

Shaft Seal Handbook



Using the steps listed below, a simple process for determining the lead direction and angle can be followed.

PROCEDURE TO DETECT SHAFT LEAD	
STEP	DESCRIPTION
1	Mount shaft in holding chuck
2	Eliminate any wobbling or run-out, level shaft
3	Loop a thin thread over the shaft
4	Attach a 1 oz (30 g) weight to thread with 2/3 contact
5	Set shaft rotation to 60 RPM
6	Observe thread movement in axial direction
7	Record results in both directions of rotation

After gathering data on the rate of axial movement of the thread, the lead angle can be calculated using the formula below:

$$\text{Lead Angle} = \text{ArcTan} \frac{\text{Axial Movement of String}}{(\text{Shaft Circumference})(\text{No. of Revolutions})}$$

The lead angle of the shaft should be $0^\circ \pm 0.05$. Example: If a string advances 0.4" in 1 minute on a 3.0" shaft rotating at 80 RPM.

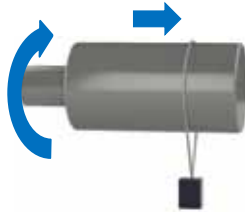
$$\text{Lead Angle} = \text{ArcTan} \frac{0.4}{(3 \pi)(80)}$$

For more detail information about finish type and lead, check Section 10 of SAE Fluid Sealing Handbook Radial Lip Seals (SAE J946).

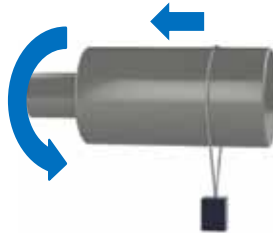
INTERPRETATION OF THREAD MOVEMENT

RIGHT HAND LEAD OR CW

CW Rotation: Moves from chucked end to free end

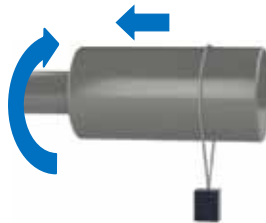


CCW Rotation: Moves from free end to chucked end

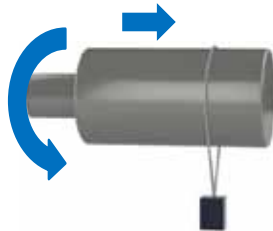


LEFT HAND LEAD OR CCW

CW Rotation: Moves from free end to chucked end



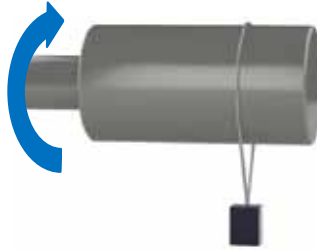
CCW Rotation: Moves from chucked end to free end



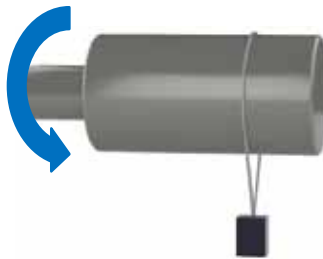
SEAL DESIGN

NO LEAD

CW Rotation: Stationary



CCW Rotation: Stationary



TAPERED SHAFT

CW Rotation: Moves in same direction no matter shaft rotation. Remounting the shaft reverses direction

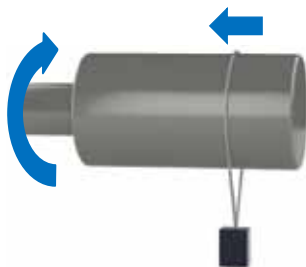


CCW Rotation: Moves in same direction no matter shaft rotation. Remounting the shaft reverses direction.

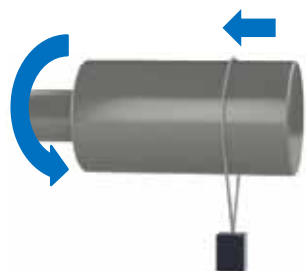


CUPPED SHAFT

CW Rotation: Moves toward center

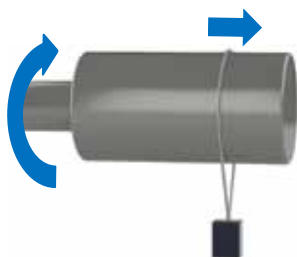


CCW Rotation: Moves toward center

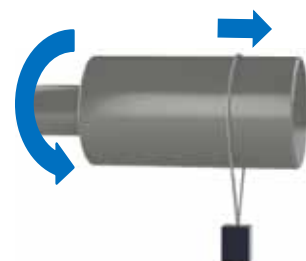


CROWNED SHAFT

CW Rotation: Moves away from center



CCW Rotation: Moves away from center



SEAL DESIGN