

**Mechanical Seals Don't Fail.  
They Get Murdered.**



**SANSOM**  
***EQUIPMENT LIMITED***

**Robert Evans P.Eng. - Principal**

# What is a Mechanical Seal?

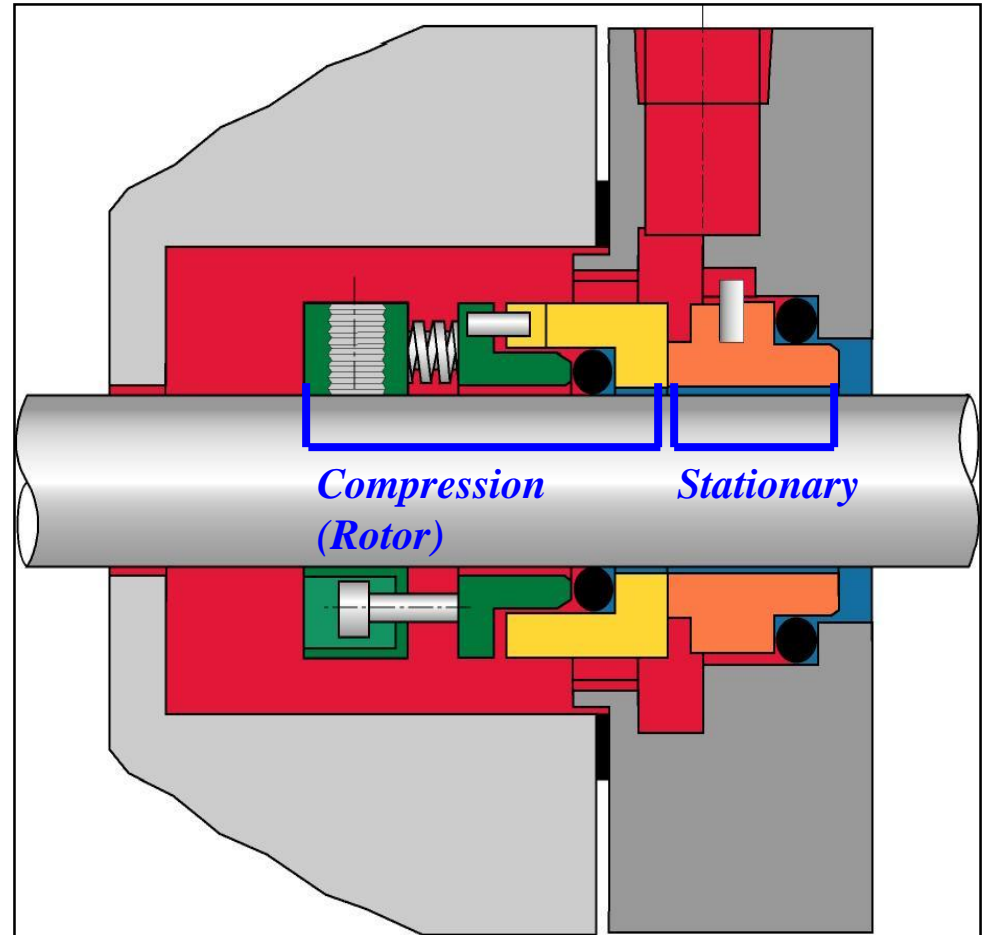
## **Mechanical Seals:**

- **Provide effective sealing for rotating equipment**
- **Robust, high precision device**
- **Designed specific to an application**
- **Require active involvement of vendor & end user to achieve reliability**

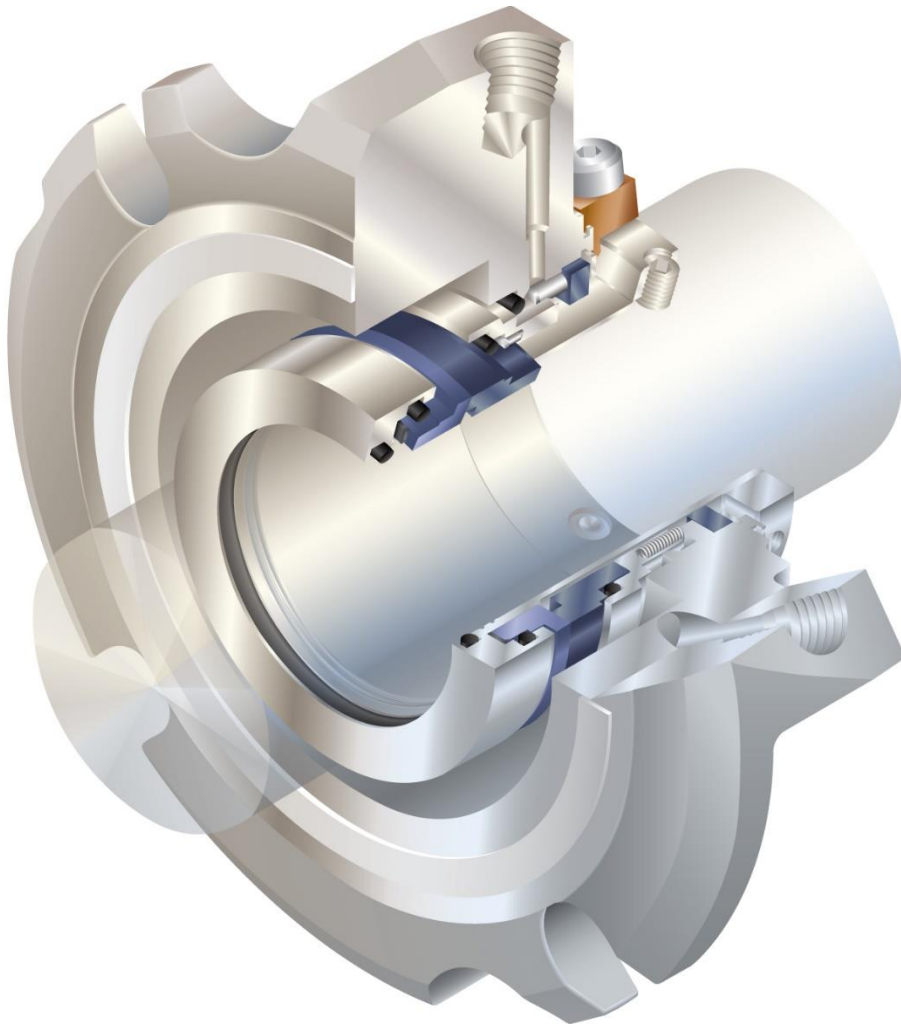
**Alternate sealing options: Packing, Bushings. O-Rings, Lipseals, Labrinth Seals**

# How a Seal works?

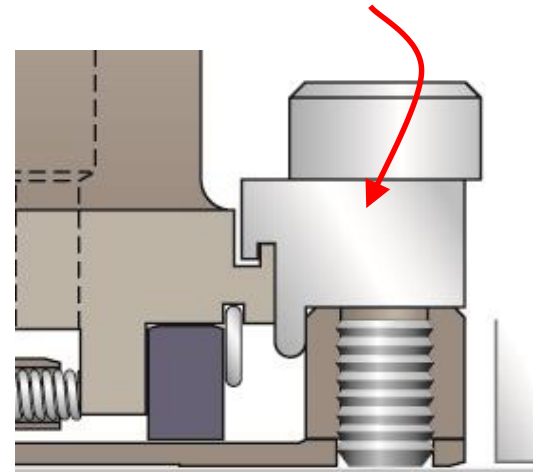
- The seal is comprised of a rotating (yellow) and stationary (orange) face. The faces are flat within 11 millions of an inch (0.000 001 1”).
- Process fluid provides lubrication for the seal faces.
- Closing forces (spring pressure + process pressure) keep the seal faces together.
- Small amount of opening force allows process liquid to migrate between the seal faces. This liquid is critical to seal performance. It provides cooling and lubrication.



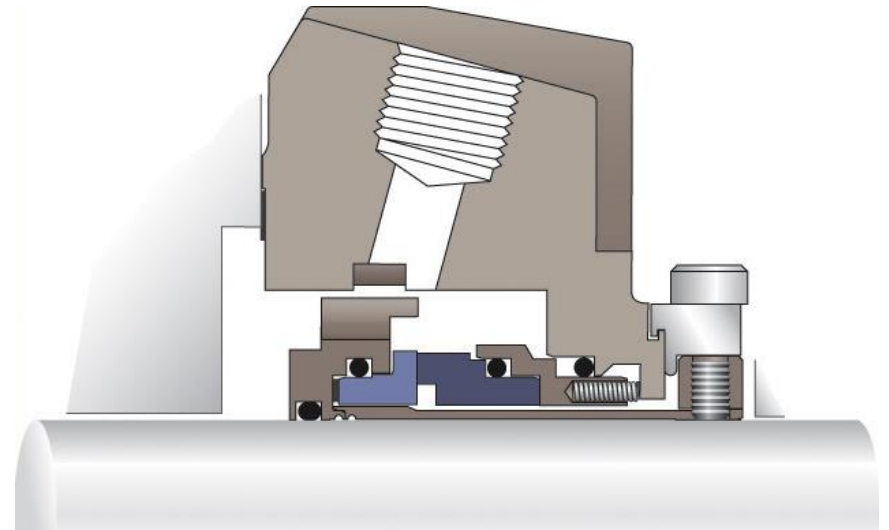
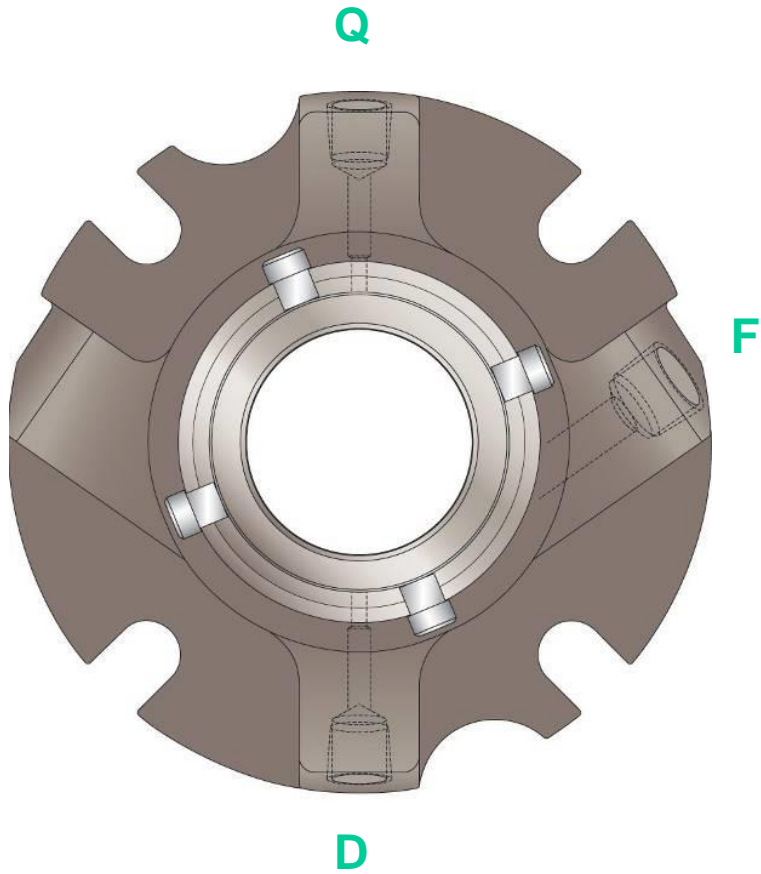
**Don't forget to remove the setting device!**



**Robust setting devices**



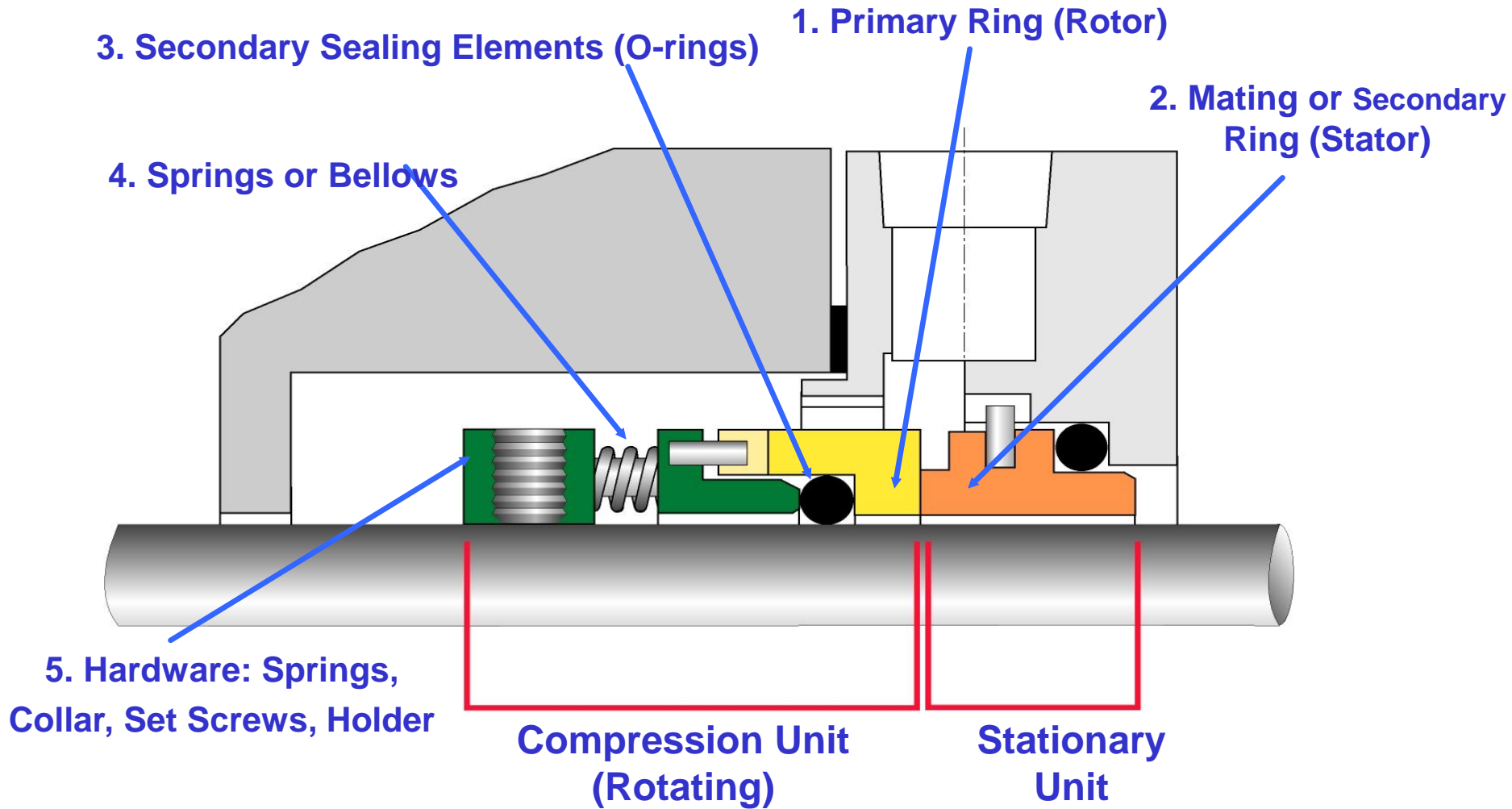
# Don't forget to Flush!



## ***Packed Gland vs Mechanical Seal***

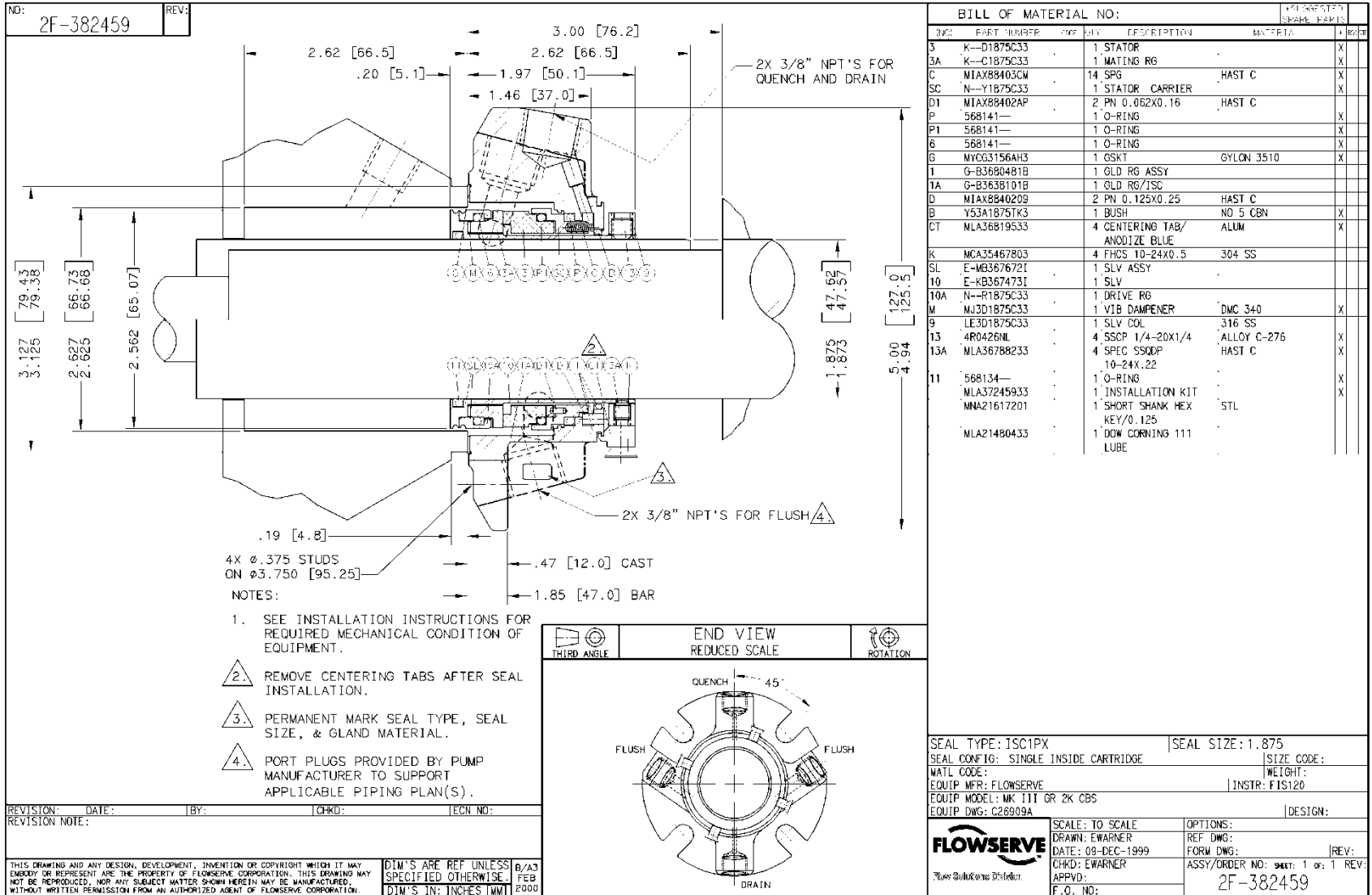
- x Requires frequent attention.**
- x Must leak to work.**
- x Leakage cause:**
- x Pollution, Unsafe Conditions, Product Loss/Dilution.**
- x High energy consumption.**
- x Shaft/Sleeve wear.**
- x Impossible to completely seal hazardous products.**
- ✓ Self adjusting, no on-going attention required.**
- ✓ Minimum leakage.**
- ✓ Leakage eliminated.**
- ✓ Dramatically reduced.**
- ✓ Eliminated.**
- ✓ Eliminated.**
- ✓ Double seal arrangements available.**

# All Mechanical Seals have five basic components



# Seal Chamber Design - Cylindrical Bore Small (CBS)

2F-382459 1 (BOTH) REV: - KAL ENG MKERELIUK FEB-05-2007 14:39:59

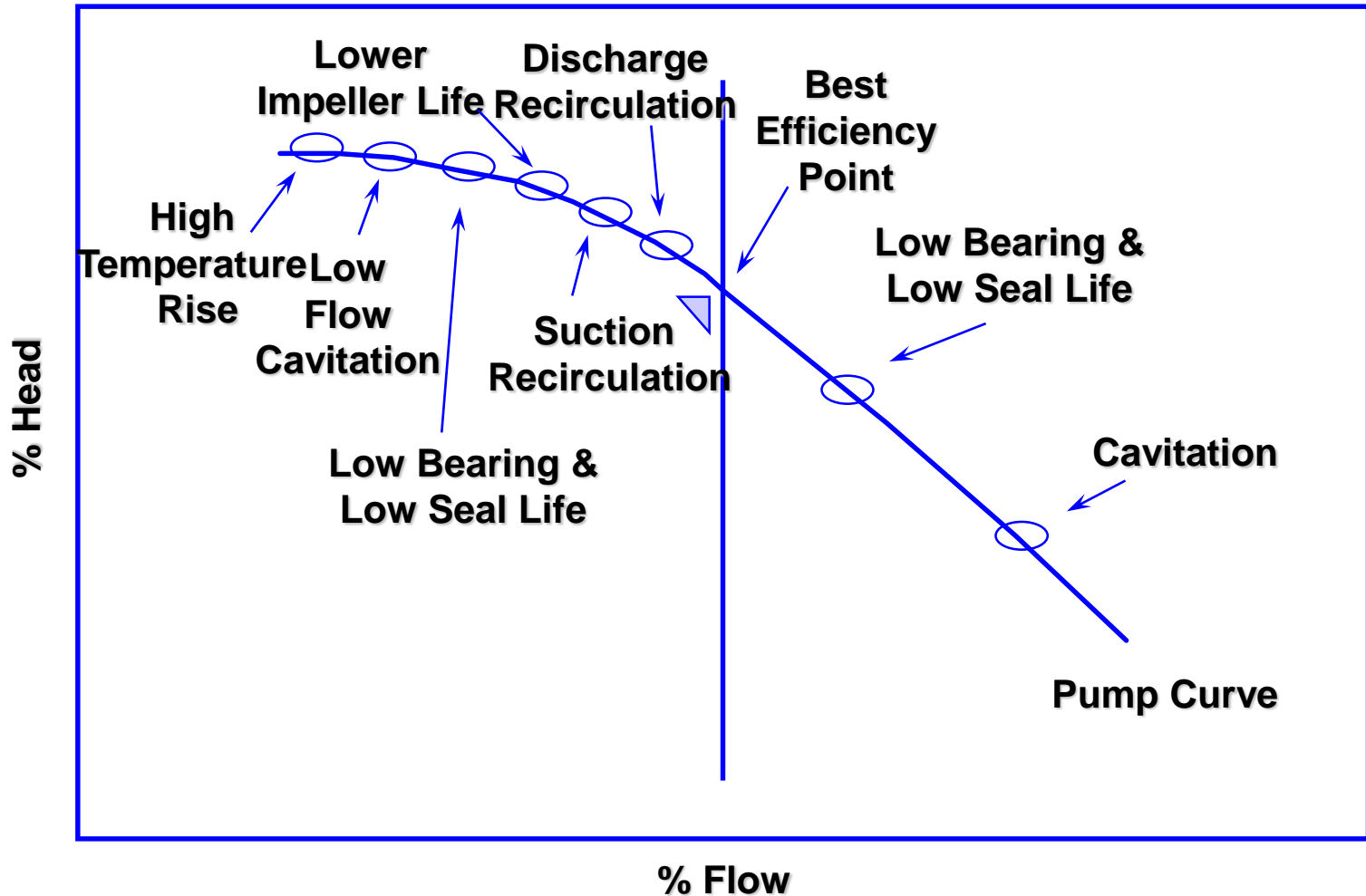




# Successful Sealing

- **Understand the application.**
- **Understand the process fluid.**
- **Know your pressures. Suction, discharge, and seal chamber.**
- **Proper environmental controls. Flush plans.**
  - **Keep the seal cool or warm**
  - **Control seal chamber pressure**
  - **Provide or assist lubrication**

# Reliability Best Practices



# Save a Pump Seal

- **Operate pump -10% to +5% of B.E.P.**
- **Use 8-10 L/D in suction line**
- **Operate pump with minimum 25 psi over vapor pressure**
- **Eliminate pipe strain**
- **Properly align shaft**
- **Ensure critical equipment surfaces for alignment meet squareness and concentricity specifications**

# Conclusions

- **Mechanical seals offer effective sealing for many forms of rotating equipment, including centrifugal pumps, compressors & mixers.**
- **Mechanical seals are a major factor in rotating equipment reliability.**
- **Many mechanical seal variations.**
- **Flush plans are often required to provide an acceptable operating environment for a mechanical seal.**
- **Mechanical seal reliability is affected by design and operating environment issues**

# Mechanical Seal – Clean Room

