SERVICE BULLETIN 40

GEAR LUBRICATION OILS

Manufacturer (Contact No.)	Lubricant Name	Severe Service	Extreme Service	Notes
AMPOL / CALTEX (1300 364 169)	AP 85W-140	☑		
	RPM Borate EP460		☑	Mineral oil base. (Alternative: RPM Borate EP320.)
	Meropa Synthetic 320EP		☑	
	Synthetic Wheel Motor Lubricant EP460		☑	
CASTROL (1300 557 998)	EPX 85W-140	☑		RECOMMENDED FOR SLASHERS & MOWERS etc.
	HSR 460 U/L		☑	
MOBIL (1300 458 237)	Mobilgear 600 XP 460	☑		Installed on FALC machines. Replaces Mobilgear 634.
	Mobilgear SHC 460		☑	Synthetic.
	Mobil SHC629		☑	Synthetic. Specified for JAYLOR Auger gearboxes.
OPTIMOL (1300 557 998)	Optigear BM460		☑	RECOMMENDED FOR HIGH POWER ROTAVATORS
	Optigear Synthetic A320		☑	RECOMMENDED SYNTHETIC LUBRICANT FOR HIGH POWER ROTAVATORS
SHELL (1300 134 205)	Spirax HD 85W-140	☑		
	Gear Oil MJX 140		☑	
	Shell Gear Oil B320		☑	

ROTAVATORS

Lubricant Specification

Lubricant specifications for Rotavators typically call for an SAE 140EP gear oil. Experience is that a good quality 140EP gear oil is adequate in many instances, however in more arduous applications (high tractor power, heavy soils deeply worked, high ambient temperatures or long work hours) better lubrication is often necessary.

Current Practices in Relation to the 'Running In' Period

Traditionally the first 100-200 hours work was a 'running in' period where the machine is operated at less than full load, this allowed gear teeth to 'bed in' by wearing progressively until the full face of the tooth became polished. This process effectively made wear based adjustments to gears to compensate for deflections in the supporting structure created by the working loads.

Today, full power loads are applied from the start-up and gears are not given a 'running in' period - the result can be localized, pitting of gear teeth while other areas of the tooth face show little evidence of working. This pitting, if unchecked may progressively spread across the tooth face eventually causing the tooth to fail completely. If this failure is observed, drain oil, check all components for wear or other damage, check / adjust bearings to correct preload and install Optimol BM 460 gear oil.

Recommended Lubricants

If the Rotavator is performing well (gears are not pitting and show evidence of good polished finish across the tooth face) continue using a good quality SAE 140EP gear oil and recommended change intervals.

If any pitting is observed, (replace damaged gears as necessary) and switch lubricant to Optimol BM 460 gear oil.

Castrol **Optigear BM460** is the standard lubricant installed and recommended for the AH, CH & RC series Rotavators.

- This is a **mineral base** gear oil with a **very good EP additive package**.
- As it is a mineral oil, its realistic sustainable upper operating temperature is 95°C.
  Typical life expectation at this temperature is 1000 hours.
- Maximum temperatures up to 120°C can be sustained for short periods, however the life of the oil halves for each additional 10° over 95°C.

Synthetic oil can be installed.

- NOTE: Unless the additive package in the selected synthetic oil is comparable in performance to that in the Optigear BM460, this could be a backward step. Whilst the synthetic base can sustain higher continuous operating temperatures than a mineral base oil, a synthetic oil without a good EP additive package may result in oil temperatures higher than desirable.
- Synthetic oils (SHC – synthetic hydrocarbon or PAO - Polyalphaolefin) typically can sustain long term operating temperatures of approximately 115°C. The typical life expectation at this temperature is 1000hrs, which is similar to the currently used mineral base oil at 95°C.
- Similar to mineral base oils, higher temperatures can be sustained for short periods, however the life of the oil halves for each additional 10° over 115°C.
- At this stage, the only recommended synthetic oil is Castrol Optigear Synthetic A320. This is a synthetic base gear oil with an additive package similar to that in the BM460 gear oil.

Recommended Maximum Operating Temperatures

Mineral Oil Lubrication								
Acceptable (Typical: 85°C.)				Tolerable (i)		Avoid		
60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C
Theoretical Oil Life in Hours (ii) →			1000	500	250	125		

Synthetic Oil Lubrication								
Acceptable						Tolerable (i)		Avoid
60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C
Theoretical Oil Life in Hours (ii) →					1000	500	250	125

NOTES

(i) Working at these temperatures is acceptable for shorter periods – however note oil life progressively falls due to deterioration by oxidation.

(ii) 'Oil life' is not to ultimate failure. 'Life' is the point at which oxidised (deteriorated) base stock exceeds the recognised standard of 6% - at this point its reduced lubrication properties start to be noticeable.

(iii) Oil seals are typical recommended as suitable for operation up to 120°C. Operation above 120°C is tolerable, however similar to oil, their life expectation falls away with increasing temperature.

Oil Change Interval

Oil changes are required to replace deteriorated lubricant with new. Deterioration is usually as a consequence of one or more of the following:

- Contamination of the lubricant with wear metal or other debris.
- Moisture ingested into the gearbox, usually by condensation.
- Oil breakdown from excessive operating temperature – oil becomes black and/or smells burnt.

In relation to the **Primary Gearbox,** if the above deterioration causes can be avoided or reduced by a combination of the following, the working life of the oil can be extended, however do not extend change intervals beyond either 1000 hours or 3 years without very careful monitoring of the oils condition.

- Filters, strainers or magnets to clear wear particles and other contaminants from the oil.
- Filtering breathers to prevent external contaminants entering the gearbox. (Including closed breather systems.)
- Storing machine under cover and away from excessive temperature changes to prevent moisture entering the gearbox.
- Operation at lower working temperature by either lower input power or alternatively the addition of an oil cooling system.

In relation to the **Side Drive(s),** due to the relatively low volume of oil plus the fact that any wear or debris contaminants are likely to collect at the bottom of the side drive in the area of both the rotor drive bearing and face seal it is recommended that an initial oil change be completed at 50 hours then regularly at 250 hours or annually. Note that when changing the oil, it is recommended that the side drive cover(s) be taken off, rather than removing oil via the drain plug, as the transmission components can be readily examined.

ROTASLASHERS, MOWERS, FLAIL MULCHERS etc.

Typically these units do not have the same power demands and duty cycle of a Rotavator and a more conventional SAE 140EP gear oil is acceptable. Howard Australia recommends Castrol EPX 85W - 140 for most of these applications, however if the application is arduous or lubricant problems are suspected the information above for Rotavators is equally applicable to other similar gear driven transmission systems.

GENERAL NOTES:

- Lubricant manufacturers offer a variety of oils (including synthetic) with alternative EP additives, friction modifiers, corrosion inhibitors etc. At this stage Howard can not offer any performance guarantees on these although many may be equally good lubricants. We would appreciate any feedback from those who have installed alternative lubricants with successful results.
- Avoid additives sold separately as a treatment for other oils. Few manufacturers will offer any warranty or defect analysis of oils that have other manufacturers additives. If an additive is required, the oil manufacturer will usually have a suitable oil that includes their tested and proven additive.
- Top of the line oils will not make a machine stronger (and prevent shaft torque failures for example), however in some situations, where machines are overpowered, the wear rates of certain components may be reduced to give acceptable machine life.
- These gear oils are not suitable for use as engine oils.
- These gear oils cannot generally be used to replace self-levelling greases. However they can be added to compatible brands to increase the quantity and quality of the lubricant available.
- Regular checks of the oil level as indicated in the maintenance schedule are essential.
- If in doubt - refer to Howard Australia Pty. Ltd. or the lubricant manufacturer.

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