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XCEL Series of Turbine Mixers

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Recommended Bolting Torques

1. Tightening Torques

Use the values specified in the following table for fastening motors, units, and accessories to their mounting surfaces with SAE Grade 5 non-lubricated fasteners. If the tightening torque exceeds the capacity of the torque wrench, use a torque multiplier.

Thread Dia-UNC (in)	Painted Metal to Painted Metal (lb-in)	Painted Metal to Concrete (lb-in)
.250-20	90	70
.314-18	185	145
.375-16	330	255
.500-13	825	640
.625-11	1,640	1,280
.750-10	2,940	2,290
.875-9	4,560	3,750
1.000-8	6,800	5,600
1.125-7	8,900	7,000
1.250-7	12,600	10,000
1.375-6	16,500	13,000
1.500-6	22,100	17,500



Installation of Mixer Drive Sizes 200-220

1. General

The Excel-200 to 220 series mixers are designed with a hollow output shaft secured to the mixer shaft by a tapered bushing and keep plate at the input end. A lower L.S. bearing and adapter, fitted to the mixer shaft at the output end, is a part of the reducer installation kit and must be mounted to the mixer before the mixer is positioned. Standard units are powered by NEMA-C Face motors mounted to an adapter which is bolted to a plate on the upper housing (see Figure at right).

Standard units may be rail, pedestal, or tank flange mounted.

Items Furnished With Unit

The following lists the required parts for assembling and XCEL-200 to 220 series speed reducer

- Tapered bushing and fastener
- Shaft key, Output
- Keeper plate w/setscrews
- Shaft key, input
- Lower L.S. bearing and adapter
- L.S. Seal Cage w/ "O"-ring and fasteners
- Air Vent
- Street Elbow
- Dipstick Bushing and Dipstick
- C-Flange w/H.S. Coupling (mounted)
- Magnetic Drain Plug

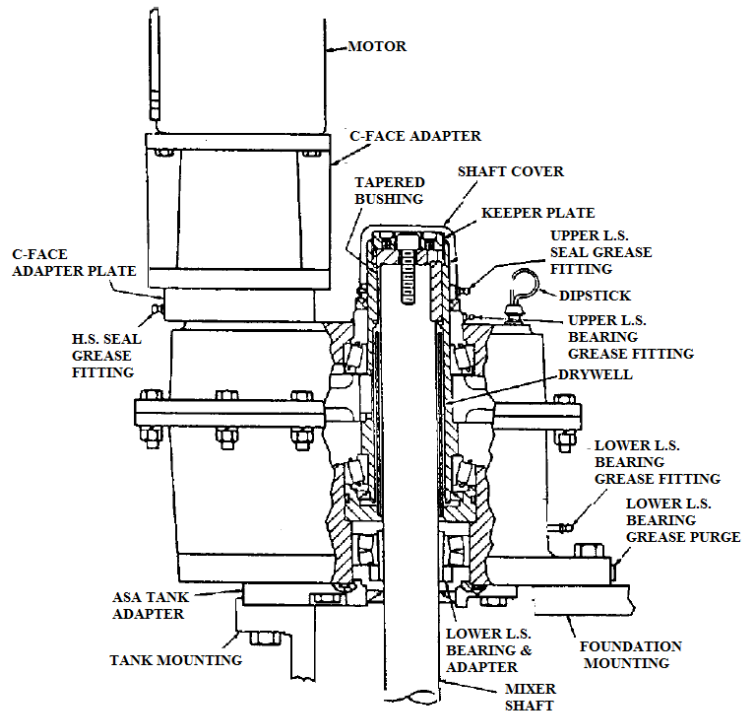


Figure 1.

Before beginning installation, make sure all parts have been received.

2. Instructions

1. Install the seal cage and mixer drive shaft bearing and adapter. Refer to Figure B. Protect the seal in the seal cage (tank adapter flange) from the sharp edges of the keyway by taping over the keyway with common transparent tape and applying a light coat of oil to the shaft.

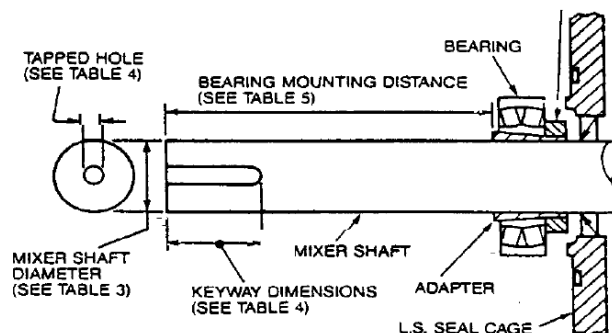


Figure 2.



Installation of Mixer Drive Sizes 200-220

2. Slide the seal cage onto the shaft. NOTE: if the shaft is in the horizontal position, support both the seal cage and the shaft to prevent the weight of the adapter from pinching the seal.
3. Install the O-ring in the groove in the seal cage.
4. Loosely assemble the bearing, tapered bearing adapter, bearing lock washer and bearing locknut, and slide the assembly onto the shaft with the nut toward the seal cage.
5. Position the bearing on the shaft as required by Table 1 below and tighten the nut as follows:
 - A) Proper tightening of the adapter is measured as a reduction in internal clearance in the bearing. The more the nut is tightened, the less internal clearance will exist in the bearing. Measure the internal clearance of the bearing prior to installation by using feeler gauges between the bearing rollers and the outer race (see Figure 3). The bearing outer race must be centered and the shims must pass over both sets of rollers to properly measure the internal clearance. Once the bearing is on the shaft and in proper position, the adapter may be tightened until the internal clearance is reduced by .0010" to .0015".
 - B) The proper tightening of the adapter may also be measure by assuming that a specific amount of axial movement of the adapter relative to the bearing inner race will provide a specific amount of reduction of internal clearance and hence a certain fit on the shaft. The ratio of axial movement to radial clearance reduction is 15:1. Once the bearing is on the shaft and in proper position, the adapter may be tightened just until the bearing moves 0.020" to 0.025". The minimum bearing internal clearance after mounting is 0.0012 to 0.0014".

Bend one of the bearing lock-washers tangs into interference position to prevent loosening.

Unit Size	Distance from shaft end
200	9.63 +/- 1/16"
210	10.83 +/- 1/16"
220	12.93 +/- 1/16"

Table 1 – Mixer shaft Bearing Location

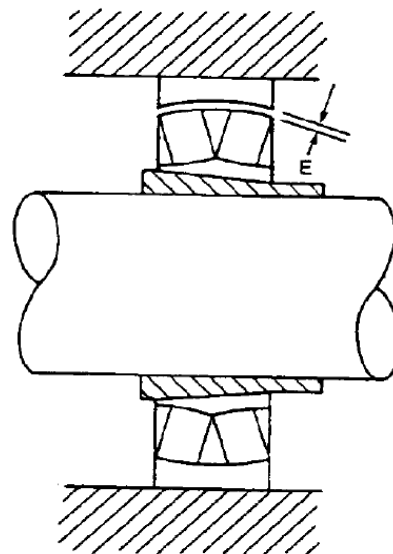


Figure 3.



Installation of Mixer Drive Sizes 200-220

6. Refer to Figure 4. Remove the pipe plug from the input housing half and replace it with the street-elbow and air-vent assembly as shown. Seal the threads with pipe compound or Teflon tape. Make sure the vent is in the vertical position. Next, remove the pipe plug from the dipstick opening and replace it with the dipstick bushing.

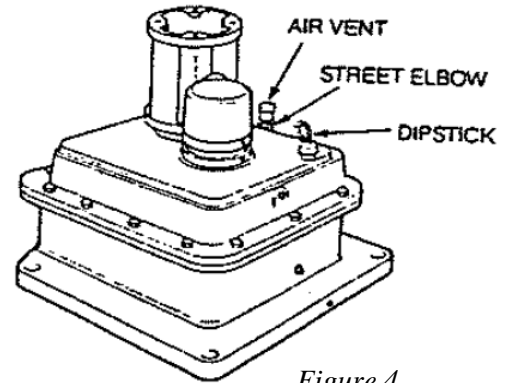


Figure 4.

7. Make sure the lower L.S. bearing and the bearing bore in the lower housing are clean and free of burrs and dirt. Coat these surfaces with light oil. Make sure oil fill, inspection, and drain ports, and all grease fittings will be accessible after installation. If necessary, reposition the unit or install pipe extensions.

8. Refer to figure 5. Support the mixer shaft to allow working room beneath the seal cage. Lift the reducer carefully keeping it level and position above the mixer shaft. Slide the reducer down over the mixer shaft and set the outer race of the bearing mounted on mixer shaft in the bore of the reducer housing. Tap the bearing race softly to make certain it is not cocked in the bore. NOTE: do not force the mixer shaft into the reducer; it should slide in smoothly.

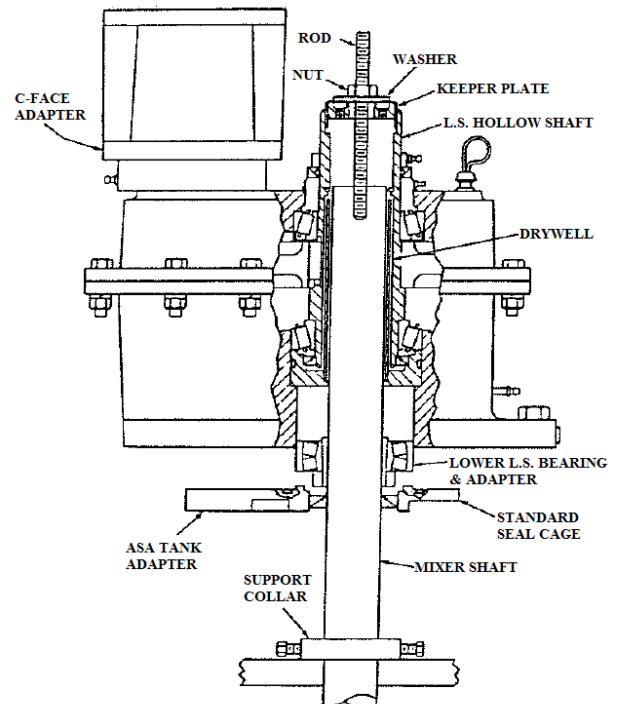


Figure 5.

9. Refer to figure 5. Thread the keep plate all the way into the hollow shaft. Insert a threaded rod through the plate and into the mixer shaft. Tighten a nut on the threaded rod to draw the mixer shaft into the unit until it contacts the keeper plate. When the mixer shaft is in place (support it in this position), remove the threaded rod and keeper plate.

10. Refer to figure 6. Rotate the mixer shaft to line up the keyways. Insert the key in the keyway from the top and tap it into place against the internal retaining ring in the hollow shaft.

11. Refer to figure 6. Slide the tapered bushing over the top of the mixer shaft. Install the bushing fastener and tighten to the torque shown in table 2 on the next page



Installation of Mixer Drive Sizes 200-220

Unit Size	Fastener Size (inches)	Torque (lb-in.)
200	.625-11 UNC x 1.75	2190
210	.625-11 UNC x 1.75	2190
220	.875-9 UNC x 2.00	6400

Table 2. Tapered Bushing Fastener Torques

Unit Size	Spanner Holes (inches)	Torque (lb-in)
200	.500 dia. X .250 Deep, 1.750 B.C.	1000
210	.500 dia. X .250 Deep, 1.750 B.C.	1500
220	.500 dia. X .250 Deep, 2.500 B.C.	2000

Table 3. Keeper Plate Torques

NOTE: Refer to figure 6. A spanner wrench may be place on the exposed high speed shaft to prevent the low speed shaft from rotating while the bushing is tightened.

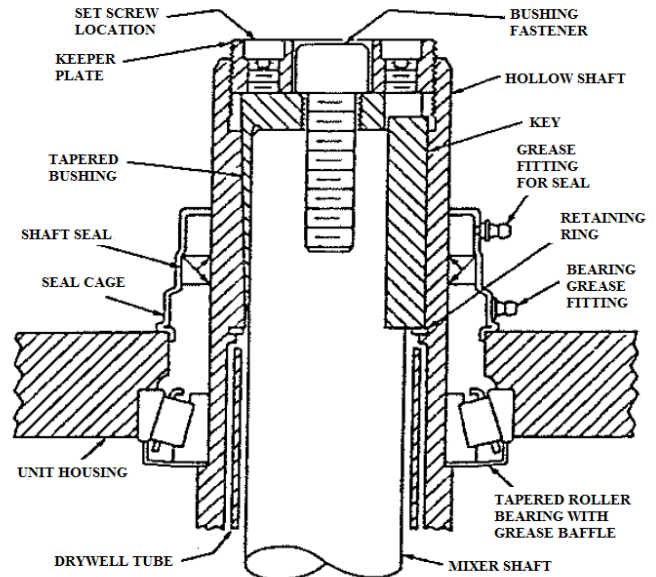


Figure 6.

12. Thread the keeper plate into the top of the hollow shaft. Use a face spanner wrench or a piece of steel stock bolted to the keep plate to position it against the upper surface of the bushing. Tighten it to the torque shown in table 3.
13. Install and tighten the keep plate set-screws.
14. Refer to figure 7. Check to be sure the lower bearing assembly is recessed into the housing. Pack the bearing cavity with NLGL #2 bearing grease.
15. Slide the lower seal cage into position against the housing, install the fasteners and tighten to 330 lb-in torque.
16. Remove the mixer shaft support and lower the unit into position. Refer to table 4 below. Secure the unit with appropriate fasteners tightened to the torques specified.

Thread Size (in)	Painted Metal to Painted Metal (lb-in)	Painted Metal to Concrete (lb-in)
.250-20 UNC	90	70
.312-18 UNC	185	145
.375-16 UNC	330	255
.500-13 UNC	825	640
.625-11 UNC	1640	1280
.750-10 UNC	2940	2290
.875- 9 UNC	4560	3750
1.00 – 8 UNC	6800	5600

Table 4. Foundation Fastener Tightening Torque
 DO NOT LUBRICATE

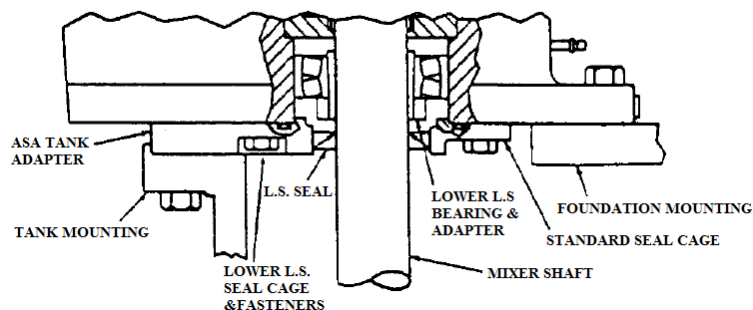


Figure 7.



Installation of Mixer Drive Sizes 200-220

NOTE: The seal cage allows for the use of the four foundation holes or the tapped holes on the underside of the housing base. The seal cage acts as a male register for a positive location.

17. Refer to figure 8 below. Pump NLGI #2 bearing grease into the upper fitting on the low speed seal cage while rotating the high speed shaft until a uniform bead of grease appears between the seal cage and the hollow shaft. Place the low speed shaft cover over the seal cage and secure it with the sheet metal screws provided.

Installing the C-Face Motor Adapter

Your Mixer drive should have had the C-Face motor adapter mounted at the factory. If it was not, refer to figure 9 and proceed as follows.

1. Pump NLGI #2 bearing grease into the grease fitting on the adapter plate while rotating the high speed shaft until a uniform bead of grease appears at the base of the high speed shaft.
2. Position the motor adapter on the adapter plate with the inspection window oriented for easy access. NOTE: Size 20 units require that the circular relief in the adapter be located over the low speed shaft.
3. Install the adapter fasteners and tighten to 330 lb-in torque.
4. Refer to figure 9 and table 5 on the following page. Place the coupling halves on the unit input (high speed) shaft and motor shaft and set the coupling overhang distances as shown in Table 5. Tighten the setscrews. The reducer hub setscrew can be tightened through the access hole in the C-Face adapter.
5. Install the coupling spider to the unit hub and install the motor to the adapter. If necessary, reach in through the access window on the adapter to align the coupling spider. Orient the motor for convenient electrical connection and tighten fasteners per table 4.

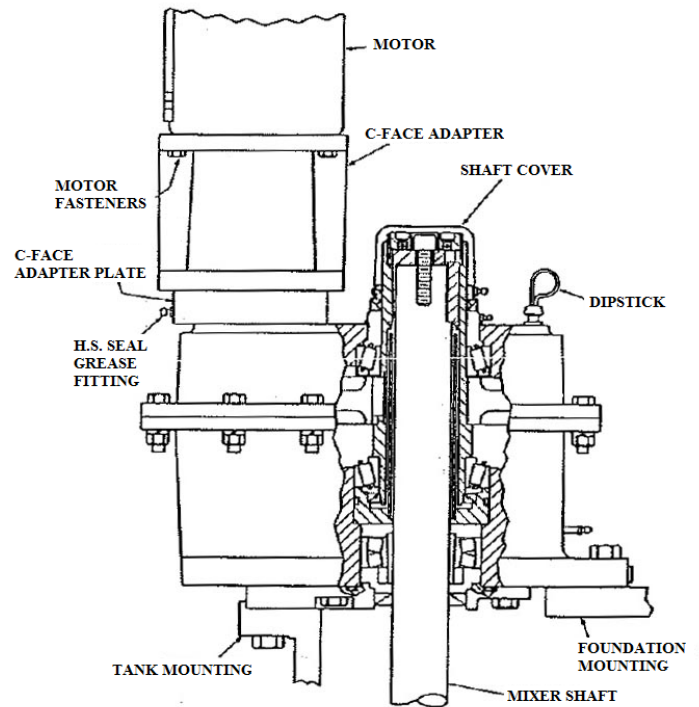


Figure 8.

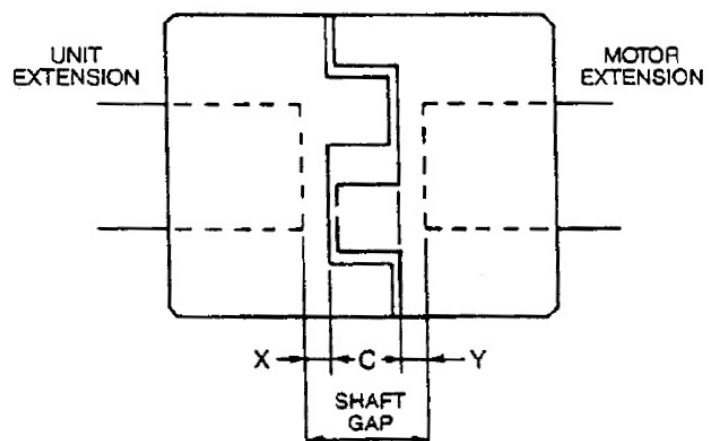


Figure 9.



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Unit Size	Motor Frame Size	Coupling Size	Nominal Shaft Gap	C	Coupling Overhang	
					Unit X	Unit Y
200	56	L-110	1.375	0.875	0.25	0.25
	143-145	L-110	1.310	0.875	0.38	0.06
	182-184	L-190	1.935	1.000	0.44	0.50
	213-215	L-190	1.435	1.000	0.00	0.44
	254-256	L-190	1.310	1.000	0.00	0.32
	284-286	L-190	1.435	1.000	0.00	0.44
210	56	L-110	1.123	0.875	0.12	0.12
	143-145	L-110	1.060	0.875	0.18	0.00
	182-184	L-190	1.685	1.000	0.56	0.12
	213-215	L-190	1.185	1.000	0.18	0.00
	254-256	L-190	1.060	1.000	0.06	0.00
	284-286	L-190	1.185	1.000	0.18	0.00
220	56	L-110	1.073	0.875	0.18	0.00
	143-145	L-110	1.010	0.875	0.12	0.00
	182-184	L-190	1.635	1.000	0.50	0.12
	213-215	L-190	1.135	1.000	0.12	0.00
	254-256	L-190	1.010	1.000	0.00	0.00
	284-286	L-190	1.135	1.000	0.12	0.00

Table 5 – C-Face Motor Coupling Settings



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Maintenance of Mixer Drive Size 200-220

1. Preventive Maintenance – always fill the unit with oil to the level indicated on the oil level dipstick. Also, make sure that the breather under the dipstick cap is fully functional. Use an oil as recommended in bulletin 05-110.
 - A. **After First Week** – Check alignment of the total system and realign where necessary. Also, tighten all external bolts and plugs where necessary. **DO NOT** readjust the internal gear or bearing settings in the reducer; these were permanently set at the factory.
 - B. **After First Month's Service** – Proceed as follows:
 1. Operate unit until sump oil reaches normal operating temperature. Shut the unit down and drain immediately.
 2. Immediately flush unit with an oil of the same type and viscosity grade as the original charge (warmed approximately 100°F in cold weather). Rapidly pour or pump a charge equal to 25-100% of the initial fill thru the unit or until clean oil flows through the drain.
 3. Close the drain and refill the unit to the correct level with new or reclaimed oil of the correct type and viscosity. If determined to be in good condition by supplier, reclaimed oil may be reused if it is filtered through a 40 micron or finer filter.
 - C. **Periodically** – Carefully check the oil level of the unit when it is stopped and at ambient temperature, add oil if needed. If the oil level is **ABOVE** the high level mark on the dipstick, have the oil analyzed for water content. Moisture in the oil may indicate that a seal is leaking. If so, replace the defective part immediately and change the oil. **DO NOT** fill above mark indicated on dipstick as leakage or undue heating may result. Also check coupling alignment to make certain that foundation settling has not cause excessive misalignment.
2. EVERY 2500 OPERATING HOURS OR NOT LESS THAN ONCE EVERY SIX MONTHS –
 - A. Oil Changes – For normal operating conditions, change gear R&O lubricants every six months or 2500 hours of operation, whichever occurs first. In dusty areas or where temperatures are high, more frequent changes may be required. Lubricant suppliers can test oil samples from the drive periodically and recommend economical change periods based on the rate of lubricant contamination and degradation.

If the drive is operated in an area where temperatures vary with the seasons, change the oil viscosity grade to suit the temperature.
 - B. **Regrease Purged seals** (see Figure 1.)

NOTE: Purged seals should be regreased whenever the grease shows signs of contamination. Pump fresh grease into the seal cavity while rotating the shaft until fresh grease can be wiped away. The low speed shaft can be reached by removing the shaft cover at the input side. See figure 1. for diagram. The high speed shaft can be reached through the panel (window) in the C-face adapter.



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Lubrication of Mixer Drive Size 200-220

1. Unit Lubrication

Read and carry out all instructions on lubrication plate and heed all warning tags. Determine the output rpm and minimum and maximum temperatures in which the drive will operate. Find the AGMA lubricant number from the following chart.

	Ambient Temperature	AGMA No.	Viscosity @ 104 °F SSU cSt	
Output RPM 80 and above	+15° to +60°F	4	626-765	135-165
	+50° to +125°F	5	918-1122	198-242
Output RPM below 80	+15° to +60°F	4	626-765	135-165
	+50° to +125°F	6	1335-1632	288-352

Mixer Size	Quantity in Quarts
200	4
210	6
220	6

Approximates only. Fill to level indicated on dipstick only.

Select an R&O oil from the table below which corresponds to the AGMA lubricant number previously determined. Lubricants listed in this manual are typical products only and should not be construed as exclusive recommendations. All mineral oil (R&O) lubricants must have a minimum viscosity index of 90.

AGMA Viscosity Grade	4	5	6
ISO viscosity Grade	150	220	320
Viscosity at 104° F SSU cSt	626-765 135-165	918-1122 198-242	1335-1632 288-352
Manufacturer	Lubricant	Lubricant	Lubricant
Amoco Oil Co.	Ind. Oil # 150	Ind. Oil # 220	Ind. Oil # 320
Ashland Oil, Inc.	100H ISO 150	100H ISO 220	100H ISO 320
BP Oil Co.	Turbinol T-150	Energol HL 220	Energol HL 320
Chevron U.S.A., Inc.	AW Machine Oil 150	AW Machine Oil 220	AW Machine Oil 320
Citgo Petroleum Corp.	Citgo Pacemaker 150	Citgo Pacemaker 220	Citgo Pacemaker 320
Conoco Inc.	Dectol R&O Oil 150	Dectol R&O Oil 220	Dectol R&O Oil 320
Exxon Company, U.S.A.	Terresstic 150	Terresstic 220	Terresstic 320
Gulf Oil	Harmony 150 or 150D	Harmony 220	Harmony 320
E.F. Houghton & Co.	Hydro-Drive HP 750	Hydro-Drive HP 1000	...
Imperial Oil Ltd.	Teresso 150	Teresso N 220	Teresso N 320
Kendall Refining Co.	Kenoil R&O 080EP
Keystone Div Pennwalt Corp	KLC-40
Lyondell Petrochemical(ARCO)	Duro 150	Duro 220	Duro 320
Mobil Oil Corp.	DTE Oil Extra Heavy	DTE Oil BB	DTE Oil AA
Petro-Canada Products	Harmony 150 or 150D	Harmony 220	Harmony 320
Phillips 66 Co.	Magnus Oil 150	Magnus Oil 220	Magnus Oil 320
Shell Oil Co.	Morlina 150	Morlina 220	Morlina 320
Shell Canada Limited	Tellus 150	Tellus 220	Tellus 320
Sun Oil Co.	Sun R&O Oil L150
Texaco Inc.	Regal Oil R&O 150	Regal Oil R&O 220	Regal Oil R&O 320

Note: speed reducer housing temperature will range from 130 to 180 °F during normal operation using the oils listed above. IF your reducer surpasses 180 °F, there may be cause for concern. If the unit is operated in an area where the temperatures vary with the season, change the oil viscosity to suit the season. For cold weather operation, use a light oil that will circulate freely at all times. The pour point of the oil should at least be 9 °F less than the minimum external temperature encountered. During hot weather, use a high viscosity oil that will not thin out and lose its lubricating qualities.



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Lubrication of Mixer Drive Size 200-220

2. Grease Lubricated Bearings

The upper and lower low speed shaft bearings are grease lubricated (see diagram below). The bearings should be greased with a NLGL #2 bearing grease selected from the following table.

Manufacturer	Lubricant
Amoca Oil Co.	Amolith Grease No.2
Ashland Oil Co., Inc.	Multilube Lithium EP Grease
BP Oil Co.	Energrease LS-EP2
Chevron U.S.A., Inc.	Industrial Grease Medium
Citgo Petroleum Corp.	Premium Lithium Grease
Conoco Inc.	EP Conolith Grease No. 2
Exxon Company, U.S.A	Unirex N2
E.F. Houghton & Co.	Cosmolube 2
Imperial Oil Ltd.	Unirex N2L
Kendall Refining Co.	Multi-Purpose Lithium Grease L-421
Keystone Div. Pennwalt Corp.	Zeniplex-2
Lyondell Petrochemical (ARCO)	Litholine H EP 2 Grease
Mobil Oil Corp.	Mobilith 22
Petro-Canada Products	Multipurpose EP2
Phillips 66 Co.	Philube Blue EP
Shell Oil Co.	Alvania Grease 2
Shell Canada Limited	Alvania Grease 2
Sun Oil Co.	Ultra Prestige EP2
Texaco Inc.	Premium RB Grease
Unacol 76 (East & West)	Unoba EP2

The greases listed above are recommended for a temperature range between 0°F and 200°F.

3. Grease Purged Seals

The high speed shaft and upper low speed shaft are furnished with grease purged seals (See Figure 1.) which minimize the entry of taconite and other abrasive dusts into the unit. Utilize one of the recommended greases from the table above in section 2.

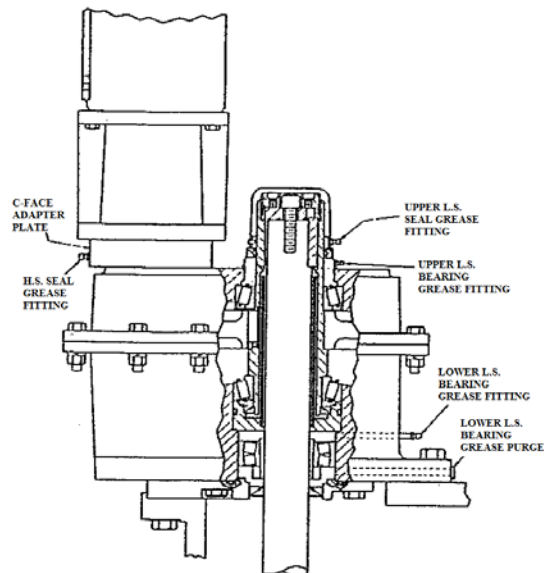


Figure 1.



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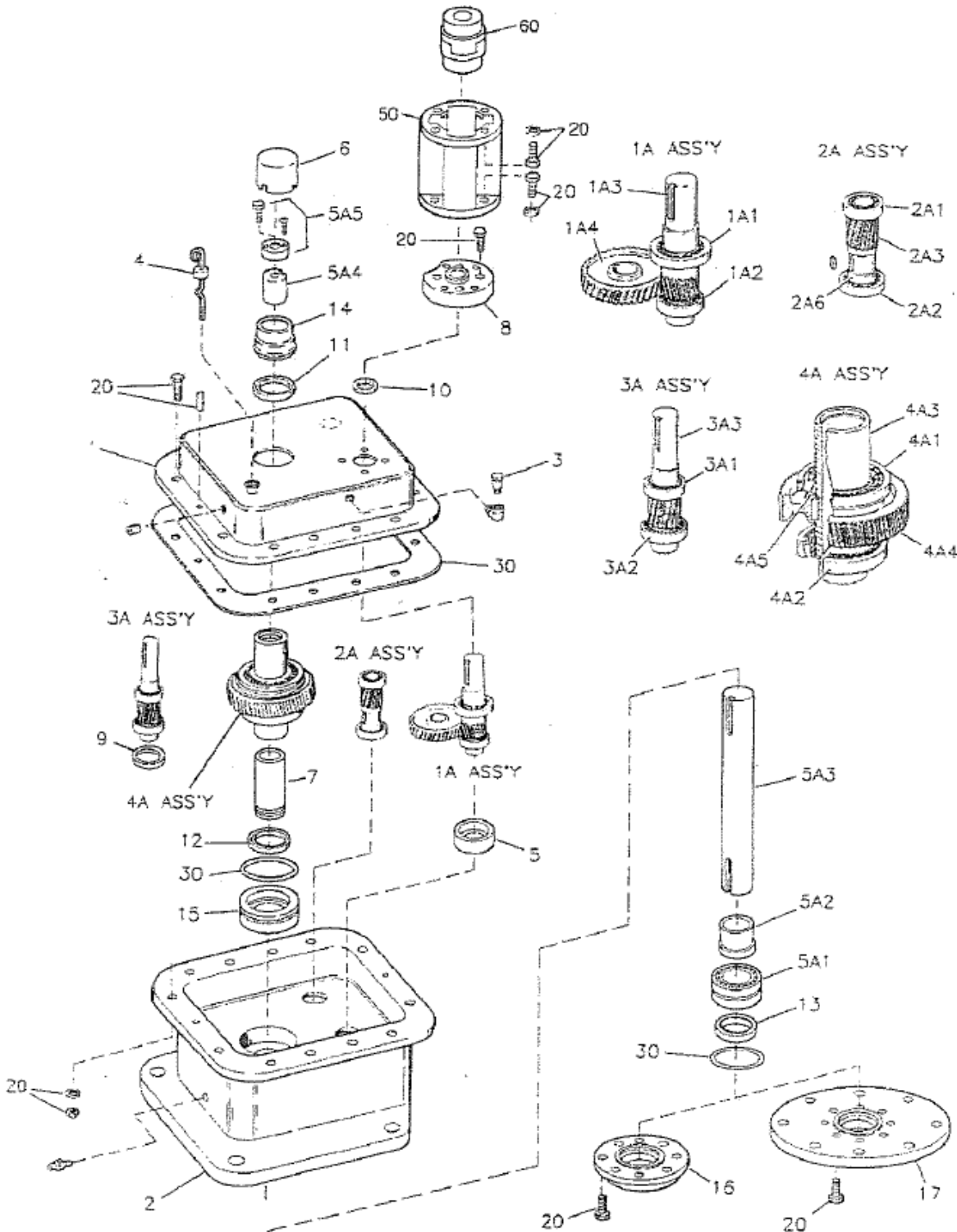
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Mixer Drive Parts Guide for Sizes 200-220 (Top Entry Only)

1. Double Reduction Units – Ratios 6.0 – 31.0





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Mixer Drive Parts Guide for Sizes 200-220 (Top Entry Only)

Ref. Number	Description
5A4	Bushing
5A5	Thrust Plate
1A	Shaft Assy, HS
1A1	*Upper HS Bearing
1A2	*Lower HS Bearing
1A3	HS Pinion & Shaft
1A4	HS Gear
2A	Shaft Assy. LS Pinion
2A1	Bearing, LS Pinion Upper
2A2	Bearing, LS Pinion Lower
2A3	Pinion & Shaft Assy., LS
2A6	Spacer

NOTES:

1. Quantities are (1) unless otherwise specified.
2. Recommended spare parts are designated by (*).
3. Consult factory for pricing & Availability