

# General information about mechanical Shaft Seals

## 1. Operating Principles & Fundamentals

Since the development of the basic mechanical seal introduction of new and innovative seal technologies has enabled mechanical seal installation on virtually any fluid handling application. To sort through which seal design will provide optimum performance a thorough understanding of mechanical seal principles and fundamentals is mandatory.



- a. Pusher & Non-Pusher Seal Designs: Pusher seals, while generally less expensive than non-pusher seal designs, will have a tendency to "hang-up" on the pump shaft when handling fluids which coke or crystallize as the secondary sealing member which must accommodate for travel as the seal faces wear is unable.
- b. Seal Driving & Spring Compression: The rotary portion of a mechanical seal is either positive or friction drive. Incorporating an improper driving arrangement on a given application will result in premature and catastrophic failure.
- c. Balanced & Unbalanced Seals: This difference in seal design will make the difference in seal performance. An unbalanced mechanical seal seeing high pressures has the fluid film between the seal faces reduced due to high hydraulic face loading resulting in overheating, rapid face wear, and premature seal failure.
- d. Inside & Outside Seal Mounting: While inside mechanical seals are a preferred method outside seals can be used when fitting a pump with a shallow stuffing box which cannot dimensionally accommodate an inside seal.

## 2. Mechanical Seal Configurations

- a. Double Mechanical Seals: When the use of an appropriate single mechanical seal becomes too expensive and when the pumpage dictates the use of an artificial sealing environment double seals are used as an economical and performance alternative.
- b. Seals In Tandem: Carcinogens and other hazardous materials require "zero leakage". Tandem seals will permit a fail safe seal operating configuration enabling the implementation of alarms, shut-downs and other warning and safety components.
- c. Cartridge Seal Designs: The critical nature of many pump installations prohibits and limits downtime for seal replacement. Many seals require complex settings during installation and the time required for proper installation is simply not available. Cartridge seals accommodate these scenarios by providing the complete seal pre-assembled and readied for installation offering repair of failed seals at convenience.

## 3. Fluid Characteristics & Seal Application

- a. Process Fluid Behavior: Prior to selecting a mechanical seal it is imperative process fluid characteristics be identified. In most cases it is the fluid which will determine materials of construction, seal design, auxiliary components require, etc., to ensure expected seal performance.
- b. Seal Pressure - Velocity Limitations: Mechanical seal designs and seal faces require cooling and lubrication to function properly. The hydraulic pressure acting on the seal faces and the rotating speed of the rotary seal will generate heat. It is this seal generated heat that limits various seal designs and materials.