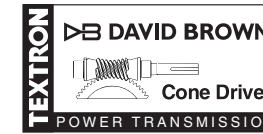


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## Lubrication Information for Cone Drive Double-Enveloping Worm Gearsets

**Note:** Lubrication is very important for successful operation of Cone Drive gearsets. Inadequate lubrication can result in increased power consumption, added maintenance and gearset failure. Please review the following recommendations and the "Approved List of Lubricants" shipped with all Cone Drive gearsets. Cone Drive recommends only those lubricants listed or any lubricant which meets all the requirements of AGMA (American Gear Manufacturers Association) 9005-D94 "Lubrication of Industrial Enclosed Gear Drives" as it applies to double enveloping worm gearing. Use of other lubricants can result in gearset failure which will not be covered under warranty. See reducers nameplate for the recommended lubricant.

**IMPORTANT:** In any applications of Cone Drive Products where breakage, damage, disconnection, any other malfunction of any drive train component, or excessive wear could result in personal injury or property damage, a fail safe device capable of stopping and holding the load in the event of such an occurrence must be incorporated after the drive train.

- Type of Oil.** Lubricating oils for use in gear units should be high quality well refined steam cylinder petroleum oils. They must not be corrosive to gears, to ball, roller or sleeve bearings; they must be neutral in reaction; free from grit or abrasives; and have good defoaming properties. As they may be subject to high operating temperatures, they must have good resistance to oxidation.  
 For worm-gears additions of 3 percent to 10 percent of acid-less tallow or similar animal fats are desirable.
- Ambient Temperature.** The oils shown on the list of approved lubricants shipped with all Cone Drive gearsets are for use in an ambient temperature range of approximately 15°F to 100° F with the low end of the range depending on the pour point of the specific oil used. If the ambient temperature will be below or above this range please contact Cone Drive for specific recommendations on proper lubricant as well as proper oil seal and shim materials.
- Sludge.** It is necessary that the oil be clean and free from sludge at all times to obtain long life from gear unit. Sludge in gear units may be caused by excessive heat, from dust and dirt and other contaminants and by the presence of moisture or chemical fumes. Therefore, every precaution should be taken to prevent water and foreign particles from entering the gear case.
- Oil Change.** If an approved synthetic lubricant is used, it should be changed after 5000 hours of operation or once per year, whichever occurs first. If a recommended steam cylinder oil is used, the change interval should be after 2500 hours of operation or every six months, whichever occurs first. These change intervals are recommended for units operating under favorable conditions. Where operating conditions are severe, such as a rapid rise and fall in temperature of the gear case with accompanied sweating of the inside walls and resulting formation of sludge, or where operation is in moist or dusty atmospheres, or in the presence of chemical fumes or extended running at sump temperatures in excess of 180° F, it may be necessary to change the oil at intervals of one to three months. It is recommended a sampling program be established with your lubricant manufacturer where reducers are exposed to the severe operating conditions, mentioned above.
- Oil Level.** Oil level should always be checked with the unit stopped.
- Extreme Pressure (E.P.) Lubricants.** Extreme Pressure (E.P.) lubricants or cylinder oils with sulphur-phosphorus additives are not acceptable and should not be used with worm gearing.

### APPROVED SYNTHETIC LUBRICANTS:

MANUFACTURER	BRAND NAME
Distributed by Cone Drive expressly from Mobil Oil Company	*Uptime SHC634 Synthetic Lubricant
Henkel Corp./Emery Group	*Emery-2843 Synthetic Lubricant
Keystone / Atochem	*Keystone KSL-367 Synthetic Lubricant
<b>Mobil Oil Corp.</b>	*Mobil SHC634 Synthetic Lubricant
Texaco Lubricants Co.	*Pinnacle 460 Synthetic Lubricant

### NOTES:

- Note #1** . . . The listed synthetic lubricants are acceptable for use as an AGMA #7, AGMA #8 and AGMA #8A. AGMA #7 lubricants are primarily used in force feed lubrication systems or other special applications.
- Note #2** . . . Worm gears operating at a sliding velocity in excess of 10 m/s (2,000 ft. per min.) may require force feed lubrication. For force feed lubrication recommendations, see Cone Drive Product Catalog or contact Cone Drive Engineering.
- Note #3** . . . Major oil companies, not on the above list, do not have products which meet the requirements of AGMA. #9005-D94
- Note #4** . . . **Manufacturers** listed above, in bold print, have product available world wide. Contact a listed manufacturer for availability in your area.
- Note #5** . . . All lubricants are listed per the manufacturers recommendation.
- Note #6** . . . (\*) This is a special lubricant, not an AGMA compound
- Note #7** . . . Centistoke viscosity values are at 40 centigrade
- Note #8** . . . Pour point of the oil used should be 5° C (9° F) less than the minimum ambient temperature expected. For special temperature or operating conditions, contact Cone Drive Engineering Department for the proper lubrication selection.
- Note #9** . . . AGMA specifications require a viscosity index (VI) of 90 (min.). However, lubricants listed with a VI of less than 90 may be used if a recommended lubricant with a VI of 90 (min.) is not available.

#22573

## Approved List of Lubricants for Cone Drive Double-Enveloping Worm Gearsets

CENTER DISTANCE	WORM SPEED (RPM)	†AMBIENT TEMPERATURE		‡ WORM SPEED ABOVE (RPM)	†AMBIENT TEMPERATURE	AGMA LUBRICANT NUMBER	VISCOSITY RANGE		
		-10°C to +10°C (-14°F to 50°F)	+10°C to +50°C (50°F to 125°F)				ASTM SYSTEM	ISO GRADE	
Up to 6" inclusive	0-700	8 Comp.	8A Comp.	700	8 Comp.	7 Comp.	125-150	1919-2346	ISO460 (414-506)
Over 6" to 12"	0-450	8 Comp.	8A Comp.	450	8 Comp.	8 Comp.	150-190	2837-3467	ISO680 (612-748)
over 12" to 18"	0-300	8 Comp.	8A Comp.	300	8 Comp.	8A Comp.	190-250	4171-5098	ISO1000 (900-1100)
Over 18" & above	0-200	8 Comp.	8A Comp.	200	8 Comp.				

MANUFACTURER	AGMA #8 COMPOUND (NON-E.P.)			AGMA #8A COMPOUND (NON-E.P.)		
	BRAND NAME	P.P.F.	SUS@210°F	BRAND NAME	P.P.F.	SUS@210°F
Distributed by Cone Drive expressly from Mobil Oil Corp.	Uptime 600W Super Cylinder Oil	20	155	Uptime Extra Hecla Super Cylinder Oil	30	198
Amoco	Cylinder Oil 680	15	200	Cylinder Oil 1000	15	243
BP Oil	NOT AVAILABLE IN THE U.S.			Energol DC-C 1000	6	1000 CST
Behnke Lubricants Inc.	Jax Super Cylinder	30	190	Jax Super Cylinder	15	243
<b>Bel-Ray Company, Inc.</b>	Steam Cylinder Oil 150	5	167	Steam Cylinder Oil 250	10	205
Bel-Ray Company, Inc.	No-Tox Worm Gear Lube (FOOD GRADE H1) Oil ISO 680	5	216	No-Tox Worm Gear Lube (FOOD GRADE H1) Oil ISO 1000	5	292
Cato Oil and Grease Corp.	Mystik Power Lube #680	5	212	Mystik Power Lube #1000	5	315
Century Lubricating Oils, Inc.	Garwal #680	35	183			
Chevron Products Comp.	Cylinder Oil W-ISO #680	10	191	Cylinder Oil W-ISO #1000	10	252
<b>Citgo Petroleum Corp.</b>	Cylinder Oil #680-7	15	193			
<b>Conoco Inc.</b>	Inca Oil #680	30	165	Inca Oil #1000	35	211
Dryden Oil Company Inc.	Worm Gear Oil #680	20	180	Worm Gear #1000	20	222
Engineered Lubricants	Enlubol SCO-3400	15	685CST	Enlubol SCO-193 Comp.	15	916CST
<b>Exxon Company</b>	Cylesstic TK 680	20	184	Cylesstic TK 1000	30	227
Fina Oil Company	Cylan Steam Cyl. Oil 680	20	175			
<b>Fiske Brothers Refining</b>	Lubriplate CP-8	22	160	Lubriplate CP-8A	35	230
<b>Fiske Brothers Refining</b>	*Lubriplate SPO-288	20	173			
<b>Huls</b>	PQ-AGMA#8	10	175			
<b>Imperial/Esso Oil</b>	Cylessso TK 680	37	680 CST	Cylessso TK 1000	37	925 CST
<b>Kendall Motor Oil Company</b>	Kendco 155 Comp.	25	177	Kendco 206 Comp.	35	229
<b>Lubrication Engineers</b>	680 Almasol	15	191			
Lyondell Lubricants	Modoc #175	30	190			
<b>Mobil Oil Corp.</b>	600W Super Cyl. Oil	20	155	Extra Hecla Super Cyl. Oil	30	200
Pennzoil Products Company	Cylinder Oil #680	30	680 CST	Cylinder Oil #1000	30	1000 CST
Pennzoil Products Company	Cylinder Oil #6-NR	36	680 CST			
Phillips 66 Company	Hector 630-S	10	172			
Primrose Oil Company				243 Cylinder Oil #8A	15	220
Schaeffer Mfg. Company	#147 Steam Cylinder Oil	10	190			
<b>Shell Oil Products Company</b>	Valvata J-680	20	650 CST			
Sunoco	Sun Gear Oil 8C	10	677			
Texaco Lubricants Company	Vanguard 680	20	190	Vanguard 1000	25	220