Successful retrofit

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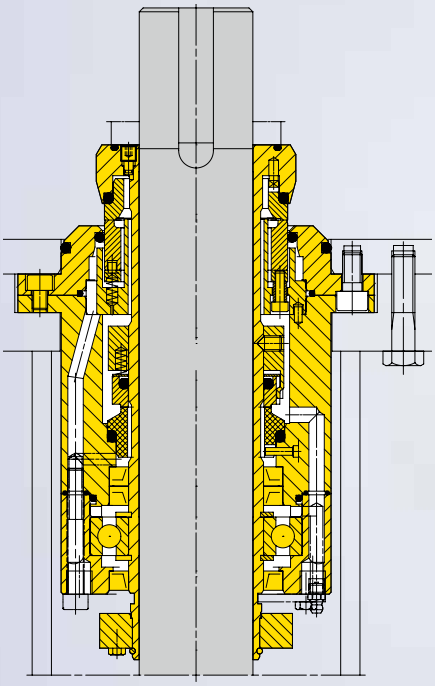
Mechanical seal MR in a heat exchanger



EagleBurgmann HSMR35S1L-D

Finzelberg GmbH & Co. KG in Andernach/Germany produce vegetable extracts for the pharmaceutical industry and extracts for dietary supplements. Several vertical so-called scraped surface heat exchangers are in use in this process.

The process medium runs in counter flow from the bottom to the top through the heat exchanger and along the way it is pasteurized by heating it up to 140 °C. Thereafter the product is cooled down to 80 °C for further processing. Inside of the heat exchanger an agitator with scrapers makes sure that the process medium does not stick at the wall and thus the heat transfer is improved. For the heating of the inner and outer jacket steam, hot water or a thermo-oil is used as standard. Typical applications of such a heat exchanger are cooling and heating operations in the food processing or the pharmaceutical industry, especially for highly viscous and very complex products such as whole fruits or parts of vegetables. The design is capable of CIP and very easy to clean, which means that dead spaces and gaps are avoided if possible. The materials are according to FDA and 3A sanitary standards.

Operating conditions

Media: Medicinal base products
(valerian, St. John's wort, melissa, camomile, etc.)
Operating temperature: 120 ... 140 °C
(cleaning with steam at 130 °C)
Operating pressure: 1 ... 4.5 bara
Speed: ... 120 min^{-1}

Equipment with seal and supply system

Equipment: Vertical scraped surface heat exchanger type with bottom drive, but the seal is at the top
Seals incl. materials: HSMR35S1L-D/70-E1, Q1Q1K/M5GG/SBVGG
Supply system: TS1016/A007 with SPS2000-00 (level switch), SP23-093-00 (thermometer), SP23-092-00 (manometer) and SPU1010/M003-00 (circulation pump)
Barrier medium: Demineralised water or osmosis water (produced by reverse osmosis)
Barrier pressure: 6 bara

Problems with the previous sealing situation and the solution

Originally a single mechanical seal from a competitor was used, which was lubricated by the process medium. Due to deposits the seal face was fast hindered to move up and the seal opened. Therefore the life time of the seal was very short and the maintenance costs accordingly high. For this reason a retrofit to double mechanical seals was done by EagleBurgmann.

The following properties of the process medium were taken into consideration for seal selection:
- The process medium contains abrasive solids and has very poor lubricating properties.
- The solid particles may deposit in the seal, preferably under the dynamically loaded O-ring, thus blocking the movability of O-ring and spring.
- The product tends to stick and conglutinate.

In consequence of the above mentioned properties of the medium an MR-seal was selected at the product side. This seal type is very robust, also in combination with media containing solids. Further technical features are the rotating seat and the spring protection sleeves which have successfully proven in practice to protect the springs from deposits of the product.

The technical features of the HSMR35S1L-D at a glance:
- Cartridge unit with integrated bearing
- High service life-times due to stationary seal design and HS-grooves at product side
- Materials according to FDA
- Suitable for sterile applications: Surfaces in contact with the product are polished and O-ring grooves are designed as open as possible to ensure a good cleanability

A new flange to fix the seal was engineered and delivered by EagleBurgmann as well.

The described sealing concept has been successfully in operation for 6 years and has been running to the full satisfaction of the customer. By considering the properties of the media the service lifetimes could be drastically increased. This has led to significantly increased system availability and substantially decreased maintenance costs. As a consequence, the more extensive seal design has amortized shortly.

EagleBurgmann Germany GmbH & Co KG
Aeussere Sauerlacher Straße 6-10
82515 Wolfratshausen / Germany

Phone +49 8171 23 0
Fax +49 8171 23 1214

info@eagleburgmann.com
www.eagleburgmann.com

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