

Safety at high temperatures and media with solids

High demands are placed on seals in a process pump for refineries. When media with hydrocarbons are pumped, the seal can be exposed to very high temperatures. Solids and poor lubrication properties of the medium can affect the sealing surfaces and wear them out. Robust solutions with reliable security features are in demand.

Changed process conditions in a refinery meant that the tandem seal of a process pump resulted in an MTBF value (MTBF: Mean Time Between Failure) of only four weeks and resulting in considerable leakage. The reason consisted in a combination of several causes: Poor lubricating properties and the high temperature of the medium, hard solids in the medium and the deformation of the shrink fitted seal faces and stationary seats during operation generated overheating between the sealing rings.

Coke was deposited on the atmosphere side. The sealing gap became unstable and the preload of the metal bellow could no longer compensate for axial displacements.

The end user decided to install seals from a different manufacturer and commissioned EagleBurgmann to develop a reliable and durable solution.

Demanding specification sheet

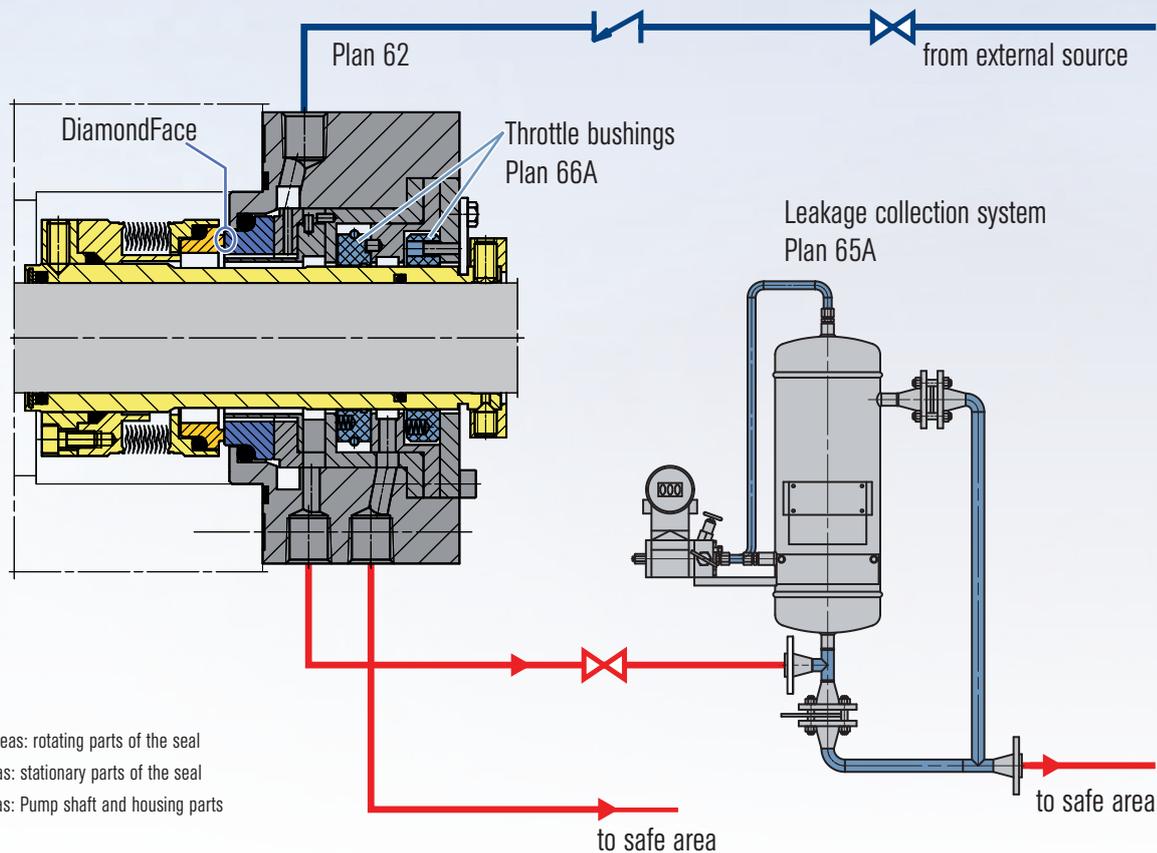
The specification sheet contained many challenges: The consequence of the problematic nature of the media and the demanding operating conditions would have been a double seal with a buffer fluid system in accordance with API Plan 53 or API Plan 52. However, there was no room for such a solution where the pump was installed. Only a single seal with the safety properties of a double seal could be considered. The high safety requirements also

stipulated that there should be no leakage to the atmosphere – even if the seal failed.

EagleBurgmann chose the mechanical seal MFLWT with metal bellows and API Plan 66A to meet all the requirements. The key design element of this seal is the loosely inserted seal face. The seal face demonstrates its positive deformation behavior during operation. It is so flexible that the sealing gap is always parallel. Compared to shrink fitted seal faces, the number of suitable materials is also significantly higher. Silicon carbide was the material of choice for use in the process pump. EagleBurgmann additionally processed the seal faces with DiamondFace technology. This provides the sliding faces with a microcrystalline diamond coating that protects them from wear caused by suspended solids in the medium, poor lubrication of the pumped product and from the consequences of a momentary dry running.



Sealing solutions with Plan 66A significantly reduce the risk of leakage to the environment and plant personnel.



Cross section of the mechanical seal MFLWTI with Plan 66A, supply according to API Plan 62 (steam quench from external source), leakage collection and alarm system LSA6 according to Plan 65A. The sliding faces of the seal are coated with DiamondFace.

DiamondFace has already proven itself in numerous applications, for example in the oil and gas industry, in refinery technology and power plant technology. Minimal friction, low wear and high chemical resistance – seals with a DiamondFace coating achieve particularly long service life even in demanding applications. Users can rely on long MTBF and MTBR (MTBR: Mean time Between Repair) intervals.

Maximum safety: Plan 66A in seal housing

The operation of the seal and the monitoring of the leakage on the atmosphere side according to API Plans 65 and 66A offer maximum operational reliability.

In accordance with the principle of Plan 66A, EagleBurgmann integrated two throttles in the seal housing on the atmosphere side. Should the seal fail unexpectedly, the floating internal throttle will withstand the entire product pressure. The leakage of the mechanical seal is directed

specifically to a leakage monitoring unit according to Plan 65. A differential pressure transmitter detects the level of the collecting tank and triggers a signal when the seal fails. In case of a fault, the small quantity of leakage of the first throttle will be conducted to the second throttle and then drained to a safe area.

A steam quench on the product side supplies the seal according to Plan 62. This prevents the above-mentioned deposits of coke. Leakages are also discharged into the collection system and then from there to a safe area according to Plan 65.

The EagleBurgmann solution in practice

The refinery pump was equipped with the EagleBurgmann solution and put into operation in October 2015. The seal has been operating reliably in all operating conditions with constant performance without any complaints or interruptions ever since. The plant availability was significantly

increased to the satisfaction of the end user and Plan 66A proved to be an enormous increase in safety for the personnel and the environment.

Operating conditions

Suction pressure: 3 bar (44 PSI)
 Outlet pressure: 8.2 bar (119 PSI)
 Temperature: 281 °C (538 °F)
 Speed of rotation: 1,470 min⁻¹
 Medium: Hydrocarbons with hard solids content

The benefits at a glance

- Single instead of double seal
- Safety through Plan 66A
- Significantly higher reliability
- Optimized emergency running properties
- Sealing of media with poor lubricating properties