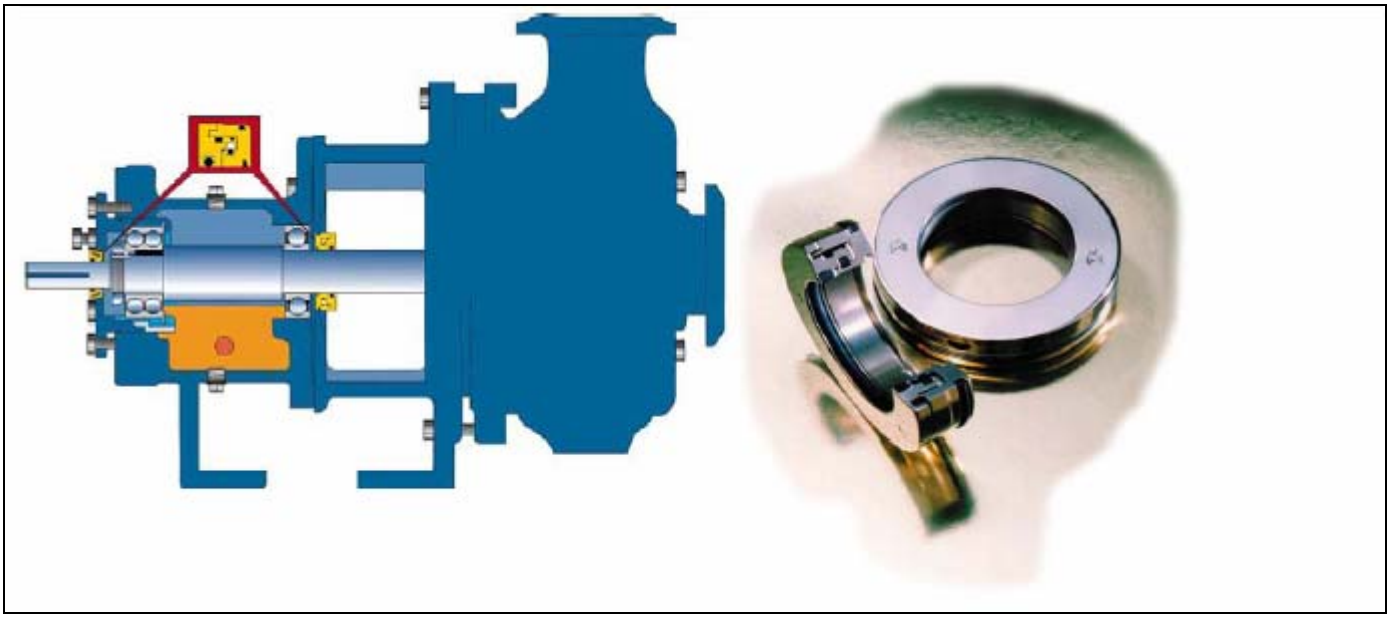
Lubrication

Lubrication and Seals



If your new Process Pump comes from the factory equipped with Inpro Bearing Isolators, it probably carries a 3-year power frame performance guarantee.

Impro Bearing Isolators are made if high quality bronze and are designed to last for at least 100,000 pumping hours. 100,000 hours equals 11.4 years, so the 3-year guarantee is conservative.

The Inpro/Seal “VBX” Bearing Isolator is the only labyrinth seal to afford positive protection against vapor transfer into the lube system; both at rest or under load. Before Impro invented the Bearing Isolator, pump bearings were “protected” with rubber lip seals. Lip seals quit sealing at 3,000 hours, according to the manufacturers. They just don’t belong in your critical industrial equipment.

Today, most ANSI pumps are made with some sort of lip seal replacements. For maximum reliability, make sure they are “VBX” Bearing Isolators.

The impact of Labyrinth Seals is: a lowering of oil temperature by 10 deg. F.; an increase in bearing life by 12.5%; lower contamination of oil; and an increase in the L 10 bearing life between 50-100% depending on the original operating environment.

Lubrication Oilers and Levels

Lubrication Levels 8196 Performance Series

Frame	"A" Dim (in)	Oiler Size (oz)	Bearing Frame Capacity	Constant Oiler Part No.	Bearing Frame Capacity Before
STP	19/32	4	1.0 pt	0072-000099-00	5 oz.
MTP	19/32	4	2.6 pt	0072-000099-00	13 oz.
LTP	19/32	4	3.0 pt	0072-000099-00	13 oz.
XLTP	9/16	8	6.0 pt	0072-000098-000	71 oz.

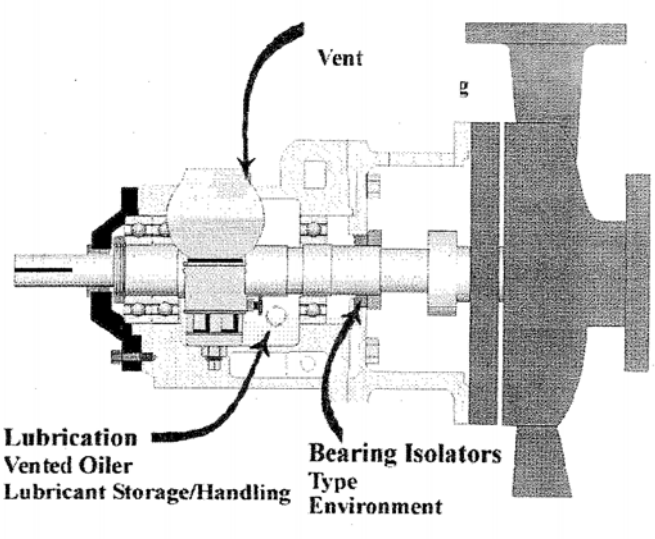
Lubrication Levels 8175 Performance Series

Frame	"A" Dim (in)	Oiler Size (oz)	Bearing Frame Capacity	Constant Oiler Part No.	Bearing Frame Capacity Before
S	9/16	8	5 qts.	0072-00098-00	
M	9/16	8	4 qts.	0072-00098-01	
L	9/16	8	3 qts.	0072-00098-02	

Notes:

1) Standard lubrication levels for new pumps should be 200 hours with mineral oil
2) Standard lubrication levels for run in pumps should be 2000 or three (3) whichever occurs first with mineral oil
3) ISO VG68 High Quality Turbine Oil with a rating of 300SSU at 100 deg. F.
4) Once a year you should change out the oil
5) Raise the breather vent above the air stream so that the operation of the oiler will not be impacted
6) Never add oil through the bearing frame vent or directly into the oil bottle sump, it must go into the oiler bottle and repeat as many times that is necessary to achieve the proper oil level.

Lubrication and Lab Seals



Contamination ingression sources

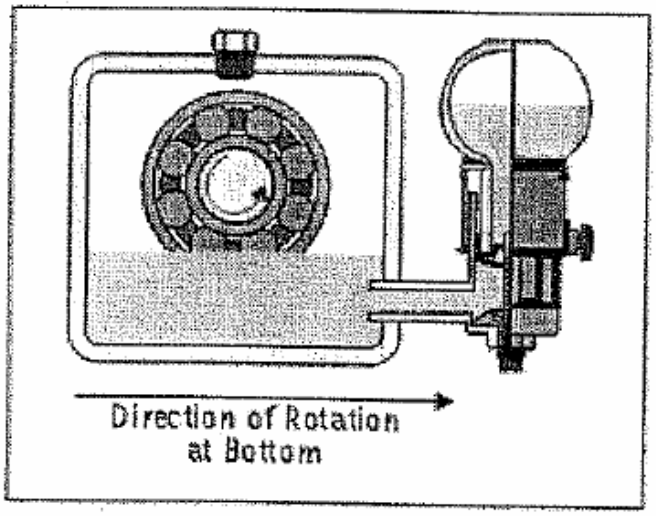


Fig. 1

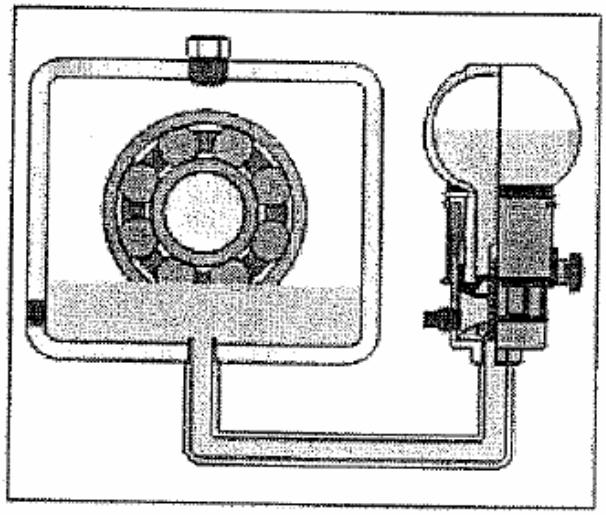


Fig. 2

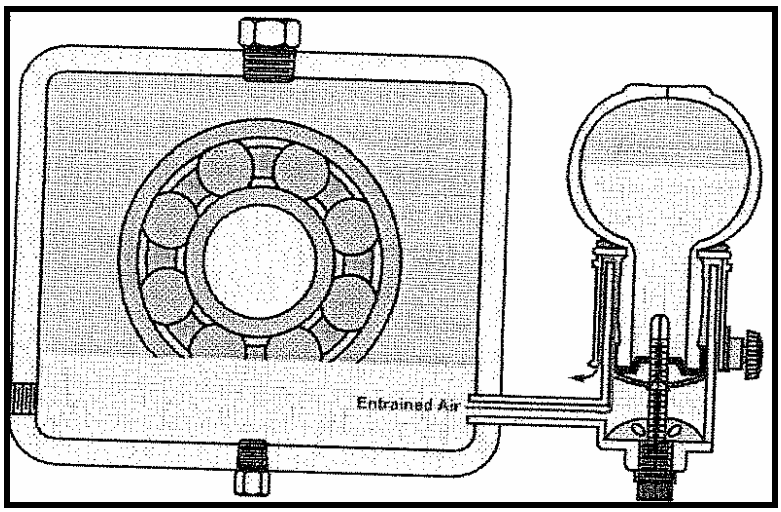


Fig. 3

Once entrained air migrates to a constant level oiler, the effect depends on the design of the constant level oiler. In the case if the traditional vented oiler, the aeration will rise to the top of oil and escape into the air, and be vented back out into its surroundings.

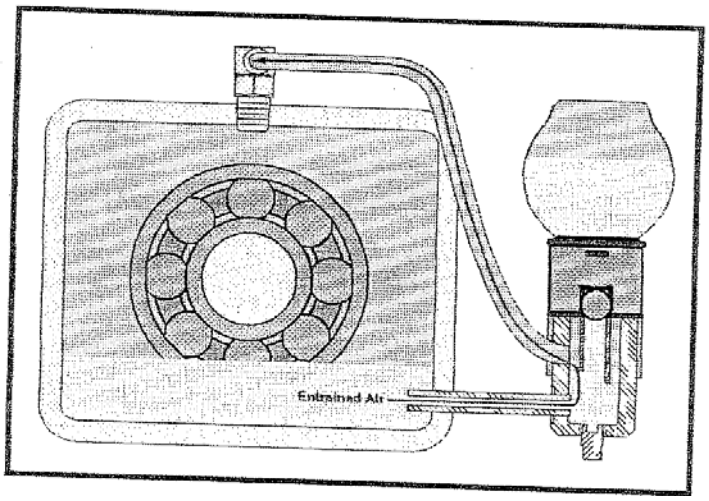


Fig. 4

A closed-system oiler will have a similar effect as the vented oiler; the aeration, upon reaching the top of the constant level oiler will return to the air volume shared by the constant level oiler and oil sump's headspace.

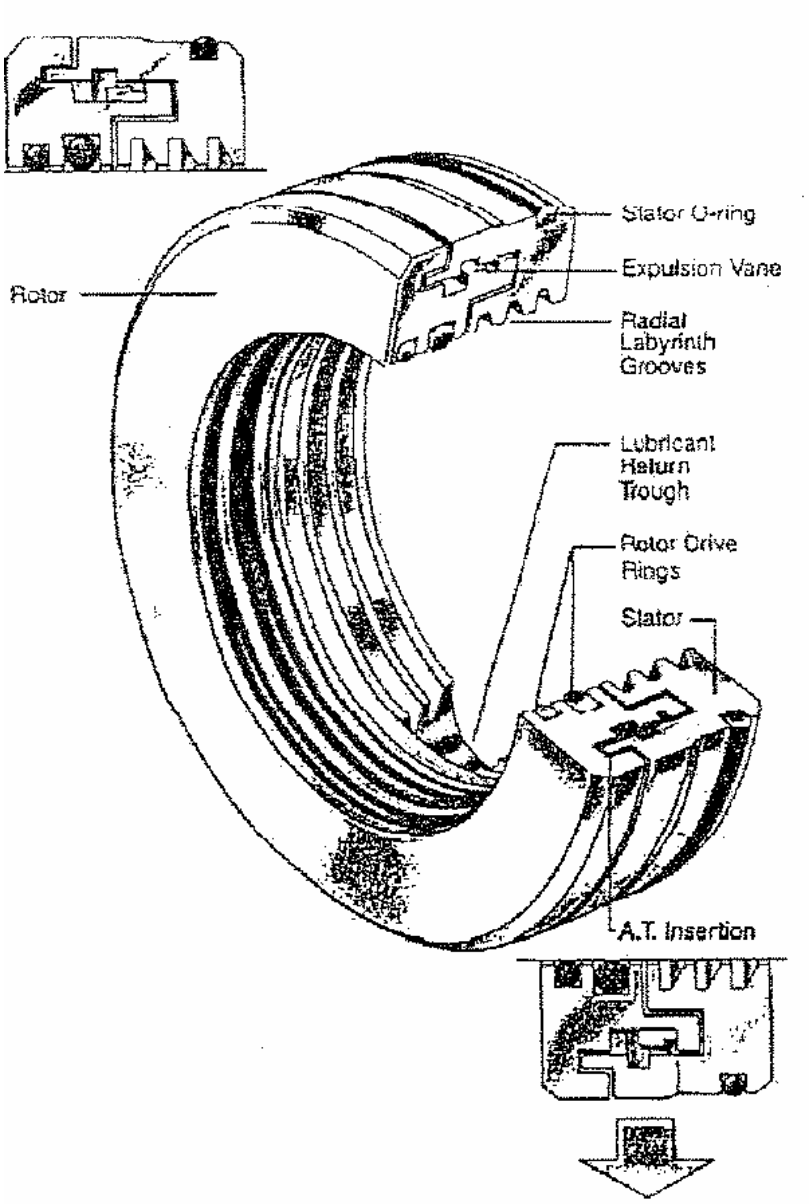


Fig. 5

Rotating labyrinth seal (bearing protector/isolator).
(Source- Impro/Seal Company; Milan, Illinois; www.impro-seal.com)

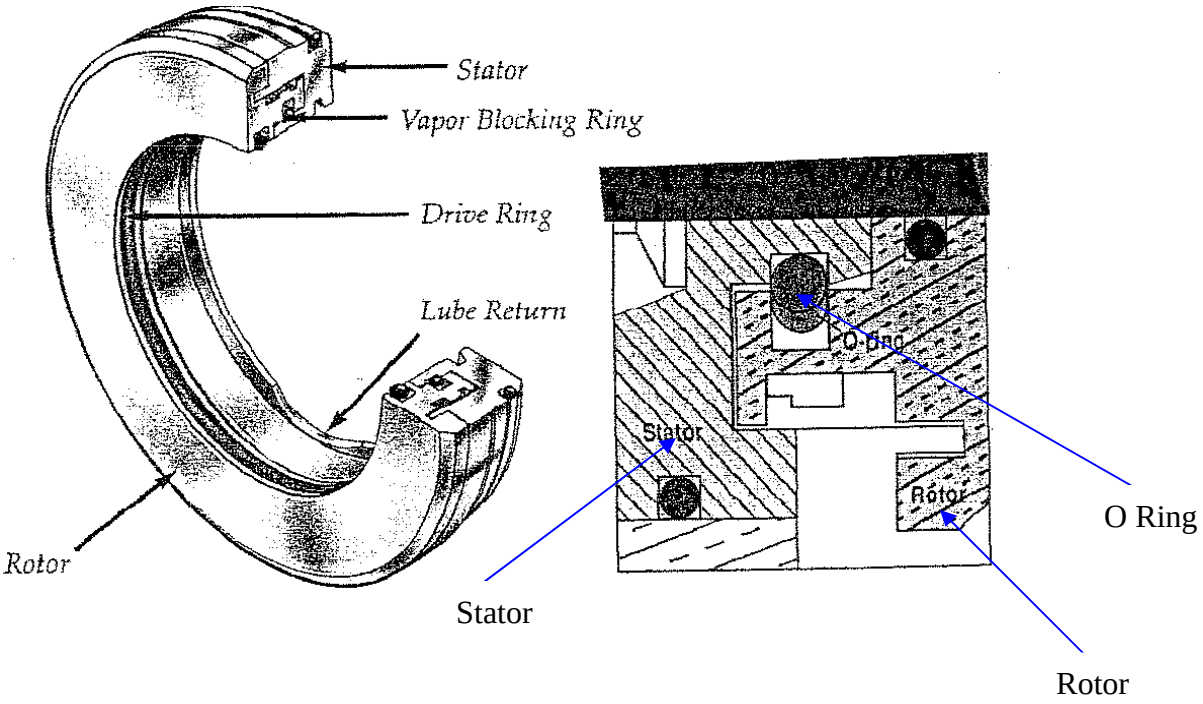


Fig. 6

Bearing protector/isolator with dynamic O-ring.
(Source- Impro/Seal Company; Milan, Illinois; www.impro-seal.com)

Lubrication Oilers and Maintaining Constant Levels

Constant Level Oilers- Operation and Adjustment

Peerless and LaBour Pumps power frames use a flood oil arrangement with a sight glass mounted in the side of the bearing frame for checking the level. Others use the sight glass and oil rings to pick the oil up from the sump and distribute it to the bearings. Still some current models and many of the older models use a bottle-type constant level oiler.

A cutaway of these oilers is shown in Figure 34. The oil stays in the bottle as long as the oil level in the bearing housing is level with the mouth of the bottle. When the oil level drops, air enters the bottle allowing oil to flow out until the oil level in the bearing housing is again up to the mouth of the bottle. The oil level in the bearing housing therefore stays constant.

The oiler bottle rests on a leveling bar that can be screwed up or down and locked in place. Raising the leveling bar raises the oiler bottle mouth and therefore the oil level in the bearing housing. The oil setting must be checked in the field. To check setting remove oiler bottle-dust cap assembly, and lift leveling bar assembly from oiler body (Figure 35). Setting should be the same as that shown in the pump instruction book. The oiler is usually set so that the oil either:

1. Covers half of the lowest ball in a flood oil lubricated ball bearing, or
2. Is ¼" above the bottom of the oil ring in a ring oiled bearing.

The level must be set carefully. Too much oil is almost as bad as no oil at all.

Be sure the oiler is clean when it is installed in the pump. Piping from the oiler to the pump must be level. Of the oiler sags, the oil levels in the housing will drop which could possibly ruin the bearing. Fill the oiler bottle with the proper oil, and place in the oiler body. The bearing housing is filled when the bubbles of air entering the oiler stop and the level in the bottle remains constant. Never pour oil directly into the oiler body since you could easily overfill it.

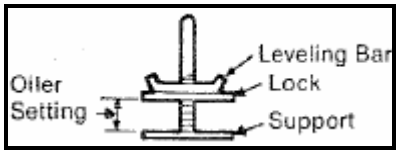


Figure 35

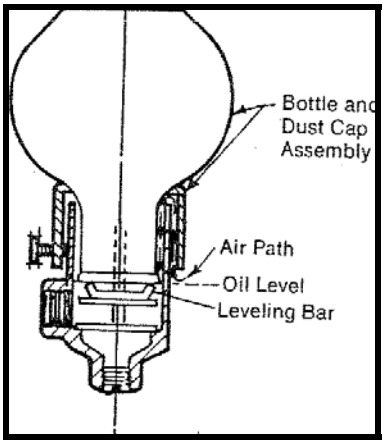
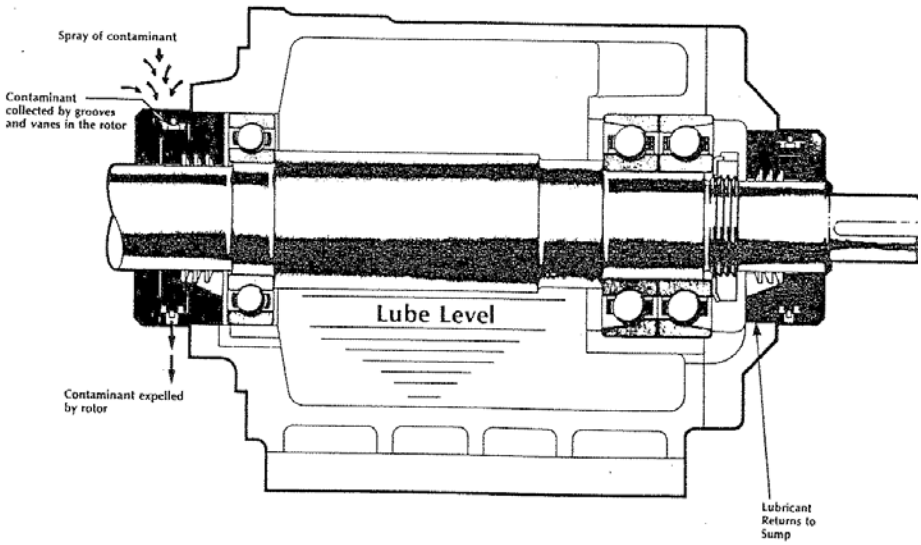
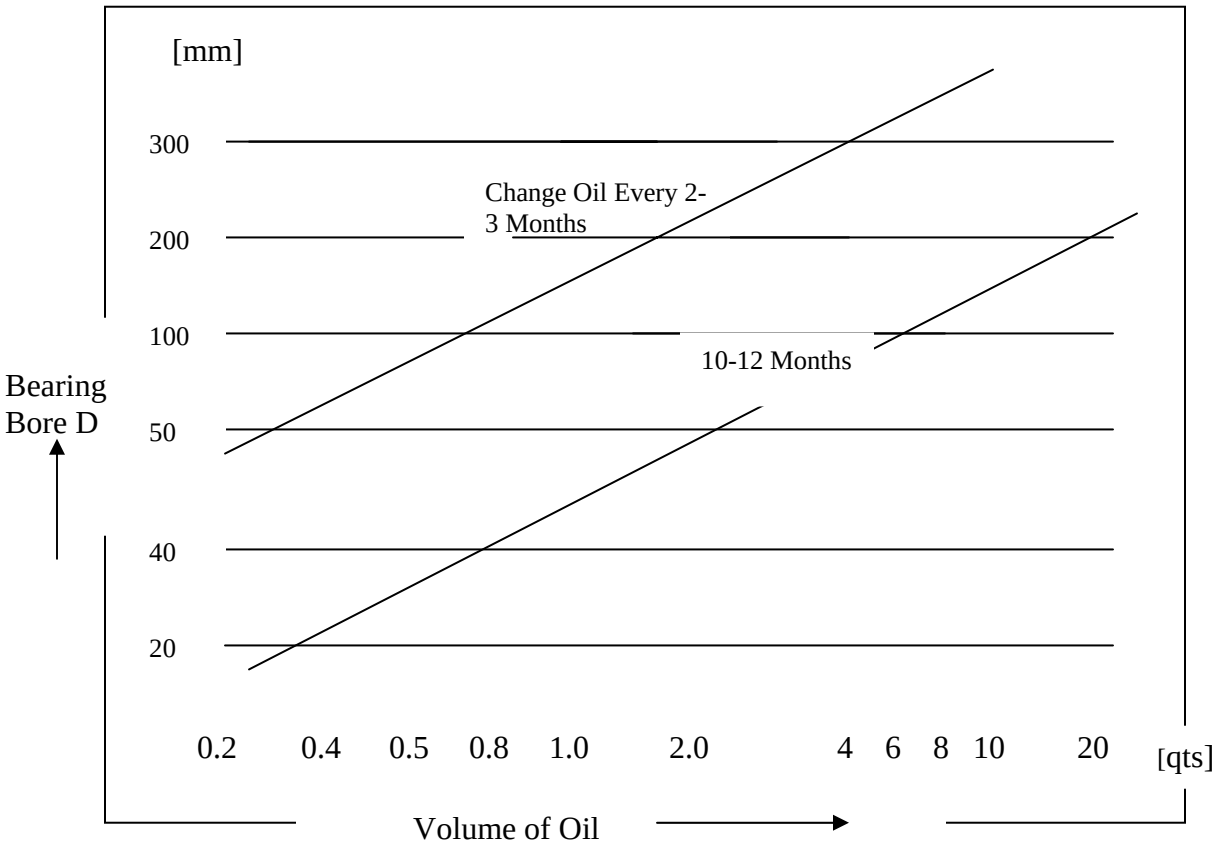


Figure 34



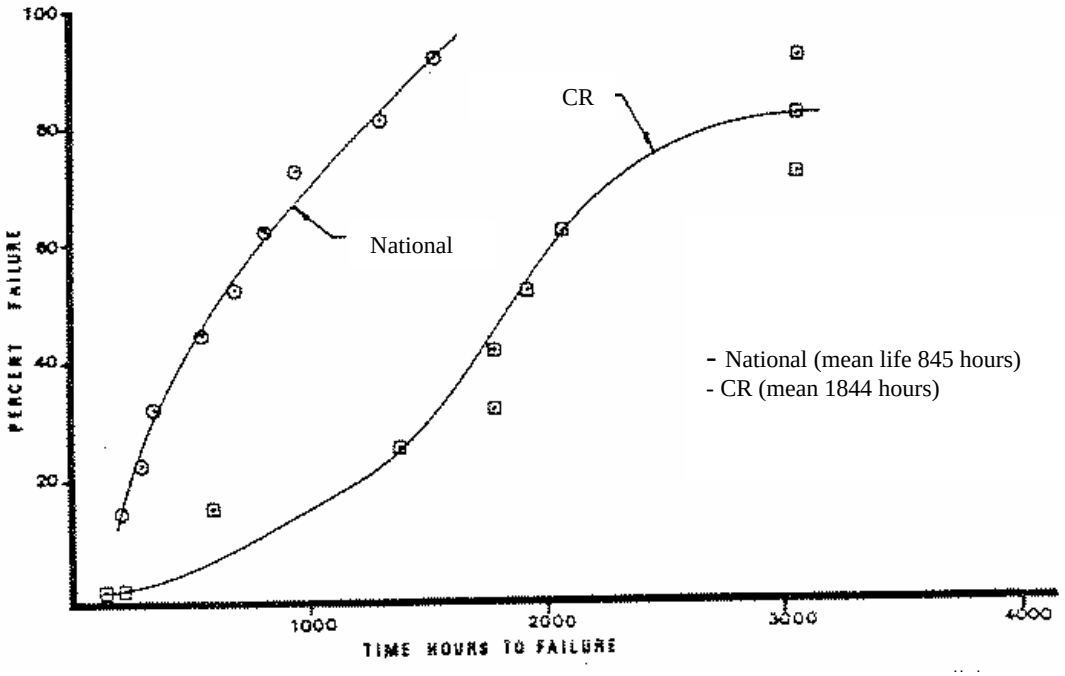


Recommended lubrication oil change frequency as a function of bearing bore diameter and lube oil sump capacity.
(Source- FAG Bearing Corporation; Stanford, Connecticut)

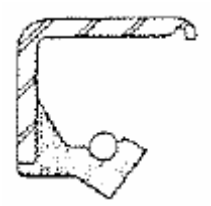
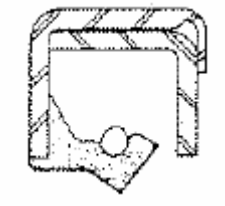
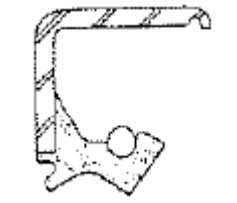
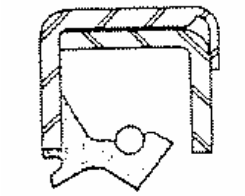
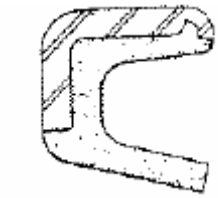
CIC 7810-192

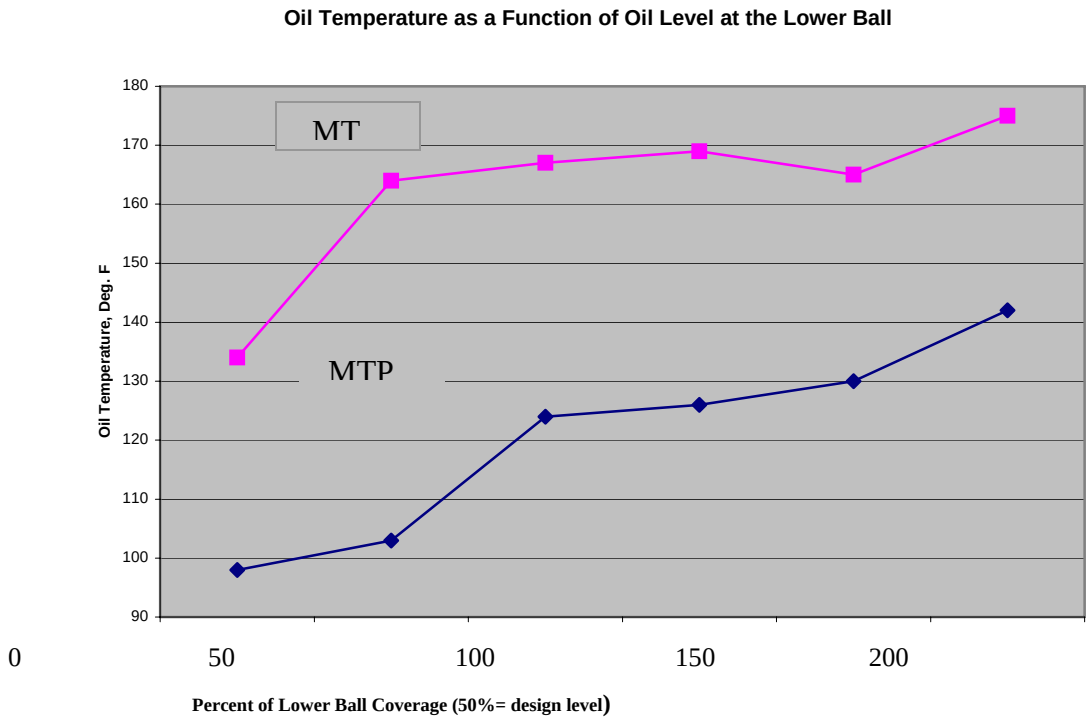
National Hours to Failure	Median Bank (% Failure)	CR Waveseal Hours to Failure
182	6.7	144
188	16.32	578
275	25.94	1343
300	35.57	1736
556	45.19	1763
648	54.81	1973
772	64.43	1979
902	74.06	2946
1264	83.68	2982
1366	93.30	3003

CIC 7810-192
Percent Failure vs. Hours to Leakage

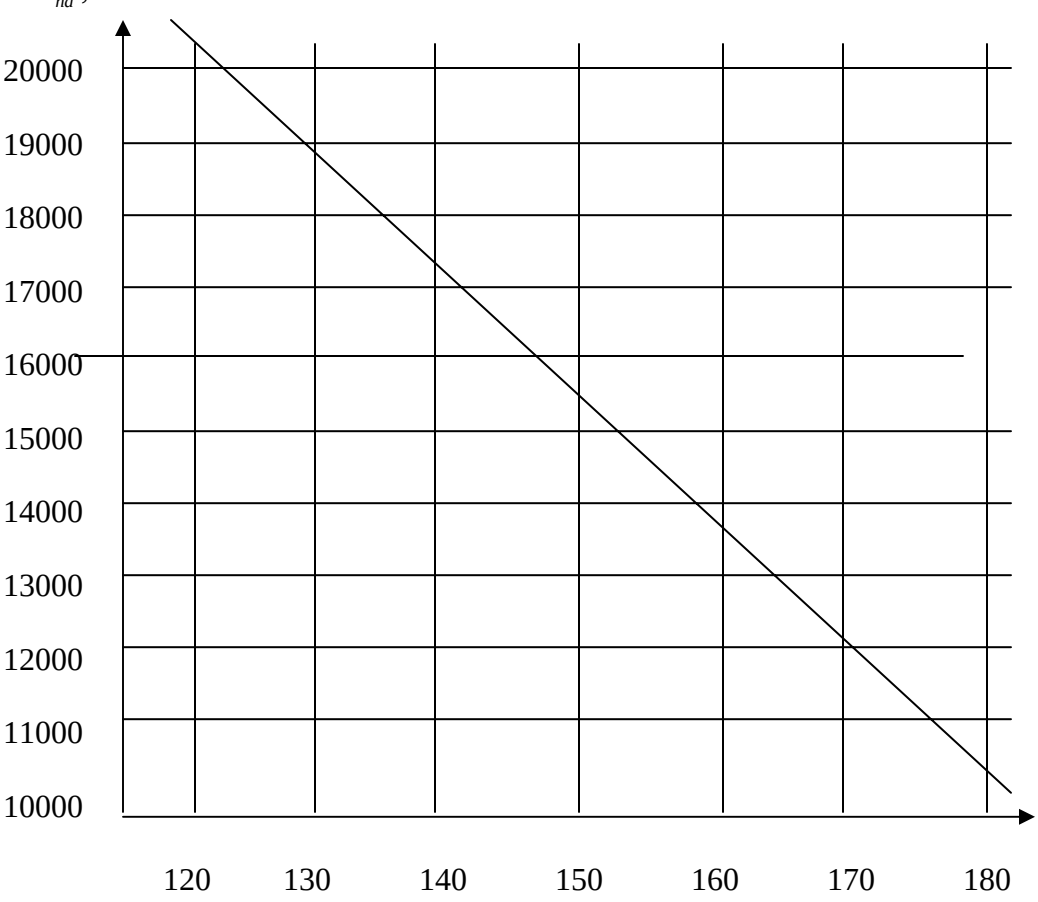


Use of Standard Seal Types

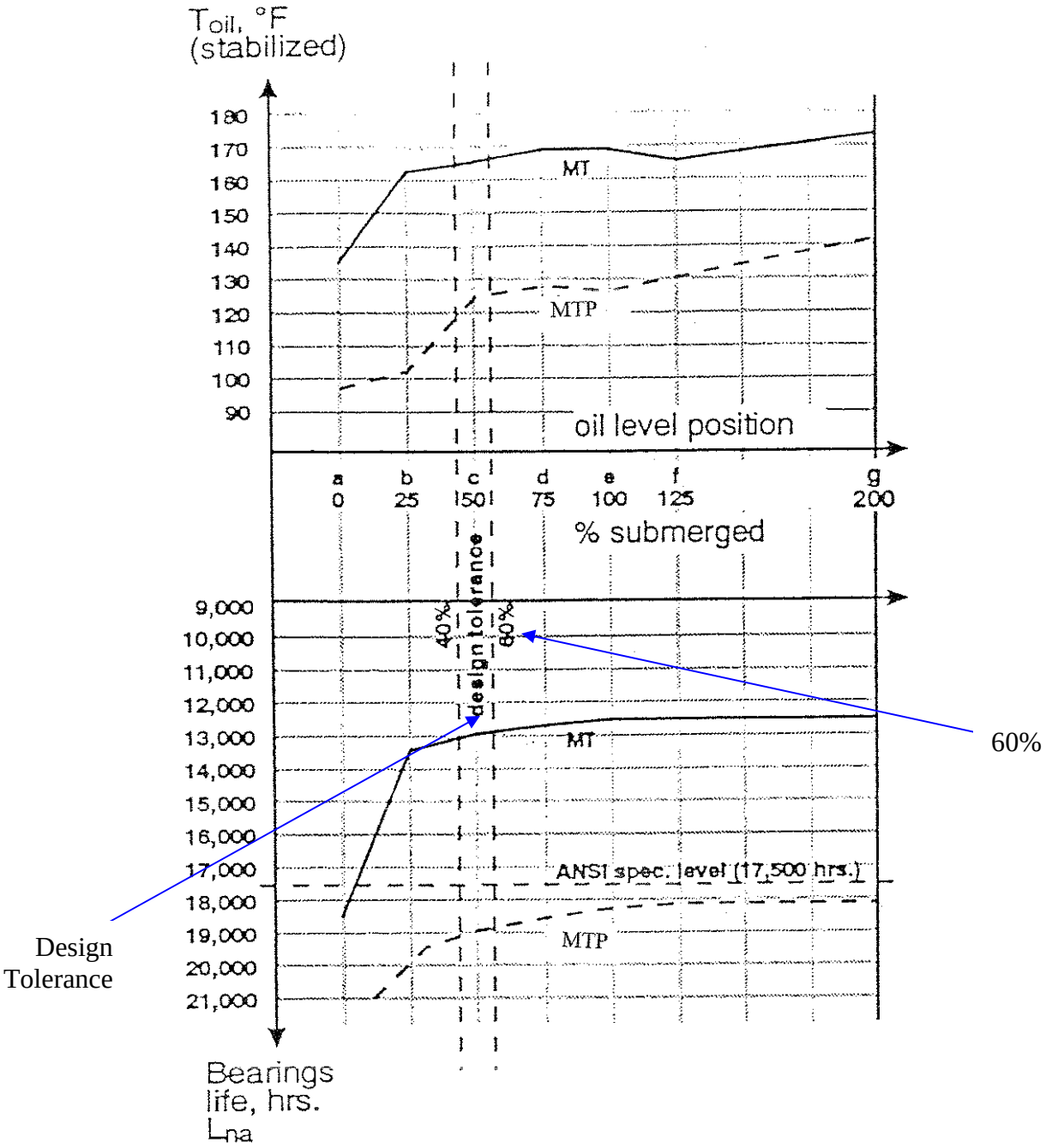
Cross Section	Types	General Application
	Bounded single lip, spring-loaded	For general sealing purposes. Generally the most economical.
	Bonded single lip, spring-loaded with inner case.	Provides all standard features plus additional inner case for greater structural rigidity.
	Bonded double lip, spring-loaded.	Provides all single-lip features plus non-spring-loaded member for moderate exposure to dust, dirt, or other foreign material.
	Bonded double lip, spring-loaded with inner case.	Provides all standard features plus additional inner shell for greater structural rigidity.
	Bonded single lip, non-spring-loaded.	Low cost for viscous fluid and grease retention.



Bearing Life



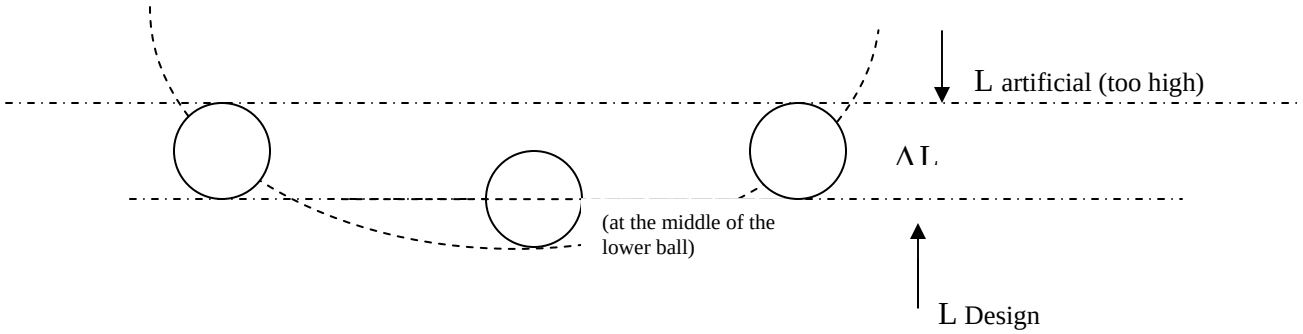
Toil in Deg. F (stabilized); Bearing Life, L_{na} , as a function of oil temperature.



Relationship between ball submergence and bearing life. (Note: Chart given for composition purposes. Actual design values are higher for both MT and MTX.)

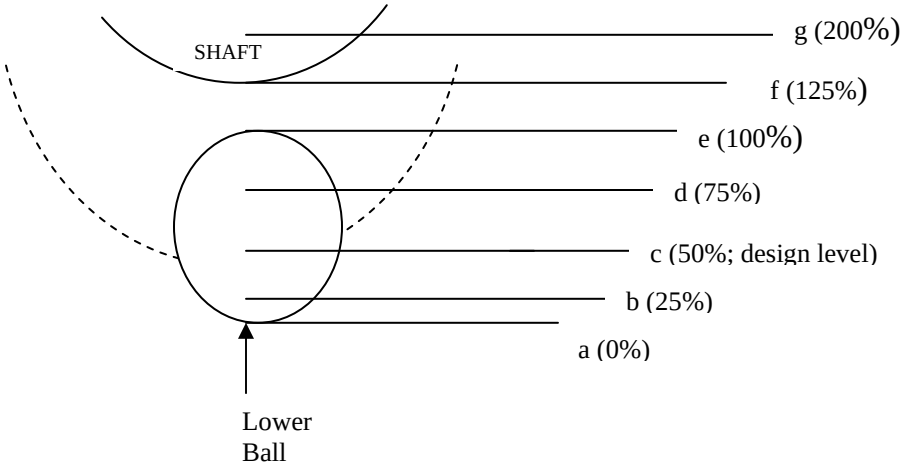
Obviously, since the MTP frame comes with the sight glass, no variation in oil levels need to be accounted for, since the sight glass allows visual control over the oil level.

Let’s designate the difference between this artificially high oil level and design level, as ΔL, illustrated in



Overflooded bearings due to oiler “burping” effect.

Five oil levels were studied



Bearing oil submergence test, for effect on oil temperature.

a= 0% (oil barely touches the lower ball)
b= 25% (oil level between bottom and center of the lower ball)
c= 50% (middle of the ball, design setting)
d= 75%
e= 100% (ball just completely covered
f= 125% (over-submergence)
g= 200% (almost half of the shaft covered)

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