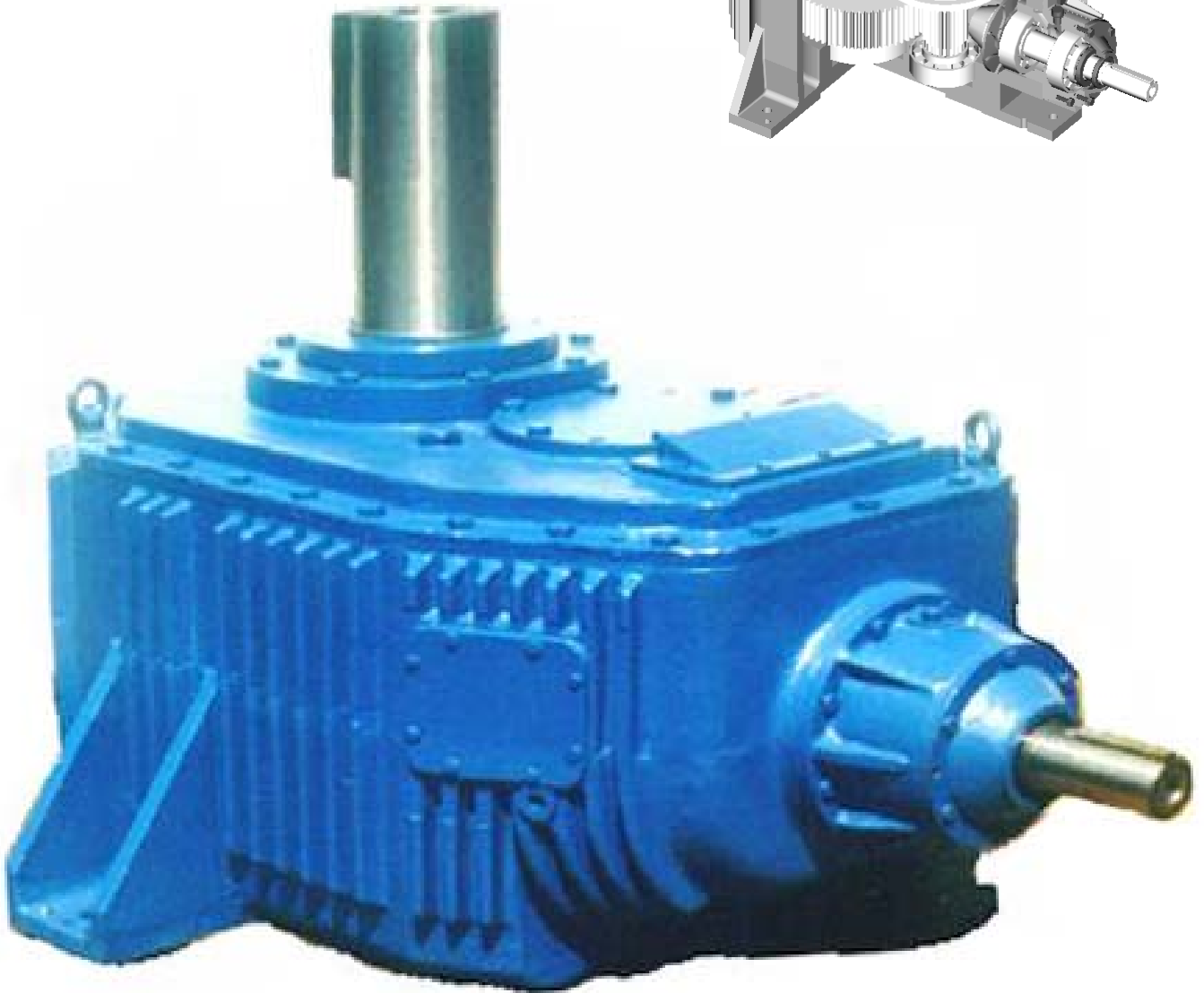
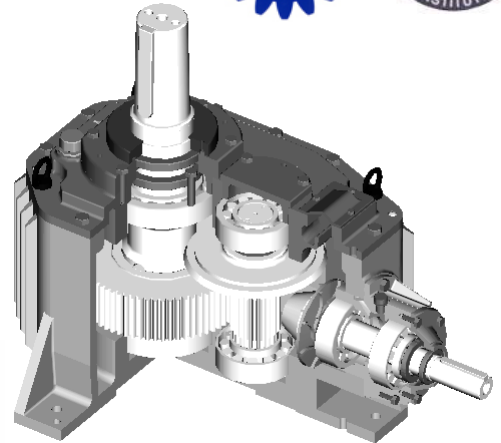




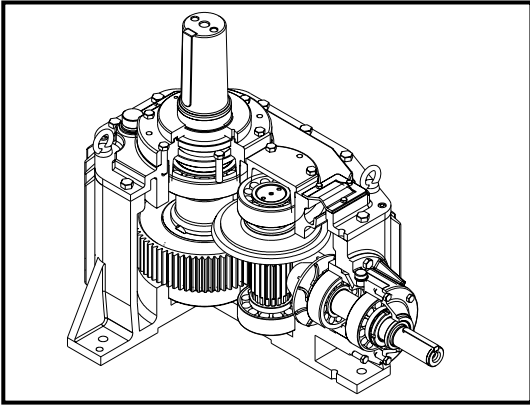
PREMIUM

**Installation and
Routine Maintenance**



**PREMIUM
COOLING TOWER GEARBOXES**

INTRODUCTION



The 'Premium' Bevel Helical cooling tower gear units incorporates the very

best in modern gear design. Each gear unit is manufactured using the most up-to-date machinery and production techniques ensuring highest standards of accuracy and precision.

'Premium' B / AMB Series gear unit is a combination of bevel and helical gear drives (for double reduction) and bevel (for single reduction) to provide a compact and efficient drive to suit conditions specifically encountered in cooling tower drives.

Maintenance of the 'Premium' Cooling Tower gearboxes was one of the criteria considered at the design stage, and has led to the development of a unit that requires little maintenance but when needed may be worked on with a very nominal effort.

This publication outlines all necessary steps for correct installation and maintenance of the cooling tower gearboxes, following this sequence should ensure the long trouble-free life of your unit.

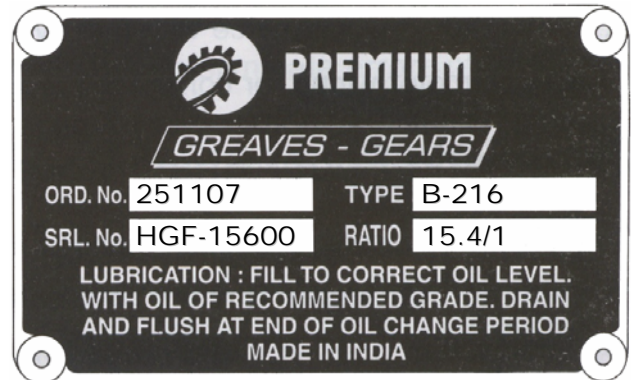
Our engineers shall be pleased to assist when unusual conditions attracts special procedures.



UNIT IDENTIFICATION

How to identify your unit:

1. Each gear unit carries 'Premium' nameplate bearing description of gearbox. This Product Description depicts an individual six figure number (O.No.) for identification purposes (eg ORD. No.251107). An enquiry to Premium marked with order number will identify the gear unit specifically.



2. All gear units also have a code description on the nameplate for the identification purpose in the following form:

B or ABM	222
Gear Unit Type	Size
B - Cooling Tower OEM Gearbox	Designation
ABM- Cooling Tower Replacement Gearbox	

By using this reference in conjunction with the sales brochure the cooling tower unit can be identified.

Note: When ordering replacement parts quote the following positively from the nameplate:

1. Order Number 2. Serial Number 3. Gearbox type 4. Reduction ratio

These are essential. Replacement parts cannot be identified without this information.

General Construction:

Spiral Bevel gears : Gears and pinions are manufactured from high quality case-hardening alloy steel, precisely generated in Klingelnberg cyclo-paloid system and lap finished in matching sets.

Helical gears : These trains are generated from high quality alloy case-hardening steel, which are individually flank ground to precision grade accuracy. Case hardening surface with softer core provides improved wear and fatigue resistance.

Case : The gearbox housing, constituting of single piece grey cast iron is of rigid construction with stylish reinforcements. Provided with easily accessible service ports, they are suitably designed on CAD workstations to absorb fan loads and simultaneously dampen loads and vibrations.

Bearings : Taper roller bearings from renowned manufacturers are used throughout. These bearings are of ample capacity to support combined thrust and radial loads.

Shafting : Input shaft integral with bevel pinion is machined from case-hardening, high grade alloy steel. Direct hardening steel is used for output shaft. The cylindrical seats for bearings, wheel, seal, coupling, fan are finished by precision grinding. These are also designed to accommodate external overhung loads and fan stresses, as appropriate.

Shaft seals : Shaft extensions are fitted with spring-loaded rubber seals to prevent outflow of oil. The ingress of foreign contaminants is particularly arrested on fan end by employing double-seals with grease accumulation between them. In addition, metallic labyrinth seals on output extensions takes care of the moist atmosphere containing micro bubbles of water particles.

STORAGE

Protection of Unit:

All units prior to despatch are test run with a rust preventive oil giving adequate protection to internal parts for a period of six months covering normal transport inland and overseas and coverage storage. When the unit is installed, the rust preventative dissolves in the first fill of lubricant without harmful effect. Shaft extensions are protected with a rust inhibitor which is proof against sea water and suitable for under-cover storage upto 12 months.

Notes :

1. Where gear units are to operate in abnormal conditions or where they are to stand for long periods without running, e.g. in plant installations, 'Premium' must be notified so that suitable protective arrangements can be made.
2. Gear units which are commissioned and then left standing for an extended period should be operated, loaded, or unloaded for a short time every two weeks to circulate the lubricants to protect surfaces. If this is not possible, the unit should be protected from corrossions.

INSTALLATION

Installation :

1. Clean ventilator and rust preventive from shaft extension.
 2. Secure unit to a rigid foundation using HD bolts to GR8.8 Specification minimum.
 3. Align unit with the floating shaft.
 3. Install drive fan and coupling halves. Couplings should be machined for a clearance fit. Hammering or mechanically forcing the coupling on the shaft can damage the bearings or disturb the setting of the gears and is not permissible. Interference fits are permissible if the coupling half can be heated for installation and fitted without hammering or mechanically forcing on the gear drive shaft. Check runout of aligning surfaces on both coupling halves before installing connecting members.
 4. Level gear drive. If shimming is required, take precautions to prevent distortion of the housing. Align driver with gear drive to obtain parallel and angular alignment (See notes on shaft alignments).
- Note : It is important to ensure when aligning unit that all machined mounting points are supported over their full area.
4. Fit guard in accordance with factory acts.
 5. Check motor wiring for correct direction of rotation (Clockwise when viewed from the respective shaft ends)

All units are dispatched without oil. On installing the unit fill with recommended lubricant to correct level on oil level indicator.

To prevent burning and fast wearing out of the lips of the oilseal due to dry running, a few drops of oil must be squirted on the lips of oilseal to wet them prior to starting up of the gearbox initially as well as at every re-start after rest period in excess of 24 hours, till oil circulation due to splash lubrication is established.

SHAFT ALIGNMENT

Whilst no general rule can be laid down for permissible error in lining up it is recommended that, for flexible couplings, faces are true to within $0.05\text{mm} + 0.0002D$ (where D = shaft diameter) and the peripheries within 0.1mm . With rigid type couplings this figure should be halved.

Errors of alignment are either angularity (Fig. 1) or eccentricity (Fig. 2) or a combination of both. 'B' / 'ABM' series units are fitted with taper roller bearings on all input which are assembled with a predetermined amount of axial float.

When the shafts move axially it does so with a rocking motion, therefore, to facilitate accurate alignment of the coupling halves, it is necessary that this end float is temporarily eliminated by the adjustment of the end cover farthest away from the coupling. The end cover should be removed and shims inserted between its spigot and bearing outer race, care being taken not to tip the outer track or over tighten the bolts.

Errors of angularity : Correct before any attempt is made to eliminate errors of eccentricity. The procedure is shown in Fig. 3 using a thickness gauge in conjunction with filler gauges. Readings should be taken in positions 1,2,3 and 4 with any axial float taken up. Adjust units by shimming under feet.

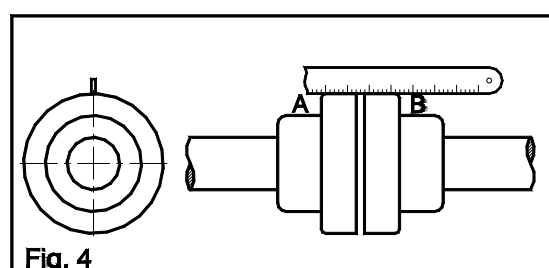
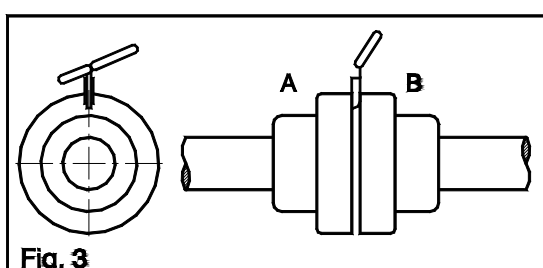
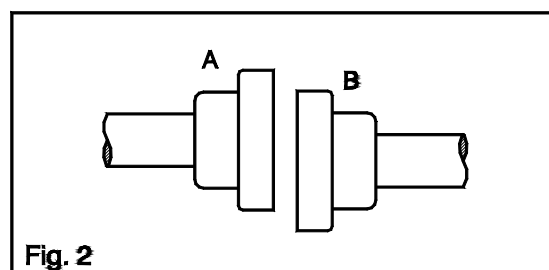
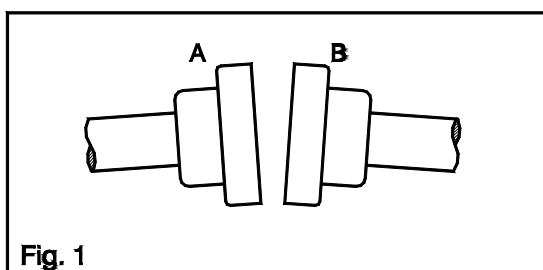
Errors of eccentricity : These occur when the centre lines of shafts do not intersect (Fig. 2). When the misalignment is in the vertical plane, it can be corrected by altering the height of the either units by means of packing shims placed under feet.

When the error is in the horizontal plane, correction may be made by moving unit transversely until set in the required position.

If both coupling halves are of the same diameter, their concentricity can be checked with the use of a straight edge as shown in Fig. 4. If the coupling diameters are not equal, a straight edge should be used in conjunction with a feeler gauge equal to half the difference in diameter.

Effect of Temperature :

Complete cooling tower drive packages are located in vicinity of induced draft caused by the cooling fans and are not likely to encounter any condition of substantial temperature difference between the unit and adjacent machinery. The relative change in temperature between the driver and driven is generally negligible under these drive conditions.



GEARS

Gears :

'Premium' cooling tower units are fitted with either single bevel gear throughout or a combination of single helical and spiral bevel gears. The helical gears are case hardened and profile ground, the spiral bevel gears are lap-finished in pairs, all to give the highest standard of accuracy and finish while giving it its quiet running characteristics.

Tooth contact (Spiral bevels) :

In the event of the gears being disturbed, it will be necessary to check tooth contact of the bevel gears if fitted, as per recommended procedure layed out below:

1. Assemble unit including the top bearing housing cover but without input shaft.
2. Assemble input bearing housing assembly nipping lock-nut up against bearing.
3. Fit bearing housing assembly to case without shims, ensuring that the back faces of the mating gears are flush with each other.
4. There should at this point, be a gap between bearing housing and case. This gap should be measured and shims added equal to it.
Note: Operations 3 and 4 may be ignored if same gears are being refitted, In this case the old shims or new one equivalent to them may be fitted.
5. Bolt bearing hosing to case, tightening bolts.
6. Using side inspection cover, apply engineers blue to both flanks of pinion teeth.
7. Rotate gears slowly until a well defined contact marking has been produced on the wheel.
8. Compare tooth markings with the diagrams shown on adjacent page.
9. If tooth marking are not in the first diagram, remove bearing housing and
 - a) Add more shims if marking are as in second diagram
 - b) Reduce shimming if marking are as in third diagram
10. Repeat operations as from 5.

Note: After attaining the correct tooth marking, the backlash should be checked (see table on the adjacent page).

If backlash is excessive, both bevel gears should be adjusted towards their apexes by adjusting the shims accordingly. Adjustment in the opposite direction will increase backlash in the bevel gears.

Note: Gears may be observed through inspection cover.

CONTACT MARKING

Table of Normal Backlash (Spiral bevels) :

B-Series :

VALUE	B114	B116	B118	B120	B122	B125	B128	B132	B135
mm	0.08-0.13	0.08-0.13	0.10-0.15	0.10-0.15	0.13-0.18	0.13-0.18	0.15-0.20	0.15-0.20	0.20-0.28
Inch	0.003-0.005	0.003-0.005	0.004-0.006	0.004-0.006	0.005-0.007	0.005-0.007	0.006-0.008	0.006-0.008	0.008-0.011

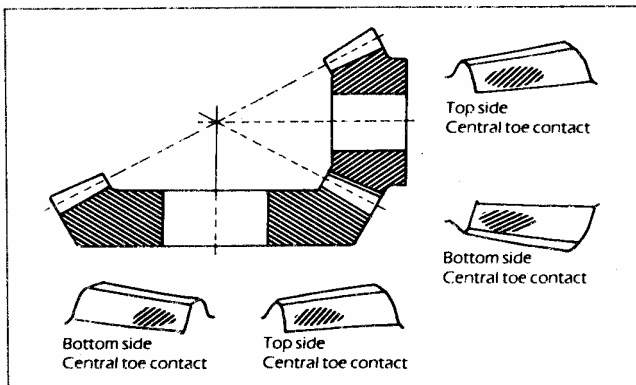
VALUE	B214	B216	B218	B220	B222	B225	B228	B232	B235
mm	0.08-0.13	0.08-0.13	0.10-0.15	0.10-0.15	0.13-0.18	0.13-0.18	0.15-0.20	0.15-0.20	0.20-0.28
Inch	0.003-0.005	0.003-0.005	0.004-0.006	0.004-0.006	0.005-0.007	0.005-0.007	0.006-0.008	0.006-0.008	0.008-0.011

ABM-Series :

VALUE	ABM118	ABM128	ABM132	ABM222	ABM225	ABM228	ABM232
mm	0.10-0.15	0.15-0.20	0.20-0.28	0.15-0.20	0.15-0.20	0.15-0.20	0.20-0.28
Inch	0.004-0.006	0.006-0.008	0.008-0.011	0.006-0.008	0.006-0.008	0.006-0.008	0.008-0.011

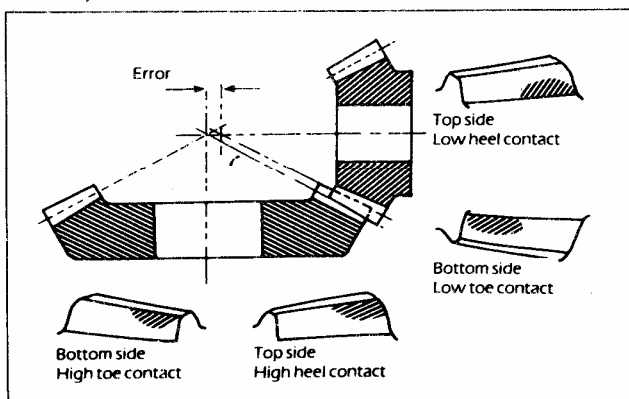
Correct Marking

Pinion member left hand in all cases shown



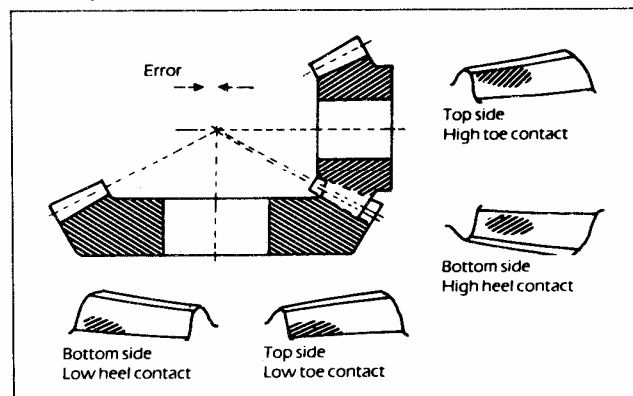
Incorrect Marking

Move pinion in



Incorrect Marking

Move pinion out



BEARINGS

Bearings :

The bearings for B / ABM-Series are selected very carefully to best suit the requirements of each unit and to more than adequately deal with the designed maximum loads acting on them. Because of the load carrying capacity at higher speeds, taper roller bearings are used throughout.

Bearing End Float :

If, unit is dismantled or partly dismantled, on re-assembly, the bearing end floats should be checked and adjusted as required. Shafts fitted with taper roller bearings have high tolerances of bearing end float and require careful setting. Two methods of achieving the correct bearing end floats on these shafts with taper roller bearings is shown below. Method one is for all shafts except the bevel input shaft and Method Two is for bevel input shafts only.

Method One (for shafts other than bevel input shaft) :

1. Assemble shaft, measure gap between the case and cover, on the top side.
2. Add to it atleast twice the minimum recommended end float but not more than the twice the maximum (see table).
3. Compare this value with the tongue length of the top catcher.
4. If the figure so obtained is less than the tongue length value, add shims equal to the difference in between the bearing outer race and top catcher otherwise add shims equal to the difference in between the top machined flanged and catcher flange.

Method One (for bevel input shafts only) :

1. Assemble input shaft, nipping locknut up against bearing.
2. Check tooth contact marking (as shown in the previous page).
3. Set a dial indicator on shaft end so as to register any axial movement.
4. Slacken lock-nut gradually, pushing and pulling the shaft each time it moves to check movement registered on dial indicator.
5. On reaching a point where movement registered is within the bearing end float tolerance (see table) leave the locknut and fix the lock-washer with the lock-nut.

Table of recommended bearing end float (mm) :

B-Series :

VALUE	B114	B116	B118	B120	B122	B125	B128	B132	B135
Input Shaft	0.025-0.075	0.025-0.075	0.025-0.075	0.025-0.075	0.025-0.075	0.050-0.100	0.050-0.100	0.050-0.100	0.075-0.150
Output Shaft	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.075-0.150	0.075-0.150
VALUE	B214	B216	B218	B220	B222	B225	B228	B232	B235
Input Shaft	0.025-0.075	0.025-0.075	0.025-0.075	0.025-0.075	0.025-0.075	0.050-0.100	0.050-0.100	0.050-0.100	0.075-0.150
Final pinion shaft	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100	0.075-0.150	0.075-0.150
Output Shaft	0.075-0.150	0.075-0.150	0.100-0.175	0.100-0.175	0.100-0.175	0.100-0.175	0.125-0.200	0.125-0.200	0.125-0.200

ABM-Series :

VALUE	ABM118	ABM128	ABM132	ABM222	ABM225	ABM228	ABM232
Input Shaft	0.025-0.075	0.050-0.100	0.075-0.150	0.050-0.100	0.050-0.100	0.050-0.100	0.050-0.100
Final pinion shaft	-	-	-	0.050-0.100	0.075-0.150	0.075-0.150	0.075-0.150
Output Shaft	0.050-0.100	0.075-0.150	0.075-0.150	0.125-0.200	0.125-0.200	0.125-0.200	0.125-0.200

OIL SEALS

Replacement of oilseals :

Oil seals should be replaced whenever unit is dismantled or if in service it shows sign of leakage or damage.

Recommended procedure for replacing oilseal :

1. Clean and drain unit.
2. Remove any part that may obstruct access to the oil seal (eg. Coupling guards etc.)
3. Remove bolts and withdraw oil catcher. Take care not to damage the shims and do not alter the shaft position. Check for burrs and scratches on the seals as these could damage the new seal.
4. Tap the old seal out of the housing.
5. Clean joint faces and shims.
6. Position shims on oil catcher.
7. Coat joint faces of oil catcher and gearcase with a good joining compound.
8. Replace oil catcher and tighten bolts.
9. For new oilseals, protect seal lips by wrapping shaft with thin strong paper coated with oil or grease. Coat seal lips with grease, then using appropriate sized adaptor, drift press into flange adaptor plate. For proper functioning always ensure that seal is seated square with the coupler.
10. Fill unit with a recommended lubricant to correct levels as indicated on the dipstick.

OPERATION

Operation :

No special break-in procedures are necessary except as noted under Lubrication.

Each unit is subjected to a running test at the works to assure smooth and quiet operation. Excessive noise or vibration at initial operation is an indication of one or a combination of the following :

- (1) Misalignment,
- (2) Imbalance of fan or other rotating parts,
- (3) Improperly adjusted fan blades,
- (4) Torsional vibrations,
- (5) Unstable mounting

If noise or vibration persists, shut the unit down and correct the fault before further operation.

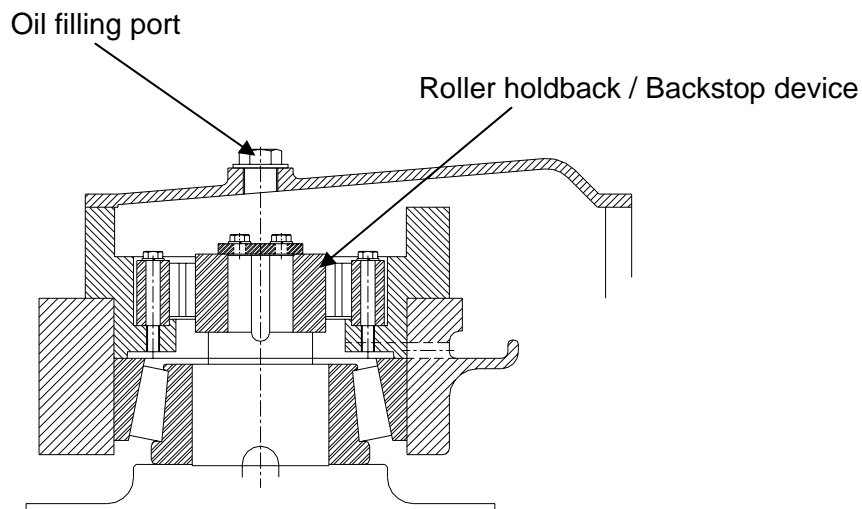
OPTIONAL FEATURES

Units with roller holdback / backstop device:

Sometimes units are fitted with Roller holdback / backstop devices to prevent the reverse rotation of the cooling fan in case the unit is not under operation or under shut down. The backstops used are centrifugally lift off type which apart from an initial oil filling do not require any special type of care.

The backstop is fitted in double reduction units with the final pinion shaft (2nd reduction helical pinion shaft) in the top of the gearbox towards the output extension.

The basic arrangement is shown below:



Oil fill during start-up:

Approximately ½ to 1 litre of the lubricant (same as that for the gearbox) is required to be filled-up before starting through the oil filling port for initial lubrication for the roller holdback / backstop device for all sizes.

Further, no additional care / maintenance is required.

LUBRICATION AND LUBRICANTS

Lubrication :

Check oil level weekly with each unit stopped. Add oil if level is below minimum level of oil level dipstick.

Special precautions are necessary during periods of inactivity in excess of one week. When the internal parts are not continually bathed by the lubricant as during operation, the gear drive is particularly vulnerable to attacks by rust and corrosion. For best results, let the drive cool for approximately four hours after shutdown, start the fan and let run for approximately five minutes. This will coat the internal parts of the drive with cool oil. Thereafter, run the fan for five minutes once a week throughout the shutdown period to maintain the oil film on the internal parts of the gear drive.

If the drive is to be inactive for a prolonged period, it is recommended that the unit be completely filled with oil. This can be accomplished by filling through the air breather port. Cover the drive with a tarpaulin or other protective covering. Drain the excess oil before returning the gear drive to service.

Oil Changes : As the oil is used, degradation takes place and since this process is more rapid at high temperatures, the oil must be changed to ensure satisfactory lubrication. The type of oil and time spent at highest temperatures determines the interval between oil changes.

Oil Change Period :

Regular oil changes are essential to ensure that the gearbox gives long and trouble free service. At elevated temperatures the effective life of the oil is very much reduced. Generally, the oil change period is **6 calendar months** up to an operating temperature of **110°C**.

Unless special procedure have been taken when ordering the unit to specify other information, the oil level should be checked occasionally with the unit stationary and topped up if necessary. The procedure for changing the oil should be to drain the oil preferably when hot and after circulation. If the unit is to be flushed, it should be done in accordance with the following procedure.

Flushing procedure :

During change of oil the following outlined procedure should be maintained:

(1) Drain out the lubricating oil completely after initial running for a period of 200-350 Hours as per convenience.

The procedure for changing the oil should be to drain the oil when hot and after circulation.

(2) Flush with flushing oil of viscosity grade 22 of any manufacturer. While flushing ensure that the gearbox is in running condition.

(3) Ensure that the gearbox is filled in with the flushing oil to the highest level marked on the dipstick through the plug provided at the top of the gearbox for oil filling and at the same time oil is being drained out at the same rate through the drain plug provided at the bottom of the gear case.

(4) The activities mentioned above should be carried out for a considerable period which will depend upon the amount of contamination of the lubricating oil due to generation of wear debris and formation of sludge.

(5) Continue the operation till the original color of flushing oil is observed and signs of contamination are not visible.

(6) Recycling of the flushing oil may be done after passing through filters of 200 mesh.

LUBRICATANTS & SHIPPING SPEC.:

Recommended lubricant :

RECOMMENDED LUBRICANT ISO VG 460	
Brand	Grade
Balmer Lawrie	Protomac SP 460
Bharat Petroleum	Amocam 460
Castrol	Alpha SP 460
Gulf	Harmony 460
Hindustan Petroleum	Parthan 460
Indian Oil	Servomesh SP 460
Veedol	Apreslube 460

Approximate weight and Oil quantity required for 1st filling :

B-Series :

UNIT SIZE	B114	B116	B118	B120	B122	B125	B128	B132	B135
Net Weight(Kg)	90	130	152	182	236	258	310	520	656
Gross Weight (Kg)	98	143	167	200	260	282	340	570	750
Oil quantity(litre)	5	7	10	14	20	25	35	52	65
UNIT SIZE	B214	B216	B218	B220	B222	B225	B228	B232	B235
Net Weight(Kg)	285	300	320	360	480	588	788	1050	1596
Gross Weight (Kg)	310	328	351	391	524	644	863	1150	1748
Oil quantity(litre)	7	10	15	20	25	35	50	85	90

ABM-Series :

UNIT SIZE	ABM118	ABM128	ABM132	ABM222	ABM225	ABM228	ABM232
Net Weight(Kg)	95	205	386	715	890	896	896
Gross Weight (Kg)	115	231	435	782	1005	1012	1012
Oil quantity(litre)	10	35	70	50	85	85	85

MAINTENANCE

Maintenance schedule:

SL NO.	ACTIVITIES TO BE CARRIED OUT	FREQUENCY	TOOLS/ GAUGES/ INSTRUMENTS ETC. TO BE USED
01.	Inspect visually for oil leaks and/or unusual noises, vibrations etc. In case of any leakage through oil seal replace the same. In case of unusual noise and vibration, inspect the internals and bearings for any damage through inspection cover.	Weekly	By observation/Feeling
02.	Check and top oil to maintain its level when the gearbox is stationary (Higher oil may lead to over-heating and leakage). Change oil when its color is blackish and viscosity is more than 460.	Weekly	Dipstick provided with gearbox
03.	Check and ensure tightness of the following mounting fasteners: a) Bolts for bevel bearing housing and top bearing housing b) Bolts for catchers/covers c) Bolts for inspection cover d) Bolts for foundation	Fortnightly	With torque wrench
04.	Check alignment of the drive machine and leveling of the gearbox installation	Fortnightly	Dial gage, Feeler gage, Straight bar etc.
05.	Clean the joint faces of catcher/cover and bearing housing and use <i>Loctite</i> on the face before tightening. Use thread lock for mounting all the bolts. Before applying thread lock ensure that the joint faces and thread surfaces are cleaned properly. Brand name of <i>Loctite</i> 574 and Thread locker 270 is 'Loctite' and manufacturer's name is 'Loctite India Ltd.' Clean the joint faces and thread surfaces to ensure that no foreign material like dried <i>Loctite</i> sealing compound used earlier or dirt etc. exist.	Half-Yearly	<i>Loctite</i> 574 Threadlocker 270 READLOCKER 270. Any sharp tool like knife/thinner etc.
06.	Inspect visually all the internals and bearing to find out if any damage or breakage is there or not. Change Oil seal.	Half-Yearly as and when oil leakage through oil seal is obtained.	By observation.

TROUBLE SHOOTING

Trouble shooting :

If the unit fails to deliver its scheduled functions, check the following points before intimating / calling the same to service engineer / Greaves service cell.

PROBLEMS	TYPICAL REASONS	REMEDIES
Drive motor does not rotate	Fuses blown	Replace fuses
	Starter tripped	Reset starter
	Connection loose	Check and tighten connections
Excessive noise	Unsuitable/Insufficient oil in gear chamber	Fill appropriate oil upto correct level
	Damaged bearings	Check and replace bearings
	Worn out wheel /pinions	Check and replace wheels/pinions
Over heating	Unsuitable/Insufficient/Overfilled lubricant	Check and correct oil level
	Clogged breather	Check and clean breather
	Excess environmental dust	Clean unit frequently
	Overload	Operate unit at recommended condition
Bearing failure	Unsuitable/Insufficient oil	Correct oil level with recommended grade
	Overload	Operate unit at recommended condition
Gears worn out	Unsuitable/Insufficient lubricant	Correct oil level with recommended grade
	Overload	Operate at normal condition
Joint leakage	Loosened bolts	Check and tighten bolts
	Unsuitable/Overfilled lubricant	Correct oil level with appropriate grade
	Clogged breather	Check and clean breather
	Excess environmental dust	Clean unit frequently
	Excessive vibration	Check vibration to be within 10µm
Oilseal leakage	Unsuitable/Overfilled lubricant	Correct oil level with appropriate grade
	Oilseal lip hardened/damaged	Check and replace oilseal
	Clogged breather	Check and clean breather
	Excessive dust, heat or chemicals	Operate unit within recommended conditions
Oil oozing out through ventilator	Unsuitable/Overfilled lubricant	Correct oil level
	Clogged breather	Check and clean breather

WARNING : The customer shall be responsible for the proper use of articles supplied by the company, particularly the rotating elements between their driven members, and their guarding for safety, and the company shall not be responsible for any injury or damage sustained as a result of the improper use of the article supplied.

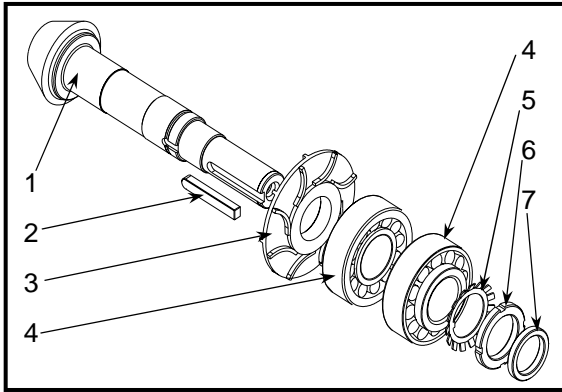
Attention is hereby drawn to the danger of using naked lights in proximity of openings in gear drives supplied by the company, and the company shall not be liable for any claim for injury or damage arising from any contravention of this warning.

IDENTIFICATION OF PARTS

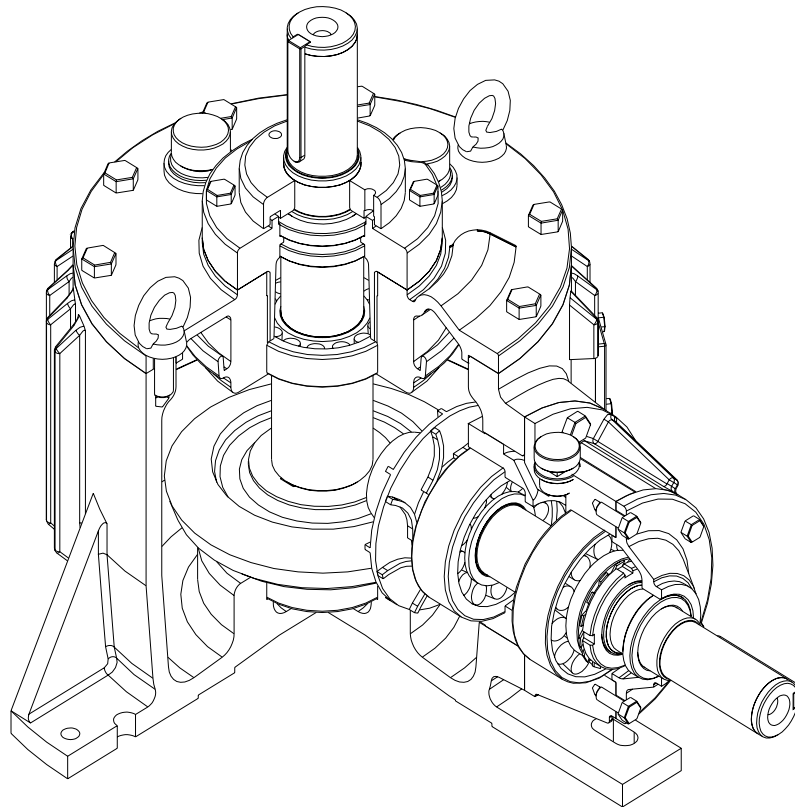
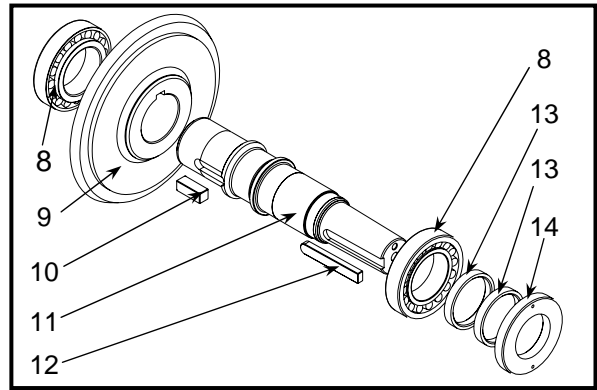
Single reduction units :

TYPE : B / ABM

Bevel input shaft



Output shaft with output wheel



1. Bevel input shaft
2. Input extension key
3. Oil slinger
4. Input bearing
5. Lock-washer
6. Lock-nut
7. Input oil seal (2 nos.)

8. Output bearing
9. Output wheel
10. Output wheel seat key
11. Output shaft (taper / straight extrn.)
12. Output extension key
13. Output oil seal
14. Water slinger (Labyrinth seal)

Important :

When ordering spares or replacement parts the following details from the name plate must be quoted :

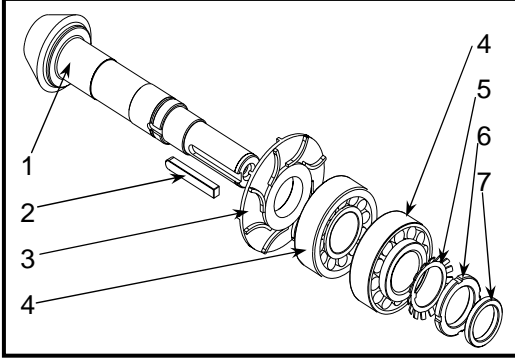
1. Serial No.
2. Geared reducer Type /Size
3. Ratio

IDENTIFICATION OF PARTS

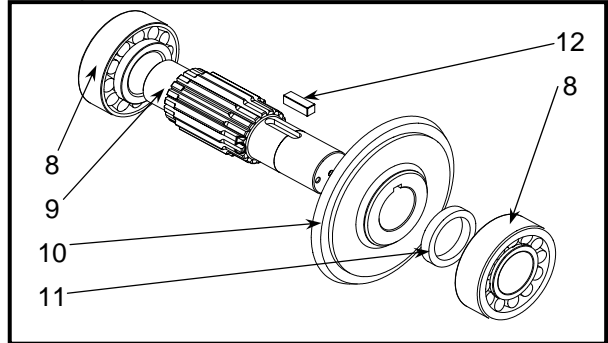
Single reduction units :

TYPE : B / ABM

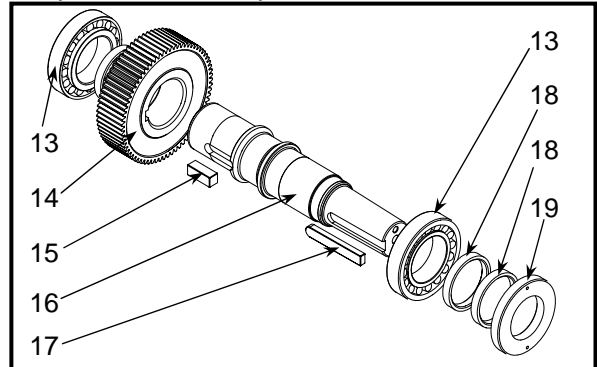
Bevel input shaft



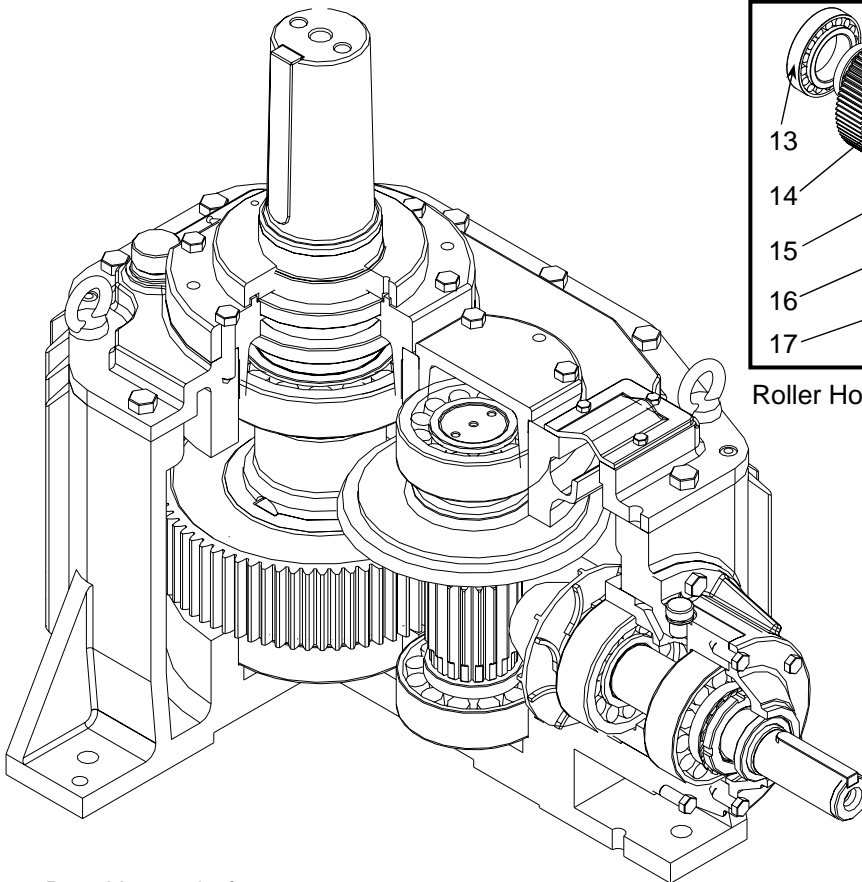
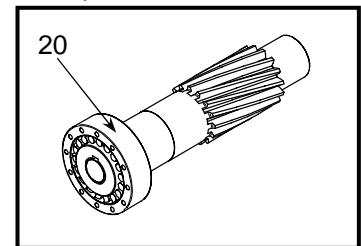
Final pinion shaft with bevel wheel



Output shaft with output wheel



Roller Holdback with final pinion shaft



1. Bevel input shaft
2. Input extension key
3. Oil slinger
4. Input bearing
5. Lock-washer
6. Lock-nut
7. Input oil seal (2 nos.)

8. Final pinion shaft bearing
9. Final pinion shaft
10. Bevel wheel
11. Final reduction distance piece
12. Final reduction wheel seat key

13. Output bearing
14. Output wheel
15. Output wheel seat key
16. Output shaft (taper / straight extrn.)
17. Output extension key
18. Output oil seal
19. Water slinger (Labyrinth seal)
20. Roller holdback / backstop (optional)

Important :

When ordering spares or replacement parts the following details from the name plate must be quoted :

1. Serial No.
2. Geared reducer Type / Size
3. Ratio

GREAVES GEARS

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