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ELECTROPOWER GEARS STORAGE, INSTALLATION, MAINTENANCE AND LUBRICATION OF GEARBOXES

1. Storage

1.1 In all instances the units are to be kept in an environment free from vibration, excessive humidity, dust and extremes of temperature.

1.2 Before dispatch all units suitable for oil lubrication will have been flushed with a rust preventative oil. This will give adequate protection for **12 months** under the conditions given in 1.1 In order to redistribute oil and prevent adhesion of the oil seals to the shafts, it is necessary to rotate the unit either by hand or under power at least every three months. After every **12 months** the unit must be re-flushed with a suitable rust preventative oil such as **SHELL ENSIS N**.

1.3 If the unit is installed and is to be run intermittently for commissioning purposes, it should be filled with the specified grade oil to the correct level (Table 1), and run at full speed for approximately 5 minutes once every **3 months**.

1.4 Grease filled units need only be rotated either by hand or under power every three months.

1.5 Where units are exposed to fluctuations in temperature that may result in internal condensation, units may be completely filled with oil. The oil should be drained and replaced every **12 months**. Where this is impractical the installation of heaters inside the unit may be necessary. Consult the manufacturer for suitable wattage.

2. Installation

2.1 Installation and connection should be carried out by a competent Mechanical Engineer.

2.2 The units should be firmly fixed to a rigid surface and correctly aligned to avoid distortion of the housing and localized stresses. Hollow shaft mounted units require an **h6** or **j6** tolerance shaft and must be located by gearbox shaft only.

2.3 Any coupling, pulley or sprocket must be fitted by screw pressure or heat shrinking to the shaft and not pressed or hammered on. Recommended bore sizes is **H7** or **K7** where high radial loads are transmitted. The mounting faces should be given a light coat of suitable grease or copper anti-seize compound before fitting. Always fit pulleys and sprockets as close as possible to the housing in order to reduce the overhung loads acting on the output shaft and bearings. Never use rigid couplings except on free end shafts, i.e. mixers and aerators. Ensure coupling run out does not exceed manufacturer's recommendations and that flat or V belts are correctly aligned and not over tightened. Where there is a risk of jamming, a slip or Torque limiting coupling is recommended to prevent damage to the gearbox.

2.4 Units are generally supplied without oil. Fill to correct level with correct grade lubricant. Ensure Breather plug if supplied is fitted at highest point of unit.

2.5 When unit is fitted with an electric motor ensure adequate clearance is allowed at fan end and do not obstruct air flow path. Motor should only be connected by a competent Electrician. For full load current and voltages see motor nameplate. A connection diagram should be supplied with the motor.

3. Maintenance

3.1 Regularly check oil level via solid level plug or transparent level plug and top up if required. Ensure Breather plugs if fitted are functioning to prevent pressure build up which can cause leaks. Under normal operating conditions the only maintenance necessary is to periodically renew the gearbox lubricant and replace bearings and seals when signs of wear become evident. Gear life will be dependent on operating conditions and a minimum life of **10,000 hours** can be expected although actual life may exceed this by many times. Gears and internal components should be replaced as necessary when indicated by loss of performance or increase in noise and vibration level.

3.2 Electric motors and Brakes should be maintained in accordance with manufacturer's instructions. Isolate power supply to motor before commencing any routine cleaning or maintenance work.

4. Oil Lubrication

4.1 Gearboxes are normally supplied with no oil and must be filled to the correct level before use. An oil level glass or marked plug is fitted in the appropriate position. If no mounting position is stated on order, unit will be supplied with level plug and breather positioned for B3 or V1 mounting. To prevent pressure build up units are normally supplied with breather plugs which must be kept clear and in uppermost position. Overfilling, high input speeds or incorrect lubricant may cause leakage through breather. Alternative breathers are available if required. Oil in a new unit should be drained and replaced after first **500** hours of operation. Subsequent oil changes are recommended at **5000** hour or at **24** month intervals. Oil should be drained when warm and use of flushing oil is recommended especially at first oil change. A suitable flushing oil is **SHELL VITREA 22**. If synthetic lubricant is used oil changes may be increased to every **10000** hours or **48** months. **DO NOT** use flushing oil with synthetic lubricant. The grades and approximate quantities of oil are given in tables 1 and 2. These apply for an ambient temperature range of **0° to 40°C**. Where ambient temperature is outside this range please refer to manufacturer. When units are compounded the higher viscosity oil should be used for all component gearboxes. Oil quantities can be obtained by treating component gearboxes as individual units.

e.g. **ESR13** compound gearbox

Primary gearbox ESR1	ISO VG460	1.7 litres
Secondary gearbox ESR3	ISO VG460	8.6 litres

Equivalent gear oil viscosity grades;

ISO grade	SAE grade	AGMA grade
220	EP90	5E
320	EP120	6E
460	EP140	7E
680	EP140	8E

Table 1: Oil quantities EPG units

Gearbox	ISO Oil reference	Horizontal mounted Litres	Vertical mounted Litres
ESR50	220	0.43	0.49
ESR00	220	0.8	1
ESR1	220	1.7	2
ESR2	460	3.5	4.4
ESR3	460	8.6	9.7
ESR35	460	12.4	17.6
ESR4	460	20.5	25
ESR45S	460	18.2	23.5
ESR425	680	52	66
ESR45	680	88.5	102
ESR6	220	0.36	0.43
ESR7	220	0.85	1.1
ESR8	460	1.45	2
ESR9	220	0.17	0.17
ESR10	460	0.43	0.43
ESR11	460	1	1
ERA33	460	3.5	V5 4.3 / V6 3.5
ERA44	460	4.5	5.7
ECR1	220	-	2
ECR2	460	-	4.4
ECR3	460	-	9.7
ECR35	460	-	17.6
ECR4	460	-	25
ECR425	680	-	66
ECR45	680	-	102

Note: All oil quantities given are nominal and will vary dependent on ratio. All lubricating oil used for EPG gearboxes must be of an **Extreme Pressure (EP)** type.

Table 2: Oil manufacturers/suppliers recommended grades Standard mineral and Synthetic.

Manufacturer/supplier	Oil type	ISO VG220	ISO VG460	ISO VG680
BP	Standard	ENERGOL GRXP220	ENERGOL GRXP460	ENERGOL GRXP680
CASTROL	Standard	ALPHA SP 220	ALPHA SP 460	ALPHA SP 680
CENTURY	Standard	CENTILUBE F76	CENTILUBE H76	CENTILUBE S76
CHEVRON	Standard	NL GEAR COMP 220	NL GEAR COMP 460	NL GEAR COMP 680
DUCKHAMS	Standard	GALEX EP220	GALEX EP460	
ESSO	Standard Synthetic	SPARTAN 220 GLYCOLUBE 220	SPARTAN 460 GLYCOLUBE 460	SPARTAN 680 GLYCOLUBE 680
FINA	Standard	GIRAN L220	GIRAN L460	GIRAN L680
GULF	Standard	EP LUB. HD 220	EP LUB. HD 460	EP LUB. HD 680
KLUBER	Standard Synthetic Synthetic	KLUBEROIL GEM1-220 KLUBERSYNTH GEM4-220 KLUBERSYNTH GH6-220	KLUBEROIL GEM1-460 KLUBERSYNTH GEM4-460 KLUBERSYNTH GH6-460	KLUBEROIL GEM1-680 KLUBERSYNTH GEM4-680 KLUBERSYNTH GH6-680
LUBRICATION ENG.	Standard	ALMAGARD 607	ALMAGARD 608	ALMAGARD 609
MOBIL	Standard Synthetic	MOBILGEAR 630 MOBILGEAR SHC 220	MOBILGEAR 634 MOBILGEAR SHC 460	MOBILGEAR 636
OPTIMOL	Standard Synthetic	OPTIGEAR 220 OPTIGEAR BM	OPTIGEAR 460 OPTIGEAR BM	OPTIGEAR 680 OPTIGEAR BM
Q8	Standard	GOYA 220	GOYA 460	GOYA 680
ROCOL	Standard	SAPPHIRE HI-TORQUE 220	SAPPHIRE HI-TORQUE 460	SAPPHIRE HI-TORQUE 680
SHELL	Standard Synthetic	OMALA 220 TIVELA SB	OMALA 460 TIVELA SD	OMALA 680 TIVELA SD
TEXACO	Standard	MEROPA 220	MEROPA 460	MEROPA 680
TOTAL	Standard	CARTER EP220	CARTER EP460	CARTER EP680

Table 3: Oil manufacturers/suppliers recommended grades Food, Pharmaceutical and Cosmetic.

Manufacturer/supplier	ISO VG220	ISO VG460	ISO VG680
KLUBER US FDA & USDA H1 Approval	KLUBEROIL 4UH1-220	KLUBEROIL 4UH1-460	KLUBEROIL 4UH1-680
MOBIL US FDA Approval	DTE FM220	DTE FM460	
SHELL US FDA Approval	CASSIDA GL220	CASSIDA GL460	
SLIPSTREAM LUBRICANTS Selective Services Ltd PO Box 3 Bexhill-on-sea Sussex TN39 4JF	GF 220	GF 460	GF 680

These tables give manufacturers trade names for those oils meeting relevant requirements for gear oil. Before mixing oils from different manufacturers consult relevant manufacturer regarding compatibility. Synthetic and standard mineral oils should not be mixed and if changing from mineral oil to synthetic, gearbox must be thoroughly cleaned to remove old oil.

5. Grease Lubrication

5.1. Certain EPG gearboxes can be lubricated with **NLGI 00** or **NLGI 0** semi-fluid gear grease. Grease quantities are given in table 4. To prevent pressure build up units are normally supplied with breather plugs which must be kept clear and in uppermost position. Grease should be replaced after every **6000** to **8000** hours of operation or at **36** month intervals. If synthetic lubricant is used grease changes may be increased to every **15000** hours or **60** months. The standard grease supplied is suitable for an ambient temperature range of **-5° to 50°C**. Where ambient temperature is outside this range oil lubrication is recommended. To remove grease from small gearboxes remove motor from unit and allow grease to drain through input aperture. Flush remaining grease out with suitable flushing oil such as **SHELL VITREA 22**. Add correct quantity of new grease before replacing motor (see tables 4 and 5). To remove grease from larger gearboxes, remove top cover plate and add flushing oil while running unit under no load. Remove drain plug and allow thinned solution to drain off. Replace plug and repeat procedure. Add correct quantity of new grease before replacing top cover plate (see table 4). Units should be run to warm grease before removal of old lubricant. **DO NOT** use flushing oil with synthetic grease.

Table 4: Grease quantities EPG units

Gearbox	Reduction		Horizontal mounting Kgs				Vertical mounting Kgs				
ESR50	116.8:1 - 28.2:1 25.15:1 - 2.33:1		0.25 0.25				0.45 0.45				
ESR00	116.8:1 - 28.2:1 25.15:1 - 2.33:1		0.65 0.75				1 1				
ESR1	116.8:1 - 28.2:1 25.15:1 - 2.33:1		1.2 1.4				2 2				
ESR2	116.8:1 - 28.2:1 25.15:1 - 2.33:1		1.85 2.25				3.1 3.1				
ESR3	116.8:1 - 28.2:1 25.15:1 - 2.33:1		3.85 4.75				8.5 8.5				
ESR6	all		0.7				0.5				
ESR7	all		1.5				1.1				
ESR8	all		2.75				2.25				
ESR9	all		0.15				0.15				
ESR10	all		0.45				0.45				
ESR11	all		0.85				1.1				
	B3 Kgs	B6 Kgs	B8 Kgs	V5 Kgs	V6 Kgs	V1/B7 V1/B6 Kgs	V3/B7 V3/B6 Kgs	B5A/B3 B5B/B3 Kgs	B5A/B8 B5B/B8 Kgs	B5A/V5 B5B/V5 Kgs	B5A/V6 B5B/V6 Kgs
ERA33	2.1	3.2	4.3	4.8	4.5	3.6	3.2	2.1	4.8	5.2	4.9

Table 5: Grease manufacturers/suppliers recommended grades Standard and Synthetic

Manufacturer/supplier	Type	NLGI 00	NLGI 0
BP	Standard	ENERGREASE FGL	
CASTROL	Synthetic	ALPHA GEL	ALPHA GEL
CENTURY	Standard	EPLITH 00	
EDGAR VAUGHAN	Standard	STAYPUT 512	
ELF	Standard		CARDREXA GR 0
ESSO	Standard		BEACON EP
FINA	Standard	MARSON EPL 00	
KLUBER	Standard Synthetic	MICROLUBE GB 00 KLUBERSYNTH GE46-1200	MICROLUBE GB 0
MOBIL	Standard Synthetic	MOBILPLEX 44 MOBILITH SHC007	MOBILPLEX 45 -
OPTIMOL	Standard		LONGTIME PD 0
ROCOL	Standard	SAPPHIRE 000	
SHELL	Standard	ALVANIA GL00	
TEXACO	Standard	SEMIFLUID EP	
TOTAL	Standard	ROLIS N	

Table 6: Grease manufacturers/supplies recommended grades Food, Pharmaceutical and Cosmetic.

Manufacturer/supplier	NLGI 00	NLGI 0
KLUBER US FDA & USDA H1 approval	KLUBERSYNTH UH1 14-1600	
MOBIL US FDA approval	MOBILGREASE FM 003	
SHELL US FDA approval	CASSIDA RLS 00	
SLIPSTREAM LUBRICANTS Selective services Ltd PO Box 3 Bexhill-on-sea Sussex TN39 4JF		No 6 GEL

Table 7: Grease manufacturers/suppliers recommended grades for re-lubrication points.

Manufacturer/supplier	NLGI 2
DOW CORNING	MOLYCOTE BR2
ROCOL	SAPPHIRE HI-LOAD 2

5.2 These tables give manufacturers trade names for those greases meeting relevant requirements for gear grease. Before mixing greases from different manufacturers consult relevant manufacturer regarding compatibility. Synthetic and standard greases should not be mixed and if changing from standard grease to synthetic, gearbox must be thoroughly cleaned to remove old grease.