

Cartex[®] -DN Cartridge seals



Cartex®-DN Cartridge seals – cost-efficient, reliable and now even better

The Cartridge principle – reliably cost-efficient

EagleBurgmann Cartex® Cartridge seals are fully pre-assembled and precisely installed component seals incorporated in a cover and shaft sleeve. The seals are installed in pumps in a wide range of industries including chemicals, water supply, paper production, food processing and many other applications. Cartridge seals are easy to fit, and they keep your running costs down.

Over the past twenty years, EagleBurgmann Cartex® Cartridge seals have demonstrated a proven track record in sealing applications on all standard pump types. This practical seal design has been successfully established in the market. The Cartex® range now includes single and double seal versions for all standard operating modes as well as special versions, for example for sterile applications or installation in positive displacement pumps.

As customer emphasis on efficiency and engineering features continues to increase, we work continuously on innovative technical improvements to our products. The latest features of the Cartex®-DN are a good example, which show how we can make a good product even better for the intended applications. Now is the time to take advantage of the latest features of the Cartex®-DN.

Simply outstanding: the Cartex® double seal

The Cartex®-DN is the double seal variant in the EagleBurgmann Cartex® range. Because the seal is double-balanced, it remains closed and balanced even in the event of barrier fluid pressure failure or pressure reversal. The seal has an integrated pumping device, so there is often no need for a separate barrier fluid circulation pump. A barrier fluid system (API Plan 53) is required in pressurized mode (barrier fluid pressure exceeds product pressure). Both seals are internally pressurized in this mode. In tandem operation, the (unpressurized) fluid is used in dead-end (API Plan 51) or flow-through (API Plan 52 or 54) mode, depending on the application. The inboard seal is externally pressurized.

The EagleBurgmann QFT 1000 buffer system and QFT 2000 vessels are suitable for the Cartex®-DN in tandem operation. The EagleBurgmann TS 1016 and TS 2000 thermosiphon systems support double and tandem seal configurations.

The Cartex® series: innovative technology for any application

Get the maximum efficiency:

- Pre-assembled Cartex® units reduce your installation costs
- Reduce system downtime for installation by 2/3, because there is no need to take measurements to position the seal.
- Protect you pump shaft/sleeve: Cartex® seals have their own shaft sleeve and do not have a dynamic O-ring which could cause damage.
- Reduce your lifecycle costs by up to 30 % compared to component seals.
- With Cartex®, you extend the average operating life of your seals compared to component seals.

Benefit from simplified handling:

- Cartex® mechanical seals are easy to install. Specialist installation is not needed.
- Pre-assembled units enhance operational reliability. No measurement errors or installation errors.
- Eliminate damage to sliding faces and prevent contamination during installation.
- Cartex® mechanical seals even fit into very tight seal chambers.

Meet your standardization goals:

- With our QDP:24 program, all standard versions are available on workdays within 24 hours after receipt of your order.
- The broad application spectrum of standard materials offers you an excellent opportunity to increase your level of standardization.
- The seals can be adapted to the specific pump design (pump and seal “from a single mold”).
- Attractively priced customized versions.





Cartex®-SNO

EagleBurgmann Cartridge seals suitable for various modes of operation in centrifugal pumps:

Cartex®-SNO

Single seal without connections for dead-end operation

Cartex®-SN

Single seal with flushing connection

Cartex®-QN/TN

Single seal with unpressurized fluid quench. Cover with supply flushing and quench connections. Same design as the Cartex®-SN but with lip (-QN) or throttle ring made of carbon or PTFE reinforced with carbon fiber (-TN) on the outboard side (longer fitting length).

Cartex®-DN

Double seal, double-balanced (the seal remains closed even in the event of barrier fluid pressure failure or pressure reversal), with integrated pumping device: Operating mode:

- A barrier fluid system (API Plan 53) is required in pressurized mode. The inboard and outboard seals are internally pressurized.
- In tandem operation with pressureless buffer fluid dead-end (API Plan 51) or flow-through (API Plan 52 or 54) mode, the inboard seal is externally pressurized and the outboard seal is internally pressurized.



Cartex®-SN



Cartex®-DN



Cartex®-Vario

The solution for ANSI seal chambers: Cartex®-ANSI

Cartex® seals for ANSI pumps. Available for standard (S) and big-bore (B) seal chambers: Cartex® -ASPN / -ABPN (equivalent to -SN) Cartex® -ASTN / -ABTN (equivalent to -TN) Cartex® -ASDN / -ABDN (equivalent to -DN)

For specialized applications:

Cartex®-Vario

Cartridge seals with modified cover for eccentric screw pumps.

The gas-lubricated version:

Cartex®-GSDN

Double seal for pumps. Based on the HR principle which is also used on liquid-lubricated Cartex® seals. High axial tolerance, double balanced, rugged design. Wide seal faces ensure high gas film stability. Product/medium at the seal faces produces continuous self-cleaning effect during ongoing operation.

Optional:

innovative technology extends service life:

DiamondFaces®

All Cartex® seals are also available with Diamond-Faces® technology. The concept is based on applying ultra-pure diamond coatings to sliding faces, so that they survive conditions of insufficient lubrication or dry running without damage. Hundreds of successful installations with diamond coated mechanical seals have confirmed expectations that the seals last longer under harsh operating conditions. www.diamondfaces.com

The right Cartex® for any application

	-SNO	-SN	-QN	-DN
Dead-end	▪			
Volatile media with poor lubrication properties			▪	▪
Media that react with oxygen			▪	▪
Low viscosity media containing no solids	▪	▪	▪	
Media containing solids		▪	▪	▪
Aggressive media				▪
Environmentally hazardous media				▪
Media, not environmentally hazardous	▪	▪		

Cartridge seals can save you money

Cost efficiency means

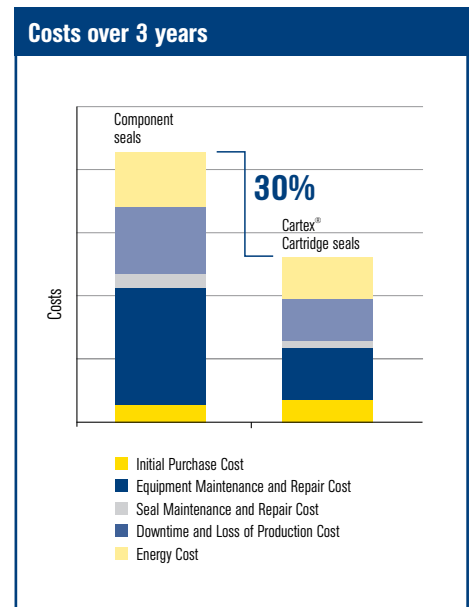
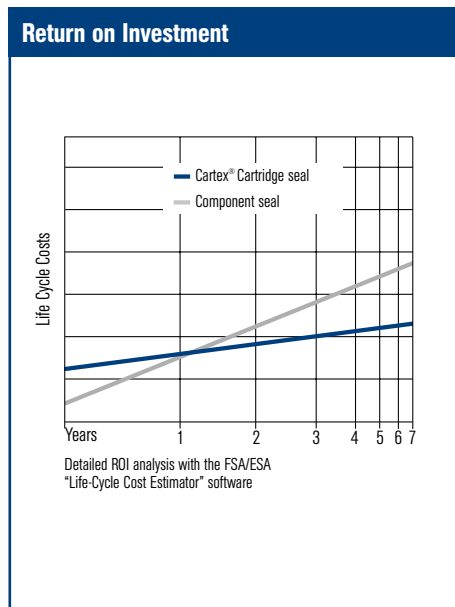
minimizing the lifecycle costs of the sealing system. The goal is to find the optimum balance between the investment in a mechanical seal and the expected service life. Insufficient investment in the mechanical seal system reduces service life compared to other durable system components (e.g. the pump bearing). Excessive investment increases lifecycle costs beyond the optimum level.

Analysis of data collected with EagleBurgmann's SEPRO service program shows clearly that Cartex® Cartridge seals provide the optimum balance. The results reveal that spare parts consumption is significantly lower on Cartridge seals compared to component seals. Cartridge seals clearly have a longer average service life, which reduces downtime and loss of production caused by pump repairs.

Cost efficiency also means

a reduction in repair costs and consequential expenses. The total cost of a Cartridge seal over a period of three years is 30% less than the cost of a component seal during the same period.

It is therefore evident that the expected reduction in operating, installation and repair costs more than offsets the higher initial purchase cost. A Cartex® Cartridge seal is an investment that offers a good future payback.



The new advantages of the Cartex®-DN

EagleBurgmann's design enhancements to the Cartex®-DN were primarily intended to improve operational reliability while keeping cost at the same level. Improvements in running characteristics, installation, service life and cost optimization were major design goals. The results are four new powerful features that make your process more reliable.

Cartex®-DN operating limits

$d_1 = 25 \dots 100 \text{ mm}$ (1,000" ... 4,000")
 other sizes on request
 $t = -40 \text{ °C} \dots 220 \text{ °C}$ (-40 °F ... 428 °F)
 (O-Ring durability must be taken into consideration)
 Axial movement $\pm 1.0 \text{ mm}$
 $d_1 \geq 75 \text{ mm} \pm 1.5 \text{ mm}$

B/Q1 sliding face material combination:

$p_1 = 25 \text{ bar}$ (363 PSI)
 $v_g = 16 \text{ m/s}$ (52 ft/s)

Q1/Q1 or U2/Q1 sliding face material combination:

$p_1 = 20 \text{ bar}$ (290 PSI)
 $v_g = 10 \text{ m/s}$ (33 ft/s)

Barrier fluid circulation system:

$p_{3\text{max}} = 25 \text{ bar}$ (363 PSI)
 $\Delta p (p_3 - p_1)_{\text{ideal}} = 2 \dots 3 \text{ bar}$ (29 ... 44 PSI)
 or 3 ... 7 bar (44 ... 102 PSI) for barrier media with poor lubricating properties

Pump startup:

$\Delta p (p_3 - p_1)_{\text{max}} = 25 \text{ bar}$ (363 PSI) allowed

Recommended supply medium: max. ISO VG 5

Standard materials:

Seal component	Inboard side	Outboard side
Seal face	Q1, B, U2	B
Seat	Q1	Q1
O-ring	V, E, K, U1	V
Springs	M	M
Components	G	G

Other materials on request

1. Simplified installation

as a result of optimized outboard venting. An additional bore in the barrier compartment makes it easy to vent the seal in any mounting position especially with connections in the horizontal position.

Your advantages:

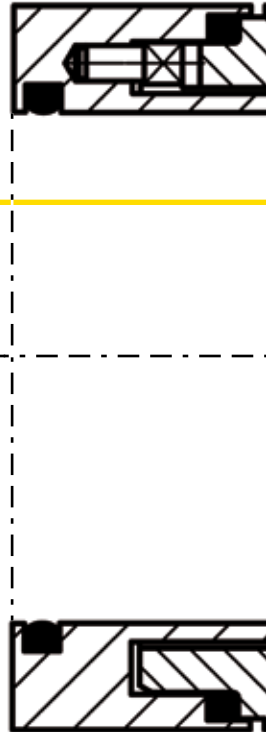
Fast installation, easier to connect to the external supply system and therefore faster pump availability.

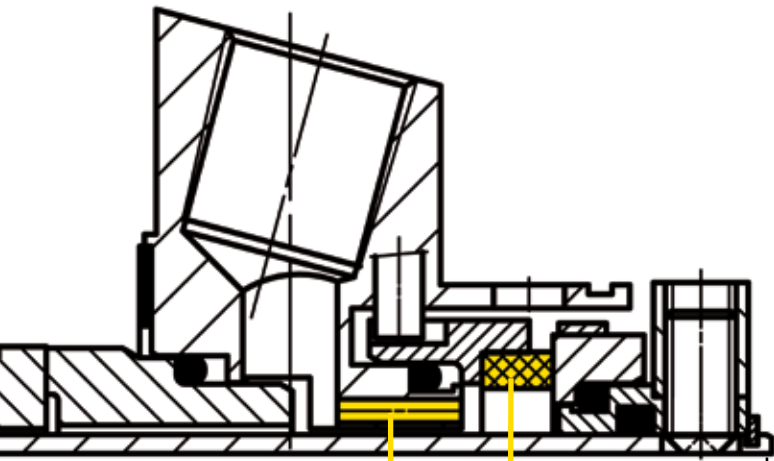
2. Improved running characteristics

through design changes to the anti-twist device of the inboard seal face. A second pin also ensures that torque is distributed evenly with minimum stress. Additionally the contact pressure is also reduced on the silicon carbide or carbon seal face.

Your advantages:

Longer seal life even with frequent start/stop and startup with viscous and/or sticky media.



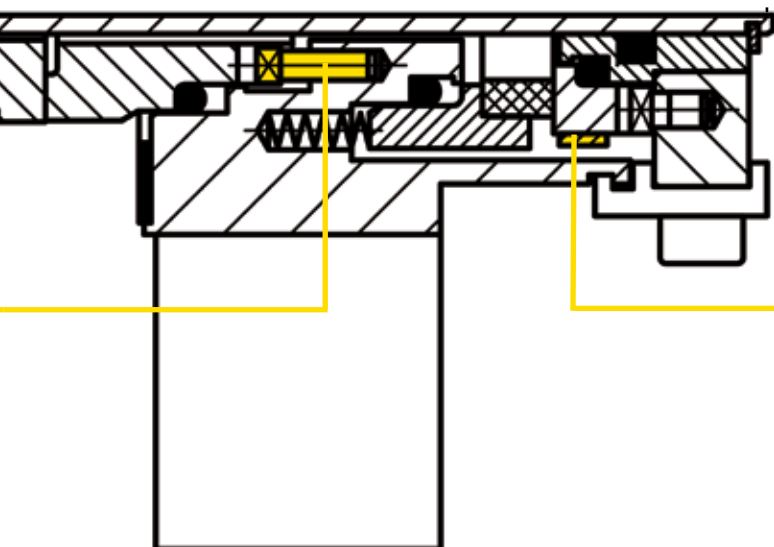


3. Longer operating life

due to optimized outboard seal face geometry. The new design results in an enlargement of the barrier chamber, and heat dissipation through the supply medium has been improved. A second bore in the barrier chamber enhances circulation of the supply medium between the inboard and outboard sides, which also helps to keep the temperature down.

Your advantages:

Both design features extend the operating life of the seal, because the temperature at the sliding faces has a major impact on seal life. As a general rule, the cooler the sliding faces, the less is the wear.



4. Significant improvement in operational reliability

even at high pressure due to a support bandage around the outboard seat. The support bandage increases strength and stability, especially under harsh operating conditions. It reduces damage and costs if the seat breaks as a result of excessive stress.

Your advantages:

Increased process reliability even at high pressure; a significant reduction in repair costs following a failure. Adjacent parts are not damaged if the bandaged seat breaks. There is only a minimal increase in leakage. Fluid does not gush out and the inboard seal does not run dry. The pump can be shut down in a controlled fashion, and the process/batch can be finished.

The impressive capability of the integrated Cartex®-DN pumping device

A supply system is required for the operation of a double seal. Besides providing pressurization, the supply system also ensures controlled heat dissipation from the seal chamber. This is necessary because the life of a mechanical seal is heavily dependent on the temperature at the sliding faces.

A sufficient volume of fluid must be kept in circulation to ensure that the supply medium effectively removes heat from the seal chamber. The general rule is that the volume of fluid in circulation must increase and the viscosity must decrease as heat dissipation demand increases.

Natural circulation (thermosiphon effect), an external circulation pump or an internal pumping device can keep the supply medium circulating.

The EagleBurgmann Cartex®-DN has an internal pumping device. Continuous design improvements and in-house testing have led to the conclusion that there is often no need for an external circulation pump.

Therefore end users get the benefits of lower operating and investment costs as well as increased operational reliability at the same time.

The pumping performance of the Cartex®-DN covers a wide range of applications even without an external pump.

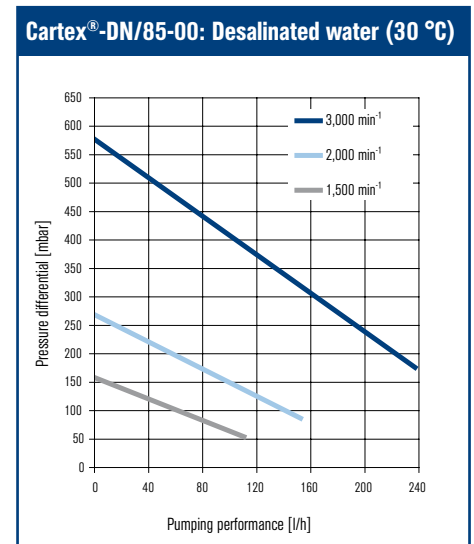
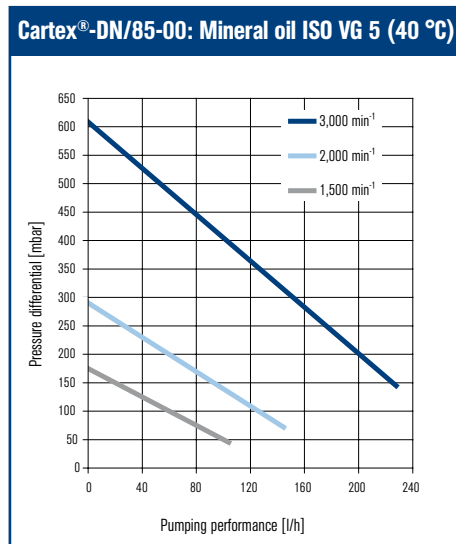
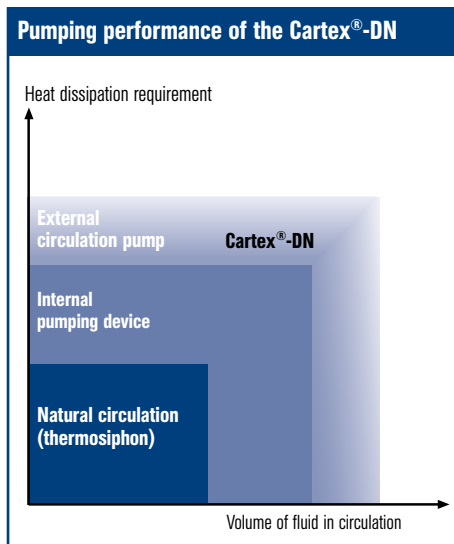
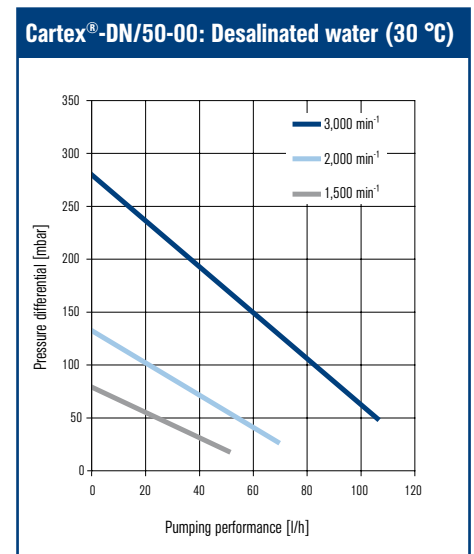
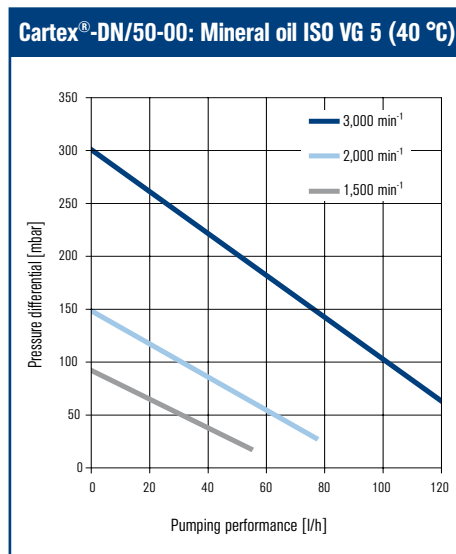
Accurate heat management assessment

We have conducted extensive dynamic testing at our R&D center to assess the performance of the integrated pumping device using fully desalinated water and mineral oil (ISO VG 5) at different operating speeds ($n = 1,500 \text{ min}^{-1}; 2,000 \text{ min}^{-1}; 3,000 \text{ min}^{-1}$). We ran the tests using an optimized supply system, as the efficiency of the pumping device depends on the position of the vessel, the pipe bore size and the numbers of bends, length and the slope of the pipes.

The results

The following graphs show the pumping performance [l/h] as a function of pressure differential.

The test results confirm the outstanding performance of the pumping device on the Cartex®-DN, which is twice as good as comparable devices supplied by other manufacturers.



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EagleBurgmann is one of the leading international companies for industrial sealing technology. Our products are used everywhere when safety and reliability are important: In the oil and gas industries, petroleum refining, chemicals, energy, food, paper, water, marine applications, aerospace and mining. Every day, more than 5000 employees contribute their ideas, solutions and commitment to ensuring that customers all over the world can rely on our seals. Our modular seal service, TotalSealCare™, underlines our commitment to customer orientation and our provision of tailor-made services for every application.

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