

The safe and reliable sealing solution for crystallizing media

EagleBurgmann®
Rely on excellence

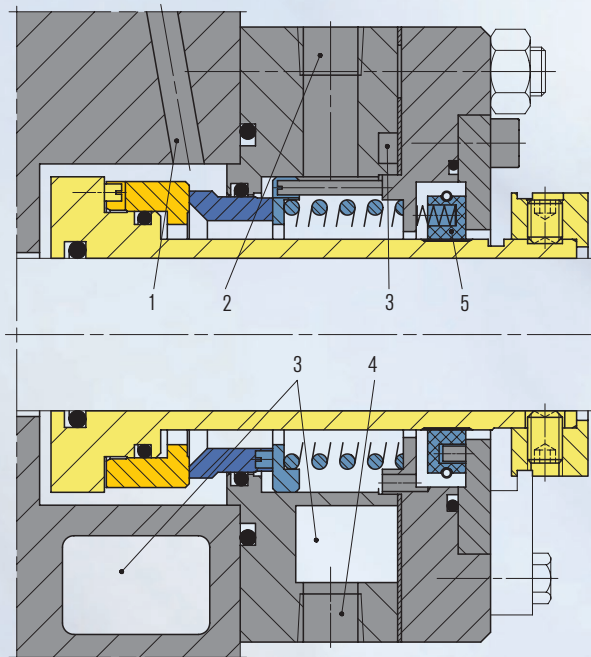
SulfurAce mechanical seal for liquid sulfur

Sulfur is an important base material that is used, for example, in refineries and chemical and pharmaceutical industries to produce sulfuric acid, dyes, rubber, synthetic fibers, insecticides, artificial fertilizers and other products. As a hazardous substance, sulfur is a challenging element for the technology and the various processes. It is flammable (dust explosion hazard), among other things, and in its liquid state with the addition of air it will generate a very toxic sulfur dioxide (SO₂). The substance also exhibits crystallizing properties which regularly causes problems during the technical processing.

Sulfur is in a liquid state in a temperature range between +120 °C ... +160 °C (+248 °F ... 320 °F). While pumping liquid sulfur, continuous minimal leakage in the area of the shaft seal frequently causes problems. This leakage clogs the drainage pipes and causes the steam quench to escape through the throttle bushing in the direction of the bearings where considerable damage can occur as a result. The sulfur leakage crystallizes and strongly contaminates the pump and environment.



Examples of crystalline sulfur leakage outside and inside of pumps



Cross section of an EagleBurgmann SulfurAce

- 1 Flushing
- 2 Quench and drainage
- 3 Steam flow
- 4 Steam ON/OFF
- 5 QS300 quench seal

- Yellow: rotating parts
- Blue: stationary parts
- Gray: housing and shaft

The sealing ace: The new EagleBurgmann SulfurAce

With the new EagleBurgmann SulfurAce mechanical seals specifically designed for use in liquid sulfur and other crystallizing media, these problems are a thing of the past. Optimal availability and functionality of the pump, a clean working environment in the system and significantly reduced maintenance costs are attainable for the end user.

The quality of the EagleBurgmann SulfurAce lies in the product-protected single spring and drive pin. In the event of leakage, the large sphere of action of the single spring together with the cleaning effect of the direct steam quench prevents the components and connected lines from clogging. The integrated EagleBurgmann QS300 quench seal effectively prevents quench steam leakage in the direction of the bearings.

EagleBurgmann SulfurAce at a glance

Operating range

Temperature: $t \dots 180 \text{ °C} (\dots 356 \text{ °F})$
 Pressure in seal compartment: $p \dots 10 \text{ bar} (\dots 145 \text{ PSI})$
 Sliding velocity: $v_g \dots 20 \text{ m/s} (\dots 66 \text{ ft/s})$
 Contained solids: $\dots 30 \text{ wt } \%$

Required steam quench

Pressure: $p = \text{min. } 3 \text{ bar} (44 \text{ PSI})$
 Temperature: $t = \text{min. } 150 \text{ °C} (302 \text{ °F})$
 Flow rate: $v = \text{min. } 0.5 \text{ kg/h}$
 (For sulfur and carbamide)

Standard materials

Seal face and seat: Silicon carbide (SiC)
 Secondary seals: FKM (V),
 Perfluorocarbon rubber (FFKM)
 Spring and metal parts: SS316 (1.4401)

Example from practical experience: Successful retrofit of a sulfur transfer pump

In a chemical plant in Japan, a pump is used to transport liquid sulfur. Competitor seals had been originally installed as shaft seals (pusher and metal bellows single seals). But they exhibited an MTBR (Mean Time Between Repair) of only 9 months.

Visible signs of seal failure and its associated leakage were massive accumulations of crystallized sulfur in the vicinity of the pump. The costs for maintenance and cleaning work were accordingly expensive and ultimately posed a considerable risk to the employees and to the environment.

The problem: Leakage and seal failures

The determined cause for the seal failures was the clogging and blocking of the spring or bellows due to crystallized sulfur. This reduced the spring force or caused it to fail entirely, and the seals opened. The cleaning force of the steam quench was strongly reduced as a result and the temperature required for the function was not attained.



The sulfur transfer pump after retrofitting to EagleBurgmann SulfurAce: no leakage, no contamination



The solution: EagleBurgmann SulfurAce

The pump was successfully retrofitted to an EagleBurgmann SulfurAce. The seal concept – single spring facing away from the product, integrated EagleBurgmann QS300 quench seal – presents a permanently reliable solution.

As a result of EagleBurgmann's experience, the steam quench was also optimized; a seal cover with steam direct-flow ensures additional safety.

The result: No leakage - greatly increased operating period

In the 40 months of operation since retrofitting to the EagleBurgmann SulfurAce, there have been no further leaks and maintenance has not been required. The new SulfurAce mechanical seal solved the end user's problems to his complete satisfaction.

Operating conditions

Shaft diameter: 52 mm (2.05 ")
Temperature: $t = 140\text{ }^{\circ}\text{C}$ (284 °F)
Pressure: $p = 0\text{ bar}$
Speed: $n = 1,760\text{ min}^{-1}$

Medium

Liquid sulfur
Specific weight: $\gamma = 1.785$
Viscosity: 0.75 mPa·s

Steam quench

Temperature: $t = \text{min. } 120\text{ }^{\circ}\text{C}$ (248 °F)
Flow rate: $v = 0.5\text{ kg/h}$



Do you have seal applications in difficult, solids-laden, crystallizing and hardening media? EagleBurgmann also offers solutions for extreme operating conditions, alternative seal materials and for different steam quench conditions. Why not give us a call?

Recommended applications

- Refining technology
- Chemical industry
- Pharmaceutical industry
- Metal production and processing
- Liquid sulfur
- Artificial fertilizer
- Carbamide
- Tar
- Starch (requires liquid quench)
- Highly viscous media
- For media inclined to harden

EagleBurgmann Japan Co., Ltd.

Shiba Park Bldg. B-14F,
2-4-1, Shibakoen, Minato-ku,
Tokyo, 105-8587

Japan

Phone: +81 (0)36432 0986

Fax: +81 (0)33438 2370

info@jp.eagleburgmann.com

eagleburgmann.jp