ISOMAG
TURBINE SEALS

LUBRICATION AND BEARING PROTECTION FOR STEAM TURBINES
IS LEAKING STEAM GETTING INTO YOUR TURBINE OIL?
HOW FREQUENTLY DO YOU NEED TO DRAIN WATER FROM YOUR TURBINE OIL?
DO CARBON BOXES EVER LEAK STEAM?
LABYRINTH SEALS
RESTRICT STEAM
FROM YOUR OIL
LABYRINTH SEALS
DO NOT SEAL STEAM FROM YOUR OIL
WOULD TURBINE BEARINGS LAST LONGER WITHOUT STEAM & WATER CONTAMINATION?
$\text{H}_2\text{O} + \text{OIL} = \text{SLUDGE}$
CONTAMINATING TURBINE OIL
THE PROBLEM

High pressure steam is trying to escape past the carbon rings in the carbon boxes.

Carbon rings wear and progressively leak more.

Leaks from the carbon box are adjacent to and directed at the labyrinths.

Labyrinth bearing seals only slow down the leaking steam, they will not stop it.
TYPICAL I.D. ONE PIECE OEM LABYRINTH

LEAK PATH

ONE PIECE LABY
CARBON BOX

STEAM

BEARING
TYPICAL O.D. ONE PIECE
OEM LABYRINTH

LEAK PATH

ONE PIECE LABY
CARBON BOX

BEARING

STEAM
TYPICAL TWO PIECE REPLACEMENT LABYRINTH
FLAT FACE
MECHANICAL SEAL

ISOMAG MAGNUM-S
CARBON BOX

NO LEAK PATH

BEARING

STEAM

STEAM
SEALING CHOICES

ONE PIECE
LABYRINTH
OPEN LEAK PATH

TWO PIECE
LABYRINTH
OPEN LEAK PATH

MECHANICAL SEAL
NO LEAK PATH
TOTALLY SEALED
FLAT FACE MECHANICAL SEALS

PROVEN TECHNOLOGY

PRECISION LAPPED SEALING FACES

HERMETIC SEALING

LOW FRICTION

NO SHAFT FRETTING
ISOMAG

Technology leader in precision flat face sealing and protection of industrial bearing and lubrication systems
ISOMAG

HOW TO SELECT TURBINE SEALS
TYPICAL HORIZONTAL SPLIT CASE TURBINE
NEEDS 3 SEALS

BEARING SEALS

OIL

CARBON BOXES

BEARING SEAL

OIL

HIGH PRESSURE STEAM

NEEDS 3 SEALS
1. Drive end “OUTBOARD”
2. Drive end “INBOARD”
3. Governor end “INBOARD”
Different turbine housings

3 most common configurations

MALE FIT  FEMALE FIT  STRAIGHT FIT
MAGNUM–S Cartridge Seal

Built to fit “MALE” & “FEMALE” turbine housings and standard cross section straight “STRAIGHT” housings.

RSA Component Seal

Compact cross section for narrow cross section “STRAIGHT” housings.
INSIDE THE MAGNUM-S CARTRIDGE SEAL

- Hardened 17-4PH Rotary Face & Magnetic Target
- Lapped Rotary Face
- Lapped Stationary Face
- Rare Earth Cobalt Magnets
- Composite Stationary Face
- Rotor Built to Fit Turbine Shaft
- Adapter Built to Fit Turbine Housing
MALE HOUSING

SEALS FIT HERE
MAGNUM - S FEMALE FIT

DRIVE END

MAGNUM-S
INSIDE THE RSA

HARDENED 17-4PH STATIONARY FACE & MAGNETIC TARGET

RARE EARTH COBALT MAGNETS

LAPPED STATIONARY FACE

LAPPED ROTARY FACE

COMPOSITE ROTARY FACE

STATIONARY BUILT TO FIT HOUSING BORE

ROTOR BUILT TO FIT SHAFT DIAMETER

TYPICAL ELIOTT TURBINE SEAL SHOWN
RSA INSIDE FIT

ISOMAG RSA SEAL

STEAM

BEARING
RSA INSIDE FIT

RSA STATIONARY

RSA ROTOR
STRAIGHT HOUSING

SEALS FIT HERE
RSA & STEAM DEFLECTOR

STEAM DEFLECTOR

RSA SEAL
STEAM DEFLECTORS

A steam deflector is a metal disc attached to the shaft and located between the carbon box and the seal. It is normally constructed of 416 or 17-4ph low expansion stainless steel. The deflector is manufactured to heat shrink to the turbine shaft with an inside diameter .002” to .003” smaller than the shaft diameter.

Use a steam deflector when the steam leaking from the carbon box is in excess of 300 degrees F.
MEASURE IT RIGHT

3 DECIMAL PLACES
.001 INCH
RECORD THE DIMENSIONS

**MALE TURBINE DATA FORM**

- **MAKE**
- **MODEL**

**SEAL POSITION**
- **DRIVE END OUTBOARD** □
- **STEAM DEFLECTOR REQUIRED** □
- **GOV. END INBOARD** □
- **YES** □ **NO** □

**STEAM BOX**

**SHAFT**

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**FEMALE TURBINE DATA FORM**

- **MAKE**
- **MODEL**

**SEAL POSITION**
- **DRIVE END OUTBOARD** □
- **STEAM DEFLECTOR REQUIRED** □
- **GOV. END INBOARD** □
- **YES** □ **NO** □

**STEAM BOX**

**SHAFT**
ISOMAG

HOW TO INSTALL TURBINE SEALS
1. Smooth sharp edges from keyways and steps.
2. Lightly lubricate rotor o-ring.
3. Slide seals into position on shaft.
4. Lift rotating assembly
5. Lower rotating assembly into lower housing … while…
6. Guiding seals into position
7. RSA seal only, gently push rotor up to the stationary (you will feel the magnets pull the rotor and stationary together)

8. Finish turbine assembly

9. You are finished
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- Seals Out Contaminants
- Seals In Lubrication
- Stops thermal cycle aspiration of air and vapor into bearings

Maximum Sealing = Maximum Protection
Turbines do not have to look like this