

HSHLV-D agitator seal

Information **EN06071**



has successfully converted top-driven stirred tank reactors with the seal type HSHLV-D in a production facility for aqueous polymer dispersions in Germany. They are running to the user's complete satisfaction. Pressures up to 100bar are the great challenge for the sealing technology in such a production plant. Upstream from the reactors storage tanks are installed, which are likewise equipped with seals (type M481).

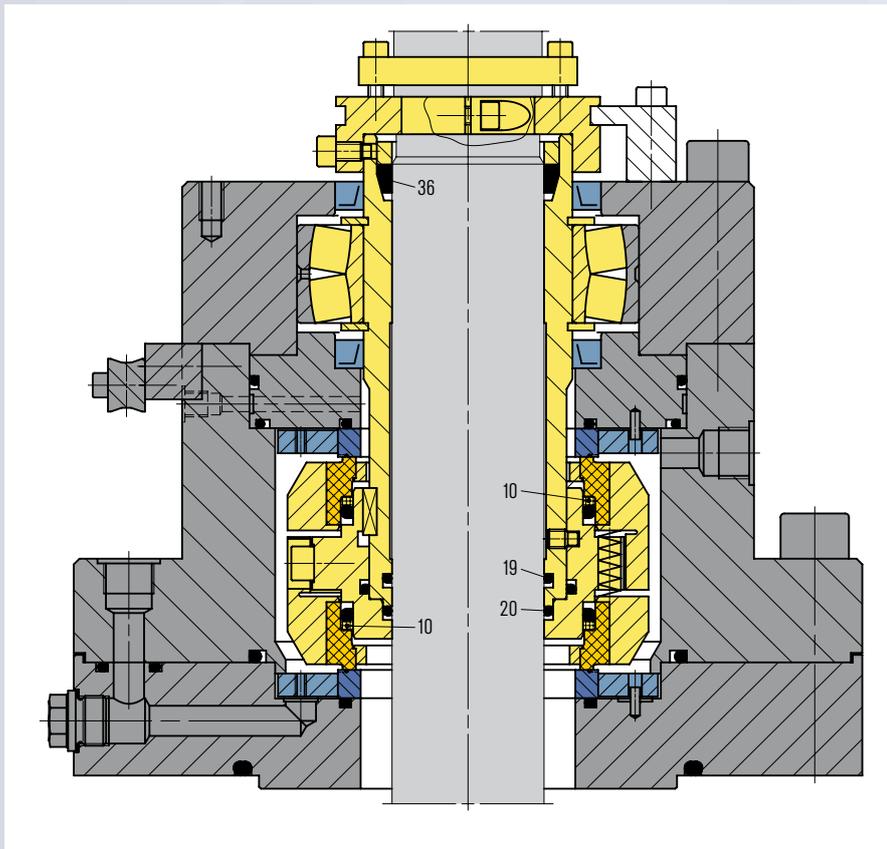
The process

The stirred tank reactors are run discontinuously in batch operation. This means that the tank is filled at the beginning of the process and then set to the required operating conditions. Diverse monomers and water are used as raw materials. Through polymerization they react to form polymers which at the end of the reaction exist in aqueous solution as a dispersion.

The agitator is not allowed to stop while the reaction is in progress as this could result in a runaway reaction, i.e. overheating and even uncontrolled release of chemicals.

The previous sealing situation and the solution from

The first stirred tank reactors, in use since the early 80's, were originally fitted with other seal types from a competitor. Already in the 80's these were converted to seals, which lead to a significant increase of the lifetime. By further optimization regarding construction details and material selection the lifetime could be further increased. To keep the level of the best available technology a new seal type, the HSHLV-D was tested. With it an average MTBF of 2 to 3 years was achieved. One seal set a new lifetime record of more than 4 years.



HSHLV-D/160-E5

Operating conditions

Media: Diverse monomers, water, polymer dispersion
 Temperature: max. 100 °C
 Pressure: Vacuum ... 100 barg
 Speed: 25 ... 100 min⁻¹

Seal and supply system

Seal: HSHLV-D/160-E5
 Materials: AQ22M1/V5/M5GE (1.4571) – AQ22V/V5GE (1.4122)
 Seal type: Agitator with top drive
 Supply system: Closed system (loop) with WED 3160/A001-A1 heat exchanger and SPN 150/L003-D1 refill unit; each seal can be operated separately and independently of the others
 Barrier medium: Synthetic oil according to ISO VG 10
 Barrier pressure: 120 barg
 Operation mode: A barrier medium circulating rate of > 1 m³/h is required to ensure that the seal is fully functional. This value was determined in practical trials. At lower circulating rates, overheating causes damage to the sliding faces.

Technical features

- A self-closing double seal of cartridge design with integrated bearing.
- A concave support ring (Item 10) is recommended at pressures beyond 50 bar and is essential at pressures beyond 80 bar. Deformation of the O-ring and subsequent damage to the PTFE coverings are thus prevented.
- In the extremely rare case that the O-rings in the shaft sleeve (Item 19 and 20) fail, an emergency seal takes over the sealing of the reactor. The reaction cycle can thus be ended in normal manner without loss of a product batch.
- An integrated cooling flange prevents the seal from overheating, thus extending its service life. The cooling flange is considered to be a part of the tank; hence to comply with the regulations for pressure vessels it is TÜV-tested separately.
- Any leakage can be selectively removed by way of a drainage facility.
- Assembly rolls make it easier to install and dismantle the mechanical seal.