

DIRECTOR GENERAL BORDER ROADS  
GENERAL MAINTENANCE INSTRUCTION 214  
ON  
BD6D125-1 SERIES BEML DIESEL ENGINES  
FITTED WITH BD-80 DOZERS

INTRODUCTION

1. BD 80 Dozers inducted into the BRO in 2001 have been selectively powered with the BEML 6D-125-1 series engines. This instruction is issued to lay down the procedure for lubrication and preventive maintenance of the engine with a view to keep the eqpt working efficiently at all time thereby minimizing the break down time.

ACTION BY:-

(a) USER UNIT

(i) To carryout regular/periodical maintenance as laid down in this instruction and enter the tasks in log book.

(a) FIELD WORKSHOP

(i) To check the maintenance and lubrication actually carried out as per log book record during the inspection and and repairs of the eqpt.

(ii) Advise user unit in respect of any discrepancy/short coming noticed.

DETAILS

- (a) Technical Specification - Appx 'A'
- (b) Periodical maint table and lubrication chart of eqpt - Appx 'B'
- © Maintenance tips - Appx 'C'

Sd/  
(US Misra)  
SE (E&M) SG  
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For Dir Gen Border Roads

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Appx 'A'

TECHNICAL SPECTIFICATION DATA

Engine Model	:	BS6D125-1
Number of Cylinders	:	06
Bore X Stroke	:	125x150 (mm x mm)
Total Piston Displacement	:	11040 (cc)
Firing Order	:	1-5-3-6-2-4
Overall length	:	1636mm
Overall width	:	1110mm
Overall height	:	2020mm
Fly wheel horse power (KW)	:	134 @1850
(Bhp @ r/min)	:	180 @ 1850
Torque (N.m/r/min)	:	758 @ 1100
(Kgm/r/min)	:	80 @ 1100
High idling speed (r/rim)	:	2050-2150
Low idling speed	:	600-650
Min fuel consumption	:	211 g/KWH
Dry weight (Kg)	:	1440
Fuel Pump	:	Bosch Type
Governor	:	All speed mechanical
Lubricating oil amount	:	30 Ltrs
(Refil capacity)	:	26 Ltrs
Coolant amount	:	82 Ltrs
Alternator	:	24V,45A
Starting Motor	:	24V,200 Ahx2 Nos
Turbocharger	:	KKK(TEL)
Exhaust (temperature turbine inlet temp)	:	Max700'C at all speeds
Valve clearance	:	Intake valve 0.33 mm
(When engine is hot or cold)	:	Exhaust valve 0.71 mm
Compression Pressure ( SAE 30 oil)	:	Min 33 Kg/ cm <sup>2</sup> (Std value)
		Min 24 Kg/cm <sup>2</sup> (permissible valve) at engine speed of 200-250 rpm )

PERIODICAL MAINTENANCE TABLE AND  
LUBRICATION CHART OF THE EQUIPMENT

GENERAL

- (a) Always use genuine spare parts for replacement.
- (b) Always use the grades of grease and oil recommended by BEML.
- (c) Always use pure oil or grease and be sure to use clean containers to prevent any dirt from getting in.
- (d) Flame should never be brought close while showing leaks or level of fuel, oil, anti freeze, or battery electrolyte.
- (e) When washing the engine, ensure that the water does not get into air cleaner. Be careful while cleaning the filters caps and the area around the dip stick so that dirt will not enter the system.
- (f) Never inspect the fan belt or attempt any maintenance on the engine is running. Always stop the engine before carrying out the maintenance.
- (g) Do not remove the radiator cap when the water is hot. There is danger of boiling water spurting out. First release the internal pressure before removing the cap.
- (h) When working in a dusty environment be careful of the following:-
  - (i) Inspect the dust indicator frequently to see whether the air cleaner is clogged. Clean the air cleaner as soon as possible.
  - (ii) Clean the radiator core so that it does not became clogged.
- (i) When checking and changing the oil do it in a place free dust and prevent any dirt from getting into the oil.
- (j) Before draining the oil, warm it to at temperature of 30° C to 40° C.
- (k) After replacing fuel filter elements, bleed the air from the circuit.
- (l) If a strainer is located in the filler the strainer must not be removed while adding oil.
- (m) Check the drained oil and filter for any signs of excessive metal particles or other foreign materials.

- (n) When removing parts containing O-rings,gasket or seals, clean the mounting surfaces and replace with new sealing parts.
- (o) Initial warming up of engine must be carried out before putting on load.
- (P) Check for abnormal noise.
- (q) Check for abnormal smoke colour(Visual observation).
- (r) Check for abnormal blow by(Visual observation).
- (s) Avoid continuous low idling and high idling of engine.
- (t) Before stopping the engine, put it in low idle and check for leakage.
- (u) Frequently monitor dash board gauges to avoid engine damage.
- (v) Avoid lugging and sudden acceleration.
- (w) Attend to any minor problems with out postponing.
- (x) Sufficient care to be taken when the eqpt in going down gradient since there is chance of engine being over driven(run) by the drive line.
- (y) Avoid cleaning and reusing of air cleaner elements beyond the recommendation (06 times)(max). Do not reuse fuel and oil filters.
- (z) Replace any filter element if found damaged/punctured/torn.
- (aa) The engine should be started periodically (at least once in 15 days ) when the eqpt is in storage for long duration.
- (ab) In case the engine is stored for long period, change turbocharger and lub oil system with fresh oil and cranking before starting the engine.
- (ac) Disconnect electrical system(negative terminal of alternator and battery while carrying out any welding on Eqpt.

### MAINTENANCE TABLE

#### DAILY MAINTENANCE (Check before starting)

- (a) Check leakage of oil, water and fuel.
- (b) Check and fill cooling water/coolent.
- (c) Check and fill fuel.
- (d) Check and fill engine oil.
- (e) Check and clean element (outer only) of dust indicator.
- (f) Inspect float position and drain water of water separator.
- (g) Check electrical wiring.
- (h) Check and adjust fan/alternator belt tension.

2. EVERY 50 HOURS (FOR HIGH ALTITUDE AND SUB ZERO OPERATING CONDITION ONLY)

- (a) Replace cartridge of fuel pre-filter

3. INITIAL 250 HOURS

- (a) Replace of cartridge of fuel pre-filter and fine filter.
- (b) Change oil and cartridge of engine oil and filter.
- (c) Check and adjust engine valve clearance.

4. EVERY 250 HOURS SERVICE

- (a) Change engine oil and filter cartridge.
- (b) Replace cartridge fuel pre-filter.
- (c) Replace cartridge fuel fine filter.
- (d) Drain water and sediment of fuel tank.
- (e) Check and clean radiator fins.

5. EVERY 500 HOURS SERVICE

- (a) Replace cartridge from corrosion resistor.
- (b) Replace cartridge

6. EVERY 1000 HOURS SERVICE

- (a) Check and re-tighten of turbo charger-fasteners.

7. EVERY 2000 HOURS SERVICE

- (a) Check alternator and starting motor.
- (b) Check and adjust axial and radial play of turbocharger.
- (c) Check for any crack of vibration damper.
- (d) Check and adjust engine valve clearance.
- (e) Clean element of engine breathing.

8. EVERY 4000 HOURS SERVICE

- (a) Check water pump.
- (b) Check fan drive assy.
- (c) Check air compressor.
- (d) Check and re-tighten the intake and exhaust manifold fasteners.

AS AND WHEN REQUIRED

- (a) Drain water from water separator.
- (b) Check and clean air cleaner element. Replace after 6 times cleaning.
- (c) Change coolant once in a year (if permanent type anti freeze is used) otherwise, change coolant once in a six months.
- (d) Check electrical intake air heater.

RECOMMENDED REPLACEMENT OF FOLLOWING RUBBER HOSES

AFTER 400 HOURS OR 9 YEARS WHICH IS EARLIER

- (a) Fuel hoses (water separator-FIP-Pre filter-fines filter).
- (b) Fuel supply hose (fuel tank -water separator).
- (c) Fuel overflow hose (FIP -return junction).
- (d) Fuel spill hose (spill pipe to return junction).
- (e) Fuel return hose (Return junction-fuel tank).

ON WEEKLY BASIS ALL RUBBER ITEMS

- (a) Coolant hose.
- (b) Turbo inlet hose.
- (c) Turbo outlet hose.
- (d) Breather hose.
- (e) Evacuator valve.
- (f) Oil filter pipe hose.
- (g) Water pump bypass hose.
- (h) Corrosion resistor hoses.
- (i) Compressor inlet hose (If applicable).

Are to be checked for any deterioration, if so the same to be changed immediately.  
Also the function and condition of dust indicator to be closely monitored. -

RECOMMENEDOIL/LUBRIACANT AND FUEL

S/No	Maintenance Job	Kind of fuel	Ambient temperature	Grade of lubricants	Periodicity of change	Capacity specified(Ltr)
1.	Eng assy BS6D125-1	Engine oil	0 <sup>0</sup> C to 50 <sup>0</sup> C	SAE 30	Initial change	30 (Total 250 hrs there after system every 250 hours. Capacity).
			-15 <sup>0</sup> to 50 <sup>0</sup> C	SAE 15W 40		
			-20 <sup>0</sup> to 0	SAE 10W		
			-20 to 40w	SAE 10W 50		
2.	Transfer case & Transmission			Servo Ultra Komastu BEML 30		
3.	Main clutch			-do-		
4.	Bevel gear/Diff			-do-		
	Final drive			-do-		
	Roller/Idler			SAE 140 Gear oil		
	Recoil spring			Servo ultra Komastu BEML 30		
	Hydraulic Tank			Servo Ultra Komastu BEML 10W		
	Grease			Sevo Gen EP-2		
	Fuel Tank	Diesel fuel	-10 <sup>0</sup> C to 50 <sup>0</sup> C	ABTND 975 No 2		
			-20 <sup>0</sup> C to -10 <sup>0</sup> C	ABTND 975 No 1		
	Cooling sytem	water	-20 <sup>0</sup> C to 5 °C	Add Anti freeze		
			5 <sup>0</sup> C to 50 <sup>0</sup> C	Soft water/Drinking water		82 Liters

NOTE:-

1. When fuel sulphur content is less than 0.5% change oil in the oil pan as per periodic maintenance hours described in this manual.

Change oil according to the following table if fuel sulphur contents is above 0.5%.

FUEL SULPHUR CONTENT	CHANGE INTREVAL OF OIL IN REGINE OIL PAN
0.5 TO 1%	½ OF REGULAR INTERVAL
above 1%	¼ OF REGULAR INTERVAL

2. Use SAE 10W oil if the atmospheric temperature is continuous lower than 0<sup>0</sup> C.
3. Suitable multi grade oil can be used for varying temperature(day/night).
4. Avoid mixing of different brands of oil even though the grade of oil is same.

MAINTAENANCE TIPS

OPERATING CONDITION IN HIGH ALTITUDE  
AND SUB ZERO CLIMATE

1. If the smoke is excess (even though the air cleaner element is clean) then it may be necessary to reduce the fuel due to lack of air availability.
2. If engine is overheating (even though the engine and radiator are in good condition), then it may be necessary to reduce the fuel due to lack of air for cooling.
3. Fuel filter clogging directly depends upon the quality of fuel (pour/cloud point) as well as on the prevailing ambient temperature. Therefore, filter element changes to be allowed depending upon the condition.
4. Avoid mixing of ATF (Aviation turbo fuel) with diesel to reduce pour/cloud point since it will reduce the lubricity of the fuel which cause abnormal wear of FIP and injector elements. If it is unavoidable then add proper additives to improve lubricity.
5. It is recommended to cover the entire Eqpt with thick polythene sheet when stored in open space to protect it from cold weather/sonw. Also muffler/tail pipe to be covered to avoid snow entry.
6. If starting became very difficult, then it is advisable to use hot water/hot air (jet air heater) to warm fuel, water and instead of using naked flame.
7. The fuel stored in barrels shall also be protected from clod weather to avoid gel formation.
8. Any major repair to be carried put in a protective environment.
9. The engine should not be run without thermostat.

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