User Manual

LAMBERT POWER CO.,LTD

PREFACE

LAMBERT Power diesel engine is based on Steyr engine, made technical and production improvement ，and achieved bigger displacement and power. It is a high speed engine which is adopted foreign technology and made in China. LAMBERT Power diesel engine has the characteristics of compact structure, best power, quick start and good economy technical specifications, simple operation and convenient maintenance. It is widely used in heavy truck, engineering machinery, and generator set, etc.

This Operation Manual mainly introduce LAMBERT Power diesel engine technical specifications, performance index, structure characteristics and use precautions. If users can operate engine as per instructions presented in this manual, engine's service life will be extended.

With the products and technology growing, LAMBERT Power diesel engine structure will be improved, we request users to pay attention to the technical information we release. The products will be changed without further notice. For more information, please visit our website.

User's Instructions

1. Engine operators must carefully read this Operation and Maintenance Manual to familiarize its structure and strictly follow the technical operation method and maintenance schedule.

2. When running new engine, we must carry out 60 hrs trial run as specified in this Manual. Idle or high speed no-load operation is strictly prohibited.

3. After engine is started at cold state, speed must be increased gradually. Never increase the speed suddenly or make engine run at idle speed for a long time.

4. After engine stops, if the environment temperature is possible to be lower than +5℃, and no anti-freeze is added. The water in radiator and engine must be drained off.

5. Never run the engine without air filter to prevent un-filtered air going into cylinders.

6. When adding fuel and oil, choose the specified grade and use special clean containers. The fuel and oil must be filtered by screen. And fuel must be precipitated over 72 hours.

7. Before each start, check coolant level and oil level.

8.The electronic part must be checked by personel with electric knowledge.

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Working Environment conditions

Standard working conditions:

Environment Temperature: Tr=298K（tr=25℃）

Dry air pressure: Pd=99kpa

Vapor pressure: Pw=1kpa

When engine working conditions don't conform to standard environment, the output power should be rectified according to GB/T18297-2001.

1. Technical Specifications

FUNCTION PARAMETER

Model	6D10D200A	6D10D258A	6D10D283A	6D10D315A	6D12D317A	6D12D355A
Type	water-cooling, in-line, 4-stroke, direct injection and dry liner					
Rated Output (kw)	182/200	235/258	258/283	286/315	288/317	323/355
r\min	1500					
Cylinder No.	6					
Firing Order	1-5-3-6-2-4					
Intake Type	TCI					
Compression Rated	16:1					
bore*Stroke(mm)	126×130				126×155	
Displacement	9.726				11.596	
Fuel Consumption (g/kw.h)	220			225	210	
Oil Consumption (g/kw.h)	0.82					
Exhaust gas temp(℃)	550					
Oil Pan Capacity(L)	24-26					
Starter motor(v/kw)	24/7					
Charging Alternater (v/w)	28/1000					
Governor	Electronic Governor ≤1%					
Flywheel NO.	SAE 1					
Fly wheel Housing NO.	14					
Net weight(kg)	980				1100	
Application	Generator set					

FUNCTION PARAMETER

Model	D2665A385	D2655A407	D2765	6D10C240A	6D10C258A	6D10C278A
Type	water-cooling, in-line, 4-stroke, direct injection and dry liner					
Rated Output (kw)	350/385	390/407	420/462	176/240	190/258	205/278
r\min	1500					
Cylinder No.	6					
Firing Order	1-5-3-6-2-4					
Intake Type	TCI					
Compression Rated	17:1			16:1		
bore*Stroke(mm)	127×165		126×166	126×130		
Displacement	12.6		12.4	9.726		
Fuel Consumption (g/kw.h)	205			220		
Oil Consumption (g/kw.h)	0.86			0.82		
Exhaust gas temp(℃)	550					
Oil Pan Capacity(L)	26-28			24-26		
Starter motor(v/kw)	24/7.5			24/7		
Charging Alternater (v/w)	28/1500			28/1000		
Governor	Electronic Governor ≤1%					
Flywheel NO.	SAE 1					
Fly wheel Housing NO.	14					
Net weight(kg)	1100			1000		
Application	Generator set			Marine		

FUNCTION PARAMETER

Model	6D10C278B	6D10C327H	6D12C350B	6D12C400H	D2655C	D2765C
Type	water-cooling, in-line, 4-stroke, direct injection and dry liner					
Rated Output (kw)	205/278	240/2100	258/350	294/400	330/450	368/500
r\min	1800	2100	1800	2150	2100	1800
Cylinder No.	6					
Firing Order	1-5-3-6-2-4					
Intake Type	TCI					
Compression Rated	16:1				17:1	
bore*Stroke(mm)	126×130		126×155		127×165	
Displacement	9.726		11.596		12.6	
Fuel Consumption (g/kw.h)	225		210		205	
Oil Consumption (g/kw.h)	0.82				0.86	
Exhaust gas temp(℃)	550					
Oil Pan Capacity(L)	24-26				26-28	
Starter motor(v/kw)	24/7				24/7.5	
Charging Alternater (v/w)	28/1000				28/1500	
Governor	Electronic Governor ≤1%					
Flywheel NO.	SAE 1					
Fly wheel Housing NO.	14					
Net weight(kg)	1100		1100		1250	
Application	Marine					

2. Fuel, lubricating oil, coolant and auxiliary materials for engine.

2.1 Fuel

In summer: 0# light diesel GB252

In winter: -10# light diesel GB252

When it is below -20℃ in winter, choose -20# diesel; at -30℃, choose -35# diesel.

2.2 Lubricating oil

For the safe and reliable running of your engine, please use CH-4 grade oil. It is allowable to use higher grade oil to replace lower grade. 15W/40CF-4 can be used in the range of -15℃+30℃ and 20W/40CF-4 can be used in -10℃+30℃.

Before start, first of all check the oil level in the oil sump. The oil capacity is about 24L and the level should be between the upper and lower scale graduation.

1. Don't check the oil level when engine is running.
2. Different quality oil can't be mixed to use.

2.3 Lubricating grease

The auto-general used lithium base lubricating grease injecting into tension pulley cavity and water pump grease cup should be conform to GB/T5671 standard.

2.4 Coolant

The antifreeze additive is Ethylene glycol with the features of anti-rust and antifreeze. It is allowed to use China-made reliable long acting anti-freeze additive instead. The use method can refer to its instructions. Two kinds of long acting anti-freeze additive are hereby recommended: JFL-336 & FD-30#.

Sheet 2-1 China- made long acting anti-freeze additive

Item No. / Grade	JFL318	JFL336	JFL345
Ethylene glycol %	33	50	56

proportion（15.6℃）	1.05	1.074	1.082
boiling point ℃	104.5±1	108.5±1	110.0±1
freezing point ℃	-18±1	-36±1	-45±1
min temperature ℃	-10	-26	-35

1. When temperature is below 0℃, regularly check the density of anti-freeze

2. The engine often working in the temperature of above 0℃ can use anti-rust and anti-scale treated water as coolant. Never use untreated water as coolant.

2.5 How to use proper viscosity oil

	SAE grade	Temperature environment （℃）
Lubricating oil	5W/30	-30～35
	10W/30	-25～35
	15W/40	-20～40
	20W/50	-15～50
gear oil	85W/90	-15～49
	80W/90	-25～49
	85/140 (viscosity is higher than 85W/90)	-15～49

2.6 Auxiliary materials

In the assembly and repair process, apply Loctite 510,242,275,648 and 270080 sealant and adhesives.

Sheet 2-2 LAMBERT POWER diesel engine auxiliary materials

SL No.	Name	Color	application and use
1	Molykotte Pulver	black	Apply to smooth metal surface in case of occlusion, for example: apply to cylinder liner surface.
2	Molykotte G.u.plus	dark gray	Have lubricating function before lubricating pressure is building up. For example: spread on the inlet valve

3	Loctite 242	blue	Apply to bolt thread and bearing surface for retaining. For example: main oil passage pressure limit bolt thread
4	Loctite 262	red	Apply to bolt thread surface for lock, sealing. For example: cylinder head bolt thread part
5	Loctite 275	green	Spread on the surface of pipe and connecting part for mounting function. For example: the surface of water outlet heating device and inlet pipe connection part
6	Loctite 510	red (orange)	Apply to bight metal surface for dealing. For example: spread to contact surface between cylinder and crankcase.
7	Loctite 648	green	Apply to bright metal surface for mounting function.
8	Loctite 270080	green	Used in plug and hole and apply to oil cavity and oil pipe. For example: the surface of all the bowel plug and cylinder.

3. Installation and connection of the engine

3.1 Lifting of the diesel engine

There is a lifting plate specially for lifting in the front end of cylinder head. When lifting, keep crankshaft centerline horizontal. It is not allowed to lift aslant or by one side. It should be slow to lifting and placing. The lifting method figures is as figure 3-1 on the lift.

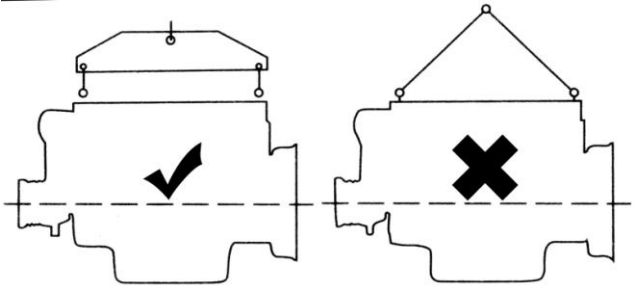

Figure 3-1

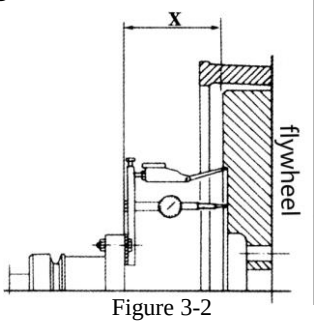

Figure 3-2

3.2 Engine Installation

The output end is at the side of flywheel. When installing with alternator, use elastic

coupling for connection to make sure crankshaft centerline and output shaft axis to be coaxial and also ensure crankshaft doesn't bear extra axial force for improper installation. The co-axiality between crankshaft centerline and gear box output shaft centerline should be less than 0.2mm; and face run out is less than 0.2mm. The co-axiality adjustment is as shown in figure 3-2.

During use, users should regularly check as per the above requirements. Adjust it if necessary to make sure normal running.

3.3 Other engine accessories installation

1) Engine exhaust pipe should be connected to outdoor. And its exhaust pipe should not have too many bending. Expansion joints should be fitted in the middle of pipeline; and additional support should be added. The inner diameter of exhaust pipe shouldn't be less than 50mm and back pressure should be more than 6Kpa.

2) The exhaust pipe exit outdoors should be covered with rain shield. Water drain plug can be fitted in the lower place of exhaust pipe to make condensed water in exhaust pipe drain away.

3) The air intakes outdoors (especially marine engine) should be fitted with waterproof cover to avoid water entering intake system.

4) The fuel tank capacity should meet 8-hour running with rated load. The fuel pipe diameter should not be less than 10mm.

4. Operation and Maintenance of Diesel Engine

4.1 Preparation and inspection before operation

Open the package and sealing

When opening the engine package, users should first count the number of diesel engine and fittings according to the packing list; and check whether there is any damage on the engine surface and whether the connection is loose or not. Then proceed to the following step:

1) Wipe anti-rust coat and corrosion inhibitor of engine parts exposed outside.
2) Drain out the seal fuel in fuel filter and inside of spare parts of fuel system. (It can be

allowed to start with the seal fuel in fuel system; but only when the seal fuel in fuel system is run out. it can't be given full load until the fuel supply is normal.)

The seal period is one year. Over 1 year it must be checked and taken necessary measures.

3) Rotate flywheel and spray solvent to inside of intake pipe until the oil seal oil in cylinder is eliminated.

4) Spray solvent to turbocharger intake and exhaust hole until the oil seal oil is eliminated.

5) Check oil in the oil sump to make sure the level is as specified.

6) Check the coolant to make sure it's as specified.

4.2 Inspection before start

Check coolant level

If engine has been fitted on the base frame, see the coolant level. If the coolant level is low, open radiator cover and add coolant. Never add a large amount of coolant when engine is hot. If there is not enough coolant at top urgent conditions, slowly add moderate temperature water until it overflows; start the engine, continue filling water to be full till the level is stable, finally cover radiator cap.

Check oil level

Oil level should be between upper and lower scale mark of dipstick. If necessary,add oil.

Check whether various accessories connection is reliable, rectify if there is problem. Check whether wire connection in electric system is normal and battery is fully charged; then open fuel tank valve to connect hand fuel pump to expel the air in fuel system.

4.3 Engine start

Set power switch and electric key to "start" position, then start the engine.

4.4 Normal running conditions

Lubricating oil mail oil pipe pressure: 300～550kPa; and it is over 80kPa at idle speed.

Oil temperature in oil sump <110℃

Temperature for coolant exit 75～95℃

Exhaust temperature after turbo≤600℃

Intake temperature after air intercooled 55±5℃

4.5 Cautions in use

While starting engine, if it does not start successfully within 15 seconds, re-start after 2 minutes interval. If it can't be started by three successive starts, stop starting immediately. Find out the reason, trouble shoot and then restart..

After engine start, run several minutes at idle speed, then raise the speed to rated speed and add the load. Only when outlet water temperature is higher than 60℃ and oil temperature is higher than 50℃, engine can run at full load. The add of load and speed should be given gradually. Never add or reduce the load suddenly.

4.6 Engine operation in winter

Fuel: Choose different grades of fuel according to the outdoor temperature in winter.

Lubricating oil: Choose different viscosity of lubricating oil as per different seasons.

Coolant: Choose different grades and amount of coolant as per the outdoor temperature in winter.

Start: In winter , if necessary ,use auxiliary starter. After engine start, when oil temperature and water temperature are normal, apply the load and run at high speed

Battery: Before cold season begins, do check electrolyte level, viscosity and unit voltage

Engine stop

Under the cold season when stopping engine, fist take off the load, and then run it for 5 minutes at idle speed. When the temperature comes down, it can be stopped. If coolant is not added antifreeze additive, open water drain valve or water seal plug in cylinder block side, radiator and inlet water pipe to drain out coolant in case of frost crack.

5. Periodic checkup and technical maintenance

Correct maintenance and upkeep of engine is the important step to ensure engine to work

normally and reliably and extend its service life.

5.1 Period for regular check and maintenance.

First check (P) Engine run for 30-50 hours.

First grade maintenance (WD1) Engine running every 200 hours

Second grade maintenance (WD2) Engine running every 250 hours.

Third grade maintenance (WD3) Engine running every 250 hours.

Fourth grade maintenance (WD4) Engine running for 250 hours.

Note: The above maintenance period is based on engine annual running 1500 hours. If annual running hours is under 500 hours, its maintenance period should be 1/2 time of the above. If annual working time is over 1500 hours, then its maintenance period is 1.5 times of the above.

The work to be done during checkup and maintenance.

Sheet 5-1 Engine technical maintenance items.

Items for check	First check	P	WD1	WD2	WD3	WD4
Change engine oil	▲	▲	▲	▲	▲	▲
water pump	▲		▲	▲	▲	▲
Change oil filter	▲	each time when changing oil				
Check and adjust valve clearance	▲		▲	▲	▲	▲
Check nozzle open pressure					▲	▲
change fuel filter			▲	▲	▲	▲
clean fuel pump strainer			▲	▲	▲	▲
check coolant capacity and add if necessary	▲	▲	▲	▲	▲	▲
change coolant	every 24 months					
Fasten cooling pipe clamp	▲					
Fasten intake pipe, hose and flange connecting parts	▲		▲	▲	▲	▲
Check air cleaner maintenance indictor			▲	▲	▲	▲
Clean air cleaner dust cup (not include automatic dust exhaust type)		▲	▲	▲	▲	
Clean air cleaner main element	when indicating light is on					
clean air cleaner main element	when indicating light is on					
change air cleaner main element	refer to manual					
change air cleaner safety element	After cleaning main element for 5 times					
check belt tension	▲	▲	▲	▲	▲	▲
check turbocharger bearing clearance						▲
check fuel pump in special workshop						▲
Adjust idle speed	▲					

The engine oil change period is subject to the following conditions.

Normal working conditions(The conditions listed in the above sheet is normal working conditions, and oil consumption is normal): at environment temperature, use fuel with sulfur content less than 0.5% (by weight).

Bad working conditions (high oil consumption)

1) A. In tropical and frigid climate (temperature is over +30℃ or under-10℃), the oil change period is 1/2 time of normal working conditions

2) B. Use fuel with sulfur content 0.5~1.%, the oil change period is 1/2 time of normal working conditions.

3) At above mentioned both bad working conditions, the oil change period is 1/4 time of normal working conditions.

Please note the oil used in the above sheet is Grade CF-4.

Daily checkup items

After engine stops, check the oil level and coolant level (include oil coolant), drain off water in fuel filter, check charging indicator and oil pressure indictor. Check seal surface of oil, water and air pipe connection to make sure no leaks. Check the fastening parts and various instruments to ensure they are normal.

5.2 Maintenance for engine stored for long time

5.2.1 Clean up engine

Before sealing, all the rust should be cleared with proper way. The parts to be treated with repellent such as lube oil pipe, fuel system and turbocharger, should be cleared thoroughly.

5.2.2 Protective procedure

After engine is heated, drain out the all the oil, clean up oil filter and add anti-rust oil to oil tank and oil sump. Drain out all the diesel in fuel tank, add mixed fuel with 90% diesel and 10% anti-rust oil to protect the whole fuel system.

If the engine is not filled with cooling emulsion, after draining out cooling water, add cooling emulsion and anti rust oil.

Before sealing, fill the above mixture and start the engine and run at idle speed for 15~25 minutes.

Take off the cover plate of intake pipe, inject anti-rust oil into intake pipe with pressure nozzle. When injecting anti-rust oil, hand crank the crankshaft to open air valve, and make anti-rust oil into combustion chamber. Once the sealing work is finished, don't turn crankshaft to prevent the the oil film on cylinder wall from removing.

Drain out the oil in engine, remove cylinder head cover, and inject anti-rust oil into valve spring and rocker arm.

All the processed part in engine and the rusted part should be spread repellent.

5.2.3 The protective measures in storage

To prevent moisture air and impurities going into engine, during transportation and storage, use sealing cover to seal outlet of intake pipe and exhaust pipe, cooling water pipe, and cover the engine with plastic bag.

6. Failure and trouble shooting

6.1 Engine doesn't start.

Failure cause	Trouble shooting
1. The fuel pipes, such as lift pump oil inlet strainer and hose, are blocked	Check and clear dirt, and check fuel cleanliness.
2. Air in fuel system	Expel air, and check joint sealing and repair.
3. Fuel injection pump failure	Check plunger, fuel outlet valve. Repair and replace.
4. Injector failure	Check injector atomization and repair.
5. Wrong timing and initial fuel supply advance angle	Check and adjust.
6. High pressure fuel pipe is damaged and fuel leaks	Repair and replace
7. Insufficient cylinder pressure	Check valve seal, cylinder head gasket seal, and piston ring wear. Repair and replace.
8. Low temperature	Add auxiliary start device.

6.2 Engine stops after running a short time

Failure cause	Trouble shooting
1. The fuel filter is blocked.	Dismantle fuel filter, clear dirt and water inside. If necessary, replace fuel filter.

2. The fuel system has air inside.	Check fuel pipe and joint sealing, and check whether screws are fastened tight, expel air.
3. Lift pump doesn't work.	Check lift pump piston, valve. Clear and repair.
4. The fuel quality is bad and with more water content.	Clean up fuel filter and replace fuel.
5. Low idle speed regulation	Readjust.

6.3 Insufficient power

Failure causes	Trouble shooting
1. Intake blockage. (air cleaner is blocked.)	Check air cleaner, intake pipe. Clear and replace filter element.
2. Exhaust back pressure is over high.	Check valve timing and check whether exhaust pipe is blocked. Adjust or repair.
3. Turbocharger pressure is insufficient.	Check and remove leakage.
4. Turbocharger doesn't work properly.	Replace.
4.1 The flow passage of compressor and turbine is blocked.	Clean up or replace.
4.2 Floating bearings is invalid.	Replace
4.3 There are deposited carbon, oil dirt in back gap of turbine and compressor	Clean up.
5. Air inter cooler is in fault, and has leak	Check and repair.
6. Fuel pipes leaks or block.	Check fuel pipe and joint sealing, filter dustiness and fuel pipe. Repair or remove blockage. Replace filter element.
7. Fuel is bad in quality.	Clean up fuel tank, filtering spares and fuel pipe. Replace fuel.
8. FIP or regulator wears heavily.	Repair or replace
9. Nozzle doesn't atomize properly.	Check injecting pressure, nozzle deposited carbon. Adjust and repair.
10. Valve timing or fuel supply timing is not correct.	Check and adjust
11. Regulator high speed regulation is too low.	Check regulation and adjust.
12. Oil level is over high in oil sump	Check oil dipstick, the drain out the excessive oil.
13. The cylinder head gasket has leaks	When engine is heated, check compressed

	pressure, replace the broken cylinder head gasket.
14. Piston rings wear and break. The bearing clearance is too big.	Replace worn spars or overhaul engine.
15. Cylinder liners or pistons wear or scratch.	Overhaul engine.

6.4 Big fuel consumption

failure causes	trouble shooting
1. Air cleaner is blocked.	Check air cleaner and exhaust pipe.
2. Exhaust back pressure is over high.	Check exhaust pipe and valve to repair.
3. Fuel quality is bad.	Change fuel as per request.
4. Fuel pipe is blocked.	Check and repair.
5. Fuel pipe has leaks.	Check and repair.
6. Injector atomization is poor.	Check and adjust or repair.
7.Timing phase or fuel supply timing is not correct.	Adjust valve clearance or fuel supply advance angle.
8. Air leaks in cylinder head gasket.	Check compressed pressure.
9. Gap between bearings is over bog. Engine needs to be overhauled.	Check and overhaul.
10. Piston is not in good conditions.	Replace cylinder liner, piston and piston ring.
11.Turbocharger system pressure is insufficient.	Check and eliminate the leaks between pipe and joints.
12. Turbocharger doesn't work normally.	Check and repair.
13. Air intercooler is damaged or has leaks.	Replace or repair.

6.5 Black smoke

Failure causes	Trouble shooting
1. Intake pipe has blockage and exhaust back pressure is high.	Eliminate it.

2. Fuel quality is poor.	Clean up and change.
3. Fuel supply or timing phase is not correct.	Adjust it.
4. Injector atomization is poor.	Check, repair and replace.
5. Injector pump injects much fuel.	Check and adjust (by professionals)
6. Turbocharger pressure is insufficient.	Check and eliminate leaks between pipe and joints.
7.Turbocharger doesn't work properly.	Check and replace.
8. Air intercooler is damaged or has leaks.	Replace or repair.

6.6 White smoke or blue smoke.

Failure causes	Trouble shooting
1.Bad fuel quality with much water	Change fuel.
2. Low water temperature	Check thermostat working temperature. Replace it if necessary.
3.Timing or fuel supply timing is not right.	Check and repair.
4.Nozzle atomization is poor.	Check and repair.
5.Compressed pressure is low and fuel burn is not enough. Piston is not in good order.	Check piston ring, cylinder liner, cylinder head gasket, and repair it.
6. Piston ring and cylinder liner doesn't run in well.	Continue run-in
7. Piston ring opening is not arranged well.	Adjust and reassembly.
8.Piston inner sustain ring loses effectiveness.	Replace.
9. Piston and cylinder liner gap is too big	Repair and replace.
10. Turbocharger seal ring is worn out.	Repair and replace.
11. Turbocharger thrust bearing wears out.	Repair and replace.
12. Turbocharger fuel return pipe has blockage.	Clean up and repair.

6.7 Unsteady speed.

Failure causes	Trouble shooting
1. Fuel quality is poor, containing water or waxiness.	Clean fuel system and change fuel.

2. Fuel system has air.	Check the seal of fuel pipe and connection and expel the air.
3. Governor adjusting spring work improperly.	Check and repair by professionals.
4. Fuel supply doesn't even.	Check and repair by professionals.
5. Nozzle atomization is poor.	Check and repair.
6. Turbocharger is working with shakes.	Check and clean compressor flow passage and eliminate blockage and eliminate carbon deposit.
7. Turbocharger bearings is damaged.	Replace

6.8 Low oil pressure

Failure causes	Trouble shooting
1. Oil level in oil sump is too low and lack of oil.	Check oil level and oil leakage, Add oil.
2. Main oil passage regulating valve is in fault.	Check valve, clean up and repair.
3. Oil leakage in lubricating system,	Check oil filter, oil pipes, connection washer is blocked or broken.
4. Oil grade doesn't conform to requirements.	Change oil and use the proper grade oil.
5. Oil pump inlet oil pipe has leaks.	Check oil pipes, joint.
6. High water temperature and high oil pressure.	Check cooling system and repair.
7. Oil filter resistance is over big.	Replace oil filter.
8. Oil cooler is blocked.	Check and repair.
9. Main oil passage is blocked.	Check and repair.
10. Bearing gaps are over big or bearings are damaged.	Check and replace.
11. Spare parts wear heavily.	Check engine working hours and over hauled.

6.9 Engine is over hot

Failure causes	Trouble Shooting
1. Water level is too low.	Check whether there is any leak. If yes, fill water.

2. Radiator is blocked.	Check radiator, clear or repair.
3. Water pump belt is loose.	Adjust.
4. Water pump gasket is damaged and water pump impellers are worn.	Check and repair or replace.
5. Thermostat is in fault.	Replace.
6. Water pipe is damaged and air leaks.	Check water pipe. Joints or washer. Replace worn spares.
7.Oil level in soil sump is low or lack of oil.	Check oil level and oil leaks. Repair and add oil.

6.10 Alternator doesn't generate electricity.

Failure causes	Trouble shooting
1. Connected wires are cut off, short circuits, or joints are loose.	Check wire connection in alternator and ammeter.
2. Rotator, stator coil is cut, short circuit or battery harness	Repair or replace.
3. Rectifier tube is damaged.	Repair or replace.
4. Insulation is broken, and conductor is cut.	Replace
5. Regulator adjusting voltage is low.	Repair
6. Regulator contact is burnt.	Repair

Warranty Certificate (For users)

Item	Content	Item	Content
Model No.		User's name	
Order No.		Zip code	
Engine No.		Address	
Purchase Date		Telephone No.	
Distributor		Mobile No.	

Dear Customer,

Thank you very much for using our products.

In order to make sure you can operate and maintain engines, please carefully read this manual and operate strictly as per the instructions. If there is any fault of engine, please contact our service center as soon as possible. We will provide timely and effective repair service.

Maintenance Instructions

Special Notice

- Operators must carefully read this manual, and familiarize engine structure, and strictly follow the technique operations and maintenance schedule. At the same time pay more attention to the Warning sign and instructions.
- The engines before dispatch has been tested strictly as per the testing specifications. The throttle has been limited by sealing. It is not allowed to remove seal to increase speed, otherwise we will not be liable for this.
- The various bolts in engine have strict torque requirements and use times. Never loosen main bearing bolts or connecting rod bolts. The detailed requirements are present in manual.
- Before using new engine , it should be given 50 hours trial running.
- After engine starts at cold state, gradually raise the speed. Never make engine run at high speed, nor run at idle speed for long time.
- After engine is shut down, if environment temperature is below 0℃, and no anti-freezing additive is not used, drain out the water in radiator and engine.
- The engine is not allowed to work without air cleaner, in case air goes into cylinder without being filtered. When working environment is bad, increase air cleaner element cleanliness or changing times to prevent early wear and tear of engine.
- When filling fuel and oil, choose the specified grade, and use the special clean container. When filling, they should be filtered. And fuel should be precipitated over 72 hours.

Special Instructions

- It is not allowed to remove injection pump oil seal.
- Turbocharger rotor is high speed rotating parts. It is not allowed to dismantle.
- Injection pump is precision component.
- Never loosen or dismantle engine main bearing bolt or connecting rod bolts. These bolts have strict torque and
- Connecting rod bolt is one-time, un-reusable bolt.