

Paharpur Gear Reducer Lubricant Manual



Paharpur Cooling Towers Ltd.
An ISO 9001 Company

Paharpur Gear Reducer Lubricants

It is critical to the operational life of a gear reducer to utilize a satisfactory lubricant that includes the correct viscosity grade and additives. Additionally, it should be within the specific limitations of contaminants and fill volume throughout the equipment's lifetime. Recommended list of lubricants, commercially available for use in Paharpur gear reducers are listed in Table IA, Table IB, Table IIA and Table IIB. Seasonal temperature changes may require one viscosity of oil for summer operation and another for winter operation. Refer to respective tables for seasonal selection information. If lubricants, other than those listed, are used, they must not contain any additives, such as detergents or EP additives which are adversely affected by moisture and could reduce the service life of the gear reducer.

Mineral lubricants, shall be in accordance with the latest revision of AGMA 9005 standard requirements for rust and oxidation inhibited gear oil. It can be hydraulic or mineral type. It should be oxidation, corrosion and rust inhibited, antifoam treated and should have good demulsification characteristics. Mineral oils shall preferably be used when the ambient temperature i.e. the dry bulb temperature in the immediate vicinity of the installed gear reducer is less than 44 Deg. C (110 Deg. F). At higher temperature, lubricant life will be reduced and a continuous monitoring program is recommended.

Synthetic lubricants offer advantages of a broader operational temperature range, reduced friction, and the ability to maintain a higher film strength which can extend the service life of the gear drive. When the operating temperature exceeds 82 deg. C (180 deg. F) or the gear reducer is started when the ambient temperature is below -7 deg. C (20 deg. F), a synthetic lubricant is recommended. Synthetic lubricants can be made of various base stocks comprised of synthetic hydrocarbon. This lubricant shall be compatible with elastomeric materials like fluorocarbon, polyacrylate, polyurethane, silicone, ethylene/acrylic, chlorinated polyethylene, polysulfide and Buna-N. The oils should be wax free, oxidation, corrosion and rust inhibited, antifoam treated and should have good demulsification characteristics. Do not use synthetic lubricant made from ester base stock. Change intervals for synthetic lubricants should not be extended beyond the change interval for mineral oils without a comprehensive monitoring program.

Change Interval

- a. First fill oil in a newly installed gear reducer shall be replaced after 7 days or after 150 hours of operation whichever is earlier. It is recommended that the oil shall be drained when it is at or near its operating temperature. Refill the gear reducer with the recommended type and amount of lubricant.
- b. Check oil level weekly and check sludge and water contamination monthly. If sludge is present or there is a condensation of water change the oil immediately.
- c. Subsequently, the oil shall be changed every 3000 hours or every six months of operation, whichever comes first. Shorter change of intervals of 2 to 3 months may be required if the gear drive is subjected to unusual operating conditions such as very moist atmosphere, rapid temperature change, consistent high operating temperature or any conditions that tend to contaminate the oil or promote the formation of sludge and deposits inside the gear reducer case. Extending the change period may be acceptable based on system downtime, or environmental consideration of the used lubricant. This can be done by proper implementation of a condition monitoring program (see guidelines for condition monitoring program below)
- d. Refer to the relevant gear reducer service manual for further information regarding lubricant maintenance.

Guidelines for condition monitoring

The following on-site analysis are recommended to be carried out on a continuous basis and records to be maintained to observe trends and spot adverse changes in the state of the lubricants. The on-site tests are simple to carry out and allow the user to check the condition of the oil as often as necessary and can be performed to supplement elaborate laboratory tests.

Lubricant Sampling : The sample should be representative of the bulk of the lubricant in operation. Discard first portion of effluent emerging from the drain line and capture a portion of the oil from the oil sump.

Appearance Test: Place a sample of lubricant in a tall, narrow clean glass bottle. Compare the sample to a new oil sample taken in a same type of container. The oil should appear clear. A hazy, cloudy or milky appearance suggest the presence of water. If so, carry out the "crackle test". A dark end colour may indicate oxidation or contamination with very fine wear particles. Titling the bottles (new and used oil samples) simultaneously will give an indication of

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changes in viscosity which could be related to oxidation or shear losses. Look for sediment in the bottom of the sample bottle – if present, run the sedimentation test.

Odour Test : Carefully sniff the oil sample and compare it to the sample of new oil. Oils that have oxidized noticeably will have a burnt odour or smell acrid, sour or pungent.

Sedimentation Test : Place a small sample of oil in a clean white plastic cup and allow it to stand covered for two days in a dust free area. Carefully pour off all but a few millimeter of the cup. If any particles are visible at the bottom of the cup contaminants are present. If the particles respond to a magnet under the cup then these contain ferrous debris. Otherwise they are sand, dirt or non ferrous debris.

Crackle Test : Place a small drop of the oil on to a hot plate at 135 deg. C. If the sample bubbles, it is possibly water is present in excess of 0.05% (500 ppm). If the sample bubbles and crackles, the water content can be in excess of 0.1% (1000 ppm). This should be confirmed with laboratory analysis.

Recommended list of Lubricant Oils for Paharpur make gear reducer

The following list of lubricants is provided as reference only. These products have been recommended by their respective manufacturers and are acceptable for use in Paharpur spiral bevel and / or helical gear reducer for cooling tower and heat exchanger applications. This list is not an attempt to include all the lubricants that meet the requirements of this manual.

I. INTERNATIONAL MANUFACTURERS AND THEIR GRADES

Table IA: NORMAL DUTY MINERAL OIL

Supplier	Air temperature at gear reducer equal to or less than 44 deg. C	Air temperature at gear reducer above 44 deg.C
ISO Viscosity Grade	VG 150	VG 220
Ashland Inc.	Valvoline R & O 150	Valvoline R & O 220
BP Lubricants	Turbinol HL-C 150	Turbinol HL-C 220
Chevron USA, Inc.	Regal R&O 150	Regal R&O 220
Citgo Petroleum Corp.	Pacemaker 150	Pacemaker 220
Citgo Petroleum Corp.	Pacemaker T 150	-
Conoco Philips	Multipurpose R&O 150	Multipurpose R&O 220
Exxon Mobil Corp.	Teresstic 150	Teresstic 220
Exxon Mobil Corp.	DTE Oil Extra heavy	DTE Oil BB
Lubricationt Engineers Inc.	Monolec 6404	Monolec 6405
Petronas	Gear STR 150	Gear STR 220
Shell	Morlina 150	Morlina 220
Shell	-	Morlina SD 220
Total	-	Carter VP/CS 220

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Table IB: SEVERE DUTY SYNTHETIC OIL

Supplier	Air temperature at gear reducer equal to or less than 44 deg. C	Air temperature at gear reducer above 44 deg. C
ISO Viscosity Grade	VG 150	VG 220
Chevron USA, Inc.	Clarity 150 synthetic	Clarity 220 synthetic
Citgo	Citgear Synthetic HT 150	Citgear Synthetic HT 150
Conoco Philips	Syncon R&O 150	Syncon R&O 220
Exxon Mobil Corp.	SHC 629	SHC 630
Shell	SHELL MORLINA S4 B 150	SHELL MORLINA S4 B 220

II. DOMESTIC MANUFACTURERS AND THEIR GRADES

Table IIA : NORMAL DUTY MINERAL OIL

Supplier	Air temperature at gear reducer equal to or less than 44 deg. C	Air temperature at gear reducer above 44 deg. C
ISO Viscosity Grade	VG 150	VG 220
IOCL	SERVOSYSTEM 150	SERVOSYSTEM 220
HPCL	ENCLO 150	ENCLO 220
BPCL	MAK HYDROL 150	MAK HYDROL 220
GULF	GULF HARMONY 150	GULF HARMONY 220
SHELL INDIA	SHELL MORLINA S2 B 150	SHELL MORLINA S2 B 220
EXXON MOBIL	MOBIL GEAR 600 XP 150	MOBIL GEAR 600 XP 220

Table IIB : SEVERE DUTY SYNTHETIC OIL

Supplier	Air temperature at gear reducer equal to or less than 44 deg. C	Air temperature at gear reducer above 44 deg. C
ISO Viscosity Grade	VG 150	VG 220
IOCL	SERVOSYNGEAR 150	SERVOSYNGEAR 220
HPCL	HYCOMSYN 150	HYCOM VDLT 220
GULF	GULF EP LUBRICANT SY 150	GULF EP LUBRICANT SY 220
SHELL INDIA	SHELL MORLINA S4 B 150	SHELL MORLINA S4 B 220
EXXON MOBIL	SHC 629	SHC 630

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Note

1. Sr. 36 gear reducer require ISO VG 220 grade of lubricant for all temperature application.
2. It is very essential that different type/grade/make of oil are never mixed. If it becomes essential to change the type of oil and/or supplier, the old oil should be removed from the gear reducer and the gear reducer shall be cleaned thoroughly.
3. The maximum permissible moisture contain in the gear reducer oil is 0.1% by weight.
4. The oil shall be preserved away from dust and other contaminants.
5. The responsibility for use of lubricants other than as listed above rests with the customer/owner and the lubricant supplier.

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