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# Sealing competence for efficient seal water management

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# Massive savings: Reduced water consumption, lower costs - with sealing solutions from EagleBurgmann.

From the chemical industry through to pulp and paper, the environmental aspects, and not just cost-effectiveness, are becoming increasingly important in the operation of production facilities. The focus is on careful use of water, one of our natural resources, as well as power consumption.

Pumps and other rotary machines are used in numerous processes; these need a continuous supply of fresh water as a buffer or quench medium for their shaft seals. In this field, a powerful sealing technology has the task of providing technically viable and financially consistent concepts for reducing the volumes of water used. EagleBurgmann has developed innovative solutions to do this, which it has implemented successfully in practice in close cooperation with well-known operators.

## It wouldn't work without water. But it does with less.

Fresh water needs to be supplied in volumes to suit the type of pump shaft seal, and the way in which the seal works. It is needed as buffer water to lubricate, flush, cool, or pressurize the seal system, and to prevent leakage to the atmosphere. The volume of buffer water needed largely depends on the temperature at the sliding faces of the seal, or the product temperature.

Dual mechanical seals are often supplied in an open buffer fluid circuit, as is the case in stock pumps in the pulp and paper industries. The water is diverted after it passes through the seal. This method uses the most fresh water to supply the seal, but the consumption is in no way related to the volume actually needed.

Efficient seal water management, and application-oriented sealing systems and concepts offer enormous potential for reducing water consumption, and increasing cost-effectiveness.

## Greater cost-effectiveness. Greater savings.

The need to reduce buffer water consumption inspired EagleBurgmann to develop and adapt mechanical seals for careful and reliable non-flow methods, and to use new instruments to supply seals, while, at the same time, monitoring the mechanical seals. Various control units are used to regulate and optimize the supply of water to suit the application.

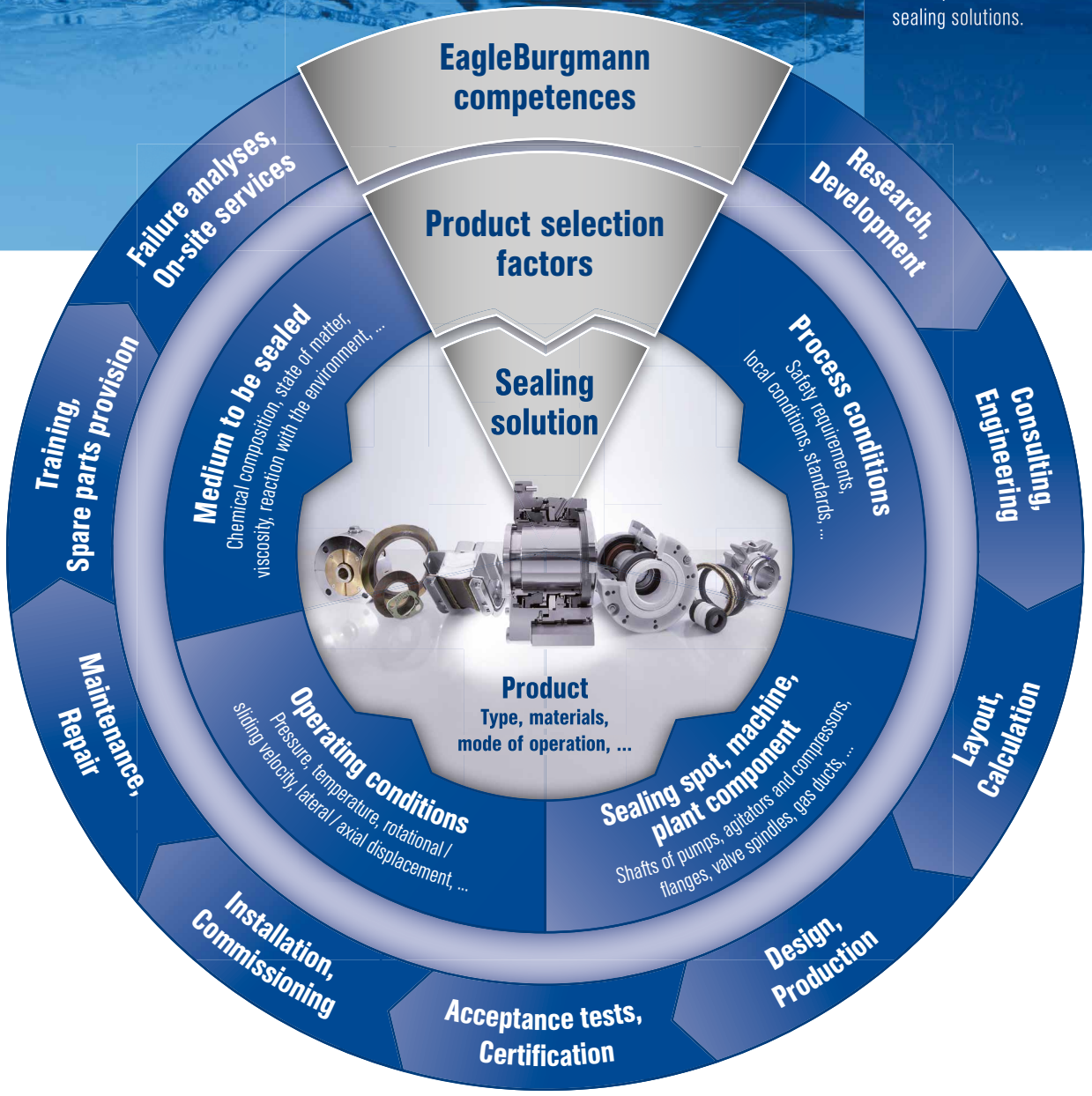
Under some operating conditions, savings of up to 99 % on buffer water consumption are possible, compared to open-flow circuits. Uncontrolled, and often unnecessarily high water consumption can be reduced to the minimum actually required without impairing the operational safety of the seal.

## The best solution.
## Even for your application.

Several factors play a major role when choosing the product, the product type, the materials used, and how it is operated: process conditions, sealing point, operating conditions, and the medium to be sealed.

No matter what requirements our customers have, we know how these factors affect functionality and economic viability, so we convert this know-how flawlessly into long-term, reliable sealing solutions.

EagleBurgmann has all the expertise needed to accompany and support the entire development, life, and service cycle of its sealing solutions.



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## Mechanical seals for non-flow operation

The significant advantages of the non-flow operation compared to a conventional operating method are the low purchase costs since there is no need for a complex supply system, and the minimal water consumption when operating the seal.

A special design principle of the EagleBurgmann non-flow seals allows the buffer water to circulate from the product side to the atmospheric side sliding faces. The seal is supplied with pressurized buffer water but, after the seal has been vented, the buffer water outlet is closed by a valve. Only the negligible leakage at the sliding faces is recirculated, which means that there is no flow at the seal (= non-flow); it is the seal that acts as a cooler.

In non-flow operation, dual seals have a much longer service life than single mechanical seals. The seal faces are lubricated with clean buffer water, which minimizes wear on the sliding faces. The result is greater operational safety, and system availability. The requirements for non-flow operation are very simple to fulfil. The significant factor is the heat introduced into the mechanical seal via the product temperature, product pressure, and speed.

Experience shows that some 80 % of all pumps in the pulp and paper industry are suitable for non-flow operation, and would benefit from its application.

### EagleBurgmann mechanical seals for non-flow operation are suitable for

- Volatile media with poor lubricating properties
- Media that react with oxygen
- Media containing solids
- Aggressive media
- Polluting media

### Applied successfully at

UPM-Kymmene, Kajaani, PM4, Finland
UPM-Kymmene, Wisaforest Pulp Mill, Finland
Stora Enso Kvarnsveden, Borlänge, Sweden
Stora Enso Fors, Sweden
Papierfabrik Palm, Wörth, Germany
Peterson Paper Moss AS, Norway

## Cartex-DN Cartridge seal

Cartex cartridge seals from EagleBurgmann have been used successfully in chemical pumps, and in stock and auxiliary pumps in the pulp and paper industry for more than two decades. The Cartex is the ideal seal for standardization. The radial installation height of the Cartex is low, so it is generally possible to convert packings without the need to modify the pump.

The Cartex-DN can be used both conventionally with pressurized buffer water, and in non-flow operation.

### Features and advantages

- Dual seal
- Balanced
- Bi-directional
- Double pressure balanced
- Integrated pumping device
- Preassembled unit, simple and fast to install

### Operating range

Temperature: t = -40 °C ... +220 °C
(-40 °F ... +428 °F)
(Check resistance of O-Rings)
Face material combination BQ1:
Pressure: $p_1$ = 25 bar (363 PSI)
Sliding velocity: $v_g$ = 16 m/s (52 ft/s)
Face material combination Q1Q1 or U2Q1:
Pressure: $p_1$ = 20 bar (290 PSI)
Sliding velocity: $v_g$ = 10 m/s (33 ft/s)

### Non-flow operation

Sliding velocity: $v_g$ = 10 m/s (33 ft/s)
Pressure: $p_1$= 10 bar (145 PSI)
Temperature: $t_1$= 80 °C (176 °F)
Buffer medium: Clean water with low hardness and few dissolved substances
Conductivity: 250 µS/cm

## LP-D Dual seal

Type LP mechanical seals are proven semi-cartridge seals for centrifugal pumps, sorters, and mixers. They have successfully found their place in the pulp and paper industry, and are available as single seals, with or without quench, and as dual seals. The modular connecting concept means that LP seals can be adapted to the available installation space.

The LP-D can be operated either conventionally with pressurized buffer water, or in non-flow operation.

### Features and advantages

- Dual seal
- Balanced
- Bi-directional
- Double pressure balanced
- Internal circulation of the buffer medium
- Static springs on both sides
- No dynamic O-Ring on the shaft
- Robust design

### Operating range

Temperature: t = -20 °C ... 140 °C
(-4 °F ... +284 °F)
(180 °C (356 °F) with Kalrez® secondary seals)
Pressure: $p_1$ ... 25 bar (363 PSI),
$p_3$ <12 bar (174 PSI)
Sliding velocity: $v_g$ ... 20 m/s (66 ft/s)
Stock density: <8 %

### Non-flow operation

Temperature: t = +5 °C ... +100 °C
(+41 °F ... +212 °F)
Pressure: $p_1$ max. 10 bar (145 PSI), $p_3 > p_1$
Sliding velocity: $v_g$ <10 m/s (33 ft/s)

## Intelligent seal water supply

EagleBurgmann buffer water regulating valves and flow control units are ahead of the field, and ensure an optimum supply of seal water. These compact, and effective buffer medium supply components are easy to install, maintenance-free, and have short pay-back times into the bargain.

### You too can save water and money!

Using our consumption calculator you can very easily determine your water consumption and costs, along with the likely savings. We would be pleased to calculate your individual potential savings upon request.

You will be amazed at the positive effect simply using the EagleBurgmann BestFlow will have on the cost-effectiveness of your facility.

### Here is a sample calculation for BestFlow buffer water valves:

| | |
|---|---|
| Number of seals in operation | 50 |
| Average water consumption per seal (l/min) | 4 |
| Average costs for water/waste water (Euro/$m^3$) | 0.52 |
| Operating time (days/year) | 330 |
| Water saving with BestFlow (%) | 99 |

| Result | without/ with BestFlow | |
|---|---|---|
| Water consumption per seal (l/min) | 4.0 | 0.04* |
| Total water consumption (l/min) | 200.0 | 2.0 |
| Total water consumption ($m^3$/day) | 288.0 | 2.9 |
| Annual water costs (Euro) | 49,421 | 494 |
| **Saving (Euro/year)** | | **48,927** |

*Average value (leakage PLUS water flow through open valve).

### One practical example of the EagleBurgmann solution

The Stora Enso Skutskär paper factory in Sweden is currently using the entire range of EagleBurgmann seal water management products with great success.
In the past, StoraEnso Skutskär had an extremely high and unnecessary water consumption due to the continuous and uncontrolled flow of buffer water through the seals. Thus, a Sulzer APP pulp pump fitted with a Cartex-DN had a buffer water consumption of up to two liters per minute.
By using the BestFlow buffer water regulating valve, the consumption at this pump alone was lowered by 90 % to just 0.2 l/min with no loss of functionality or process reliability whatsoever.

## BestFlow Buffer water regulating valve

EagleBurgmann BestFlow regulates the flow of buffer water via a thermo-sensitive expansion element. The valve opens automatically when the temperature in the seal rises above the permitted value, allowing fresh, cool buffer water to flow into the seal chamber. Once the seal, or the buffer water has cooled down, the valve closes, and the flow is stopped. This ensures that buffer medium is only replaced when the seal needs cooling.

### Features and advantages

- Reduced, minimal buffer water consumption
- Easy to install and use
- Can be vented in both horizontal, and vertical arrangements
- Expanding element is fully functional at all times
- Robust, non-fatiguing moving parts
- No power supply required
- Pressure-equalized component

### Operating range

Temperature at buffer water outlet:
t = 60°C / 82°C (140 °F / 180 °F)
Buffer water pressure: p max. = 16 bar (232 PSI)
$\Delta p$ ($p_3$ - $p_1$) = min. 2 bar (29 PSI)

### Applied successfully at

UPM-Kymmene, Kajaani, PM4, Finland
Boliden Kokkola Zinc, Finland
UPM-Kymmene, Wisaforest Pulp Mill, Finland
Stora Enso Kvarnsveden, Borlänge, Sweden
Stora Enso Fors, Sweden
Stora Enso Skutskär, Sweden

## MFU Multi Flow Unit

The MFU is designed to allow the volume of water supplied (flush, quench, or buffer water) to the seal system on rotary machines to be set easily. This keeps the seal operating safely, and optimizes or minimizes the necessary water consumption. Important parameters such as pressure and flow rate are also constantly monitored, which means that any failures can be detected at an early stage.

### Features and advantages

- Easy to apply and clean, even during operation
- Compact and robust design
- Reliable operation, even during pressure fluctuations
- Rapid detection of seal damage

### The MFU series is available in three basic versions:

MFU-MP: for single mechanical seals with flush
MFU-MQ: for single mechanical seals with quench
MFU-MD: for dual mechanical seals

### Operating range

Max. operating pressure: 25 bar (363 PSI)
Max. operating temperature: 85 °C (185 °F)
Indicated flow range (pressure drop):
0.1 ... 2 l/min. (≤0.1 bar (1.5 PSI) at 2 l/min.)
0.5 ... 4 l/min. (0.1 bar (1.5 PSI) at 4 l/min.)
1 ... 8 l/min. (≥1 bar (15 PSI) at 8 l/min.)
8 ... 15 l/min. (available on request)

### Applied successfully at

Kemira Pigments Oy, Pori, Finland
Norske Skog Golbey, France
Partek Nordkalk Oyj Abp, Finland
Patria Papier & Zellstoff AG, Austria
SCA Hygiene Products S.A, Belgium
Sappi Maastricht, Netherlands
Stora Enso Fors, Sweden
Holmen Paper Hallsta, Sweden
Korsnäs Frövi, Frövi, Sweden

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EagleBurgmann, a joint venture of the German Freudenberg Group and the Japanese Eagle Industry Group, is one of the internationally leading companies for industrial sealing technology. Our products are used everywhere where safety and reliability are important: in the oil and gas industry, refining technology, the petrochemical, chemical and pharmaceutical industries, food processing, power, water, mining, pulp & paper, aerospace and many other spheres. Every day, more than 6,000 employees in more than 60 subsidiaries contribute their ideas, solutions and commitment towards ensuring that customers all over the world can rely on our seals. Our modular TotalSealCare service underlines our strong customer orientation and offers tailor-made services for every application.

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