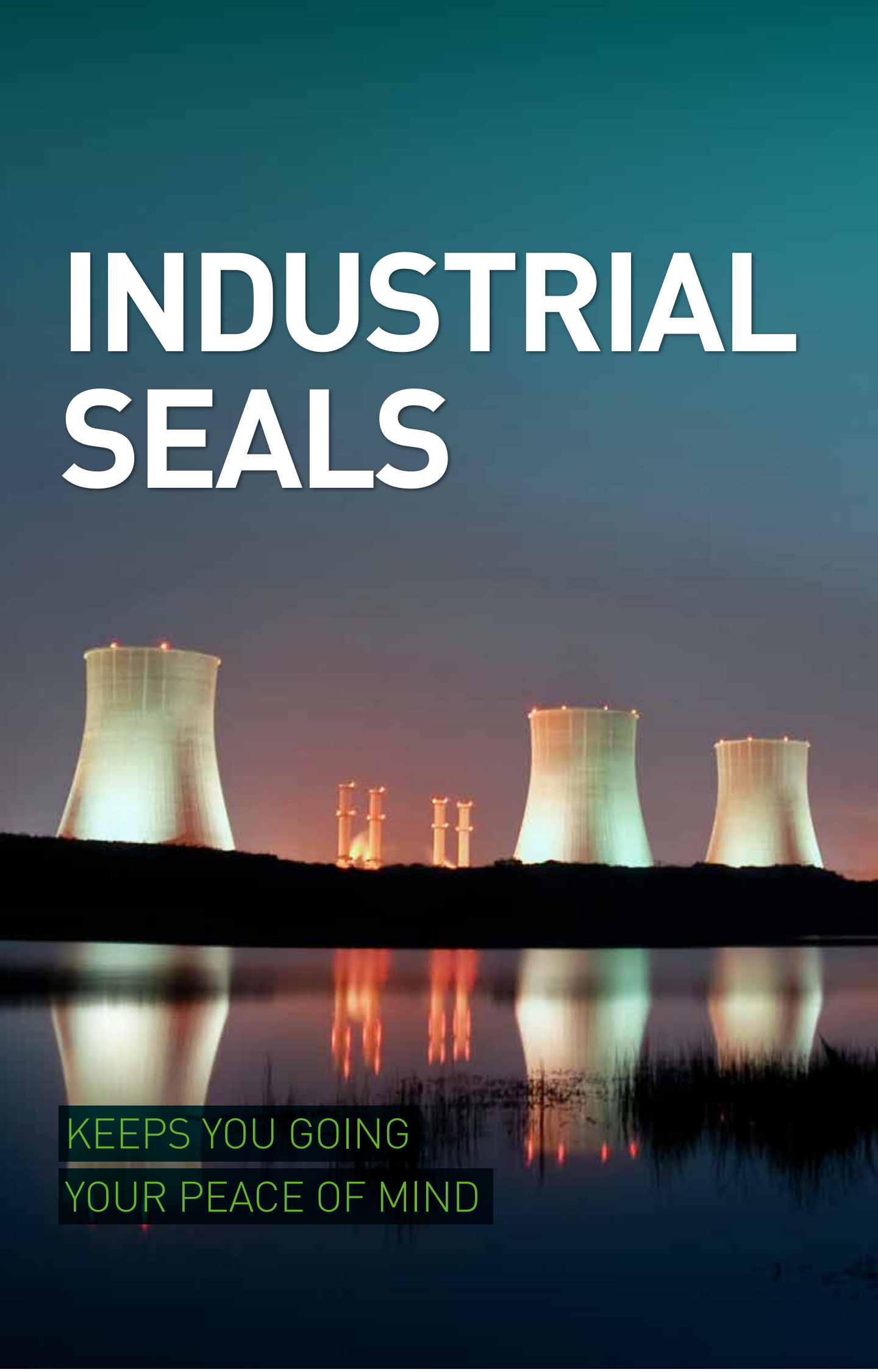
INDUSTRIAL SEALS

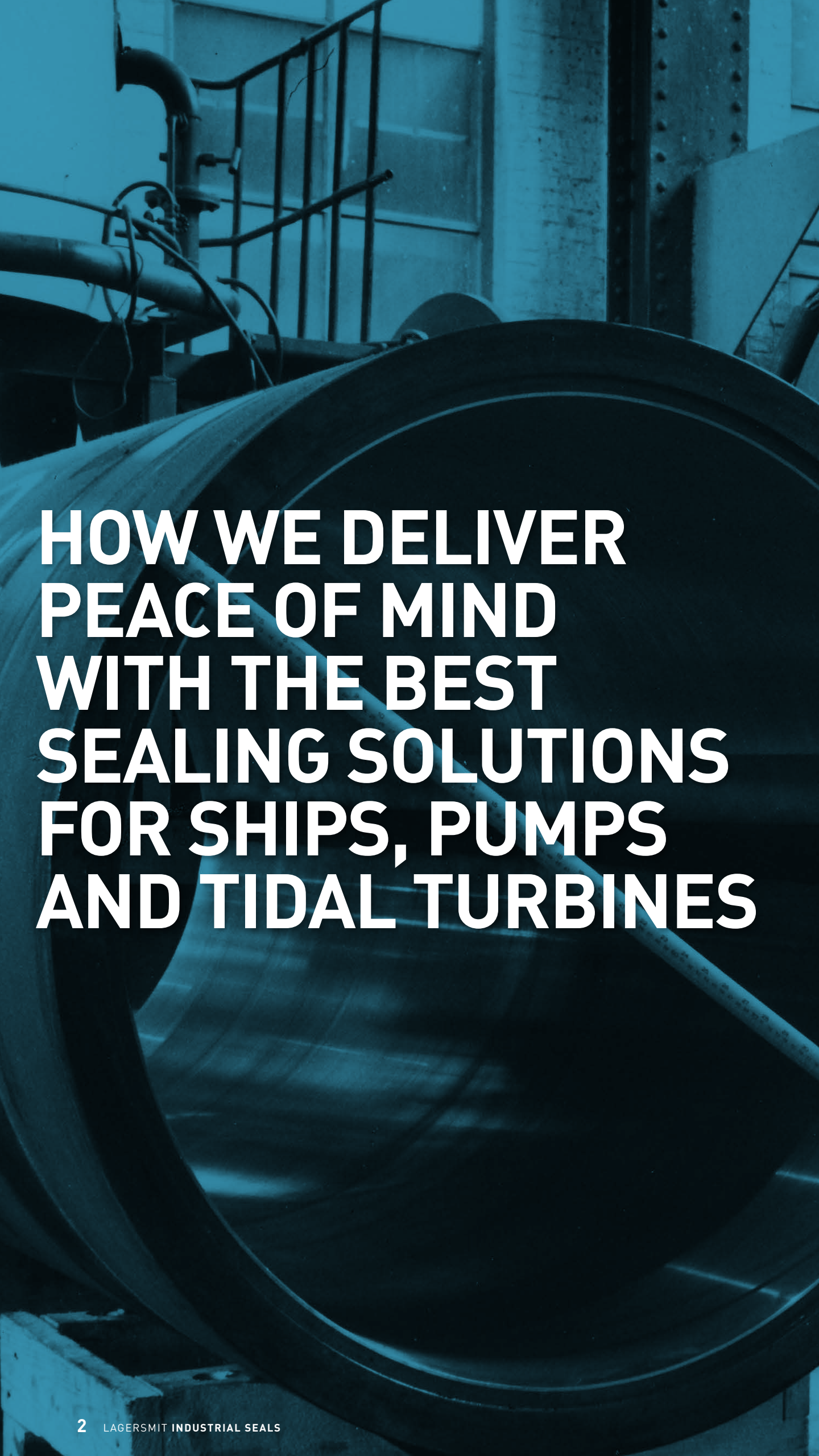


KEEPS YOU GOING

YOUR PEACE OF MIND

LAGERSMIT

THE ORIGIN OF SEALING SOLUTIONS



HOW WE DELIVER PEACE OF MIND WITH THE BEST SEALING SOLUTIONS FOR SHIPS, PUMPS AND TIDAL TURBINES

COMPANY INTRODUCTION

EVER SINCE ITS ESTABLISHMENT IN 1856, LAGERSMIT HAS MET THE NEEDS OF MANY SECTORS OF INDUSTRY THAT CALL FOR ABSOLUTE RELIABILITY. THANKS TO THIS HERITAGE AND WITH MORE THAN 50.000 SEALS DELIVERED, WE HAVE GAINED THE KNOWLEDGE, RESOURCES, AND CAPACITY TO DEVELOP SECURE, PREDICTABLE SEALS FOR THE INDUSTRY THAT KEEP GOING – BOTH NOW AND IN THE FUTURE.

It's important that all sealing components are of the highest quality and are perfectly compatible with each other. At the production facility at our headquarters in the Netherlands, we make sure that our Liquidyne® pump shaft seals and Supreme® propulsion seals meet these high standards – adding quality and reliability to your operation. Lagersmit currently delivers Peace of Mind to a vast network of pump manufacturers, (petro)chemical and energy companies. This brochure features the Real Stories of a few of these customers.

Believing that there's always room for improvement, we keep developing new ideas for your applications and deliver the best sealing solutions according to our Modular, Made-to-Measure philosophy.

Our dedicated service network covers your needs 24 hours a day, 7 days a week, worldwide.

MORE ABOUT LAGERSMIT

since 1856

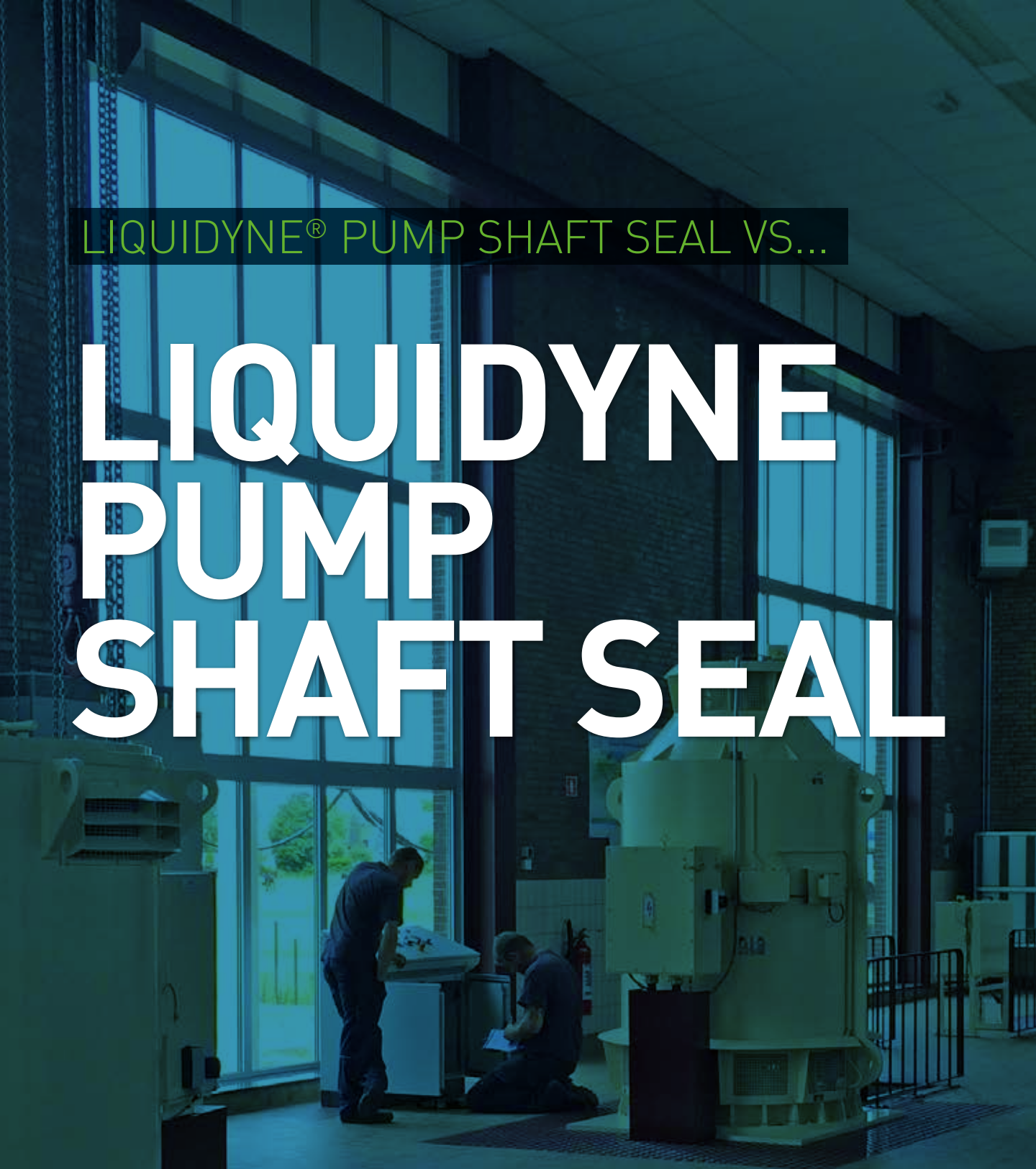
FOUNDED IN 1856

BASED IN THE NETHERLANDS

24/7 WORLDWIDE SERVICE & SPARE PARTS

50.000

DELIVERED OVER 50.000 SEALS



LIQUIDYNE® PUMP SHAFT SEAL VS...

LIQUIDYNE PUMP SHAFT SEAL

Released in 1983, the Liquidyne pump shaft seal was initially intended for heavy-duty dredge pumps and is the next step for gland packing and the alternative of a mechanical seal. Thanks to its robust design, the seal can handle above-average axial and radial play. It is suitable for pumps that have to deal with severe shocks and vibrations, incorrect alignment, and abrasive media. The Liquidyne increases the pump's lifetime and leads to a longer mean time between maintenance (MTBM) thanks to its robustness. Condition monitoring adds predictability and secures your operation.

LIQUIDYNE® PUMP SHAFT SEAL VS...

...VS GLAND PACKING

Summarised top advantages Liquidyne versus gland packing:

- Condition monitoring ensures you can plan maintenance efficiently, optimise MTBM, reduce costs, and minimise the risk of sudden pump failure
- Energy savings due to less friction and minimised heat development
- Safe workplace – the floor is kept dry, and no adjustments are required during operation
- Easy to maintain – no other tasks required besides condition monitoring

READ THE WHOLE BLOG

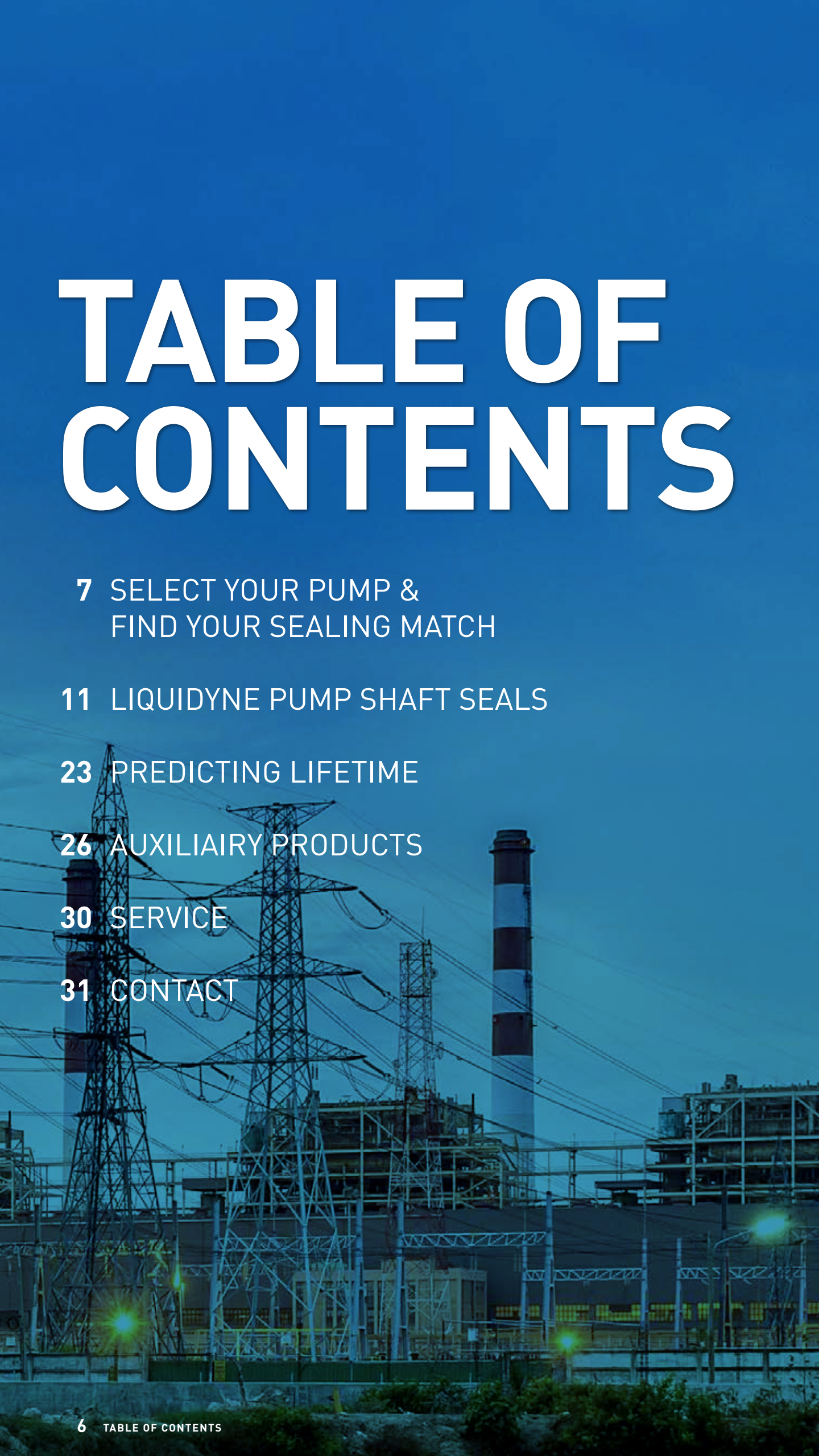
...VS MECHANICAL SEAL

Summarised main advantages Liquidyne versus mechanical seal:

- Predictable lifetime: condition monitoring minimises the risk of sudden pump failure
- Optimised cost of ownership thanks to the possibility of ordering spare parts, energy savings, and easy maintenance
- The Liquidyne has a robust seal design, making it virtually non-sensitive for abrasive media

READ THE WHOLE BLOG

TABLE OF CONTENTS



SELECT YOUR PUMP & FIND YOUR SEALING MATCH

- VERTICAL SUMP PUMPS
- DEEPWELL PUMPS
- SLURRY PUMPS
- SELF-PRIMING CENTRIFUGAL PUMPS
- DIFFUSER PUMPS
- BOOSTER PUMPS
- SPLIT CASE PUMPS
- CONCRETE VOLUTE PUMP
- SEWAGE PUMPS
- VERTICAL SUSPENDED PUMPS
- AXIAL PUMPS
- FISH-FRIENDLY PUMPS

SEAL SELECTOR

REAL QUOTE:
NOURYON INDUSTRIAL CHEMICALS

Nouryon Industrial Chemicals (formerly AkzoNobel) has several Liquidyne® seals installed on their circulation pumps in their Salt factory. The seal has to withstand tough working conditions, such as with salt water or at high temperatures over 100 degrees Celsius.

MICHEL BEYENS

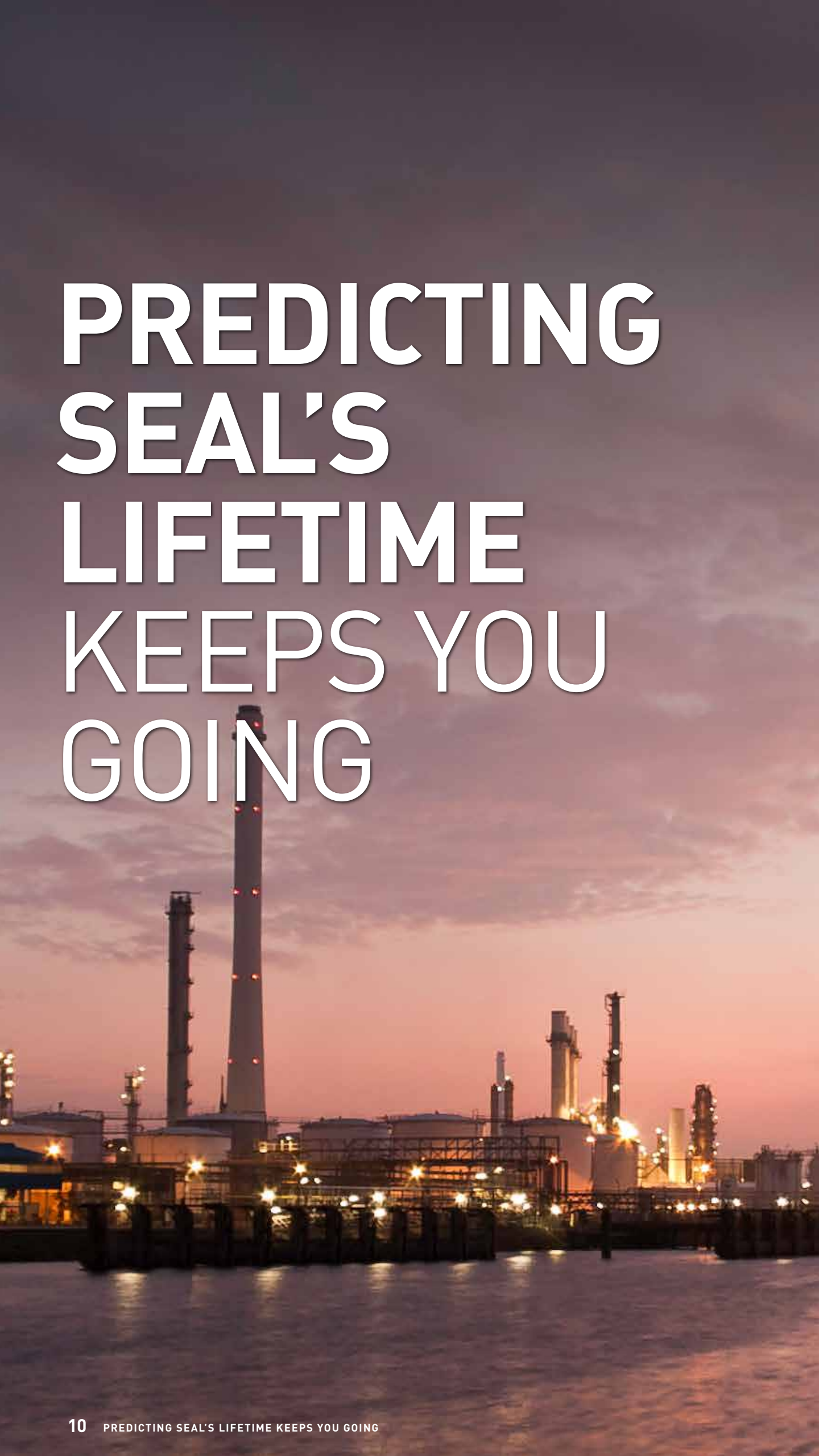
Customer Support

“The Liquidyne seal is robust and incredibly tough, with the biggest advantage being that the degree of wear and tear of a seal is measurable. This condition monitoring enables us to better plan maintenance and coordinate related activities with production. The Liquidyne has been installed for six years now: it’s had no maintenance, and it hasn’t failed once so far.

The Liquidyne is economically attractive: after more than six years, the seal is still in such a good condition that you’ll only need to replace a few parts of the seal instead of purchasing a completely new seal.”

HARMJAN SPAAN
Supervisor Maintenance (rotating) – Nouryon

PREDICTING SEAL'S LIFETIME KEEPS YOU GOING



LIQUIDYNE® PUMP SHAFT SEALS

AS A MANUFACTURER AND SUPPLIER OF THE LIQUIDYNE PUMP SHAFT SEAL WE HAVE A STRONG FOCUS ON INCREASING THE MEAN TIME BETWEEN MAINTENANCE (MTBM) OF ROTATING EQUIPMENT AND AT THE SAME TIME LOWERING MAINTENANCE COSTS.

How the Liquidyne works in a nutshell

The (water) lubricated Liquidyne lip seals run over a partially grooved bush placed over the pump shaft. The helical shape of the grooves and peripheral velocity of the bush create water flow between the grooves and the lip seal.

WATCH THE VIDEO

Predictable lifetime

One of the main benefits of the Liquidyne is that the condition monitoring function is not just to simply monitor the condition of the seal, but it also creates a predictable lifetime. How? Over time, the grooves on the bush gradually wear down. Less water is transported over the bush and the amount of water leaving the drain decreases. When the drain flow is at 20% of the initial flow, maintenance needs to be planned.

By keeping track of this drain flow you can plan maintenance more efficiently, minimising the risk sudden pump failure, optimise mean time between maintenance and reduce costs.

The Liquidyne seal is environmentally friendly due to the following characteristics:

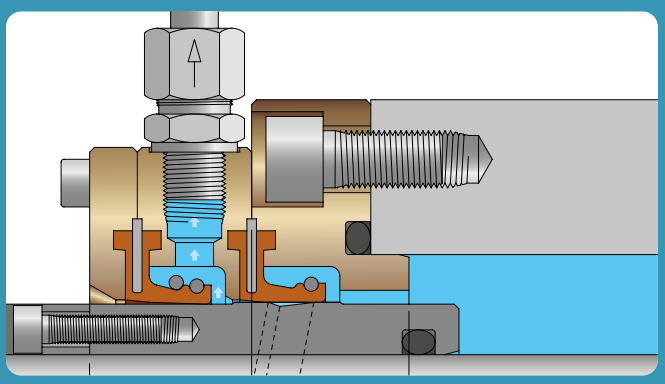
- Energy savings
- (Water) lubricated

Other benefits:

- Increased reliability due to robust seal design (see also our Real Story from Nouryon Industrial Chemicals in section -select your pump)
- Environment Health Safety: No leakage on the floor, safe and clean working environment
- Optional design: the Liquidyne can be executed with divisible housing parts. Ask for details.

MORE INFORMATION

LIQUIDYNE® 2-STAGE



STANDARD DESIGN

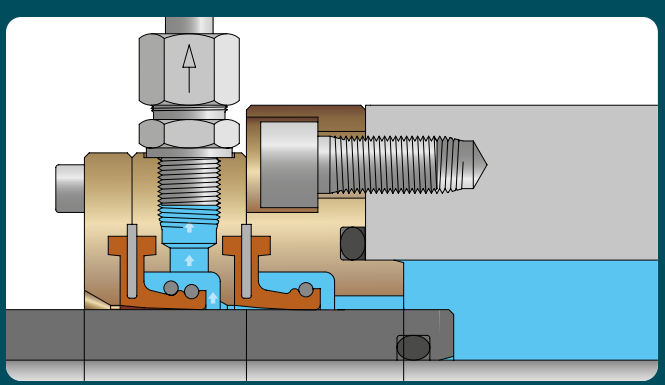
<100 MICRON	6<PH<8	NO RESTRICTION	NO RESTRICTION	0<T<90°C	1<P<41

How it works

The Liquidyne 2-Stage is the standard design of the Liquidyne range. This seal is used in pumps that process relatively clean media that may contain abrasive particles that are no larger than 100 microns.
The Liquidyne 2-Stage design uses the process medium to lubricate the seal.

BENEFITS

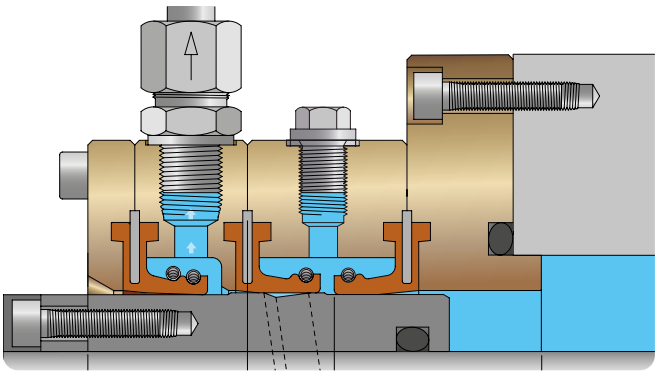
- Predictable lifetime due to condition monitoring
- Low power consumption
- Maximised maintenance interval
- Hard Metal Layer (HML) coating for extra durable grooved liners
- No external flush needed
- Optional design: the Liquidyne can be designed with divisible housing parts. Ask for more details.



OPTIONAL: LIQUIDYNE® 2-TG
As this application is typically used on low-pressure pumps, the liner does not feature a grooved surface but a smooth, flat surface.

MORE INFORMATION

LIQUIDYNE® 3-STAGE VACUUM



<100 MICRON

6<PH<8

NO RESTRICTION

NO RESTRICTION

0<T<90°C

1<P<41

How it works

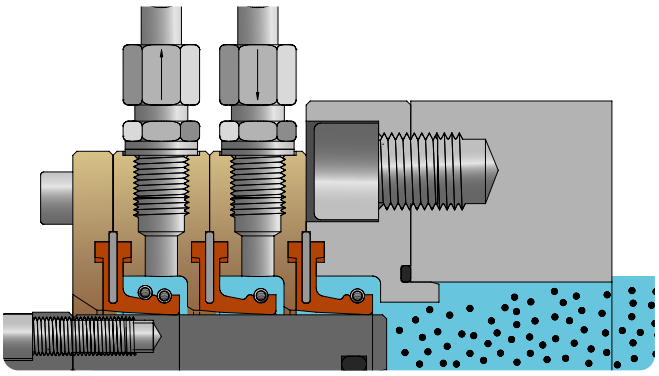
The Liquidyne 3-Stage Vacuum is specially designed to hold a water column up to eight metres when the pump is at a standstill. The vacuum module also prevents air leakage through the seal into the pump if the pressure inside the pump is lower than the atmospheric pressure.

BENEFITS

- Suitable for dry start-up of the pump
- Retains pump medium up to eight metres
- Predictable lifetime due to condition monitoring
- Low power consumption
- Maximised maintenance intervals
- Hard Metal Layer (HML) coating for extra durable grooved liners
- Optional design: can be designed with divisible housing parts

MORE INFORMATION

LIQUIDYNE® 3-STAGE



>100 MICRON	6<PH<8	NO RESTRICTION	NO RESTRICTION	0<T<90°C	1<P<41

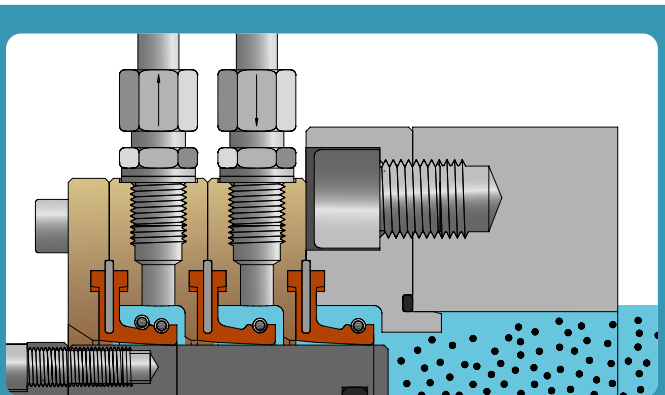
How it works

Lagersmit developed this Liquidyne 3-Stage seal especially for pumps with a pump medium polluted with abrasive media. This Liquidyne seals the pump and uses an external flush to lubricate, cool, and clean the seal, while the drain flow enables the condition monitoring.

BENEFITS

- Robust seal design
- Dirt retaining module
- Predictable lifetime due to condition monitoring
- Low power consumption
- Maximised maintenance intervals
- Hard Metal Layer (HML) coating for extra durable grooved liners
- Optional design: can be designed with divisible housing parts

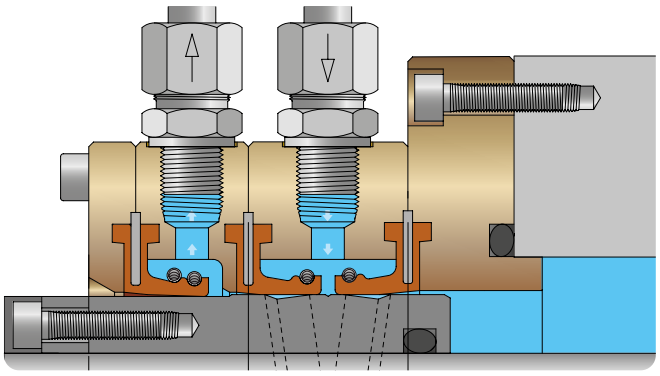
MORE INFORMATION



OPTIONAL: LIQUIDYNE® 3-TG

As this application is typically used on low-pressure pumps, the liner does not feature a grooved surface but a smooth, flat surface.

LIQUIDYNE® LDS



<100 MICRON | 6<PH<8 | NO RESTRICTION | NO RESTRICTION | 0<T<90°C | 1<P<41

How it works

The Liquidyne LDS design is used in pumps that process polluted and agressive media. It seals off the pump and uses an external flush to lubricate, cool, and clean the seal. The flush flows through the seal as well as towards the pump. This ensures that the pump medium is kept away from the seal to create the most durable solution. The drain flow enables condition monitoring.

BENEFITS

- Suitable for dry start-up of the pump
- Most durable solution
- Predictable lifetime due to condition monitoring
- Low power consumption
- Maximised maintenance intervals
- Hard Metal Layer (HML) coating for extra durable grooved liners
- Optional design: can be designed with divisible housing parts

MORE INFORMATION

REAL STORY: **STORK**

As a pump manufacturer with a rich and long history, we have ample experience in designing pumps. The shaft seal is an essential part of our pumps. In the past, Stork Pumps often used compression gland packing and mechanical seals.

ERIC DE PAAUW

Account Manager

“As recently as 2018, we converted a compression gland packing into a water-lubricated Liquidyne® seal for a pumping station pump. This involved a Stork pump from 1969 equipped with a grease-lubricated compression gland packing.
The Water Board (Waterschap) prescribed a water-lubricated lip seal, in part because of its target to eliminate the use of grease in surface water. As a pump manufacturer, we always carefully weigh up our options. We have chosen a pump shaft seal from Lagersmit, partially because of our positive previous experiences with the quality of products delivered, the service offered, and options for joint, customer-specific engineered solutions.

Adjustments have been made to the pump parts, and the Liquidyne seal – delivered on time – has been installed.
The pump, complete with the new Liquidyne seal, was then successfully commissioned and tested in the pumping station.
We have positive experiences working with Lagersmit and regard them as a reliable, high-quality partner for our pump shaft seals.”

GEERT HOEFLAAK
Business Developer- Stork

REAL CUSTOM DESIGN: **LIQUIDYNE HYBRID SEAL**

We're always up for a new challenge! Our R&D team enjoys exchanging ideas and creating the sealing solution you need. Read more about our Liquidyne® Hybrid seal that we have developed.

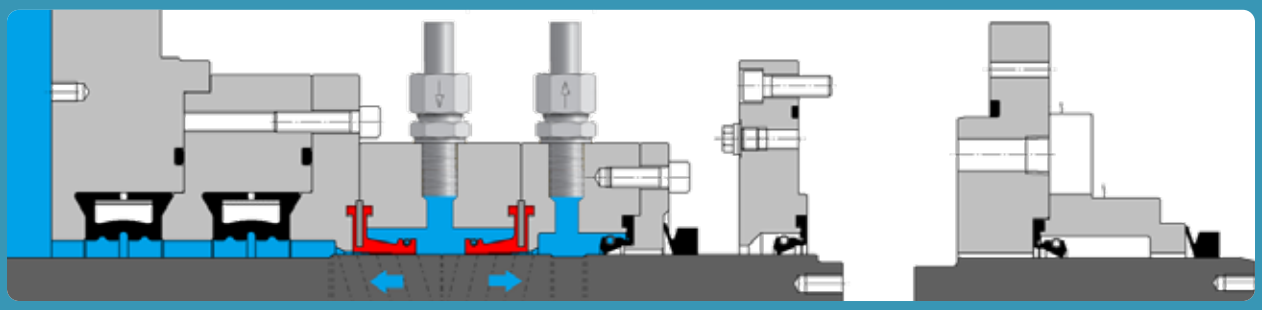
Hybrid seal

A special Hybrid (combination of a Supreme® and Liquidyne) has been manufactured for cooling-water pumps for nuclear reactors. A Supreme seal is installed in the cooling-water pump's drive mechanism and used to keep out lubricant. In addition, a Liquidyne is used to ensure the water is retained in the cooling-water pump.

How it works

The Liquidyne Hybrid is specially designed for concrete volute pumps that are designed with a grease-lubricated roller bearing at the bottom. The Liquidyne Hybrid system consists of two parts: the pump shaft seal is used to seal the pump shaft of a vertical pump, while the bearing seal protects the pump bearing and its grease environment.

The seals are placed inline over the pump shaft. The pump shaft seal is mounted on the pump cover or housing part of an inflatable seal, whereas the bearing seal is mounted directly on the bearing housing.



The bearing seal – known as Supreme® – is a grease-lubricated seal unit. A bearing seal is placed in order to prevent water or dirt from entering the bearing housing on both sides.

REAL CUSTOM DESIGN: **LIQUIDYNE HYBRID SEAL**

The pump shaft seal is a water-flushed sealing system known as Liquidyne LDS. This system is particularly able to withstand high and variable loads caused by circumferential velocities and pressure differences. In addition, thanks to its flexible lip seals, the pump shaft seal can continue to function at its best even with axial movement.

Design

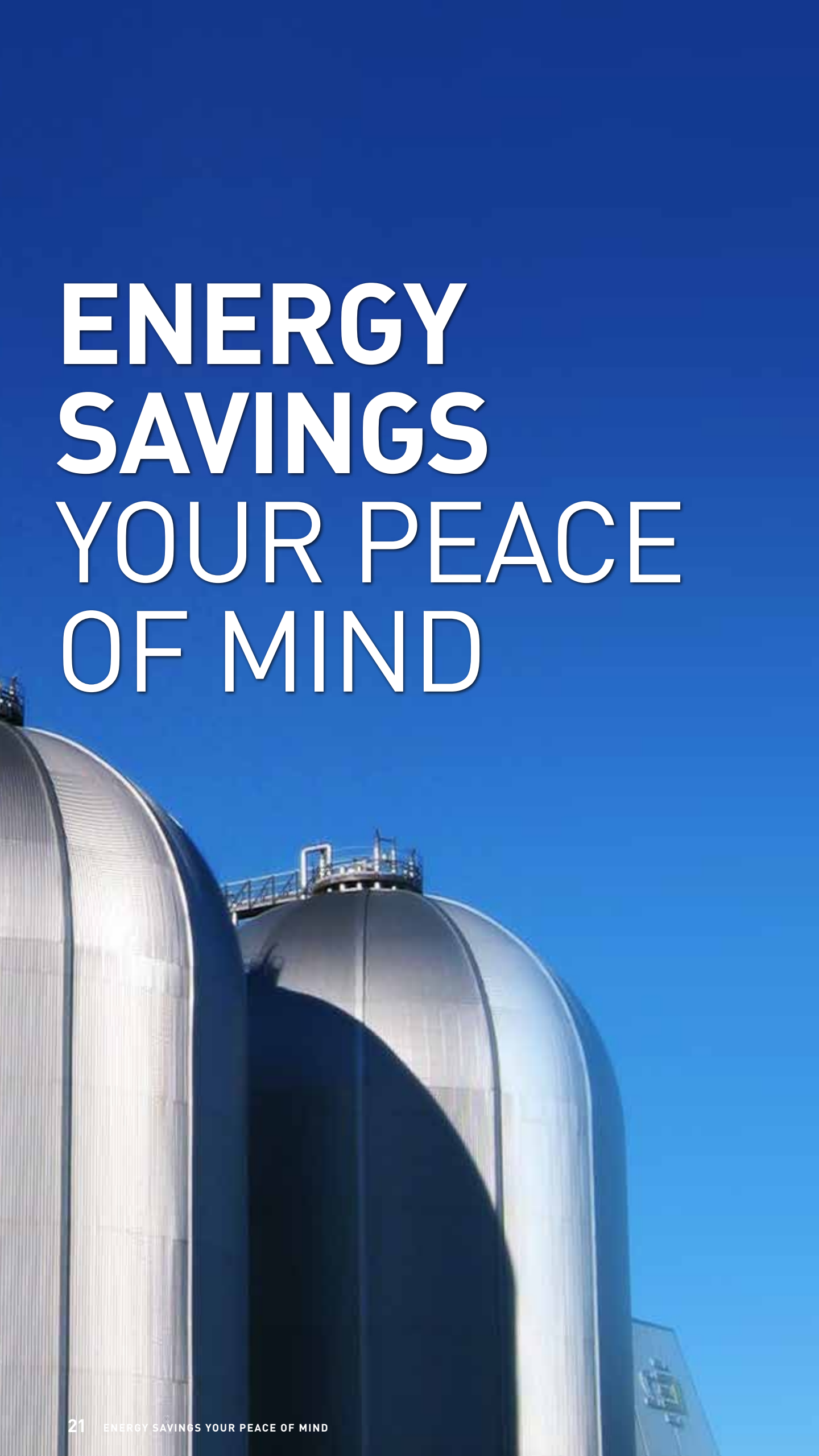
- Pump shaft seal module
- Pressure-reducing module
- Drain pipe
- Inflatable seals
- Bearing seal module
- Uses external flush to:
  - Lubricate
  - Clean
  - Cool the seal
  - Active flow to pump side

If you want to know more about our custom-designed sealing solutions, please get in touch with our experts by sending an e-mail to industry@lagersmit.com

NICOLETTE VAN HOUWELINGEN

CUSTOMER SUPPORT

ENERGY SAVINGS YOUR PEACE OF MIND



REAL ENERGY SAVINGS: **SABIC**

On SABIC Utilities' site in Bergen op Zoom, we have changed the gland packings of the 1 MW cooling water pumps into Liquidyne seals. Replacing the shaft seal led to the following results for SABIC.

Costs
Due to the minimized friction of the Liquidyne seal, the pump consumes 12.6% less power.

Availability
Pump availability increased into 99.5%, meaning an improvement of 53%.

Reliability
The lifetime of the Liquidyne seal was extended to between six and eight years.

Environment Health Safety
No maintenance and adjusting needed during operation.
No leakage - safe and clean working environment.

REAL STORY: **PREDICTING LIFETIME**

PREDICTING LIFETIME

Whether it's a dredge operation or an industrial water process, work goes on – day and night, worldwide. Condition monitoring enables you to keep track of your seal's performance and plan maintenance in time, enabling a predictable lifetime and minimising the risk of for example sudden failures. You can measure your seal's performance in different ways, ranging from a simple manual operation with a bucket and timer to a completely automated approach with a programmable logic controller (PLC).

MANUAL CONDITION MONITORING

If you want to manually monitor the seal's condition, all you need is a bucket and stopwatch. The water from the Liquidyne® is eventually transported from the pump side to the drain side of the seal. At this point, you can use a bucket to collect the drain flow for a period of time (like 60 seconds) and record how much water you collected.

Our specialists are often asked exactly what you should take notice of when checking the condition of the seal. Most important is to measure the following within fixed time intervals:

- Water inflow and outflow (litres/hour)
- Temperature difference between inflowing and outflowing water

HOW TO MONITOR THE CONDITION OF THE SEAL WITH THE FLOW METER

A digital flow meter is used to measure the rate of flow of liquids, in this case water. For Liquidyne pumping applications, Lagersmit offers a range of approved, fully digital flow meters. By installing the non-mechanical flow meter in a pipeline from the pump, the flow is logged without disrupting the flow. The data can be logged locally at the pump site or, if you have a more advanced approach, in your data management system (PLC). If logged, you will see a similar graph to **figure 1**.

The state of the grooved bush is measured based on the flow. Due to the wear of the grooves on the grooved bush, the flow decreases over time. The lip seal will also have more contact with the running surface and allows less water to be transported over the bush. The water flow towards the drain decreases, and as a result the drain flow decreases.

Recording the drain flow from the moment the seal was taken into use allows for maintenance to be scheduled more efficiently and the maintenance interval to be maximised. When the drain flow is at 20% of the initial drain flow, you can plan maintenance. The most advanced way to monitor the condition of your seal is to connect the digital flow meter to a PLC.

SUITABLE FOR WHICH LIQUIDYNE SEALS?

The Liquidyne 3-stage is used as an example, but the digital flow meter can be applied on all Liquidyne seals. This means you can apply the flow meters on Liquidynes for dredge pumps, industrial (cooling) water or other pumps, jet pumps, gland pumps, and process pumps.

MORE INFORMATION ABOUT THE FLOW METER

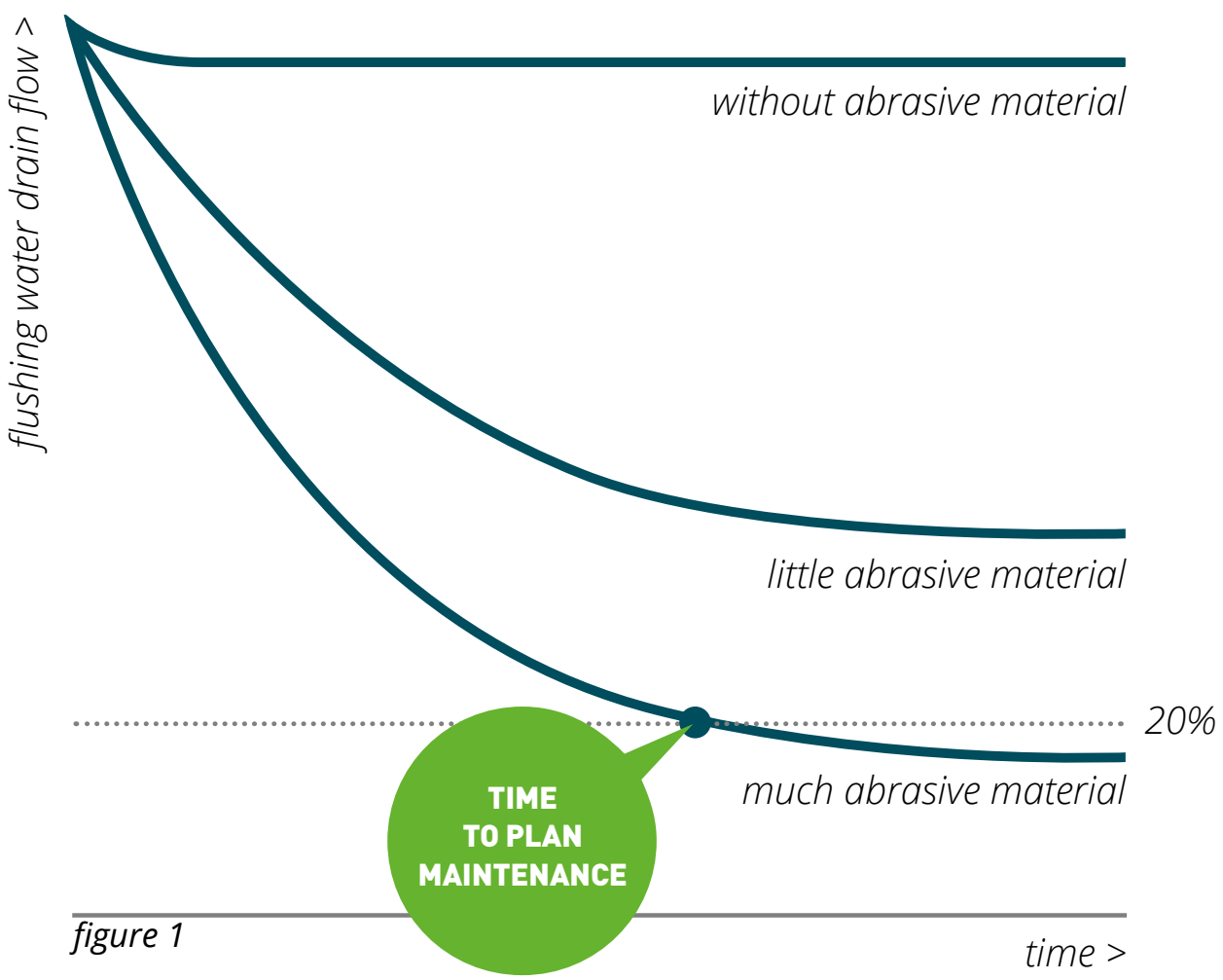
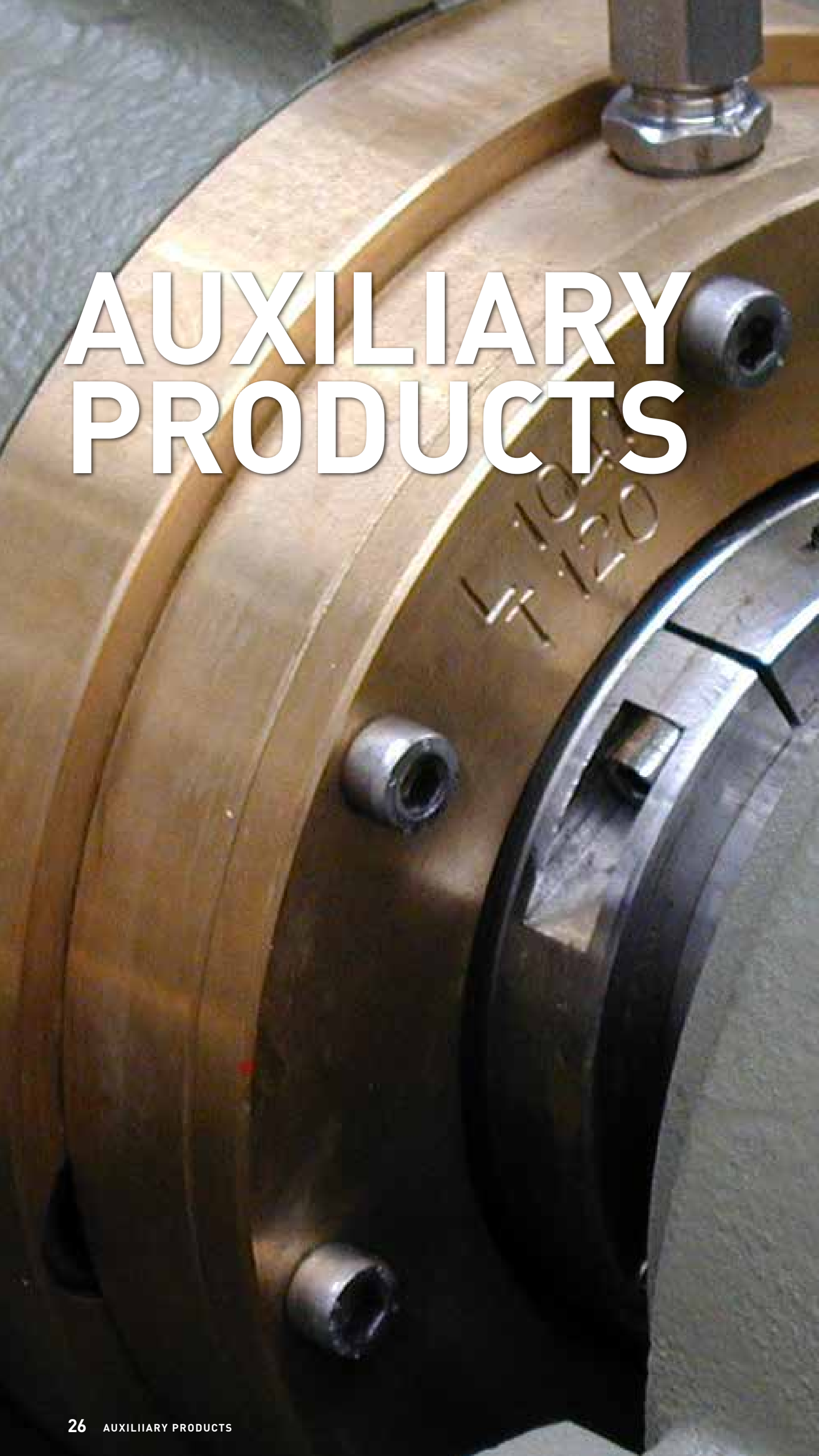
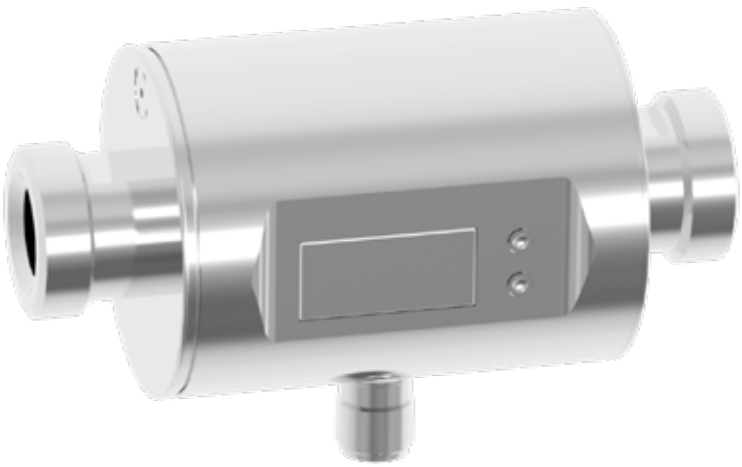


figure 1



AUXILIARY PRODUCTS

FLOW METER



Monitoring the drain
Lagersmit offers the next step in ensuring a secure pump operation thanks to selected digital flow meters, which simplify the task of monitoring the Liquidyne® seal and the pump condition.

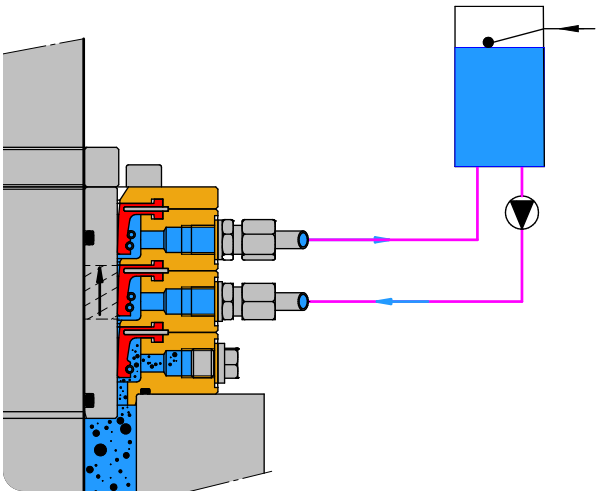
How it works
By installing a non-mechanical flow meter in a pipeline from the pump, the flow is logged without disrupting the flow. The data can be logged in your data management system or locally at the pump site. Read our Real Story: Predicting lifetime on page 23 for more information about how you can keep track of your seal's performance and enable a predictable lifetime.

BENEFITS

- Maintenance can be planned and intervals maximised
- Better control and accuracy of flush and drain
- Applicable to all Liquidyne seals

MORE INFORMATION

CLOSED LOOP LUBRICATION UNIT (CLLU)



The Liquidyne is a sealing solution that needs to be flushed during heavy-duty operations, such as when dealing with abrasive media. For situations in which no flush supply is present, Lagersmit has developed a Closed Loop Lubrication Unit (CLLU) to circulate external flush medium. Circulating the flushing medium minimises the total consumption of the seal and increases the durability of the Liquidyne seal, as flush water is filtered. The system can be Made-to-Measure for your application and available space. The CLLU will monitor the seal's performance and provide an alarm when maintenance needs to be planned.

THE CLLU CAN BE APPLIED TO:

- Liquidyne 3-Stage
- Liquidyne 3-Stage Vacuum
- Liquidyne 3-TG

MORE INFORMATION

REAL STORY: **SHELL**

The Liquidyne seal features in Shell's Supplier Qualification System (SQS) as well as on its Technically Accepted Manufacturers and Products list (TAMAP). The Liquidyne is also published on the Shell Global rotating equipment network as Best Practice for cooling-water pumps and is suitable for incorporation in the Shell DEP (Design Engineering Practice).

REAL SERVICE

SERVICE

Our service engineers are your seal experts and can assist with installing and overhauling a Liquidyne seal on location. Every engineer is specifically trained to ensure optimal quality. Their focus ranges from installation to supervision, and from troubleshooting to regular maintenance.

After every service job, we carefully store all relevant information to ensure your Peace of Mind during the next maintenance job. This enables you to protect your core business, 24/7, worldwide.

- Commissioning
- Troubleshooting
- Installation
- Retrofit
- Maintenance

service@lagersmit.com
+31 (0)88 0216 300

GET IN TOUCH

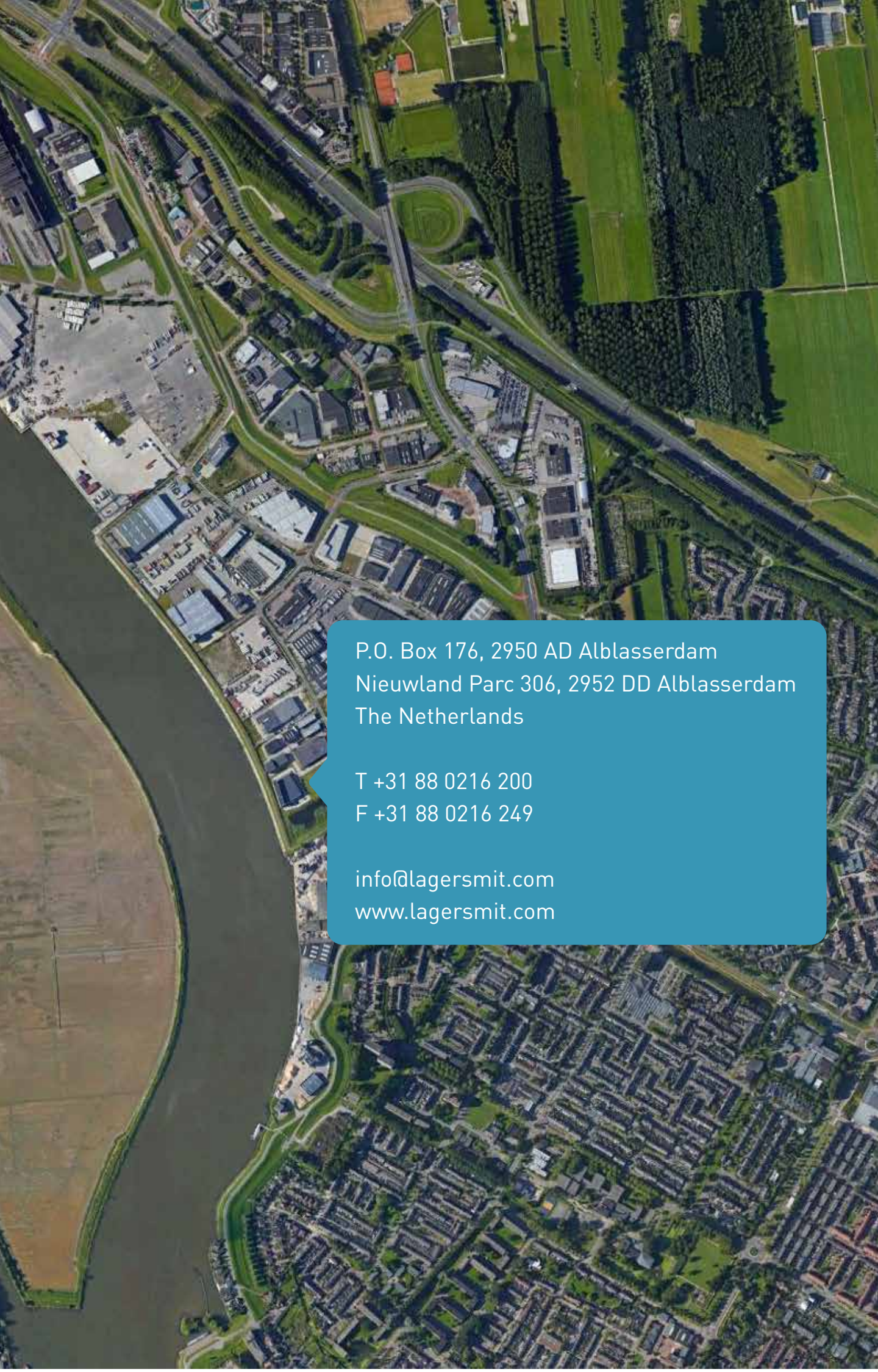
CONTACT

Get in touch with our experts
for more information!

industry@lagersmit.com
+31 (0)88 0216 200

LAGERSMIT.COM

P.O. Box 176, 2950 AD Alblasserdam
Nieuwland Parc 306, 2952 DD Alblasserdam
The Netherlands



P.O. Box 176, 2950 AD Alblasserdam
Nieuwland Parc 306, 2952 DD Alblasserdam
The Netherlands

T +31 88 0216 200
F +31 88 0216 249

info@lagersmit.com
www.lagersmit.com

LAGERSMIT
THE ORIGIN OF SEALING SOLUTIONS