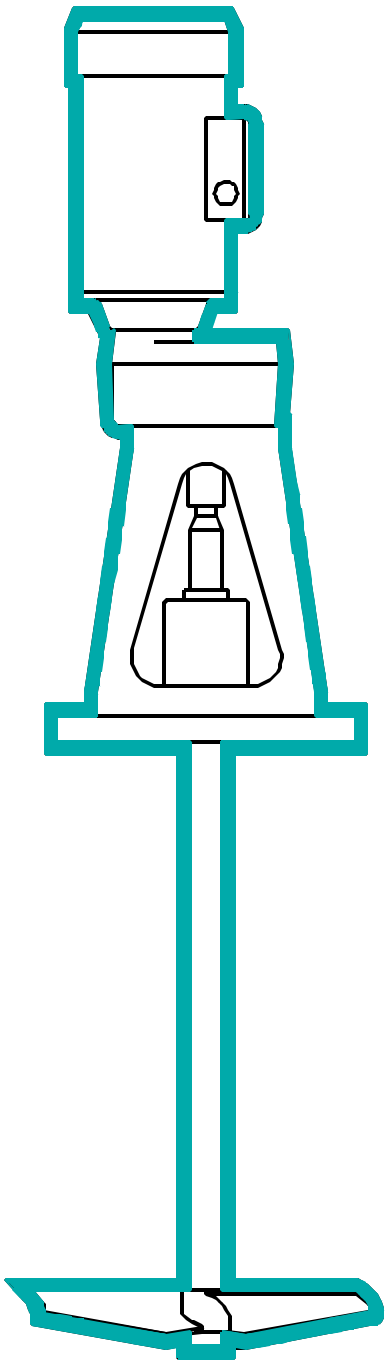
Chemineer

Manual 526

BTN Agitators
Installation, Operation Maintenance Manual



Equipment Reference:
BTN Style Agitator

MODEL:

UNIT SERIAL #:

EQUIPMENT TAG #:

P.O. #:

For service and
information contact:

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INITIAL INSPECTION

Step 1: Inspect crates. Upon receipt, inspect all crates and equipment for shipping damage. Report shipping damage to your local Chemineer office or to the factory in Dayton, Ohio. A claim should be filed immediately with the carrier involved.

Step 2: Uncrate. Check the contents. Do not uncrate the unit until you have read the ***Mounting & Installation*** section of this manual and looked at the assembly drawing shipped with the unit. Be careful in uncrating and handling. Do not discard the crating without making sure that all agitator parts have been removed. Correct assembly of this unit requires referring to both the unit assembly drawing and this manual.

Step 3: Questions? Call Chemineer. If the shipment is not complete or you do not understand what you have received, please contact *your local Chemineer office* immediately.

CHEMINEER ASSISTANCE

Chemineer maintains a fully staffed Parts and Field Service Department ready to help you with any service requirement. Simply contact your local Chemineer office, or contact Parts/Field Service at the Chemineer Factory in Dayton, Ohio:

Chemineer, Inc.
P.O. Box 1123
Dayton, Ohio 45401
Phone: (937) 454-3200
FAX: (937) 454-3375

Services available are as follows:

Installation and maintenance training seminars,
Installation and start-up supervision,
Preventative maintenance planning,
Parts order service,
Special instructions.

STORAGE

Do not remove protective packaging, desiccant, or any protective coverings applied to the wetted parts until the agitator is to be put into service. If the equipment is to be stored, *do not stack crates*. Store in a clean dry indoor location which is free from wide variations in temperature. The storage area should be free from vibration and excessive heat.

Inspect for external rust at six-month intervals. Apply rust preventative as required. If the unit has been in storage for more than six months or subjected to adverse moisture conditions, the motor windings may have to be dried prior to operation.

CAUTION! Coated/rubber covered agitator parts require special handling to avoid . . . damage to coatings/rubber coverings. Do not use chains or hooks on coated/covered . . surfaces. Special care is required to prevent damage to edges and outside corners. Contact Chemineer Field Service for instructions.

Short-Term Indoor Storage

Agitators should be stored indoors in areas with no vibration and relatively constant temperatures and humidity. The factory storage preparations should be acceptable for up to six months storage.

Rotate the motor and gear drive shafts 10 to 15 revolutions at least once per month to reduce the possibility of brinelling of the bearings and to redistribute bearing grease.

AGITATOR INSTALLATION

Bolt unit securely to mounting nozzle. Mounting fasteners and flange-to-vessel seal are not supplied with agitator. Total weight is shown on assembly drawing. Support structure must be rigid enough to prevent deflection and vibration. If required, install impellers as shown on assembly drawings. Impellers should be installed with the flat or concave side of the blades away from the gear reducer.

Special Case, Angle Mounted Units: The BTN agitator may be angle mounted. Position unit as shown in *Figure 1* to properly provide optimum mixing results. *CAUTION: Angle mounted units must be supported vertically during shaft, seal and bearing installation.*

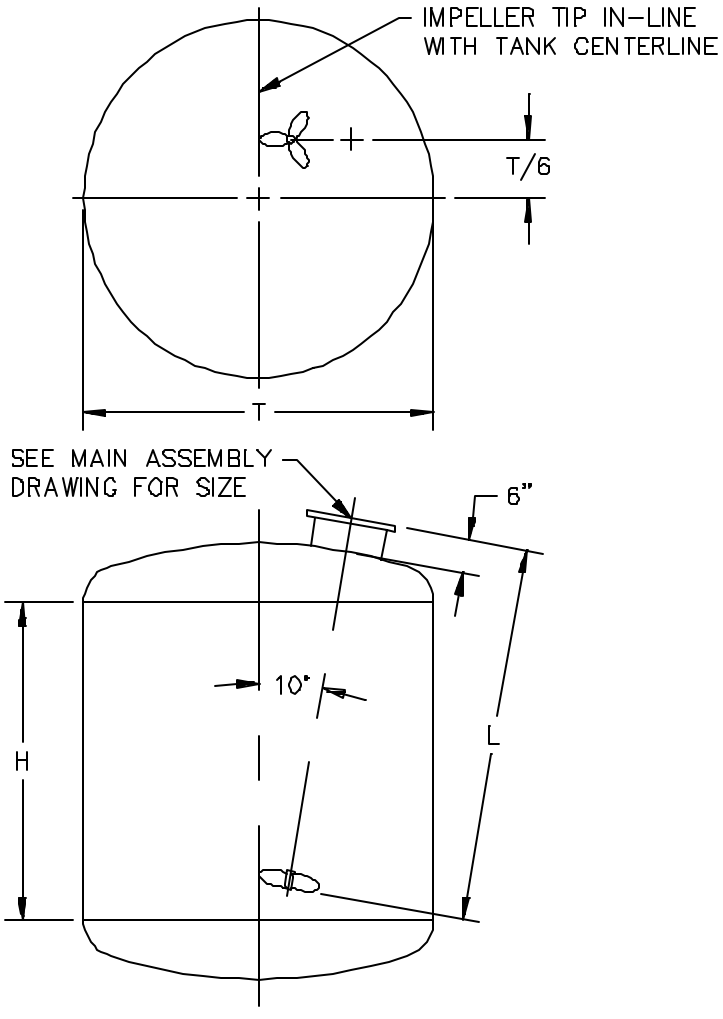

Figure 1: Angle Mount Installation

AGITATOR INSTALLATION

Correct installation requires the unit assembly drawing, seal assembly drawing and this manual. Also refer to *Figure 2, page 5*. Completely read and understand all of the following instructions before attempting to install or service this equipment.

1. The agitator unit is usually shipped fully assembled. Occasionally units are not shipped from the factory assembled. In these instances, refer directly to ***Agitator Drive Assembly and Mechanical Seal Installation***, *page 6* for full assembly/mounting instructions.
   Agitator installation consists of mounting the unit onto the vessel and making the necessary coolant-lubricant connections, if required. Locate all contents before discarding crating materials.

   NOTE: In order to properly align and mount the unit, the unit must be oriented so that the shaft is vertical. Do not attempt to support the shaft using the setscrews in the bearing or seal rotary part.

2. Remove all shipping constraints and any protective covering on the mounting flange face.
   A lifting mechanism for the agitator may be helpful. Please note the approximate net weight of the unit as shown on the assembly drawing and use caution when moving or lifting these items.

   Special care should be exercised in mounting the unit to avoid damage to the seal components. Any type of shock or impact should be avoided as the carbon seal element is easily damaged. NEVER lift the agitator using the extension shaft as a lift point.

3. Set the proper mounting flange seal (gasket or o-ring supplied by customer unless specially noted) on the vessel flange and protect it from damage.

4. Carefully lower the agitator assembly into the vessel. Properly align the agitator flange to vessel flange and install the flange to vessel hardware (customer supplied). Torque bolts to the value shown in *Table 1, page 8*.

5. *This step only applicable if mechanical seal is lubricated -- dry-running seals never require lubrication*. Connect seal fluid lines and fill the seal lubricator and seal housing with seal fluid. Pressurize the seal lubricator to 20 psi (138 kPa) above the maximum vessel operating pressure. Refer to unit assembly drawing for operating pressures. Refer to ***Lubrication, Lubricated Mechanical Seals*** for specific lubrication information.

   CAUTION! Never pressurize the vessel without first pressurizing the seal cavity (seal lubricator).

6. Install the handhole covers.

AGITATOR INSTALLATION

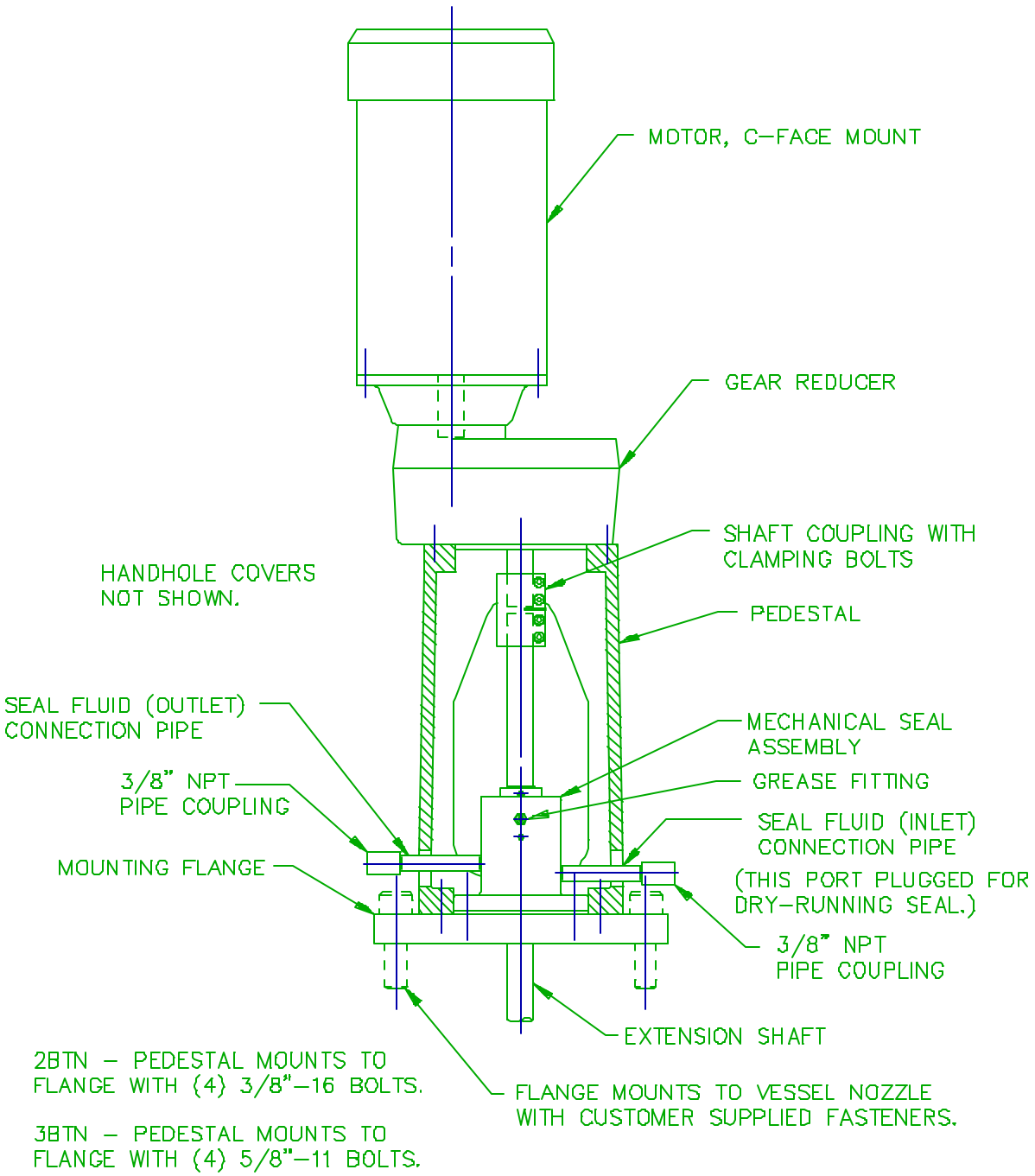

Figure 2: Agitator Installation

AGITATOR DRIVE ASSEMBLY AND MECHANICAL SEAL INSTALLATION

This section applies to any unit not fully assembled from the factory.

NOTE: In order to properly align the unit, it must be oriented so that the shaft is vertical. Do not attempt to support the shaft using the setscrews in the bearing or seal rotary part.

1. Remove all shipping constraints and any protective covering on the mounting flange face. A lifting mechanism for the agitator may be helpful. Please note the approximate net weight of the unit as shown on the assembly drawing and use caution when moving or lifting these items.

   Special care should be exercised in mounting the unit to avoid damage to the seal components or shaft. Any type of shock or impact should be avoided as the carbon seal element is easily damaged. NEVER lift the agitator using the extension shaft as a lift point.

2. Lower shaft through vessel nozzle into tank and support with approximately 8 inches of shaft extending above the vessel flange.

3. Clean the exposed surface of the extension shaft. Verify that the upper seat and o-ring are in the seal housing and the lower seat is in the agitator mounting flange. Refer to the unit mechanical seal assembly drawing or *Figure 3, page 18*.

   Special care should be exercised in mounting the unit to avoid damage to the seal components. Any type of shock or impact should be avoided as the carbon seal element is easily damaged.

4. Set the proper mounting flange seal (gasket or o-ring supplied by customer unless specially noted) on the vessel flange and protect it from damage.

5. Carefully lower the agitator assembly into the vessel. Properly align the agitator flange to vessel flange and install the flange to vessel hardware (customer supplied). If angle mounted, make sure the unit is properly oriented as shown in *Figure 1 on Page 3.* Torque bolts to the value shown in *Table 1, page 8.*

6. Properly orient the seal heads and slide them over the shaft end and against the lower seal seat. Carefully place the seal housing over the exposed seal heads. Do not bolt the housing to flange.

7. Install the snap ring over the shaft. Carefully raise the shaft enough to insert it into the sleeve coupling and install the snap ring into the top of the groove above the seal housing.

8. Tighten the shaft coupling clamping bolts.

AGITATOR DRIVE ASSEMBLY AND MECHANICAL SEAL INSTALLATION

9. Move the snap ring toward the top of the shaft and raise the seal housing to access and adjust the seal heads.

10. Set the inboard seal head at the dimension shown on the unit mechanical seal assembly drawing. Place the outboard seal head "back to back" with the inboard seal head.

11. Lower the seal housing and carefully cross-tighten the bolts that secure the housing to the mounting flange. Torque to the value shown in *Table 1, page 8*.

12. Tighten the set screws on the seal bearing and install the snap ring.

13. *This step only applicable if mechanical seal is lubricated -- dry-running seals never require lubrication*. Connect seal fluid lines and fill the seal lubricator and seal housing with seal fluid. Pressurize the seal lubricator to 20 psi (138 kPa) above the maximum vessel operating pressure. Refer to unit assembly drawing for operating pressures. Refer to ***Lubrication, Lubricated Mechanical Seals*** for specific lubrication information.

CAUTION! Never pressurize the vessel without first pressurizing the seal cavity (seal lubricator).

14. Install the handhole covers.

AGITATOR

TABLE 1: BOLT TIGHTENING TORQUE

BOLT SIZE	CARBON STEEL [1]				300 SERIES STAINLESS STEEL, ALLOY 20, MONELS, INCONELS & HASTELLOYS B & C [2]	
	GRADE 2 METRIC GRADE 4.8		GRADE 5 METRIC GRADE 8.8			
	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm
3/8 - 16	15	20	23	31	15	20
1/2 - 13	38	51	56	76	38	51
9/16 -12	50	68	83	113	50	68
5/8 - 11	68	92	113	153	68	92
3/4 - 10	120	163	200	271	120	163
7/8 - 9	105	143	296	401	182	247
1 - 8	165	224	443	601	273	370

Tighten all fasteners to values shown unless specifically instructed to do otherwise. Lubricate all fasteners at assembly with grease, oil or an anti-seize material. Bolt threads and contact surfaces of bolt heads and nuts should be lubricated.

[1] If fasteners cannot be lubricated, multiply table values by 1.33.

[2] If fasteners cannot be lubricated, multiply table values by 1.25.

MOTOR

1. Check the nameplate data on the motor to assure that the available power supply agrees with the motor requirements. Protective devices should be of the proper size and rating to safely carry the load and interrupt the circuit on overloads.

2. If motor has been stored in a damp location, the windings may require drying.

   NOTE: Do not obstruct the normal flow of ventilating air through or over the motor.

3. Connect the motor in accordance with the National Electric Code and local requirements, but do not make the connections permanent until the motor rotation has been checked.

   Identify motor auxiliary devices such as space heaters or temperature sensors. Connect them in proper circuits and insulate them from motor power cables.

4. Jog the motor to check for correct rotation prior to securing wiring. Refer to unit assembly drawing for unit rotation direction.

LUBRICATION

This section defines the proper oils and greases that must be used with this equipment.

GEAR DRIVE

The gear drive on this agitator has been charged at the factory with a special lubricant which need not be changed for the life of the unit. If grease is ever added, use Mobilux® EP023 or equivalent. Refer to ***Vendor Data*** at the end of this manual for specific gear drive information.

MOTOR

The motor bearings have been properly greased by the manufacturer. Motor bearings should be regreased at 12-month intervals when installed in clean, dry environments, or every six months for heavy duty and dusty locations. Any good quality general purpose grease consisting of a refined base oil stock and a lithium or calcium-complex based soap, with an NLGI No. 2 classification, will work satisfactorily. Most major oil companies offer such products, usually with extreme pressure (EP) additives for additional protection. *Table 3, page 11* lists some commonly available greases.

When regreasing, stop the motor, remove the outlet plug and add grease according to *Table 2* with a hand lever gun only. Run the motor for about ten minutes before replacing the outlet plug. Certain TEFC motors have a spring relief outlet fitting on the fan end. If the outlet plug is not accessible at the surface of the hood, it is the spring relief type and need not be removed when regreasing.

CAUTION! Overgreasing is a major cause of bearing and motor failure.

TABLE 2: MOTOR BEARING GREASE ADDITION

MOTOR FRAME SIZE	RELIANCE		SIEMENS		BALDOR	
	in^3	cm^3	in^3	cm^3	in^3	cm^3
56C	sealed for life		sealed for life		sealed for life	
140TC	sealed for life		0.4	6.6	0.6	9.8
180TC	0.5	8.2	0.6	9.8	0.6	9.8

MOTOR

TABLE 3: TYPICAL NLGI NO. 2 GREASES

For Ambient Temperature Range of 0° to 150° F (-18° to 66° C)		
MANUFACTURER	**GENERAL PURPOSE**	**EP**
Amoco Oil Co.	Amolith grease: Grade 2	Amolith grease: Grade 2EP
Ashland Oil Co.		Multi-lube Lithium EP grease: Grade 2
		EP Lithium #2
Chevron U.S.A.Inc.	Industrial grease: Grade medium	Dura-Lith greases EP: Grade 2
CITGO Petroleum Corp.		Premium Lithium EP grease: Grade 2
Conoco Inc.		EP Conolith grease: Grade 2
Exxon Co. U.S.A.	Unirex N: Grade 2	Nebula EP: Grade 2
		Ronex MP: Grade 2
Mobil Oil Corp.		Mobilux EP 2
Pennzoil Products Co.		Pennlith EP grease 712
Phillips 66 Co.	Philube L Multi-purpose grease L-2	Philube EP grease: EP-2
Shell Oil Co.	Alvania grease 2	Alvania grease EP 2
		Alvania grease EP LF 2
Texaco Lubricants Co.	Premium RB grease	Multifak EP 2
Unocal 76		Unoba EP grease: Grade 2
		Multiplex EP: Grade 2

MOTOR

The following table may be used as a guide in determining frequency of lubrication. The periods listed assume a clean, dry environment with a temperature not exceeding 150°F (66°C). If conditions are less desirable than this, adjust the frequency accordingly. (*Table 4* is for motor speeds 1800 RPM or slower).

TABLE 4: LUBRICATION FREQUENCY

DUTY	LUBRICATION INTERVAL (Months)
Intermittent	36
8-16 Hours/Day	30
Continuous	24

LUBRICATED MECHANICAL SEALS

This section DOES NOT apply to dry-running mechanical seals. Do not lubricate the seal faces of dry-running seals.

Double mechanical seals must be supplied with adequate lubricant in order to operate properly. The lubricant can be any low viscosity fluid with reasonable lubricity, compatible with the process fluid, and stable over the full range of pressures and temperatures at which the mechanical seal will be operated. Common liquid lubricants (barrier fluids) include glycerine, ethylene glycol, mineral oil and water. Operating temperature limits for these lubricants are listed in *Table 5* below. Refer to unit assembly drawings for specific agitator/seal pressure and temperature operating limits. Consult *Chemineer Field Service* for other lubricants.

TABLE 5: MECHANICAL SEAL LUBRICANTS

LUBRICANT	TEMPERATURE LIMIT	
	°F	°C
Glycerine	≤150	≤66
Ethylene Glycol	≤250	≤121
Mineral Oil	≤400	≤204
Water	≤160	≤71

The specific gravity of any liquid lubricant should never be less than .63 at a reference temperature 50°F or 28°C above the maximum vessel temperature. The boiling (flash) point of a lubricant should never be less than 25°F or 14°C above maximum vessel operating temperature. The standard seal housing operating pressure is 20 psi (138 kPa) above the maximum vessel operating pressure.

The BTN mechanical seal housing includes an integral bearing which maintains proper seal alignment. This bearing is grease lubricated. The bearing should be regreased at one month intervals. Add new grease **slowly** at the grease fitting until new grease is evident around the bearing. Typical greases are as shown in *Table 3, page 11*.

AGITATOR

Your Chemineer agitator has been designed for your specific application. Proper operating procedures will allow maximum performance. The following list will aid in the safe operation of your unit.

- **!** **Do not** operate the unit before reading and following the instructions on all tags and nameplates attached to the unit.
- **!** **Do not** operate the unit with less than one impeller's diameter liquid coverage above the lowest impeller. Increased side loading caused by operations at liquid level will decrease unit life.
- **!** **Do not** operate the unit in a fluid with a specific gravity or viscosity higher than that for which the unit was designed.
- **!** **Do not** attempt to start a unit with the mixing impeller buried in solids or a "set up" fluid.
- **!** **Do not** operate mechanical shaft seals at temperatures or pressures higher than those for which the unit was designed. Refer to unit assembly drawing.
- **!** **Do not** locate large pump discharges, other agitators, down comers, coils, baffles, or other vessel internals close to the agitator impellers and extension shaft.
- **!** **Do not** make any changes in the field (i.e. motor horsepower, agitator speed, shaft length, impeller diameter, impeller blade width, etc.) without reviewing the change with *your local Chemineer office* or *Chemineer Field Service*.

For variable speed units, the liquid level may be allowed to pass through the impeller zone on filling or draining by operating at a reduced speed. Prolonged operation with the liquid level at the impeller location should be avoided at any operating speed as the side forces on the impeller will decrease machine life.

CAUTION: There may be a speed range where the unit cannot be operated because of shaft resonant frequency. This range must be avoided or passed through quickly or destructive forces can be generated. Refer to main unit assembly drawing for speed range information or consult the *Chemineer Factory*.

Should there be problems operating the unit, confirm that the installation is correct. If you are unable to resolve the problem, contact *your local Chemineer office*.

MOTOR

Electric motors furnished on Chemineer BTN agitators are designed to deliver their rated output when properly installed and maintained.

Air circulation is very important to get full performance and long life from an electric motor. Do not block the suction inlets on fan cooled motors. Life of the motor will be decreased if its temperature exceeds its thermal rating. The allowable temperature is stamped on the motor nameplate.

Prior to permanently wiring the electric motor:

- Check nameplate data on motor to assure that the available power supply agrees with the motor requirements. Protective devices should be the proper size and rating to safely carry the load and to interrupt the circuit on overloads.

- Check motor leads with connection diagrams on motor nameplate and/or conduit box so that the proper connections are made. All motors should be installed in accordance with the National Electric Code and local requirements.

- Check the gear drive output shaft rotation against the proper rotation indicated on the assembly drawing. BTN units may run in reverse unless otherwise noted on the assembly drawing. For standard three-phase electric motors, the rotation is reversed by switching any two power leads.

- Check operating motor amperage against motor nameplate amperage.

The motor should start quickly and run smoothly. If the motor should fail to start or make abnormal noise, immediately shut motor off, disconnect it from the power supply, and investigate the cause. If the problem cannot be corrected, contact *your local Chemineer office* for assistance.

GEAR DRIVE

The gear drive on this agitator has been charged at the factory with a special lubricant which need not be changed for the life of the unit. Should any problem arise involving damage to the gear drive, replace the reducer in its entirety.

Tighten the bolts at the motor to the gear drive and the gear drive to the pedestal. Torque to the values shown in *Table 1, page 8*.

The motor shaft fits into a quill in the gear drive. There is no flexible coupling. There is a key to transmit the motor torque.

The output shaft on the gear drive is fitted with a split rigid sleeve coupling and is positioned so that the shaft end is flush with the coupling horizontal split line. This positioning creates approximately 1/8" (3.18mm) gap between the gear drive output shaft and the agitator shaft.

AGITATOR DRIVE REMOVAL AND MECHANICAL SEAL MAINTENANCE

Refer to both the main unit assembly drawing and the mechanical seal assembly drawing for this section.

3. *Lock out and disconnect all power to the gear drive motor and optional devices.*

   NOTE: The unit must be oriented with the shaft vertical in order to change the seal. DO NOT attempt to support the shaft using the setscrews in the bearing or shaft seal rotary part.

4. Depressurize and ventilate the vessel. Disconnect seal fluid lines and cap to exclude dirt and moisture. *(Dry-running seals will not have fluid lines.)*

5. Remove handhole covers.

6. Remove bolts holding agitator mounting flange to vessel nozzle. Lift unit away from the nozzle sufficiently to allow the extension shaft to be blocked in place. Block extension shaft securely under mounting flange face (without damaging flange face). Lower unit until shaft blocking rests on vessel nozzle.

7. Remove bolts anchoring agitator pedestal to mounting flange. Loosen clamping bolts in lower half of shaft sleeve coupling. The drive/pedestal assembly may now be removed from mounting flange to a suitable service area. Ensure clamping bolts in lower half of sleeve coupling remain with coupling.

8. The mounting flange, seal housing, and shaft should be remaining on top of vessel. Reference *Figure 3, page 18.*

9. Remove snap ring above bearing. Loosen set screws in bearing inner race. Remove seal housing to flange bolts. Clean shaft above the bearing with a crocus cloth and slide the seal housing assembly off end of shaft. At this point, the upper seat and o-ring will remain inside the seal housing, while the lower seat and both seal heads will remain on the shaft.

10. Inspect the exposed seal parts and replace as necessary.

It is recommended that whenever the mechanical seal components are maintained, that the flange is removed and the flange gasket replaced.

11. Refer to the above instructions in reverse order to re-assemble the mechanical seal and agitator drive.

MECHANICAL SEAL MAINTENANCE

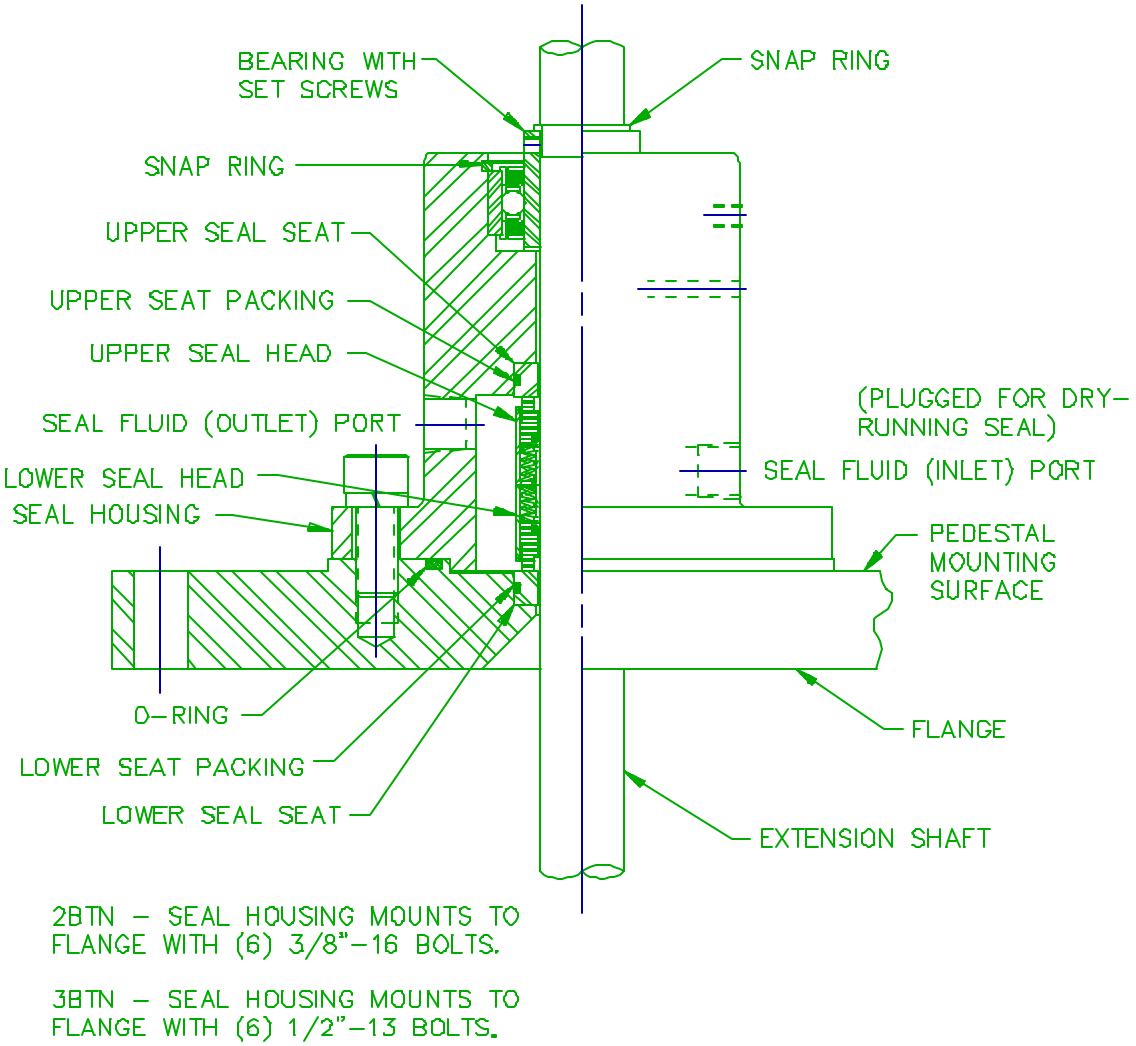

Figure 3: Mechanical Seal Assembly

Chemineer, Inc.
A Unit of Robbins & Myers, Inc.