

## An important note to our customers:

These instructions are provided as a reference and do not universally apply to all Turba-Films. As each Turba-Film is unique, so are specific details of the maintenance instructions and parts list. LCI offers this information as a general guide to bearing and seal maintenance procedures.

Complete manuals with installation, operating and maintenance instructions are available for your Turba-Film, regardless of age. Plant manuals also include detailed parts lists, an outline drawing of the machine, and cross section details of bearing and seal assemblies.

Please contact LCI Corporation if additional assistance is needed.

Parts:	8 a.m. to 5 p.m. EST	(866) 632-0391
	After hours pager	(704) 337-0831

Service:	8 a.m. to 5 p.m. EST	(704) 398-7888
	After hours pager	(888) 439-7545

[www.turbafilm.com](http://www.turbafilm.com)

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.1 UPPER BEARING AND MECHANICAL SEAL, DISASSEMBLY

Reference drawing: General Assembly, Upper Bearing Assembly  
Mechanical Seal, Lower Bearing Assembly

#### Preparation for Disassembly



#### **Warning!**

Secure the drive to prevent accidental starting of the unit during this procedure.

Remove the belt guard, the rotor sheave, sheave bushing, and key for belt driven units. For units that are directly driven, remove drive, coupling, and key from the rotor shaft (204). Units that are directly driven may be equipped with a drive support mounted to the top head. The drive support should be removed if it hinders access to the bearing and seal housing (201).

Shut off the seal fluid supply to the mechanical seals (300). Remove the seal fluid connections to the bearing and seal housing (201, 401).

#### Installation of the Jack-Screw

Before removing the upper mechanical seal (300A) and bearings (218,219) the rotor must be supported by a jack-screw installed in the bottom bearing housing cap (402). A jack-screw can be easily made by using a piece of 3/4"-10 UNC all-thread rod, or a stud, and a couple of hex nuts. The jack-screw should be approximately 6" long and free of dirt, grit, or anything else that may contaminate the grease in the lower bearing.

Remove the plug (406) and gasket (405) located in the lower bearing housing cap (402). With the top bearing cap (202) removed, insert the jack-screw in the lower bearing housing cap (402) and raise the rotor (500) approximately 1/8". This will remove the axial load on the split ring (209) due to the rotor's weight and allow the disassembly of the bearing. On small units a spiral wound retainer clip (209) is used in place of a split ring.



#### **Note!**

Precautions must be made to prevent the jack-screw from backing out during this procedure. This can be accomplished by using a jam nut, on the jack-screw, tightened against the lower bearing housing cap (402).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.1 UPPER BEARING AND MECHANICAL SEAL, DISASSEMBLY

#### Removing the Upper Bearing(s)

After raising and securing the rotor (500), remove the safety wire (217). Loosen cap screws (211) and remove clamp ring (210). Remove split ring (209) from shaft (204). If split ring (209) will not clear the flange of sleeve (205), then raise rotor (500) by a few turns on the jack-screw in the lower bearing cap (402). Also check bearing (219) and sleeve (205) to determine if they have risen up in bearing housing (201). If so, tap lightly with a rawhide mallet, or other appropriate tool on the flange of sleeve (205).

In most instances, it is easier to let the bearings (218,219) remain in housing (201) and remove them with housing (201) from top head (105) and rotor shaft (204). Housing (201) is fastened to top head (105) by socket head cap screws (212). Socket head cap screws (212) can be removed and bearing / seal housing (201) and bearings (218,219) can be pulled from top head (105) and rotor shaft (204).



#### **Attention!**

Care should be exercised when removing housing (201). The mechanical seal can be damaged if housing (201) is handled too roughly during removal. The housing should be lifted straight up to prevent chipping the primary seal face (304) or scratching the stationary seal seats (302). Take special care if your unit has ceramic seal seats, as this material does not tolerate mechanical shock. After removing housing (201), bearings (218,219) can now be extracted from housing (201).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.1 UPPER BEARING AND MECHANICAL SEAL, DISASSEMBLY

#### Removing the Upper Mechanical Seal (300A)

The seal retainer (301), the component that contains the primary rings (304), springs, and the rotor shaft O-ring sealing elements (305), is driven by a dog-point set-screw. This set-screw is installed so that the dog-point is positioned in the milled slot on rotor shaft (204). Remove the set-screw from the seal retainer to prevent scoring the rotor shaft (204) and slide seal retainer (301) off rotor shaft (204). Primary seal seat (301) can now be removed by removing the snap ring. Remove inboard stationary seat (302) from top head (105) and outboard stationary seat (302) from top bearing & seal housing (201).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.2 LOWER BEARING AND MECHANICAL SEAL, DISASSEMBLY

#### Preparation for Disassembly



#### **Warning!**

Secure the drive to prevent accidental starting of the unit during this procedure.

Shut off the seal fluid supply to mechanical seal (300B). Remove the seal fluid connections to bearing and seal housing (401).

Since the weight of the rotor (500) is supported by the upper bearing (200), no special procedures are required for supporting the rotor i.e., no need for a jack-screw.

#### Removing the Lower Bearing (400)

Lower bearing (412) is held rigidly to shaft (404) by a tapered bore adapter (413). Adapter (413) is tightened by a locknut and washer combination (413). In order to remove bearing (412) from rotor shaft (404), adapter (413) locknut must be loosened.

Wipe as much grease away from bearing (412) as possible. Bend the lockwasher tab out of the slot on locknut (413). A spanner wrench or spanner socket should be used to loosen locknut (413). Do not use a hammer and chisel (or screwdriver) to remove locknut (413). Remove lockwasher (413) and thread locknut (413) back on adapter (413) until there are several threads of engagement. Using a rawhide mallet, or other appropriate tool, strike nut (413) in order to drive adapter (413) down into the bore of bearing (412). This will relax the tapered bore adapter (413) grip on shaft (404).

In most instances, it is easier to let bearing (412) remain in housing (402) and remove housing (401) from the bottom outlet (106) and rotor shaft (404) first. Housing (401) is fastened to bottom outlet (106) by socket head cap screws (414). Bearing / seal housings (401) is supplied with tapped holes in the mounting flange to be used with jack-screws. Remove socket head cap screws (414) that attach housing (401) to bottom outlet (106) and use them as jack-screws to force housing (401) from its rabbet fit in bottom outlet (106).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.2 LOWER BEARING AND MECHANICAL SEAL, DISASSEMBLY



#### **Attention!**

Care should be exercised when removing housing (401). The mechanical seal can be damaged if housing (401) is handled too roughly during removal. The housing should be dropped straight down to prevent chipping the primary seal face or scratching the stationary seal seats. Take special care if your unit has ceramic seal seats as this material does not tolerate mechanical shock. After removing housing (401), bearing (412) can now be extracted from housing (401).

#### Removing the Lower Mechanical Seal (300B)

The seal retainer (301), the component that contains the primary rings (304), springs, and rotor shaft O-ring sealing elements (305) is driven by a dog-point set-screw. This set-screw is installed so that the dog-point is positioned in the milled slot on rotor shaft (404). Remove the set-screw from seal retainer (301) to prevent scoring rotor shaft (404) and slide seal retainer (301) off rotor shaft (404). Primary seal seat (304) can now be removed by removing the snap ring. Remove inboard stationary seat (302) from bottom outlet (106) and outboard stationary seat (302) from bottom bearing & seal housing (401).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.3 UPPER BEARING AND MECHANICAL SEAL, ASSEMBLY

Reference Drawing: General Assembly, Upper Bearing Assembly,  
Mechanical Seal, Lower Bearing Assembly

Before installing upper mechanical seal (300A) and bearings (218,219), install the jack-screw in bottom bearing housing cap (402) as described in the disassembly instructions. This will insure that rotor (500) is at the proper position for installation of mechanical seal (300A) and bearing (218,219).

#### Inspection of Rotor Shaft (204)

Inspect upper rotor shaft (204) for wear, scratches, evidence of abuse or anything that may prevent an O-ring from sealing properly on rotor shaft (204). Replace or repair shaft (204) as necessary.

Inspect the mechanical seal drive slot for any sharp edges or burrs that may cut an O-ring during installation of the new seal.

#### Installation of Housing (201) components

Clean housing (201) thoroughly.

Inspect for damage / wear. Pay close attention to O-ring (303) sealing bores and the bearing (218,219) fit areas. Replace or repair as necessary. Remove any/all residual grease from the bearing area and clean thoroughly.

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.3 UPPER BEARING AND MECHANICAL SEAL, ASSEMBLY

Before installing mechanical seal stationary seat (302) into bearing and seal housing (201), sparingly lubricate the O-ring with a light silicone grease or oil. Extreme care must be taken to prevent the lapped sealing surface from being damaged. After the seat is installed, make sure no grease of any kind is left on the seal face. The seat face can be lubricated with light oil if the oil is compatible with the seal coolant / lubricant that is to be used.

Grease seal (215), installed between the bearing area and the mechanical seal area, should be a light press fit. Reference the parts drawing of top bearing and seal (200) for the correct orientation of the lip. Use a light silicone grease or oil to lubricate the grease seal lip (215). This will help to prevent wearing the shaft.

#### Installation of the Mechanical Seal

Use a light silicone oil to coat the entire rotor shaft (204). This will allow O-rings (305) in primary rings (304) of the mechanical seal, to seat properly and ease installation of seal retainer assembly (301) on shaft (204).

Lubricate O-ring (303) for the stationary seal seat (302) with either silicone oil or a light silicone grease. The sealing surface of seat (302) must be clean and free of grease. Once seat (302) is lubricated properly, slide seat (302) over rotor shaft (204) with the lapped side of the seat up and push it down rotor shaft (204) until it rest on top head (105).



#### **Attention!**

Before installing seal retainer assembly (301) on rotor shaft (204), make sure the dog point set-screw in seal retainer (301) has been backed out so as not to score shaft (204) during assembly. Seal retainer (301) should slide on shaft (204) with a little resistance i.e., it should not slide along shaft (204) without assistance.

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.3 UPPER BEARING AND MECHANICAL SEAL, ASSEMBLY

The seal (300A) may have to be compressed slightly before the dog point set-screw can be properly installed. Special attention should be paid to the installation of the set-screw. The screw should not be "bottomed-out" in the drive slot. The seal is designed to "float" on the shaft. Proper installation can be verified by checking to see if the seal retainer assembly can slide along the axis of shaft (204) a short distance. Also, check to make sure the seal retainer cannot rotate about shaft (204).

#### Installation of the Bearing and Seal Housing

Apply a light silicone grease or oil to the inboard end of housing (201) where inboard seat O-ring (303) will seal. Bearing and seal housing O-ring (216) must also be lubricated to insure a good seal and proper installation. Install inboard stationary seat (302) with O-ring (303) into housing (201) with the lapped side of stationary seat (302) facing outward. Check to make sure the surface of top head (105), where housing (201) will mount, is clean and free of nicks or burrs.

Installation of housing (201) may require two (2) people.



#### **Note!**

Great care must be taken when lowering housing (201) over rotor shaft (204) so as not to damage the fragile mechanical seal faces. After bolting down bearing and seal housing (201), check to make sure grease seal (215) is still properly installed in housing (201).

#### Installation of the Top Bearings (200)

Bearings (218,219) should be packed by hand with appropriate grease. (Refer to LCI's grease recommendations.) One way to do this is to place the clean and dry bearing in a clean and dry plastic bag. Put enough grease in the bag for properly lubricating the bearing and knead the grease into the bearing. This can prevent dirt or other abrasives from getting in the grease and causing premature bearing failure.

Rotor shaft (204) should now be wiped clean of any lubrication that may be in the bearing area. Do not use an anti-seize lubricant on shaft (204) or bearing housing (201). Install key (206) into the slot in rotor shaft (204). Assemble spacer (208), thrust bearing (218), spacer (207) and ball bearing (219) into housing (201). Slide sleeve (205) down rotor shaft (204) with the key slot aligned with the key (206) in rotor shaft (204). It may be helpful to tap sleeve (205) using a rawhide mallet or other appropriate tool to seat sleeve (205) between bearings (218,219) and rotor shaft (204).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.3 UPPER BEARING AND MECHANICAL SEAL, ASSEMBLY

After assembling bearings (218,219) and sleeve (205) on shaft (204) and in housing (201), install split ring (209) in the groove of rotor shaft (204). Split ring (209) will insure proper position of the bearings (218,219) on rotor shaft (204) and prevent rotor (500) from dropping. If the groove in rotor shaft (204) is below the flange of sleeve (205), raise the rotor by turning the jack-screw in bearing cap (402) at the bottom of lower bearing (400) or tap sleeve (205) down using a rawhide mallet or other appropriate tool. Install clamp ring (210) with screws (211) and secure with safety wire (217).

Remove the jack screw in lower bearing cap (402) and replace gasket (405) and plug (406).

Bearing cap (202) should be clean and dry before installation. Install grease seal (214) in cap (202). Fill cap (202) with bearing grease. Use a new gasket (203) and attach cap (202) to housing (201). Care should be taken to insure the bearings are not over-greased. Grease will expand upon being heated and can cause the bearings to generate excessive heat from churning the excess grease, ultimately causing premature bearing failure.

Seal fluid service to the upper and lower mechanical seals must be returned before operating the unit.

7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

7.4 LOWER BEARING AND MECHANICAL SEAL, ASSEMBLY

Reference Drawing : General Assembly, Lower Bearing Assembly,  
Mechanical Seal

Inspection of Stub Shaft (404)



**Warning!**

Insure the drive motor has been shut off and secured.

Inspect lower stub shaft (404) for wear, scratches, and evidence of abuse or anything that may prevent an O-ring from sealing properly on shaft (404). Replace shaft (404) if necessary.

Inspect the mechanical seal drive slot for any sharp edge or burr that may cut an O-ring during installation of the new seal.

Installation of Housing components

Clean housing (401) thoroughly.

Inspect for damage/wear. Pay close attention to the O-ring sealing bores and the bearing fit area. Replace or repair as necessary. Remove any/all residual grease from the bearing area and clean thoroughly.

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.4 LOWER BEARING AND MECHANICAL SEAL, ASSEMBLY

Before installing outboard mechanical seal seat (302) into bearing and seal housing (401), sparingly lubricate O-ring (303) with a light silicone grease or oil. Extreme care must be taken to prevent the lapped sealing surface from being damaged. It may be necessary to pull the seat into housing (401) from the bearing end. After outboard seat (302) is installed, make sure no grease is left on the seal face. It is imperative that the seal faces are installed clean and dry.

The grease seal (411), installed between the bearing area and the mechanical area, should be a light press fit. Reference the parts drawing of the lower bearing and seal for the correct orientation of the lip. Use a light silicone grease or oil to lubricate the grease seal lip (411). This will help to prevent wearing the shaft (404).

#### Installation of Mechanical Seal (300B)

Use light silicone oil to coat the entire surface of shaft (404). This will allow O-rings (305) in the primary rings (304) of the mechanical seal to seat properly and ease installation of the seal retainer assembly (301) on shaft (404).

Lubricate O-ring (303) for inboard stationary seal seat (302) with either silicone oil or light silicone grease. The sealing surface of the seat must be clean and free of grease. Once the seat is lubricated properly, slide inboard seat (302) over rotor shaft (404) with the lapped side of the seat down. If vacuum is available to the Turba-Film® Evaporator, it can be used to hold inboard seal seat (302) against the bottom head.



#### **Attention!**

Before installing the seal retainer assembly (301) on rotor shaft (404), make sure the dog point set-screw (in the seal retainer) has been backed out so as not to score shaft (404) during assembly. The seal retainer (301) should slide on shaft (404) with a little resistance i.e., it should not slide along shaft (404) without assistance.

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.4 LOWER BEARING AND MECHANICAL SEAL, ASSEMBLY (400)

Seal (300B) may have to be compressed slightly before the dog point set-screw can be properly installed. Special attention should be paid to the installation of the set-screw. The screw should not be "bottomed-out" in the drive slot. Seal (300B) is designed to "float" on the shaft in order to accommodate thermal expansion during startup and shutdown. Proper installation can be verified by checking to see if seal (300B) can slide on shaft (404). Check to make sure seal retainer (301) cannot rotate about shaft (404).

#### Installation of the Seal and Bearing Housing (401)

Apply a light silicone grease or oil to the inboard end of housing (401) where inboard seat O-ring (303) will seal. Bearing and seal housing O-ring (407) must also be lubricated to insure a good seal and proper installation. Check to make sure the surface of bottom outlet (106), where housing (401) will mount, is clean and free of nicks or burrs.

Installation of housing (401) may require two people.



#### **Attention!**

Great care must be taken when raising housing (401) over rotor shaft (404) so as not to damage the fragile mechanical seal faces. Housing (401) should be raised far enough to start inboard seat O-ring (303) into housing (401) before using mounting screws (414) to pull housing (401) up to bottom outlet (106). After bolting down bearing and seal housing (401), check to make sure grease seal (411) is still properly installed in housing (401)

#### Installation of the Lower Bearing (412)

Bearing (412) should be packed by hand with appropriate grease. (Refer to LCI's grease recommendations.) One way to do this is to place clean and dry bearing (412) in a clean and dry plastic bag. Put enough grease in the bag for properly lubricating bearing (412) and knead the grease into the bearing. This can prevent dirt or other abrasives from getting in the grease and causing premature bearing failure.

Shaft (404) should now be wiped clean of any lubrication that may be in the bearing area. Do not use an anti-seize lubricant on shaft (404) or bearing housing (401). Tapered bore adapter (413) should be installed in the bore of bearing (412). Put the lock washer and lock nut (413) on tapered bore adapter (413) loosely so as to prevent adapter (413) from slipping out of bearing (412) during assembly on rotor shaft (404).

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.4 LOWER BEARING AND MECHANICAL SEAL, ASSEMBLY



#### **Note!**

It is very important to reference the lower bearing and seal parts drawing at this time (19235PD4). There is a “set” dimension noted on this drawing that will locate bearing (412) in housing (401). The location of bearing (412) in housing (401) is engineered to compensate for thermal expansion during startup and shutdown.

Tightening of locknut (413) should be done with an appropriate tool and not with a hammer and screwdriver. During tightening of lock nut (413), tapered bore adapter (413) may want to turn on rotor shaft (404). If this is the case, lightly tapping on the outer race of bearing (412) with a non-metallic dowel will drive bearing (412) onto adapter (413) and tighten it to rotor shaft (404). It may also be necessary to have someone hold the sheave on the driven end of rotor (500) to prevent rotor (500) from turning.

Once lock nut (413) is tight, the location of bearing (412) should be verified. One of the tabs on lock washer (413) should be secured in one of the locknut grooves.



#### **Note!**

Over-tightening taper bore adapter (413) will cause bearing (412) to generate excess heat. This will be evident by a higher than normal temperature of bearing housing (401) during normal operation. If left unresolved, this may cause premature bearing wear or degradation of the grease.

Bearing cap (402) should be clean and dry before installation. Fill cap (402) with bearing grease. Use a new gasket and attach cap (402) to housing (401). Care should be taken to insure bearing (412) is not over-greased. Grease will expand upon being heated and can cause bearing (412) to generate excessive heat from churning the excess grease, ultimately causing premature bearing failure.



#### **Note!**

Remember to remove the jack-screw and install plug (406) with gasket (405) in lower bearing and seal housing cap (402). Seal fluid service to the upper and lower mechanical seals must be returned before operating the unit,

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.5 MAINTENANCE

The only components requiring routine maintenance are bearings (218,219,412) and mechanical seals (300A, 300B).

Proper maintenance of bearings (218,219,412) is a key item in maintaining the evaporator. The health of bearings (218,219,412) can be monitored by many high tech methods. If the equipment is not available for this, perhaps the easiest method is monitoring the temperature of bearing housings (201,401) and listening to bearings (218,219,412).

Bearing housings (201,401) temperature should be checked periodically when the unit is first installed to establish a baseline temperature. The bearings will heat up to an equilibrium temperature after a couple of hours of normal operation. It is difficult to predict this temperature for all units because it will vary on the type of drive, operating temperature of the heating jackets, ambient conditions, vapor temperatures, etc. Normally, bearing (218,219,412) temperatures will be in a range of 100-180°F.

The baseline temperature taken when the unit is first installed and operated under normal conditions can be used to determine the bearing health in the future. After installing new bearings (218,219,412), during routine maintenance, it is a good idea to monitor bearing (218,219,412) temperatures. A bearing housing (201,401) temperature considerably higher than the baseline may indicate over-greasing of the bearings (218,219,412) or over-tightening of the taper bore adapter sleeve (413).

It is also important to verify that bearing (218,219,412) temperature is within an acceptable range for the grease being used. See the grease recommendations.

Since thin-film evaporators operate at relatively slow speed, problems with bearings (218,219,412) can be heard rather easily with the assistance of a mechanic's stethoscope. A healthy bearing sounds very smooth. Chirping is indicative of imminent bearing failure and the unit should be shut down as quickly as possible to prevent seriously damaging the mechanical seals or other Turba-Film® components.

7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

7.5 MAINTENANCE

GREASE RECOMMENDATIONS FOR LCI TURBA-FILM®

While there are numerous types and brands of grease that will perform satisfactorily in our thin-film evaporators, we have reviewed and approved the following greases for lubrication of ball and roller bearings used in LCI Turba-Film® units.

GREASE BRAND	BASE	MANUF. BY	TEMP. RANGE °F	NLGI GRADE	USDA APPROVAL
Energrease HTB	Bentonite	BP	5° to 500°	1	none
Mobilith AW2	Lithium	Mobil	-4° to 392°	2	H2
Darina	Non-soap	Shell	-30° to 325°	2	H2
Alvania (bearings originally packed with this grease at factory)	Lithium	Shell LCI PART # 689200	-20° to 265°	2	H2
Barrierta L 55/2	PTFE	Kluber Lubrication	-22° to 500°	2	H2
Aquaplex 524	Non-soap	Specialty Lubricants	-10° to 400°	2	H1
Aquaplex 985	Non-soap	Specialty Lubricants	0° to 425°	2	H1
Lubriplate FGL-2	Aluminum Complex	Kar Products	10° to 515°	2	H1
G.I. Lube	Calcium	Ricmar Industries	0° to 180°	2	H1

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.5 MAINTENANCE



#### **Attention!**

Care must be taken when selecting the proper grease. Consideration should be given to actual operating temperature of the bearings. This can easily be determined by measuring the temperature of the bearing housing during operation. When measuring bearing housing temperatures, the unit should be running for a minimum of 2 to 3 hours under normal operating conditions to insure the bearing temperatures have stabilized.

The NLGI grade is a measure of the stiffness of the grease. The higher the NLGI grade, the thicker the grease. The NLGI grade is determined by an ASTM test referred to as the worked penetration. Lower NLGI grades such as a grade 1 grease are commonly used in central lubricating systems because they are easier to pump than a grade 2 or 3. Lower NLGI grades are also more susceptible to being washed off when exposed to high pressure liquid streams than the higher grades. Most grease formulations are available in more than one grade. LCI recommends an NLGI grade 1 or 2 for use in Turba-Film® equipment.

Grease is actually a semisolid lubricant consisting of two main components, a thickener and a liquid lubricator. The thickener acts like a sponge to retain the low viscosity lubricator and release it at a controlled rate. The thickener also provides the grease with its stiff and tacky nature. The two most common types of thickeners are referred to as either a soap or a non-soap. Lithium, calcium, and aluminum complexes are examples of soap based greases. Most soap based greases use a mineral oil as the liquid lubricator and are normally limited to lower operating temperature ranges. Bentonite, polyurea, PTFE and other synthetics are examples of non-soap type greases. Most greases are referenced by their thickener, i.e. a lithium base grease or a calcium base grease. However, many times a non-soap thickener is considered proprietary by its manufacturer and referred to only as a non-soap grease. Many non-soap based greases use synthetic liquid lubricators and can achieve higher operating temperatures.

Many Turba-Film® thin-film evaporators are used in the food processing industry and require the use of USDA approved greases. There are two lubricant groups approved by the USDA, H1 and H2. USDA-H1 approved lubricants may be used in applications where incidental contact with food is possible. Lubricants approved as USDA-H1 are referred to as food grade lubricants. USDA-H2 approved lubricants are generally suitable for use in the food industry where contact with the food product is considered not possible.

## 7. DISASSEMBLY, ASSEMBLY, AND MAINTENANCE

### 7.5 MAINTENANCE

These are referred to as special lubricants for use in the food processing industry. The USDA publishes a list of lubricant names and manufacturers that meet H1 or H2 approval. This list is available through the U.S. Government Publishing Office as Miscellaneous Publication 1419 (List of Proprietary Substances and Non-Food Compounds Authorized for Use Under USDA Inspection and Grading Program).

In most applications, high temperature grease should only be used for higher operating temperatures. The high temperature greases normally have higher lubrication viscosity's in the lower range of their temperature rating. Because of this, using high temperature grease in the low range of its temperature rating can increase power consumption of the drive.



#### **Attention!**

It is extremely important when changing greases that the bearings and bearing housing be thoroughly cleaned so that all residual grease has been removed. Some greases, when mixed, will form an abrasive that will damage the bearings and, quite possibly, the equipment.



#### **Attention!**

When changing greases or installing new bearings, it is important to thoroughly grease (pack) the bearings by hand before installation. Care must be taken to insure that no dirt, grit, or other abrasives contaminate the grease. One method to insure this is to place bearing(412) in a clean, dry re-sealable plastic bag. Grease can then be added, excess air removed, and the bag sealed. The grease can now easily be worked into bearing (412) without the risk of contaminants entering the grease. Bearing (412) should be left in the bag until ready to install in housing (401). Refer to bearing (412) installation instructions for complete details on proper bearing installation and lubrication practices.