6. Longer MTBF intervals
7. Maintenance time/skills can be used elsewhere
8. No EPA monitoring/documentation
9. Improved operator safety
10. Protection for the environment



Typical Requirements for Plan 52/53 Seal System

Removing seal support systems results in a smaller footprint, and eliminates potential points of failure that would require ongoing maintenance.

Who Should Consider Switching from Sealed to Sealless Pumps?

- Applications with legislative & liability risk compliance
- Units needing to improve reliability
- Duties that are hard to seal
- Applications/fluids that react with moisture/air
- Any plant seeking to meet higher MTBF goals

What are the Benefits of Switching to Sealless Pumps?

Removal of the Mechanical Seal

- No product leakage
- Compact footprint with no alignment issues
- Higher MTBF

Cost Savings:

- Significantly lower installation costs
- No seal support system and utilities
- Less instrumentation
- Less maintenance & lower total cost of ownership

Mitigation of Risk:

- Less operator intervention
- Zero leaks so zero environmental impact

The Inventors of the Magnetic Drive Sealless Pump Continue to Meet & Exceed all relevant ISO and ASME Pump Standards

HMD Kontro Sealless Magnetic Drive Metallic Pumps are Specifically Designed for Chemical Processing Applications

HMD introduced the world's first sealless magnetic drive pump for the Chemical industry back in 1947 – and since that time, HMD's engineers have leveraged more than 70 years of experience to ensure that HMD Kontro sealless pumps adhere to, or exceed the latest ISO and ASME standards.

For the safe and efficient transfer of toxic, corrosive, carcinogenic and aggressive liquids, a wide range of HMD Kontro Sealless Magnetic Drive Pumps are designed of stainless steel with silicon carbide internal bearings, which enables them to withstand extremely high temperatures. Additional options of Alloy 20 or Alloy C with PTFE gaskets are also available. Sealless pumps specifically designed for Chemical Processing Applications include:

For more information and pump specs on all HMD Kontro pumps:

Click here

GTA/GTI – is a **General Transfer** pump with interchangeable components to address any ISO or ANSI performance specification.

CSA/CSI – is a modular range of **Chemical Service** pumps that feature interchangeable parts enabling a few models to cover a wide range of applications.

GSA/GSI – **General Service** pumps are designed for toxic, aggressive, hot, or crystallising processes required by heavy chemical industries.

CS – is a **Chemical Service** pump specifically designed for heat transfer in hot oil systems. The pump features a unique torque ring that requires no cooling fluids or heat exchangers.

SPGS – the **Self Priming General Service** pump is designed for the transfer of water and other hazardous or toxic substances.

The Benefits of HMD/Kontro Pumps Include:

- Close Coupled design available in multiple hydraulic sizes
- Various frame sizes to suit power requirements
- Horizontal and vertical pumps available
- Large degree of interchangeability within frame sizes
- Commonality minimizes spare parts inventory and associated costs
- Mounted on a sub-base (Close Coupled design) or fabricated steel baseplate (Long Coupled design)
- Self-venting and completely self-draining
- Design ensures safe, leak free operation
- Increased efficiency via low operating costs
- Minimal spares holding and maintenance
- No costly seal support systems to specify, install or maintain
- Standard 316 Stainless Steel materials of construction. Other variations are available on request
- Silicon carbide internal bearings and Compressed Synthetic Fibre gaskets
- Standard ANSI/ISO flange options are available

ANSIMAG Sealless Magnetic Drive ETFE Lined Pumps are Designed for Highly Corrosive Chemical Processing Applications

ANSIMAG Meets or Exceeds ASME / ANSI B73.3 and ISO 2858 Pump Standards.

ANSIMAG sealless pumps are ideal for most corrosive or acidic applications in chemical manufacturing. All wetted parts are ETFE lined or ETFE molded components that can safely handle a wide range of corrosives and solvents up to 250°F (121°C) without corrosion. A patented, fully encapsulated Mag Drive hermetically seals the inner magnets to isolate them from process fluid and maintain magnet integrity for the life of the unit. A Kevlar-fiber reinforced vinyl ester shell delivers unprecedented reliability.

ANSIMAG pumps are more energy-efficient than mechanically sealed pumps. An innovative rear casing generates no eddy currents and eliminates heat generation, which reduces energy costs. Because ANSIMAG pumps have no seals – there are no leaks, no emissions and no costs related to seal maintenance.

Unique ANSIMAG Advantages:

Click here for more details

1. **Fully Supported Impeller –** increases reliability by rigidly supporting the stationary pump shaft at the pump suction and rear containment shell. This prevents radial impeller deflection low flow (or off BEP) conditions. It also increases the pump's allowable operating range and makes ANSIMAG pumps more reliable than cantilevered or overhung impeller designs.
2. **Axial Thrust Washers –** provide a positive thrust surface that is unaffected by cavitation, solids or transient suction conditions. Axial Thrust Washers increase the allowable operating range of the pump while also improving reliability compared to pumps with thrust balanced methods.
3. **Fully Encapsulated Inner Drive –** this patented technology provides unsurpassed resistance to chemical attack. The integrity and strength of the magnets are maintained for the lifetime of the unit by hermetically sealing the inner magnets and isolating them from process fluid. A secondary stainless steel layer provides increased durability.
4. **Replacement Impeller –** A single piece replaceable impeller is attached to the inner magnet drive via ANSIMAG's patented tongue and groove system. The separation provides a cost effective approach to spare parts management and makes it easy to swap out the impeller as process conditions change.
5. **Non-Metallic Containment Shell –** An innovative CFR-ETFE lined rear casing generates zero hysteresis losses during operation, thus eliminating heat generation and reducing energy costs. With a burst pressure of 6X MAWP of the pump, the Kevlar fiber reinforced vinyl ester shell delivers unprecedented reliability, and makes ANSIMAG pumps more energy-efficient than mechanically sealed pumps.
6. **Simple Sealless Design –** Consisting of just 9 wetted parts, ANSIMAG pumps can be quickly & easily repaired in the field. Routine maintenance or repairs can be performed without the need for special tools or training.

ANSIMAG pumps provide affordable replacement options for aging ASME/ANSI B73.3 and ISO 2858 sized pumps, because the 6 members in the pump family cover a wide range of sizes and standard external dimensions to facilitate sealless or sealed pump replacement without changing piping or baseplates.

Click here for more details

Additional Protection and Peace-of-Mind for Handling Harsh Chemicals

Sealless pumps offer the best solution to fugitive emission regulation. But every pump can use help defending against unstable process conditions. Sensors & monitors alert operators to potential problems and secondary containment systems ensure that problems do not escalate.

VapourView "Gas-in-Liquid" Detector

To avoid risk of damage and dry running, our patented VapourView™ technology uses an ultrasonic signal to instantaneously detect the presence of gas in a liquid stream from outside the confines of the pump pressure boundary.

Traditional temperature and power control monitoring solutions sense the secondary effects of a gas build-up in the pump – but in most cases – pump damage occurs before any change is registered. By using ultrasonic technology, VapourView senses the build-up of bubbles in liquid, and warns operators if a pump suffers from incorrect priming or venting, entrained process gas or incipient vaporization.

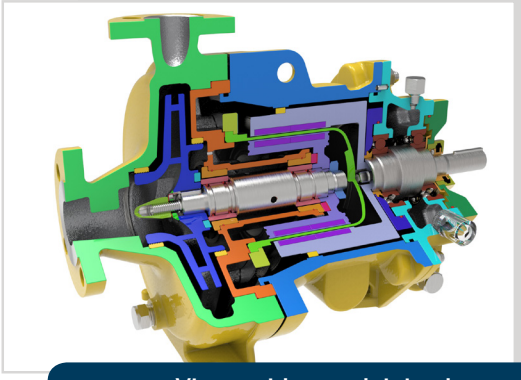
VapourView is adaptable to any application and can be retrofitted to any sealless magnetic drive pump. The system eliminates the potential for dry running, and brings peace-of-mind against catastrophic failures and unexpected repair costs.

See how VapourView works

VapourView Technical Specifications

ZeroLoss Containment Shells

Applications that span the full hydrocarbon chain can pose challenges to pump seals by creating magnetic losses and by heating the process fluid. Sundyne pumps overcome these challenges through containment shells that eliminate induction heating & eddy current losses.



View a video explaining how secondary containment shells work

Installing a ZeroLoss containment shell in a sealless pump boosts efficiency and enables smaller motors to be specified – resulting in a 20% reduction in power consumption. These savings lower initial capital costs and decrease total power costs over the life of the pump.

Most magnetic drive pump containment shells are made of metal, but HMD Kontro's optional ZeroLoss shells are engineered from a combination of poly-ether-ether-ketone (PEEK) and carbon fiber that was initially developed for military and aerospace equipment. Five times lighter than steel but just as strong, the ZeroLoss Shell:

- Increases the pump's reliability
- Widens temperature ranges from -40°F to +305°F (-40°C to +150°C)
- Provides greater efficiency & enables a smaller motor to be specified
- Bolsters the pump's resistance to thermal shock
- Eliminates potential vaporization of process chemicals near the pump's bearing.

ZeroLoss Containment Shells enable pumps to resist a wider range of volatile chemicals and endure a broader range of process applications.

Adherence to Industry Standards

Standards play a key role in the chemical industry. The characteristics they define assure customers that performance & safety requirements are met, while also guaranteeing interoperability for equipment throughout a plant.

The ANSI/ASME B73.3 standard specifically addresses centrifugal pumps for the chemical industry. The standard covers 27 pump sizes and specifies dimensions for height, length, nozzle and shaft diameters, plus the location & spacing of mounting bolts. The ISO 5199/2858 standards cover the same type of industrial pumps as ANSI B73.3.

ANSI – American National Standards Institute
ASME – American Society of Mechanical Engineers
ISO – International Organization for Standardization

Sundyne Pumps Meet or Exceed Chemical Industry Standards – Anywhere Around the Globe.

Metallic Options – HMD pioneered the sealless magnetic drive pump for the chemical industry in 1947 – and since that time, HMD's engineers have leveraged more than 70 years of experience to ensure that HMD Kontro sealless pumps adhere to, and exceed the latest ASME and ISO standards.

Non-Metallic Options – For highly corrosive chemical applications, ANSIMAG pumps are ASME / ANSI B73.3 compliant and are available in materials that can stand up to most abrasive or highly-corrosive applications.

Setting a New Standard for Aftermarket Service Worldwide

With manufacturing operations and service facilities in the United States, England, France, Spain and Japan, Sundyne is well positioned to serve customers' needs on a global scale.

Sundyne's expansive distribution network provides customers with prompt, local support. Authorized Service Centers (ASCs) support every product line and bring engineering expertise & technical support to the customers' job site. From routine maintenance programs and onsite troubleshooting to genuine Sundyne replacement components, the Sundyne ASC network provides everything it takes to keep chemical plants up-and-running – anywhere around the globe.

Think Sealless for Chemical Processing Applications

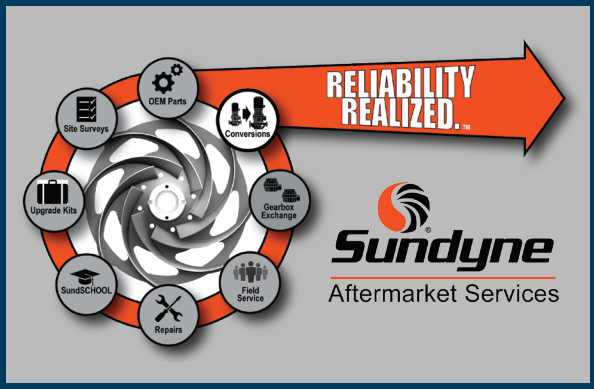
When it comes to handling harsh & hazardous chemicals, safety for plant personnel & the environment are critical factors – but bottom line ROI is just as important.

With 70-plus years of experience designing magnetic drive sealless pumps, and countless customer deployments by the world's largest chemical manufacturers, Sundyne's track record in the Chemical Processing industry is built on proven differentiators:

10 reasons to Choose Sundyne Sealless Magnetic Drive Pumps for Chemical Processing Applications:

1. **Design Simplicity –** sealless pumps = no leaks and no emissions
2. **Lower Installation Costs –** no need for seal support systems
3. **Extensive Flow & Pressure envelope –** supported by a wide range of pumps
4. **Support for all Industry Standards –** in any geography
5. Construction Materials to handle any job:
   - **Metallic** liquid ends for high temperature applications
   - **Non-Metallic ETFE Lined** liquid ends for highly corrosive substances
6. **Monitoring Solutions** to identify potential problems before they escalate
7. **Flexibility –** to handle solids & withstand dry running
8. **Secondary Containment Options –** to deliver peace-of-mind
9. **Extended MTBF –** decreases maintenance costs
10. **Global Service & Support –** same day local support, anywhere in the world

Contact Sundyne today to learn more about how Sealless Magnetic Drive Pumps can streamline chemical processing applications and save money in the process.



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