



Operation Manual  
Engine Series 6126  
(6126AZLD-4/6/7/8)

Remington Diesel Engines Manufacture

# Content

Chapter 1	Description.....	1
Chapter 2	Diesel Engine Operation and Attention.....	2
Chapter 3	Diesel Engine Safety Operation Specification.....	4
Chapter 4	Diesel Engine Main Technique Performance.....	5
	Main Technical Specifications.....	5
	Technical Data.....	6
	Fit Clearances and Wear Limit of Main Parts .....	8
Chapter 5	Operation of the Marine Diesel Engine.....	9
	Transportation.....	9
	Installation.....	9
	Storage and preservation .....	11
	Fuel, oil and jacket water .....	12
	Prepare for starting.....	13
	Starting .....	14
	Running.....	15
	Stopping .....	16
	Run in Operation rule for the new diesel engine .....	17

Chapter 6	Technical Maintenance of diesel engine	18
	Working day maintenance	18
	First grade technique mainenance	18
	Second grade technique mainenance	19
	Third grade technique mainenance	20
Chapter 7	Trouble and Remedy Method	21
	Start failure	21
	Inefficiency power	22
	Abnormal exhaust smoke	23
	Unusual pounding noise	24
	Oil pressure drop to zero or lacking pressure	25
	Engine Overheated Engine Overheated	26
	Engine Overspeed	26



## Chapter 1 Description

6126 series diesel engine for our company in introducing, digesting, absorbing the domestic and foreign advanced technology foundation, develop the successful high power series diesel engine. This machine has the characteristics of compact structure, high reliability, advanced technology index, good startup performance, simple operation, convenient maintenance and excellent economic performance.

6126 series diesel engine can be widely used in heavy truck, loader, bulldozer, excavator, crane and other engineering machinery and small power station. To maximize the use of different users.

## Chapter 2 Diesel Engine Operation and Attention

The diesel engine be tested by the test rule before leave the factory, accelerator and governor be sealed by lead.

- 1- Do not use the bad quality or unclear fuel and oil.
- 2- Use the soft fresh water to cool the diesel engine, must not cooled by sea water directly.
- 3- It's forbidden to work at intake system leak and without air cleaner.
- 4- It's forbidden to work and start at less oil and water.
- 5- It's forbidden to work at long time overload and such against work regulation.
- 6- It's forbidden to test the generator by short circuit method.
- 7- Control the starting time and spacing at electric starting.
- 8- Technique maintenance at fixed period.
- 9- Drain out the cooling water to prevent the cylinder frost cracking at the ambient temperature lower zero°C.
- 10- Inject hot water and oil at the ambient temperature lower than -5°C.
- 11- Do some test run as this description before using the new engine.
- 12- Do not speed up suddenly and running with load after the engine start without load.
- 13- Identify the safety mark at engine operation.

Pay attention the above items.

## Chapter 3 Diesel Engine Safety Operation Specification

- 1- The operator should read the Maintenance Manual and know well about the structure, operation and maintenance.
- 2- One who is not familiar with the operation instructions is not allowed to operate the engine.
- 3- The engine is not permitted to be started unless all preparation work for the engine starting has been done.
- 4- Attention to the fire protection at the engine running, the fuel tank should be provide a fire prevention device.
- 5- While the engine is operating, it is not permitted to be dismantled, checked and adjusted.
- 6- Emergency stop the engine at oil pressure lower even falls to zero, or with abnormal sound inside while engine running.
- 7- Once the engine overspeeds suddenly due to out of control, push the stop lever immediately to stop the engine, then check the cause and remedy the fault. If the stop lever is out of order, push down the decompression lever or block up the air inlet port to stop the engine.
- 8- The circuit system should be overhauled by the professional electrician or one knows well electricity knowledge.
- 9- The engine should be used in ventilation area to prevent the waste gas pollute the working environment.

## Chapter 4 Diesel Engine Main Technique Performance

Model	6126ZLD4	6126ZLD7	6126ZLD8
Type	In line, water cooling, 4 stroke, wet cylinder, direct injecting combustion chamber, electrical starting		
Intake	Turbocharged inter-cooled		
Turbocharger air cooled system	Pulse type		
Lubricate type	pressure, splash combined type		
Cooling type	Water cooled		
Crankshaft rotation direction	inverse (face to the flywheel)		
Cylinder no.	6		
Bore × Stroke mm	126×130		126×155
Displacement L	9.726		11.596
Pressure ratio	16 : 1		
Firing order	1 – 5 – 3 – 6 – 2 – 4		
Rated output kW	250	308	345
Rated speed r/min	1800	1800	1800
Prime output kW	260	320	350
Highest speed r/min	1800	1800	1800
Average effective pressure kPa	1834	2056	2125
Fuel consumption rate g/kW.h	turbocharged and after cooled: ≤210.0		
Oil consumption rate g/kW.h	≤1.68 (after run in)		
Lowest load stable speed r/min	/		
Lowest idling stable speed r/min	600 ± 50		
Net mass kg	850~900		
Dimensions (L × W × H) mm	1640×740×1120		

### Engine Main technique specification

## Technique Data

### 1. Each kind of temperature, pressure scope

( at 12 hours power rating )

- 1) lubricating oil temperature :  $\leq 105^{\circ}\text{C}$
- 2) Outlet water temperature  $\leq 95^{\circ}\text{C}$
- 3) main oil passage oil pressure: 0.35~0.55MP(Idle  $\geq 0.10\text{MPa}$ )
- 4) Exhaust gas temperature:  $\leq 600^{\circ}\text{C}$  (at manifold branch)
- 5) Injection pressure: 22.5+1.0Mpa

### 2. Tightening Torques of main bolts and nuts

- 1) cylinder head bolts:  $320 \pm 25\text{N.m}$
- 2) cylinder head bolts:  $140 \pm 20\text{N.m}$
- 3) main bearing bolts:  $250^{+25}\text{N.m}$
- 4) connecting rod bolts:  $225 \pm 25\text{N.m}$
- 5) flywheel bolts:  $260 \pm 20\text{N.m}$
- 6) fuel Injection angle bolts Palette: 130+10N.m

### 3. Main Adjustment Data

- 1) Valve clearance (cooled)  
Intake valve: 0.30~0.35mm                      exhaust valve: 0.40~0.45mm
- 2) Compression clearance: 1.0 ~ 1.20mm
- 3) Commencement of fuel injection (in rank angel)  
1500~1800r/min type:  $16 \pm 1^{\circ}$  ;    2000~2200r/min type:  $25 \pm 1^{\circ}$

### 4. Valve timing (in crank angel)

Intake valve opens: before TDC  $34\sim 39^{\circ}$   
Intake valve closes: after BDC  $61\sim 67^{\circ}$   
Exhaust valve opens: Before BDC  $76\sim 81^{\circ}$   
Exhaust valve closes: After TDC  $26\sim 34^{\circ}$

## Clearances and wear limits of main parts

No.	Description	Coordinate nature	Clearances (mm)	Wear limits(mm)	
1	Main journal and bearing	diametral clearance	0.095~0.163	0.17	
2	Crank and thrust shoe	axial clearance	0.052~0.255	0.35	
3	Connecting rod journal and bearing	diametral clearance	0.059~0.127	0.16	
4	Connecting rod large end and crank fillet surfaces	axial clearance	0.15~0.35	/	
5	Piston skirt and cylinder liner hole	diametral clearance	0.143~0.182	0.35~0.40	
6	Piston pin and connecting rod small end bushing hole	diametral clearance	0.045~0.066	0.10	
7	First compression ring and ring grooves end surfaces	Clearance	0.07~0.102	0.28	
8	Second compression ring and ring grooves end surfaces	clearance	0.04~0.075	0.26	
9	Oil ring and ring groove end surfaces	clearance	0.04~0.075	0.26	
10	Gap of first compression ring in the cylinder	在标准缸径 量规内测量 measure under the standard bore gauge	clearance	0.35~0.60	1.0~1.20
11	Gap of second compression ring in the cylinder		clearance	0.25~0.40	1.0~1.20
12	Gap of oil ring in the cylinder		clearance	0.35~0.55	1.0~1.20
13	Camshaft supporting journal and bushing hole	diametral clearance	0.04~0.12	0.20	
14	Camshaft and thrust plate	axial clearance	0.10~0.40	0.55	
15	Valve tappet and cylinder block tappet hole	diametral clearance	0.025~0.089	0.15	
16	Intake valve rod and valve guide hole	diametral clearance	0.03~0.066	0.10	
17	Exhaust valve rod and valve guide hole	diametral clearance	0.05~0.086	0.15	
18	The cylinder liner protrudes organism compaction altitude	height difference	0.02~0.07	/	
19	Rocker arm shaft and rocker arm hole	diametral clearance	0.04~0.119	0.20	
20	Backlash of all timing gears	clearance	0.15~0.33	0.45	

## Chapter Five Marine engine Operation

### Engine transportation

When the diesel engine is transported, should lift the engine by engine hooks . Moving the engine, pay more attention to avoid damage the engine appearance , accessories , oil pipes , panel , etc .

When long distance transportation is necessary, the air filter and silencer should be dismantled, use plugs and plastics to seal the air intake and exhaust hole , water pump inlet and outlet hole , fuel inlet and outlet hole . If necessary, pack the engine properly and transport.

### Installation

1. The diesel engine should install on horizontal, firm surface. When connected with marine gear box, marine generator or other transmission equipment, its axes angle must be adjusted and controlled in 0.13mm . The flywheel and connected axes must keep 1.0-3.0mm clearance, to avoid damage the engine when affected by the reaction of the axes.
2. When install the marine engine, allow 8° vertical gradient , the same gradient of power output exes and impel axes with the parallel should no more than 0.08mm . Users should check , measure and adjust it , to avoid big vibration cause by out of center , then output descend and exes、 flexible pin and gear tooth irregular wear , cause engine body and ship body.
3. User can change the engine crankshaft head independently in the allowed output , to bring the ship necessary accessorial equipment , such as fire pump set 、 fish tackle etc . However should install transmission exes and clutch between the marine engine and transmission equipments, not allow accessorial equipment and crankshaft be drive by transverse reaction, to avoid damage the crankshaft.
4. Engine exhaust pipe can not be too longer, also should reduce the turning, the corner

should have bigger bendy semi diameter, to avoid big pressure of exhaust and reduce engine output.

5. Inlet pipe of the seawater should on the lowest position of the ship cabin, and should install a filter to avoid absorb impurity. Inlet pipe should with check valve, to avoid inundation from seawater .
6. Seawater pump is not installed on the marine engine directly, user can install it in the cabin according pump's direction of rotation . Please note when install it, the pump can be adjusted from left to right position , also can adjust the flexibility of the transmission belt .

### Storage and Preservation

If the engine will not be used in a long period, should store and preserve it according following method:

1. First drain out fuel, oil and cooling water from the engine.
1. Demount the injector , put 200G dehydrated clean oil to each cylinder , turn crankshaft to make oil on every part surface symmetrically, then install the injector and fixed it well .
2. Warp up the air filter with plastic film, dismantle the silencer and plug up the exhaust hole with wooden plug.
3. Wipe off the dirty oil 、 dust and rust from the surface of the engine , smear the unpainted parts surface with thin layer of anti-rusting grease, then cover it with clean paper . Finally pack the engine with plastic bag.
4. The preserved engine should be stored in well ventilated, dry and clean place, it is strictly forbidden to be putted together with corrosive substances.

The effective period of this method is 3 months, when the time exceeds the period, please repeat this procedure.

## 1. Fuel oil

The diesel engine should use following specification oil according form 1:

form 1 fuel oil specification

Fuel oil specification	GB252 light diesel oil		
Atmospheric temperature	Above 0 °C	0°C ~ -10°C	-10°C ~ -20°C
Diesel oil brand	0#	-10#	-20#

- Please clear the fuel oil for at least 72 hours before filling it into the fuel tank , then Pick up the top clean fuel oil. The fuel oil must be strictly filtered when filled to the fuel tank.

## 2. Lubricant oil

- The diesel engine should use following specification lubricant oil according form 2:

form 2 lubricant oil specification

Lubricant oil specification	Level	Brand	Temperature
GB11122 oil	CC & CD	30 # & 40 #	5°C
		20W/40 ~ 50 #	<5°C ~ -15°C
		15W/40 ~ 50 #	-15°C ~ -20°C

- Capacity demand: The suitable capacity should be between top and bottom level of the oil sump guage.



**Forbid to use inferior quality oil !**

**Forbid to use mixed oil !**

## 3. Cooling Water

- Please use clear soft water, such as rain water, river water, etc.

- If it is hard water, such as well water and spring water which contains much minerals, please boil, precipitated and filter before use.
- When the temperature below 0 °C, antifreeze mixture can be used for cooling. The antifreeze mixture can be mixed with water and alcohol.



**Forbid to put sea water into engine for cooling !**

### Prepare for starting

1. Check if the diesel engine fixed properly and connected reliably. The control system is flexible.
2. Check the oil sump and injector pump, if the oil meets the standard level. Check if the fuel tank with full fuel, fuel system expedite.
3. Open the fuel tank valve, went out the air from the fuel system. At the same time, check if there are leaking from each fuel pipe. If find such matter, please solve out immediately.
4. Check if the fresh water tank of head exchanger with full cooling water, each water pipe leaking or not.
5. Check if every accessories connected properly , battery is sufficient , circuitry work well.
6. Check if the clutch system is cut off.



**Without promise, forbid to start the diesel engine !**

### Starting

1. Keep the control handle of the fuel valve to the position where the fuel will be delivered rather more or moderate speed.
2. Turn the circuit switch clockwise and close the circuit.

3. Turn the starting switch to the “starting position”, after the crankshaft is speeded up by the starting motor, the engine is started then.
4. Please note: Each starting no more than 10 seconds to protect the motor and battery. If start continually, the interval time should be more than 2 mins. If three times start failed, please do not start until the problem is found out and be eliminated.
5. As soon as the engine start, turn the starting switch back to the previous position. Turn on the circuit, let the alternator product electricity to the battery. A the same time, adapt the fuel valve to moderate speed to see if the diesel engine run properly. Check if the oil pressure ok, then adapt the speed handle gradually to make the speed meet 75%~80% of the standard speed. Then run the engine without loading.

## Running

1. Only when the temperature of the cooling water reach 50~60°C and oil temperature reach 40~50°C, can operate the engine with load. When the water temperature reach 80°C, operate the engine at full load.
2. The engine speed and load should be increased and decreased gradually. In general, Shouldn't increase and decrease rapidly.
3. When the engine is working, should pay attention to each data of the meter and observe the color of the exhaust smoke, listen to the voice inside. If any problem, should stop the engine immediately and remedy it.
4. It is forbidden to let the engine running at idle speed for long time
5. The injection pump has been adjusted rightly before leaving factory, it is forbidden for user to change it at will. If necessary, it should be adjusted at the injection pump equipment.



**Note: new diesel engine or just overhauled engine, it is permitted to run at full load only after it has worked over 60 hours !**

## Stopping

1. Before stopping the engine, unload first, decrease the engine to the idle speed gradually, also cut off the clutch system. When the water temperature falls down below 70°C, operate the stop handle to stop to stop the engine.
2. After stopping, should take the circuit switch , close the fuel tank valve .
3. When the temperature under 0°C, if do not use the antifreeze , should drain out the cooling water from the engine to avoid damage the engine body and water pump . If with antifreeze, it is unnecessary to drain out the water.

**Note: Forbid to stop the engine by shutting off the valve of the fuel tank !**



**Forbid to stop the engine suddenly at high water temperature !**

## New engine adjusting period principle

From the experience, new engine life , working stability and economical mainly depends on previous adjusting period . Thus user should operate the engine under new engine adjusting principle.

Number	Load	Running time	Note
1	Idle load	20 mins	<ul style="list-style-type: none"> <li>- During adjusting period, fuel valve should at full open position, load can be estimated by left load form, but must know the principle of increasing load gradually.</li> <li>- During running period, pay attention to water temperature, oil pressure, and oil increasing temperature. Listen carefully if strange sound. If any problem, stop engine and remedy immediately.</li> </ul>
2	25% load	1hour 40mins	
3	50% load	13 hours	
4	75% load	30 hours	
5	100% load	15 hours	
6	total	60 hours	

## 6. Marine engine 's technology maintenance

In order to work well and reliability for diesel engine, keep better technique capability, reduce abrasion of spare parts, extend the engine life, the users must carry out following maintenance rule carefully and regularly.

Diesel engine maintenance criterion:

1. daily maintenance (carry through Each class)
2. Top of technology maintenance (carry through After working 100 hours in Total)
3. Second of technology maintenance (carry through After working 500 hours in Total)
4. Third of technology maintenance (carry through After working 1000 hours in Total)

### Daily maintenance items

1. Check the oil sump face of diesel engine should be kept between fuel gauge up and down scale. When not enough, must be filled.
2. Checked the oil in speed governor of injection pump should be kept on stated situation, when not enough, must be filled.
3. Check the freshwater capacity in heat changer, when not enough, must be filled.
4. When the temperature is below 0°C, cooling water should be filled antifreeze and drop it when engine stop.
5. Check and screw down the tight and fitted parts outside of diesel engine, remove the leaking oil, water and air matter in timely.
6. Clean out dust and smeary on surface of engine, keep engine cleanness
7. Guarantee cleanness and dryness of electric equipment and wires, clean out all of fault and abnormality phenomena when diesel engine running.

## Top of technology maintenance items

1. Carry out all of daily maintenance items
2. Replace oil in oil sump and cleanout oil sump and collection oil pump and scree assembly.
3. Cleanout or replace oil filter.
4. Cleanout fuel filter or replace new filters after working 200hours in total
5. Checked the screw moment of screw in cylinder head and see if the valve distance get to stated request.
6. Clean out the dust in plate for dust and surface of air filter, clean out dust and ash in exhaust pipe and muffler
7. After working 200hours in total, check the injection pressure and injection atomization instance, cleanout valve parts and readjust injection pressure when necessary.
8. Checked voltage of battery and ACID rate should be kepted between 1.27 and 1.28(atmosphere tempture 20°C).If rate is below 1.14, should charge the battery.

## Second of technology maintenance items

1. Carry out all of top of technology maintenance items
2. Checked work of injection pump, adjust oil supplying advanced angle .When necessary, should readjust oil capacity of injection pump on testing bed.
3. Checked seal ring of intake and outtake valve and clean out cumulated carbon. When necessary, should whet and correct and readjust valve distance get to stated request.
4. Checked the tightness and fitted instance of connecting rod screw, main bearing screw, cylinder head screw and flywheel screw should be suitable with screw moment.
5. Cleanout or replace air filter.
6. Cleanout the sewage in cooling system, lotion should be used caustic soda (NaOH) plus 1 liter water to be mixed. Before cleaning, let out water fully, then filled with lotion. After 8-12 hours, restart diesel engine and stop when water temperature get to working temperature about 80°C, then let out lotion at once. Finally, cleanout whole cooling system by cleaning water.

7. Checked working instance for thermostat and leaking instance for hole for releasing water. If leaking is serious, should be replace water seal.
8. Check and see if electric equipment and wires connection is fitted and if lead touching is well. In case burnt, must be clean up and replaced.
9. Check and see if moving capacity of rotor for turbo charger is in stated range. When necessary, should repair or replace.

### Third of technology maintenance

1. Carry out all of second of technology maintenance items
2. Check each spare parts of diesel engine and adjust and necessary maintenance.
3. Remove and check alternator and startor. Clean up bearing and fill with new lubricant, meanwhile check and see if start gear abrasion.
4. Remove and check cylinder head, cylinder line, piston and piston rings, cleanout the water, oil smudgy and cumulate carbon and clean up again.
5. Check and measure piston and piston ring's abrasion instance.
6. Check and measure the abrasion instance of holes inside of cylinder line.
7. Check and measure abrasion instance of each shaft neck for crankshaft and clean up each oil way of crankshaft.
8. Check and measure abrasion instance of main bearing and connection rod bearing.
9. Clean up each oil way for engine body and replace oil.
10. After reinstalling the engine, make the engine work and work must be according to new canonical running rules after try to be running.

## Chapter seven Troubleshooting

### Start failure

Cause	remedy method
Jammed in filter and fuel system	Dismantle and clean
Air trapped in fuel system	Went the air from the system and fixed all pipe
Fuel supply time wrong	Adjust the supply time
Injector sprays abnormally	Check and adjust injector fuel pressure , clean or replace valve
Insufficient compress pressure	Check or replace piston ring, cylinder liner and valve. If the cylinder head gasket leak steam, please screw well the cylinder head bolt, If any damage of cylinder head gasket, please replace it .
Valve gap wrong	Adjust the valve gap and aim at gear tooth as sign
Battery is insufficient	Recharging the battery
Connecting of electric device is not good	Check and tight the connection
Temperature is low , oil is too viscous	Make the water and oil to be higher temperature

### Inefficiency power

Cause	remedy and method
Less pressure in cylinder	Please refer to item 5 “ hard to start “ , if any parts exceed wear out limit , replace it.
Fuel supply time wrong	Adjust the supply time
Valve gap wrong	Adjust it
Each cylinder fuel supply is unbalanced	Adjust injector pump fuel supply
Air filter is blocked	Clean or replace the filter
Injector pump , injector wear out or injector pressure is incorrect	Replace it with new parts, adjust injector pressure and check spray condition.
Incorrect speed	Adjust handle to make speed meet standard level

## Abnormal exhaust smoke

Cause	remedy and method
Overload	Reduce the load . If the power is not suitable , should adjust it.
Injector is not good	Check the injector pressure and spray condition , if the injector with problem , replace it
Fuel inferior quality	Change good quality fuel
Inefficiency fuel inflammation	Mainly caused by the spray is not good , supply fuel time is incorrect , cylinder head gasket leak steam , compression ratio inefficiency . Solve out one by one

### Unusual pounding noise

abnormality & cause	remedy
Fuel delivery advance angle is not correct	adjust the fuel delivery advance angle
Aires in the fuel system	Drains the air in the fuel system.
Fuel delivery not balance	adjust fuel delivery of every cylinder injection pump
Fuel quality bad	replace the qualified fuel
Parts fray over the limits	exchange the parts

### Oil pressure drop to zero or lacking pressure

abnormality & cause	remedy
Oil level is too low in the crankcase oil tray	Add oil to the oil staff standard
Oil passage leak oil	rule out oil leaking
Oil filter, secondary filter and passage jam	Wash, replace the filter if necessary
Oil pressure meter breaks or meter and passage jam	overhaul or replace
Oil be too thinness	replace the qualified oil
Oil pump gear is worn out and clearance too large	Adjust the clearance or replace the gear
Pressure regulating valve of oil filter breaks	Overhaul or adjust the regulate valve
Crank shaft, camshaft bearing clearances too large.	overhaul or replace

### Engine Overheated

Abnormality & cause	remedy
cooling water temperature over high	
Cooling water insufficient or to form aero some in the pipe	Fill the water tank full, improve the water lever to make the cooling water high than the water pump center
Water pump	Check the water pump and belt to eliminate leaking
Too much furring in the cooling system	eliminate the furring
Oil temperature too high	
Over or less quantity of oil	check the oil level if in the standard
Low oil pressure and less flow	Refer to Oil pressure drop to zero or lacking pressure
engine overload	Low the load of engine

### Engine Overspeed

Govenor are stuck	Stop the engine immediately and overhaul
Control Rod of injection pump is stuck.	Stop the engine immediately and overhaul
Injection pump supply fuel too much	Stop the engine immediately and re-adjust the fuel feeding quality.
Engine consume too much oil	Stop the engine immediately and overhaul