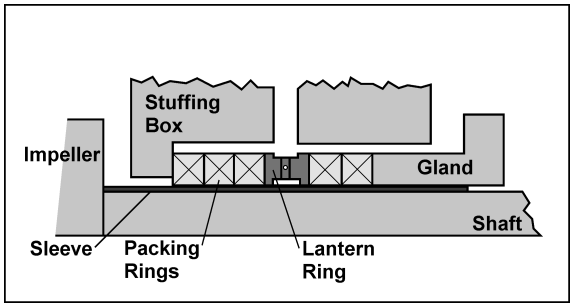
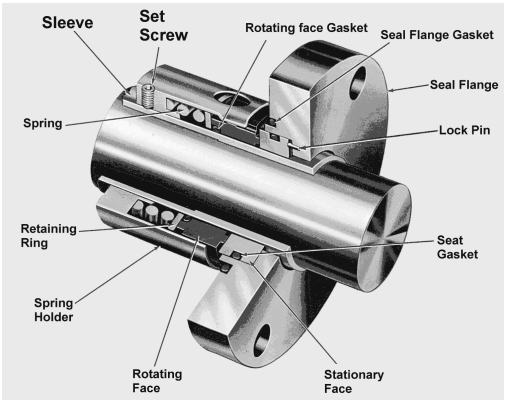
YEOMANS CHICAGO CORPORATION

Application of Mechanical Seals with Shaft Sleeves on Dry-Pit Wastewater Pumps

In wastewater pumps the traditional sealing method has been the packed stuffing box. This arrangement consists of multiple rings of braided or woven rope material positioned tightly around the pump shaft, with adjustable compression provided by a packing gland. In this sealing arrangement the shaft is usually protected from wear and corrosion by a hardened stainless steel shaft sleeve. Typically, 400 Series stainless steel hardened to 425 ~ 475 Brinnell is recommended for this application. Since the outer surface of the sleeve is a primary dynamic sealing face, hardening of the sleeve is important as it significantly prolongs the sleeve service life.



A common alternative to the packed stuffing box is the mechanical seal. In this case, the use of a shaft sleeve is important to protect the shaft from corrosion. The sleeve does not come into dynamic contact with any other part. Therefore, hardness of the sleeve material in the natural state is usually sufficient to provide the required service life.



It is not uncommon, however, that a hardened sleeve is specified for a pump along with the mechanical seal. This combination will work successfully if the seal is of elastomer bellows type. The issue is more complex when a specified seal relies on mechanical means such as setscrews for mounting to the shaft. Among those seal types are some cartridge and split seals (a split seal becomes a cartridge when assembled). Manufacturers standard material specifications should be consulted to assure the buyer of the appropriate shaft sleeve material hardness.

A cartridge seal is a self-contained mechanical seal that includes stationary and rotating seal faces as well as all necessary secondary seals. Its proper operation depends upon a secure mount of the rotating seal assembly to the shaft. In a majority of cartridge seal designs this function is achieved by the use of setscrews that hold a retaining collar to the shaft. Standard setscrews furnished by the seal manufacturers are usually made of unhardened stainless steel.

There is a potential incompatibility issue with this type of mount. *When a cartridge seal is installed over a hardened shaft sleeve, the setscrews may not provide enough friction to hold the seal to the shaft, as they may not adequately "bite" into the hardened shaft sleeve. This may allow the rotary seal assembly to slip or spin relative to the shaft, causing eventual seal failure.*

In general, the use of a hardened shaft sleeve should be avoided when a cartridge seal is specified. Alternatives may include a non-hardened shaft sleeve or a modified pump shaft that would accept a seal without a shaft sleeve (many cartridge seals are equipped with a thin sleeve for corrosion protection). When a customer has specifically requested a hardened shaft sleeve with a cartridge seal, this information must be relayed to potential seal vendors so they can recommend and apply appropriate setscrews or an alternative mounting method. At the same time, when possible, the customer should be notified of potential problems that may occur with this type of seal application.