



**ZE205E/ZE230E**  
**HYDRAULIC EXCAVATOR**  
**MAINTENANCE MANUAL**



First Edition of January 2013



## To users

Dear users, thank you for choosing Zoomlion hydraulic excavator. Before maintain this machine, please read and fully understand this manual and strictly comply with the relevant provisions in it.

Regular inspection, maintenance and repair on the machines are the essential means to ensure that the machines can give full play to their excellent performance, work safely and reliably and have their service lives prolonged. In order to make it convenient for you to do inspection, maintenance and repair for the machines, we provide this Maintenance Manual for you.

The maintenance manual gives you a detailed introduction on the rules and explanations about the inspection, maintenance and repair of hydraulic excavators and also introduces methods of troubleshooting for the common faults.

In order to make the machines work normally and to ensure you and other people's personal safety, make sure that you have read up on the manual and other attached documents carefully and thoroughly before maintaining and repairing the machines. If you have any doubts or questions, please contact the local service engineers and we will provide technical support for you timely and effectively. The company will not bear any undesirable consequences resulted in disobeying the rules of this maintenance manual.

In the process of maintaining the machines, any person without authorization cannot dismantle or adjust the hydraulic components. When any hydraulic components are broken down or any parts are damaged, please call our local service engineers.

Because of the constant improvement and upgrades of product design as well as differences in the product specifications and models, the details of some pictures and text content in the manual may be a little different from the products that you possess. The company reserves the right to revise the content of this *Maintenance Manual* due to technical improvement. We are subject to change without prior notice and we hope that all users can understand us.

This maintenance manual is suitable for ZE205E/ZE230E hydraulic excavators.

Thank you very much for your trust and support for Zoomlion products. We sincerely wish you all the best!

## Safety Instructions

The manual involves the following safety and warning icons:



High risk of danger: there is risk of death or heavy injuries.



Middle risk of danger: there is risk of heavy injuries.



Slight risk of danger: there is risk of light injuries or moderate injuries.



Safety sign: there is risk of property loss.



This icon marks instructions for particular information.



The icon is for showing the importance of particular information.



It shows that this operation does not conform to the safety specification and easily causes death and injuries, so it is forbidden.

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**Chapter One: Safety Criterion for Excavator Maintenance**







## Chapter One: Safety Criterion for Excavator Maintenance

### 1.1 Basic Safety Requirements for Maintenance

It is of great significance to carry out maintenance and repair for the excavators, for this can extend the machines' service lives, ensure the personnel and machines' safety, improve work efficiency and increase economic benefits. Except reading the "Safety Tips", maintenance staff should comply with the following regulations:

a) The staff in charge of maintenance should not perform the maintenance work unless they have fully understand the structure, performance, assembly and disassembly procedures, technical requirements and precautions of the complete vehicle.

b). For difficult maintenance items, you'd better consult the manufacturer.

c). Routine maintenance is usually carried out before starting the vehicle and after completing the work every day. Park the vehicle on level ground, lock the locking mechanism, and then carry out maintenance.

d). Before maintenance, the surrounding area of the parts to be maintained should be cleaned and scrubbed thoroughly, especially the surrounding area of oil filling port, filter, fuel injectors and box cover, so as to prevent dust from entering into the oil.

e). Always remember that there is high pressure in the hydraulic circuit and release the pressure first before refueling, fuel discharging or inspection and maintenance.

f). Before changing engine oil, start the vehicle and let the oil temperature rise to 30°C~40°C before draining the old oil.

g). Use clean oil and grease. The inspection or change of oil should not be performed at dusty place, otherwise the dust will enter into the oil.

h). The electrical system can not be handled in the rain.

i). When checking or adding coolant, take care not to let the hot water spray out and hurt people.

j). After the replacement of engine oil filter element or coarse strainer, air in the oil circuit should be discharged.

k). It is prohibited to refuel with the filter screen on the oil filling port being removed.

l). Before overhauling the gearbox, empty the pockets. Take care not to let wrenches, nuts and other things fall into the cabinets, resulting in unnecessary troubles.

m). Keep oil far away from fire and do not use a torch instead of lighting.

n). When replacing O-rings, gaskets or other seals, the parts surface should be cleaned and installed carefully.

### 1.2 Precautions for Maintenance

Carry out technical maintenance correctly and timely, that is, perform such technical maintenance works as inspection, cleaning, lubrication, adjustment and fastening etc. for the machines frequently and regularly. This will not only increase the production efficiency, reduce wear and avoid unexpected failures, but also improve excavators' working efficiency, extend machines' service lives and reduce maintenance costs.

The machine's maintenance period is recorded by the hour meter.

Under poor operating conditions, maintenance should be done earlier than the required time.

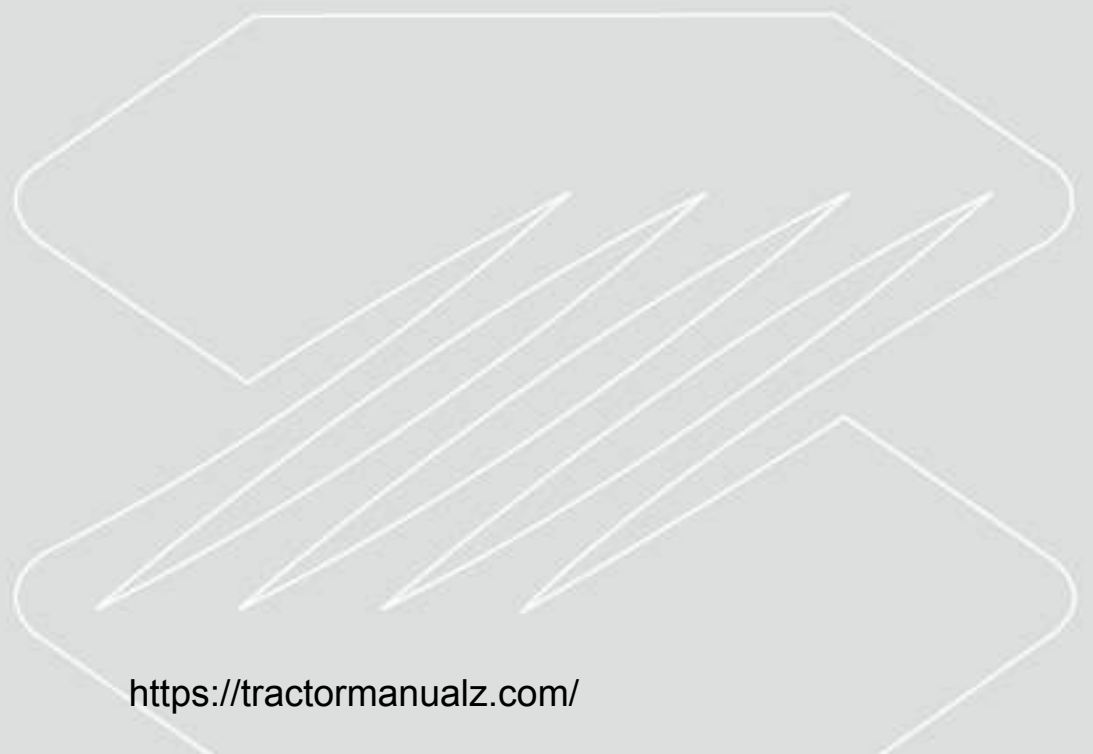
**Attention**

- 1. Comply with relevant provisions of the "Safety Operation Specification" during maintenance.**
- 2. When maintenance is performed under the vehicle, put up signs at the driver's seat or around the vehicle when necessary.**
- 3. Before cleaning or refueling the machine, checking the tension of the fan belt or inspecting the moving parts and their nearby parts, shut down the engine.**
- 4. Before maintaining, inspecting or charging the batteries, shut down the engine and remove the battery clips at the same time. Before dismantling the connector between the batteries and the charger, switch off the charger switch.**
- 5. Keep away from open fire during maintenance (no smoking and no electrical sparks).**
- 6. Before carrying out oil feeding, oil draining or other inspections and maintenance for the hydraulic system, release the pressure first.**
- 7. Special adjusting tools should be used when adjusting oil pressure, or else failures will occur when performing difficult maintenance items.**
- 8. During inspection and maintenance, only essential personnel can approach.**
- 9. All oil filling ports, surface of oil dipstick and all fuel containers should be kept clean; only oil of brands specified by Zoomlion should be used; the inspection and replacement of various oils should be performed in environments with few dusts, so as to maintain high degree of cleanliness.**



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**Chapter Two: General Drawing and Main Parameters  
of Excavator**





## Chapter Two: Outline and Main Parameters of Excavator

### 2.1 Outline of Excavator

The appearances of hydraulic excavators ZE205E/ZE230E introduced in this manual are generally the same, as seen in Figure 2-1.

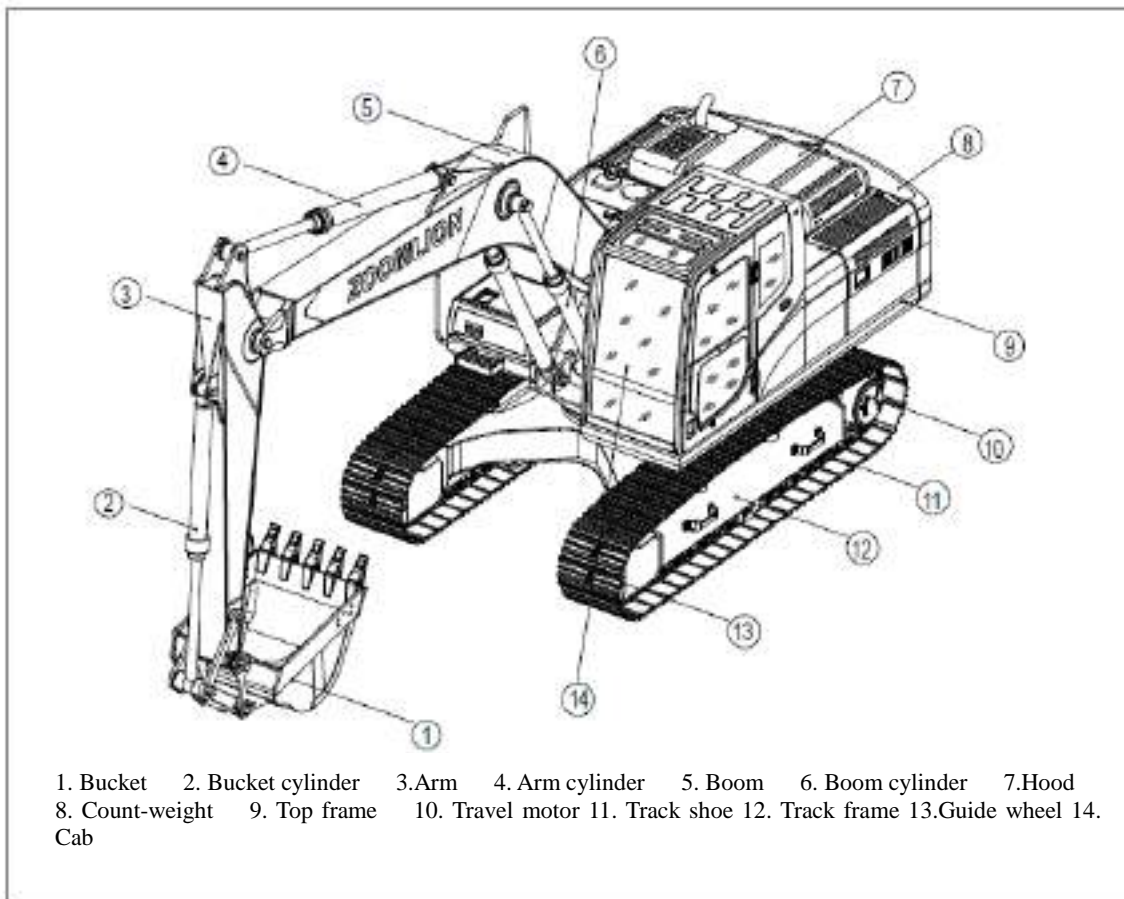


Figure 2-1 Outline of ZE205E/ZE230E

### 2.2 Main Technical Parameters of Excavator

See Table 2-1 for the main technical parameters of ZE205E/ZE230E hydraulic excavators, Figure 2-2 for the outline dimension and Figure 2-3 and Figure 2-4 for the working range.

**Table 2-1 Main technical parameters of ZE205E/ZE230E hydraulic excavators**

Parts	Items	ZE205E	ZE230E
Bucket Capacity	m <sup>3</sup>	0.85	1.10
Engine	Model	BC5.9-C	BC5.9-C
	Type	6 cylinders,4 stroke water-cooled direct injection, turbo-charged inter-cooled type	
	Rated power kW/rpm	112/1950	133/2000
	Maximum torque (N-m/rpm)	655/1500	708/1500
	Displacement (ml)	5883	5883
	Starter motor (v)	24	24
	Generator (Amp)	70	70
Hydraulic system	Main pump type	Swash-plate type dual variable piston pump	
	Maximum flow rate (L/min)	2×206	2×220
	Pilot pump	Gear pump	
	Travel motor	Double-speed swash-plate type piston motor with automatic braking valve and parking brake	
	Slewing motor	Swash-plate type piston motor with automatic braking valve	
System pressure	Hydraulic circuit of working device (Mpa)	32.1 (35 when pressurized)	34.3 (35.3 when pressurized)
	Travel hydraulic circuit (Mpa)	34.3	34.3
	Slewing hydraulic circuit (Mpa)	25.5	25.5
	Pilot hydraulic circuit (Mpa)	3.9	3.9
Hydraulic cylinder (amount of cylinders -- cylinder bore ×travel distance × piston rod's diameter)	Boom (mm)	2-120×1315×85	2-130×1315×90
	Arm	1-135×1 490×95	1-140×1 635×100
	Bucket	1-115×1120×80	1-130×1020×90
Rotary system	Slewing motor	Swash-plate type piston motor	
	Retarding mechanism	Secondary planet reducer	
	Slewing speed (rpm)	11.5	11.3
	Slewing brake	Wet multi-disc brake	
Traveling system	Travel motor	The swash plate piston motor	
	Retarding mechanism	Planet reducer	
	Steering control	Two operation levers with pedals	
	Parking brake	Wet multi-disc brake	
	Maximum traction force (kN)	192	195
	Gradeability	35° (70%)	35° (70%)
	Travel speed (high/low) (km/h)	5.5/3.3	5.2/3.4

Table 2-1 (Continued)

Parts	Items	ZE205E	ZE230E
Chassis	Track frame	Box structure	
	Track shoe (piece/side)	46	49
	Track roller (one side)	7	8
	Carrier roller (one side)	2	2
	Track guarding frame (piece/side)	1	2
Volume of cooling liquid and oil	Fuel tank (L)	350	350
	Cooling liquid (L)	35	35
	Engine oil (L)	26	26
	Slewing device (L)	3.4	4.0
	Traveling device (L)	2×5.5	2×5.5
	Hydraulic system (L)	300	300
	Hydraulic oil tank (L)	230	230
Operating weight	Standard(kg)	20300	22800
Outline dimension (see Figure 2-2)	A (Overall length mm)	9481.5	9760
	B (Overall width mm)	2800	2990
	C (Overall height(to the top of boom mm)	3010	3190
	D (turning radius of the tail mm)	2740	2840
	E (Length of the tail mm)	2840	2800
	G (Ground clearance of counterweight mm)	1085	1070
	H (Minimum ground clearance mm)	440	440
	I (Track contact length mm)	3370	3640
	J (Length of the track mm)	4160	4430
	K (Track gauge mm)	2200	2390
	L (Width of the track mm)	2800	2990
	M (Width of the track shoe mm)	600	600
	N (Height of the shoe tooth mm)	26	26
	P (Overall height to the top of the cab mm)	2950	2960
Q (Width of the slewing table mm)	2720	2720	
Working range (see Figure 2-3 and Figure 2-4)	A (maximum excavating distance mm)	9855	10170
	B (maximum excavating distance on the ground mm)	9675	9995
	C (maximum excavating depth mm)	6625	6860
	D (maximum vertical excavating depth mm)	5980	6120
	E (maximum excavating height mm)	9715	10220
	F (maximum discharge height mm)	6865	7240
	G (minimum slewing radius mm)	3275	3140
Digging force	Maximum excavating force of the bucket	140	155
	Maximum excavating force of the arm	100	124

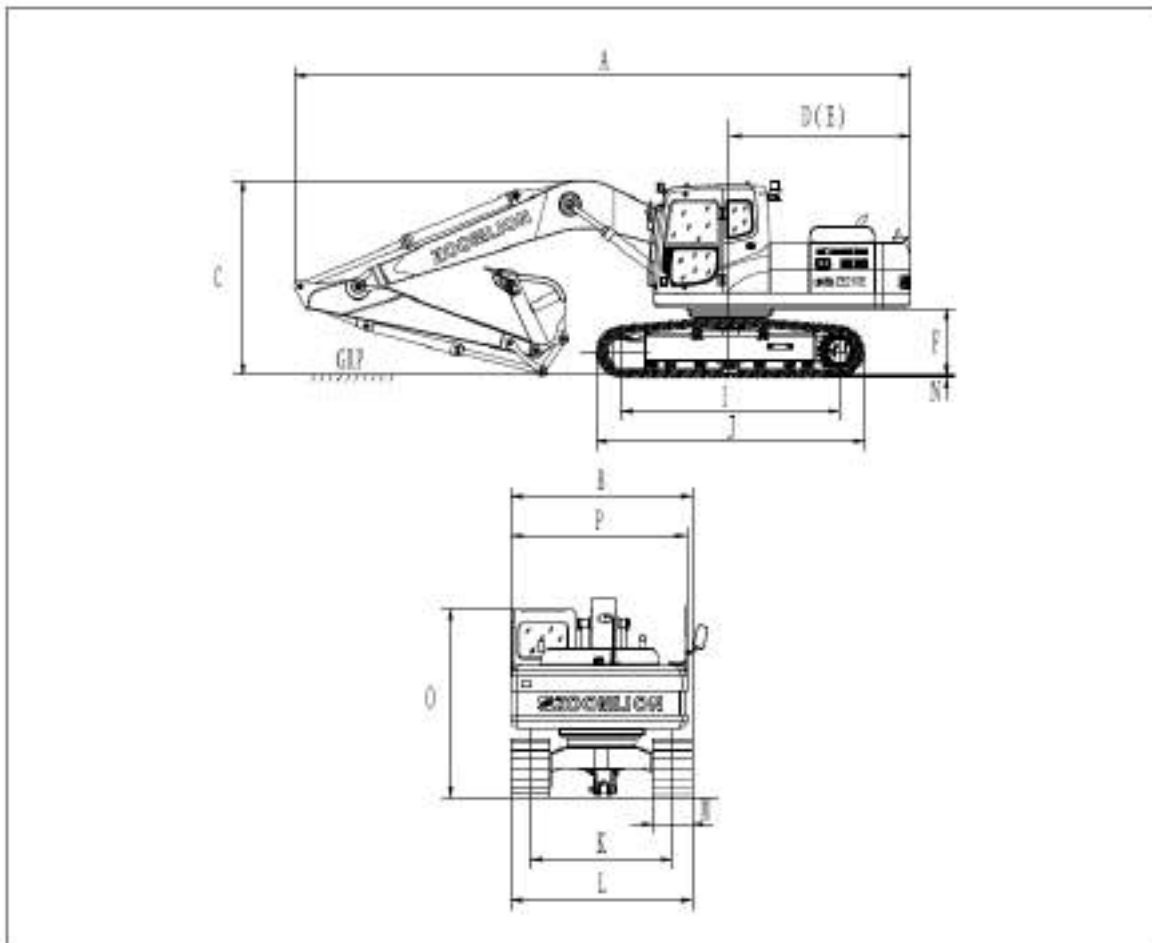


Figure 2-2 External dimension of ZE205E/ZE230E hydraulic excavators



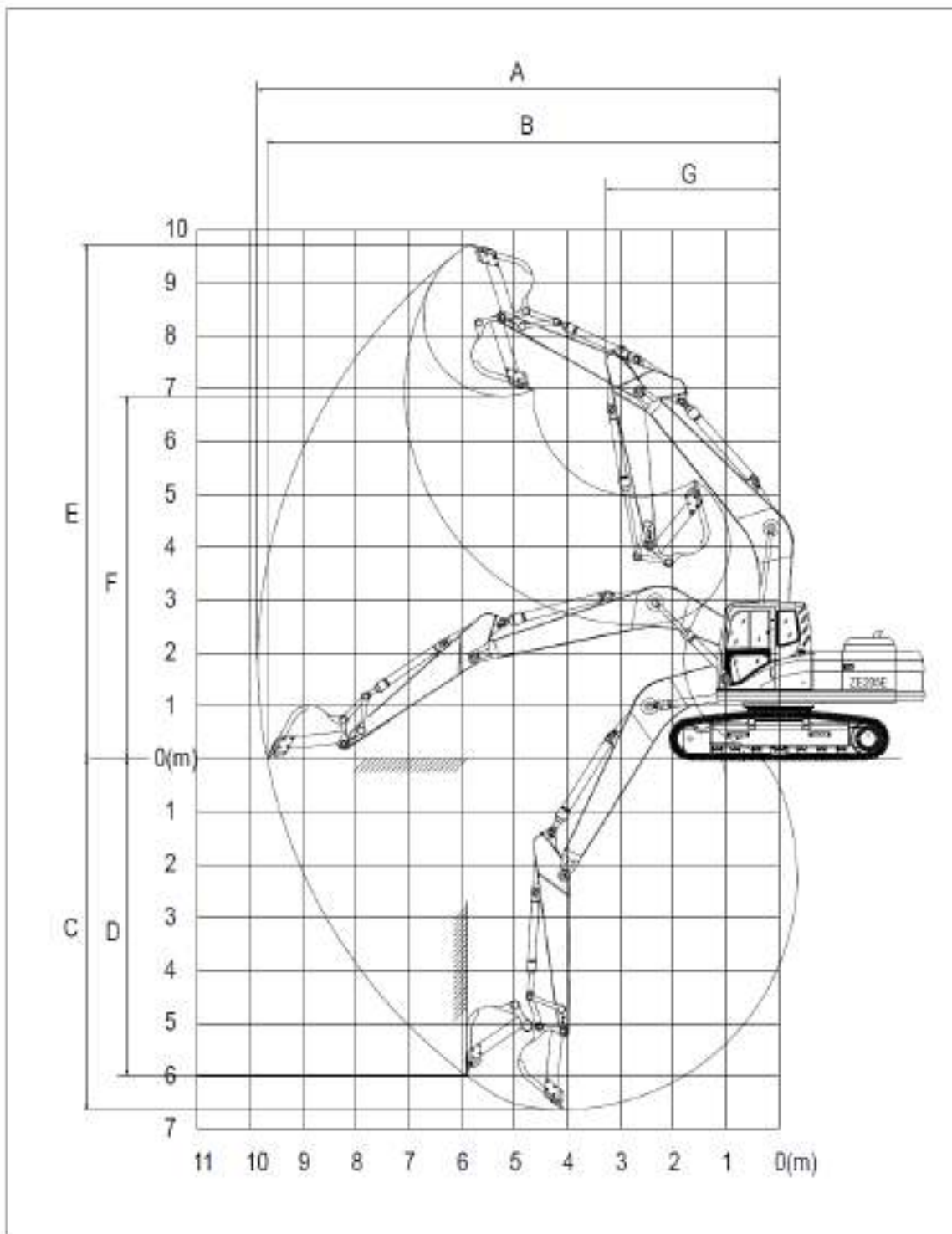


Figure 2-3 Schematic diagram of ZE205E's working range

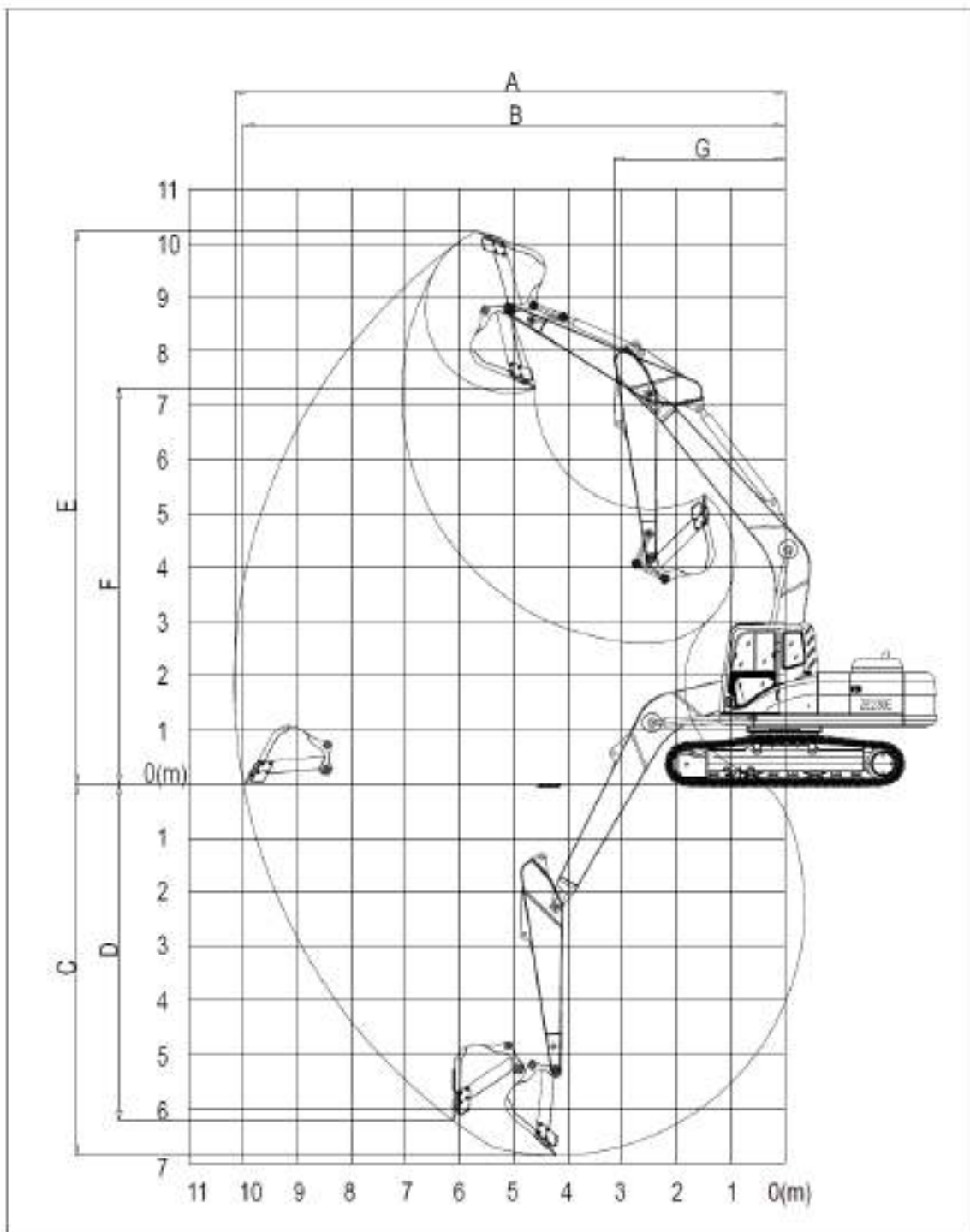


Figure 2-4 Schematic diagram of ZE230E's working range



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**Chapter Three: Maintenance of Excavator**





## Chapter Three: Maintenance of Excavator

### 3.1 Maintenance Information of Excavator

When operating or steering the machines, users must carry out regular maintenance and repair work for them, so as to guarantee safety. In addition, to further improve safety, users should also replace the key parts regularly, because the materials of these parts will change as time passes by and these parts are prone to wear down or deteriorate. Since it is hard to determine the conditions of parts through regular maintenance, you should change the parts when the prescribed time for replacement arrives, which is essential to guarantee that these parts are in good condition all the time. These parts are closely related to safety and fire prevention.

If these parts are abnormal before the replacement cycle arrives, they must be repaired or changed instantly. Please contact Zoomlion or Zoomlion dealers to replace the key safety parts. Before maintaining and repairing excavators, please read the “Operation Manual” and the following maintenance guidelines first.



1. Don't carry out any inspection and maintenance not described in this manual.
2. Maintenance and repairs should be done on flat and firm ground.

#### 3.1.1. Hour Meter's Readings

Check the readings of the hour meter every day and see whether they have arrived the required time to carry out maintenance.

#### 3.1.2. Genuine Wearing Parts of Zoomlion

Use the genuine parts of Zoomlion specified in the “Parts Catalogue” for replacement.

#### 3.1.3. Lubricating Oil

Use the engine oil and lubricating oil designated by Zoomlion. Choose the engine oil and lubricating oil with suitable viscosity according to ambient temperature.

#### 3.1.4. Windshield Washer Fluid

Use car-used windshield washer fluid and make sure that no contaminations go inside.

#### 3.1.5. Clean Engine Oil and Lubricating Oil

Use clean engine oil and lubricating oil and keep the oil or the grease container clean. Don't let any impurities mix into the oil and the grease.

#### 3.1.6. Check the Discharged Oil and the Used Filter Cartridge

After changing the oil or the filter cartridge, check if there is metal debris or impurities in the old oil and the filter cartridge. If a mass of metal debris and impurities are found, report to the executive staff and take proper measures.

#### 3.1.7. Coarse Fuel Filter Cartridge

If the machine is assembled with coarse fuel filter cartridge, don't remove the filter cartridge when adding fuel.

### **3.1.8. Notes for Welding**

- a) Disconnect the starter switch of the engine and disconnect the battery cathode.
- b) Don't use a voltage over 220V continuously.
- c) Connect grounding cables within 1m from the welding location. If the grounding cables are close to the apparatus or connectors etc., failures may occur.
- d) Avoid sealing elements or bearings between the welding location and the ground point.
- e) Don't use the pin of working device or the surrounding regions of the hydraulic cylinder as the ground point.

### **3.1.9. Prevent Dropping Things into the Interior of the Machine**

- a) When opening the inspection window or the oil filling port of the oil tank, pay attention not to drop any nuts, bolts or tools into the interior of the machine. If these things fall into the machine, machine damage or fault may occur, resulting in accidents. If something falls into the machine, take out it at once.
- b) Don't put unessential things in your pockets, just necessary things for inspection.

### **3.1.10. Working Sites with Much Dirt**

When working at places with much dirt, please do as the following procedures:

- a) The dirt indicator should be used frequently to check whether the air filter is blocked and clean the filter cartridge more frequently.
- b) The dirt indicator should be used frequently to check whether the air filter is blocked and clean the filter cartridge more frequently.
- c) Clean and replace the fuel filter cartridge regularly.
- d) Clean the electrical parts, especially the starter motor and the alternator to avoid dirt accumulation.
- e) When checking or changing oil, move the machine to a place without dirt so as to prevent the dirt from entering the oil.

### **3.1.11. Avoid Mixing Different Lubricating Oils**

Don't mix oils of different brands together. If you need to add oils of different brands, please discharge all the old oil and add oil of new brand.

### **3.1.12. Lock the Engine Cover and the Left and Right Doors**

When doing maintenance with the engine cover and the left and right doors open, use the locking lever to lock the engine cover and the left and right doors firmly. If inspection or maintenance is done they are open but not locked, there is risk of their being closed suddenly by blowing wind and causing personal injury.

### **3.1.13. Hydraulic System—Exhausting**

When the hydraulic system is repaired or changed or the hydraulic pipeline is dismantled or installed, air

must be discharged from the oil circuit. See section “Discharge the Air in the Hydraulic System” for the relevant details.

### **3.1.14. Installation of the Hydraulic Hose**

a) When dismantling parts at positions with O-rings or sealed with sealing gaskets, please clean the installing surface and replace them with new parts. Do not forget to install the O-rings and sealing gaskets.

b) When installing the hoses, don't twist the hoses or bend them into circles with minor diameters because this will damage the hoses and shorten the hoses' service life significantly.

### **3.1.15. Checks after Maintenance and Inspection**

If no checks are done after inspection and maintenance, accidental faults may occur and cause severe injuries or damage. You must do as the following procedures:

#### **a) Inspections after shutting down the machine (after shutting down the engines)**

1) Whether the maintained parts have been checked;  
2) Whether the inspection and maintenance of all items have been done correctly (Refer to the chapter “Maintenance Schedule for Excavator” of the manual);

3) Whether there are tools or parts falling into the interior of the machines;

4) Whether there is water leak or oil leak;

5) Whether all the bolts are fastened.

#### **b) Inspection when operating the engine**

The inspection details about operating the engines can be seen in relevant chapter of the “Operation Manual”, and pay attention to safety.

1) Whether the inspection and maintenance items have been done normally;

2) Whether there is oil leak when the engine speed rises and load is imposed.

### **3.1.16. Choose the Fuel and Lubricating Oil Suitable for the Ambient Temperature**

Use the fuel and lubricating suitable for the ambient temperature.

Relevant details can be seen in the section “Choose the suitable lubricating oil, fuel and coolant”.

## **3.2. Maintenance of Electrical System**

a) It is very dangerous if the electrical devices are damp or the wire insulation layers are damaged, because this will result in electricity leak and machine faults. Don't use water to wash the interior of the cab. When washing the machines, pay attention not to let water enter the electrical parts.

b) For the maintenance of electrical system, check the tension of the fan belt, check whether the fan belt is damaged or worn down and check the liquid level of the storage battery.

c) Don't install any electrical elements which are not specified by Zoomlion to install.

d) The disturbance of the external signals will cause fault of controller in the control system. When installing radio receiver or other wireless devices, please contact Zoomlion or Zoomlion dealers.

e) When working in the beach, clean the electrical system carefully to prevent corrosion.

f) When installing air cooler or other electrical devices in the cab, connect it to the specialized power

connector, and the selected power can't be connected to the fuse, the starter switch or the electrical relay of the storage battery.

### 3.3. Maintenance of Hydraulic System

The hydraulic system is at high temperature during and after work. During operation, there is also high pressure in it. Therefore, when doing inspection and maintenance to the hydraulic system, comply with the following procedures:

- a) Park the machine on flat ground, lower the bucket down to the ground and release the pressure in the hydraulic cylinder and pipeline.
- b) Shut down the engine.
- c) Before starting maintenance, please wait for the system to cool down.
- d) Even if the temperature decreases, there is still pressure in the interior. When loosening the plug screws, screws or hose connectors, don't stand in front of the parts. Before dismantling the parts, loosen them gradually to release the internal pressure.
- e) When doing inspection and maintenance to the hydraulic oil pipeline, the internal pressure must be discharged.
- f) The inspection or maintenance items include: check the oil level of the hydraulic oil, change the filter cartridge and add the hydraulic oil.
- g) When dismantling the high pressure hose, check whether the O-ring is damaged. If it is damaged, replace it.

### 3.4 Oil for Main Parts of Excavator and Coolant

#### 3.4.1. Deal with Lubricating Oil, Fuel and Cooling Liquid and Analyze the Oil Quality

##### 3.4.1.1 Lubricating Oil

The lubricating oil is used for engine and working device under poor working conditions (high temperature and high pressure), and it will deteriorate in use. Use the oil brand specified in Table 3-1.

- a) When the specified time arrives, even if the oil is not dirty, it should be changed.
- b) The lubricating oil is like the blood in human body, so pay attention to prevent any impurities (water, metal particles and dust etc.) from entering it when dealing with it. Most of machine's problems are caused by impurities, so please pay special attention to prevent any impurities from entering the oil when it is stored or refueled.
- c) Refuel according to the specified oil mass. Too much or too little oil will both cause faults.
- d) If the oil in the working device is not clean, some water or air must have entered the oil circuit. In this case, please contact Zoomlion or Zoomlion dealers.
- e) When changing oil, change relevant filter cartridge. Especially when changing the engine oil filter cartridge, add fresh, clean and specified engine oil into the new filter cartridge before the installation.
- f) It is recommended to make regular analysis for oil quality, so as to check the machines' conditions. Please contact Zoomlion or Zoomlion dealers for to apply for this service.
- g) The hydraulic system uses Mobil Nuto H46 oil when leaving the factory.




**Prompt**

**1. If hydraulic oil not recommended by our company is used, the filter cartridge may be blocked, so do not use it.**

**2. When changing the hydraulic oil, please clear away the remaining oil in the pipeline and the oil cylinder.**

### 3.4.1.2 Fuel

a) The injection pump is a precision component which cannot work properly if the fuel used contains water or contaminations.

b) When storing or adding the fuel, pay special attention not to let impurities mix into it.

c) Be sure to use the fuel specified in Table 3-1.

When using the fuel, select it according to the ambient temperature. Otherwise, the fuel is easy to solidify in a low temperature (especially lower than  $-15^{\circ}\text{C}$  ( $5^{\circ}\text{F}$ )).

d) To avoid condensation and water formation of moisture in the air inside the fuel tank, fully refuel the fuel tank after the finishing works every day.

e) Before starting the engine, or in the ten minutes after refueling, discharge the sediments and water in the fuel tank.

f) If the fuel in the engine is used up, or the filter cartridge is changed, discharge the air in the oil circuit.

### 3.4.1.3 Coolant

a) There is a large amount of calcium and other matters in the river water. If this water is used, the scale will affix on the engine and the radiator, which causes fault of heat exchange and overheating. Don't use any water unfitted to drink.

b) When using the antifreeze, comply with the notes in the "Maintenance Manual".

c) Zoomlion uses specified antifreeze in the coolant. This kind of antifreeze can effectively prevent the cooling system from corrosion and it can be used continuously for 2 years or 4000 hours. Besides, this antifreeze can be used even in hot areas.

d) The antifreeze is flammable, so it should be kept away from open fire.

e) The mixture ratio of the water and the antifreeze varies with the ambient temperature. For details about the mixture ratio, please see "Recommended oil for common parts".

f) If engine overheating occurs, please wait for the engine to cool down before adding coolant.

g) Apart from resulting in engine overheating, shortage of coolant will also cause corrosion of the cooling system due to the incoming air.

### 3.4.1.4 Grease

The grease is used for preventing the joint from being twisted and for preventing noise. After a long time's use, grease should be added to parts which are not flexible or make noise.



**1. Pay special attention to wipe off the old grease squeezed out when adding new grease. The sand or dirt which affixes on the grease will cause abrasion of the rotating parts.**

### 3.4.1.5 Storage of the Lubricating Oil and the Fuel

- a) Put them indoors to avoid water, dirt or other foreign matters from entering into them.
- b) If an oil drum is to be stored for a long time, you should lay it on its side with the oil filling port on the side, so as to avoid sucking moisture. If the oil drum has to be put outdoors, the waterproof cloth should be used to cover it or take other protecting measures.
- c) In order to prevent the oil from deteriorating in the long process of storage, first-come-first-go principle must be adopted (the lubricating oil or the fuel with the longest storage time should be used first).

### 3.4.1.6 Filter Cartridge

- a) The filter cartridges are very important safety components which can prevent impurities in the oil pipeline and the air pipeline from entering the important devices and cause faults. Replace all the filter cartridges regularly.
- b) Don't use the cleaned filter cartridge again (filter cartridge type). Replace it with a new one.
- c) When changing the filter cartridge, check whether there are metal particles on the old filter cartridge. If any metal particles are found, please contact Zoomlion or Zoomlion dealers.
- d) Before use, don't open the package of spare filter cartridges.
- e) Use the filter cartridges specified by Zoomlion.

### 3.4.2 Choose Suitable Lubricating Oil, Fuel and Cooling Liquid



- 1. Please choose the oil specially used for Zoomlion excavators at the designated place.**
- 2. When starting the engine in a temperature below 0C, make sure to use the multi-level oil recommended by Zoomlion as the engine oil even if the temperature may rise to above 10C in the daytime. You'd better limit your use of low-viscosity lubricating oil, because though it can improve the cold-start performance, but will shorten the engine's service life if used for a long time.**
- 3. The coolant is essential in whatever climate. The antifreeze can reduce the coolant's freezing point and increase the coolant's boiling point. Even in warm regions, we still recommend you to choose antifreeze coolant specified by Zoomlion, because it not only has the antifreeze function, but also prevents the cooling system from corrosion and prolongs the parts' life.**

**4. If you have any questions on the selection of oil, please consult Zoomlion or Zoomlion dealers.**

#### 3.4.2.1 Recommended Oil and Coolant for Main Parts of Excavator

**Table 3-1 Recommended Oil and Coolant**

Parts	Kinds of liquid	The Ambient Temperature (°C)									
		-40	-30	-20	-10	0	10	20	30	40	
Engine oil pan	Engine oil	API CH-4 10W-40									
		API CH-4 10W-30									
		API CH-4 5W-40									
Engine fuel tank	Diesel oil	No.0									
		No.-10									
		No.-20									
		No.-35									
Hydraulic oil tank	Hydraulic oil	ISO HV 32									
		ISO HM 46									
		ISO HS 46									
		ISO HM 68									
Slewing reducer, travel reducer, carrier roller and track roller	Gear oil	SAE 85W-140									
		SAE 80W-90									
		SAE 80W-140									
Cooling system	Antifreeze	The water and ethylene glycol mixture (50:50)									
		The water and ethylene glycol mixture (40:60)									
Hinge points of working device, tensioning cylinder and slewing ring	Grease	No. 2 general lithium grease (GB7324-2010)									

SAE: Society of Automotive Engineers

API: American Petroleum Institute

ISO: International Standardization Organization

**3.4.2.2 Add the Oil When New Machines Are Out of Factory**

Add the oil products listed in Table 3-2 when new machines are out of factory.

**Table 3-2 List of oil and coolant added when new machines are out of factory**

Parts	Technical specifications of the oil products
Engine oil pan	API CH-4 15W-40
Fuel tank	No.0 diesel oil ( for summer)/ No.-10 diesel oil (for winter)
Sllewing reducer	SAE 85W-140
Travel reducer	
Hydraulic oil system	ISO HM 46
Cooling system	Mixture of water and ethylene glycol (50:50)

### 3.5 Wearing Parts

**Table 3-3 Wearing Parts List**

Items	Part No.	Part name	Quantity	Changing cycle
Engine oil filter cartridge	1000400170	Filter cartridge	1	Every 500 hours
Fuel filter cartridge	1000400151	Filter cartridge	1	Every 250 hours
	1000400152	Filter cartridge	1	Every 250hours
	1000400150	Filter cartridge	1	Every 250hours
Ventilation device of the hydraulic oil tank	1010500098	Filter cartridge	1	Every 500 hours
Filter cartridge of the hydraulic oil	1010600279	Filter cartridge (O-ring)	1	Every 1000 hours
Pilot filter cartridge	1010600488	Filter cartridge	1	Every 500 hours
Air filter	1010500128	Filter cartridge	1	--
	1010500127			
Bucket	1999900644	Pin cotter	5	--
	1999900643	Bucket teeth	5	
	1999900646	Shroud (left)	1	
	1999900647	Shroud (right)	1	
	003001016B0001010	(bolt)	8	
	1040200673	(nut M24×2 -10 level)	8	

The wearing parts (as seen in Table 3-3), such as the filter cartridge and the bucket teeth, should be replaced during regular maintenance or before reaching wearing limits. In order to use the machines economically, change the wearing parts correctly and select Zoomlion parts with high quality for replacement. Before ordering parts, please check the part No. in the “Parts Catalogue” of the corresponding machines. Notes: the parts in the bracket should be replaced as well.

### 3.6 Technical Specification of Tightening Torques



**1. If the nuts, bolts or other parts are not tightened to the specified torques, the tightened parts will be loose or damaged, resulting in machine faults or causing problems during operation.**

**2. Pay special attention when tightening parts.**

Tightening torque is decided according to the width across flats of the nut or bolt. Unless otherwise specified, tighten the metric nut and bolt to the torque seen in Table 3-4. If any nuts or bolts need to be changed, replace them with Zoomlion parts of the same size. The tightening torques of the commonly-used hydraulic hoses' metric nipples can be seen in Table 3-5.

**Table 3-4 List of tightening torques for common bolts**

Diameters of thread (mm)	Widths across flats (mm)	Tightening torques (Nm)	
		Grade 10.9	Grade 8.8
M6	10	13~16	9~12
M8	13	30~36	22~30
M10	16	65~78	45~59
M12	18	110~130	78~104
M14	21	180~210	124~165
M16	24	280~330	193~257
M18	27	380~450	264~354
M20	30	540~650	376~502
M22	34	740~880	512~683
M24	36	940~1120	651~868
M27	41	1400~1650	952~1269
M30	46	1700~2000	1293~1723
M33	50	2473~3298	1759~2345
M36	55	2800~3350	2259~3012

**Table 3-5 List of tightening torques for commonly-used hydraulic hoses' nipples**

Type of thread	Tightening torque (Nm)
M14×1.5	20~35
M16×1.5	25~40
M18×1.5	30~45
M20×1.5	35~50
M22×1.5	40~70
M24×1.5	40~70
M26×1.5	60~100
M30×2.0	80~120
M36×2.0	100~150
M42×2.0	150~220
M45×2.0	180~250

### 3.7 Regular Replacement of Key Safety Parts

In order to further improve safety, users should regularly change the parts listed in Table 3-6. These parts are closely related to safety and fire prevention.

The materials of these parts will change as time passes by and these parts are prone to wear down or deteriorate. Since it is hard to determine the conditions of parts through regular maintenance, you should change the parts when the prescribed time for replacement arrives, which is essential to guarantee that these parts are in good condition all the time. If these parts are abnormal before the replacement cycle arrives, they must be repaired or changed instantly. Please contact Zoomlion or Zoomlion dealers to replace the key safety parts.



1. If deterioration, deformation or crack appears on the hose clamp, replace it when replacing the hose.
2. When changing the hose, change the O-ring, the sealing gasket and other similar parts at the same time.

**Table 3-6 Changing cycles of key parts**

No.	Regular change of the key safety parts	Quantity	Changing cycle
1	Fuel hose (fuel tank—oil-water separator)	1	Every two years or every 4000 hours, the first comes first
2	Fuel hose (oil-water separator—attached fuel filter)	1	
3	Fuel return pipeline (fuel injection pump—fuel tank)	1	
4	Overflow hose (engine output connector—fuel tank)	1	
5	Pump outlet hose (pump—control valve)	2	
6	Hose of working device (oil inlet and outlet of boom cylinder)	4	
7	Hose of working device (bucket cylinder pipeline—control valve)	2	
8	Hose of working device (oil inlet and outlet of bucket cylinder)	2	
9	Hose of working device (pipeline of arm cylinder— control valve)	2	
10	Hose of working device (oil inlet and outlet of arm cylinder)	2	
11	Hose of slewing pipeline (oil inlet and outlet of slewing motor—control valve)	2	
12	Main suction hose	1	
13	Travel pipeline hose (control valve—swivel joint)	4	
14	Travel pipeline hose (swivel joint—travel motor)	4	
15	Heater hose (engine—A/C evaporator)	2	
16	Seat belt (Optional)	1	Every three years

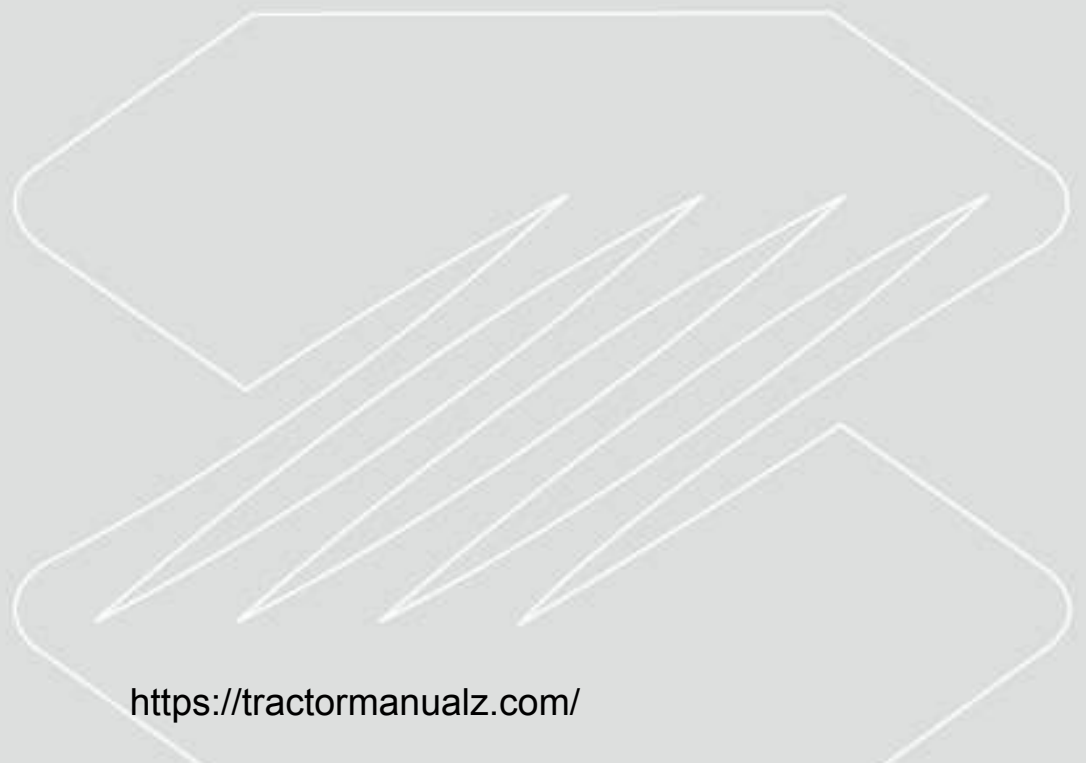






ZE205E/ZE230E HYDRAULIC EXCAVATOR  
MAINTENANCE MANUAL

**Chapter Four: Maintenance Schedule of Excavator**





## Chapter Four: Maintenance Schedule of Excavator

### 4.1 Daily Maintenance

#### 4.1.1 Daily Inspection Items

The details about the following items can be seen in the section of Chapter 4 “Inspection before Starting the Engine” in the operation manual.

Check the coolant level and add coolant.

Check the oil level of the engine oil pan and add oil.

Check the fuel level and refuel.

- Discharge the water and sediments in the fuel tank
- Check the water and sediments in the oil-water separator and discharge the water

Check the oil level of the hydraulic oil tank and add oil.

- Check the wires
- Check the horn’s function.
- Lubricate the working device (every 8~10 hours when working)
- Check whether the radiator and insect-proof screen are clean and clean them when necessary.

Check whether there is noise in the slewing ring.

#### 4.1.3 Lubricate the Work Device



**1. If abnormal noise appears at the lubricating places, do extra lubrication for them except that included in the maintenance schedule.**

**2. After excavating in the water, lubricate the pin soaking in the water.**

The working devices are lubricated according to the following steps:

- a) Adjust the working device to the posture shown below (seen in Figure 4-1), then lower the working device down on the ground and shut down the engine.
- b) Use the grease gun. Press the grease through the grease gun indicated by the arrow.
- c) Erase the squeezed old grease after adding the grease.

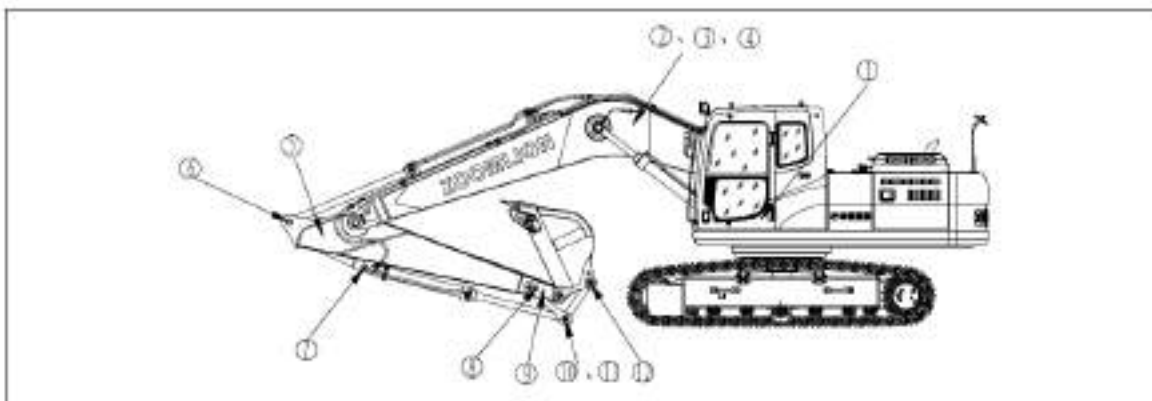


Figure 4-1 Correct parking position when lubricating the work device

(1) The two hinge pins of the boom cylinder , are shown in Figure 4-2.



**Figure 4-2 Lubricate the work device ( I )**

(2) The two hinge pins of the boom;

(3) The two ends of the piston rod of the boom cylinder;

(4) The root pin of the bucket arm cylinder is shown in Figure 4-3.

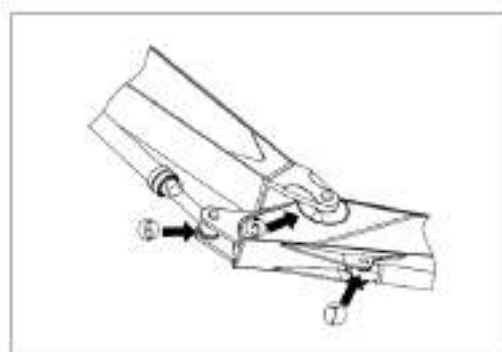


**Figure 4-3 Lubricate the work device (II)**

(5) The two connecting pins of the boom and the bucket arm;

(6) The end of the piston rod of the arm cylinder;

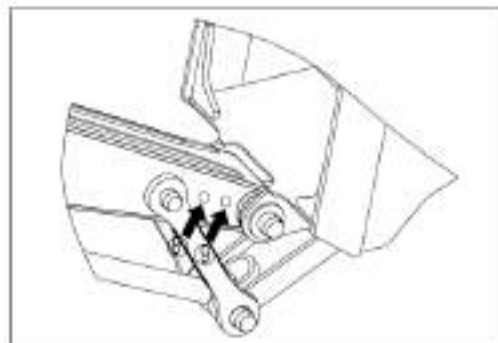
(7) The root pin of the bucket cylinder is shown in Figure 4-4.



**Figure 4-4 Lubricate the work device (III)**

(8) The connecting pin of the arm and the connecting rod;

(9) The connecting pin of the arm and the bucket is shown in Figure 4-5.



**Figure 4-5 Lubricate the work device (IV)**

- (10) The two connecting pins of the connecting rod;
- (11) The end of the piston rod of the bucket cylinder;
- (12) The connecting pin of the bucket and the connecting rod is shown in Figure 4-6.



**Figure 4-6 Lubricate the work device (V)**

## 4.2 Every 250 hours

### 4.2.1 Check the Oil Level in the Oil Pan and Refuel



**1. After shutting down the engine, the parts and the oil are still hot, which may cause serious scalding. Before starting operation, wait until the temperature drops.**

- a) Pull out the dipstick and wipe off the oil on the dipstick with cloths
- b) Insert the dipstick into the conduit completely.
- c) When pulling out the dipstick, the oil level is appropriate if it is between the Mark H and Mark L.
- d) If the oil level doesn't reach the Mark L on the dipstick, open the oil filling port and add engine oil.
- e) If the oil level is higher than the Mark H, loose the oil drain plug and discharge the superfluous oil.
- f) After checking the oil level or refueling, insert the dipstick into the hole and install the cover of the filling port.

### 4.2.2 Check the Oil Level in the Reducer of the Travel Motor and Refuel



**Warnings**

1. After shutting down the engine, the parts and the oil are still hot, which may cause serious scalding. Before starting operation, wait until the temperature drops.

2. If there is remaining pressure in the case, the oil or the screw-plug will fly out. So loose the screw-plug slowly to release the pressure.

Prepare a hex wrench.

a) Lay the traveling reducer to have the Mark TOP be at the top and have the mark and the screw-plug (P) be perpendicular to the ground, seen in Figure 4-7.

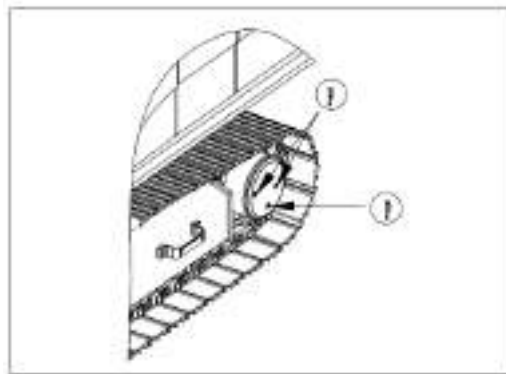
b) Use the hex wrench to dismount the screw-plug (F) and check whether the oil level is within the range from the bottom of the screw-plug hole to that of 10mm (0.4 in) lower than the bottom of the screw-plug hole.

c) If the oil level is too low, install the screw-plug (F), operate the traveling lever and drive the machine forward and backward to rotate the sprocket by one round. Then repeat the second step to have a check.

d) If the oil level is still low, instill the engine oil from the hole of the screw-plug (F) until the engine oil overflows.

f) After inspection, install the screw-plug (F).

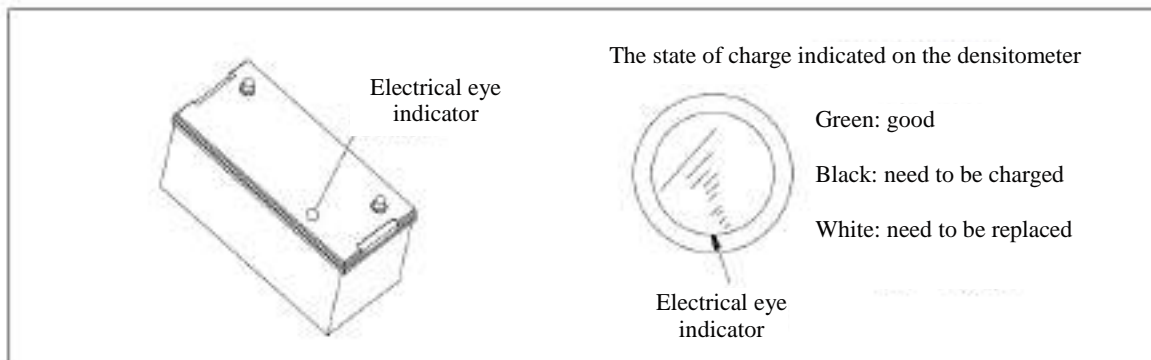
Note: There are two screw-plugs (F). When refueling, it is easy to refuel through the screw-plug hole through which people cannot see the interior gears.



**Figure 4-7 Check the Oil Level in the Travel Motor Reducer**

**4.2.3 Check the Status of the Battery Storage with the Indicator**

The status of the battery can be judged by the electric eye indicator on the surface of the storage battery. Under normal good status, the electric eye indicator indicates green. But if the electric eye indicator turns white or black, as seen in Figure 4-8, the storage battery is short of electricity or lacks electrolyte. In this case, you should charge or replace the battery immediately.



**Figure 4-8 Check the status of the battery storage with the indicator**

**4.2.4 Check and Adjust the Tension of the Belt of the Air Conditioner Compressor**

**a) Check**

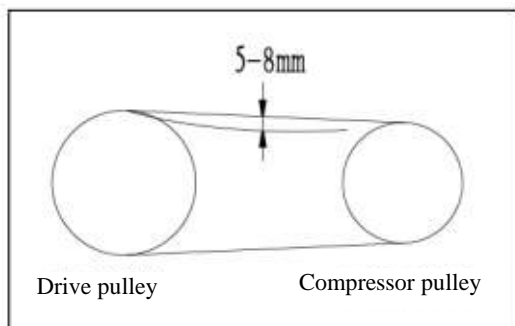
Use the finger force with about 98.8N (6kgf) to press the belt in the middle part of the drive pulley and the compressor pulley, and check that the deflection is 5-8mm(0.20in-0.31in), as seen in Figure 4-9..

**b) Adjust**

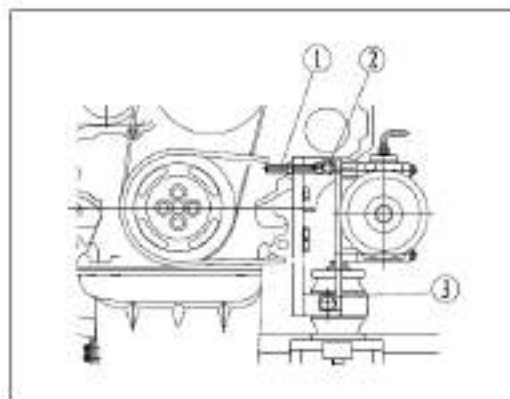
1) Loose the screw-plugs (2) and (3) (as seen in Figure 4-10). The bracket fixes the compressor. When loosening the screw-plugs (2) and (3), the bracket moves with the fixed position of screw-plug (3) as a pivot.

2) Loose the nut that is installed on the fixing bracket and tighten the bolt (1). Tighten it to make the deflection of the belt be 5-8mm (about 58.8N (6kgf)).

3) Check whether each belt pulley is damaged and whether the V-shape groove and the V-shape belt are worn down. Pay special attention that the V-shape belt cannot touch the bottom of the V-shape groove.



**Figure 4-9 Check the belt tension of the air conditioner compressor**



**Figure 4-10 Adjust the belt tension of the air conditioner compressor**

4) If the belt has been lengthened without margin to adjust, or if there is an incision or a crack on the belt, please replace it.

5) When adjusting the new belt, readjust it after operating for one hour.

**4.2.5 Clean the Air Filter**

a) Dismantle the panel at the rear of the cab, loose the installing bolt, and take down the air filter and the filter on it, as seen in Figure 4-11.

b) Use compressed air to clean the filter. If there is oil on the filter or the filter is too dirty, wash it with neutral mediums. After washing it in the water, dry the filter thoroughly before reusing it. If it is unable to remove the blockings of the filter through blowing air or washing in the water, replace with a new filter.

c) After cleaning the filter, reinstall it and install the rear panel in the cab.

The normal interval of cleaning the filters is 250 hours, but if the machine works in a workplace with much dirt, shorten the maintenance cycle and clean the filters more frequently.

Notes: if the filter is blocked, the air quantity will decrease and abnormal noise can be heard from the air conditioner.

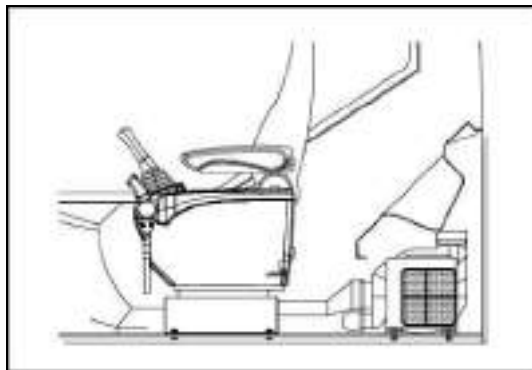


Figure 4-11 Clean the air filter

#### 4.2.6 Replace the Engine Oil Filter Cartridge

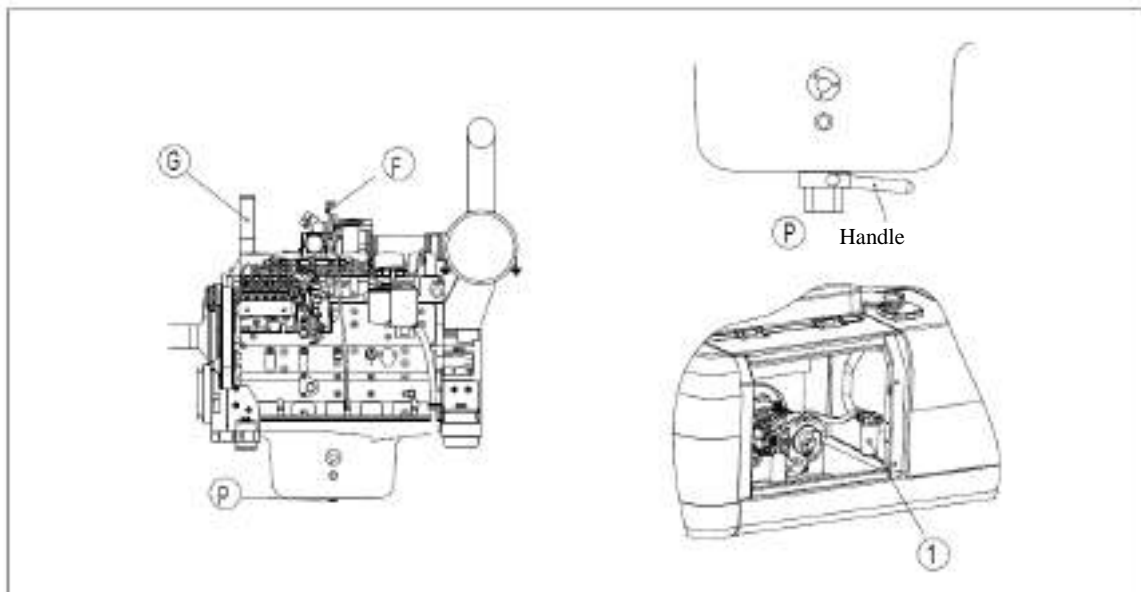


**1. After shutting down the engine, the parts and the oil are still hot, which may cause serious scalding. Before starting operation, wait until the temperature drops.**

The operating methods are as follows:

- Filter cartridge wrench
- a) Dismantle the bottom cover on the bottom of the machine, and then lay a container under the drain valve (P) to receive the oil, as seen in Figure 4-12..
- b) To prevent the oil from splashing on your body, pull down the handle of the drain valve (P) slowly to discharge the oil, and then lift up the handle to close the drain valve.
- c) Open the lid on the rear right side, and then use the filter cartridge wrench to turn the filter cartridge (1) towards the left to dismantle it.
- d) Clean the filter seat and add clean engine oil to the new filter cartridge. Coat the filter cartridge's sealing surface and the threads with engine oil (or coat them with a thin layer of grease), and then install the filter cartridge on the filter seat.





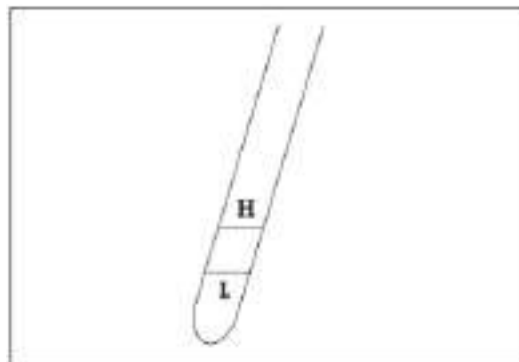
**Figure 4-12 Replace the engine oil filter**

**Warnings**

**1. Check that the old sealing doesn't adhere to the filter seat. If the old sealing still retains, it will cause leaks.**

e) Make the sealing surface touch with the sealing surface of the filter seat in the installation, and then tighten it for 3/4-1 round further.

f) After changing the filter cartridge, open the engine cover and add engine oil through the oil filling port (F) to a position between the Mark H and Mark L on the dipstick (G), as seen in Figure 4-13.



**Figure 4-13 Dipstick mark**

**Warnings**

**1. Please purchase the genuine engine oil designated by Zoomlion to guarantee the oil quality and make sure the 500-hour changing cycle.**

g) Operate the engine at idle speed for a short time, and then shut down the engine and check the oil level again to make it in a position between the Mark L and Mark H on the dipstick (G). The details can be seen in "Check the Oil Level in the Oil Pan and Refuel".

h) Install the bottom cover.

**4.2.7 Replace the Fuel Filter Cartridge**

**Warnings**

**1. After operating the engine, the parts are hot. Before changing the filter cartridge, wait until all the parts cool down.**

**2. Keep the fuel away from open fire.**

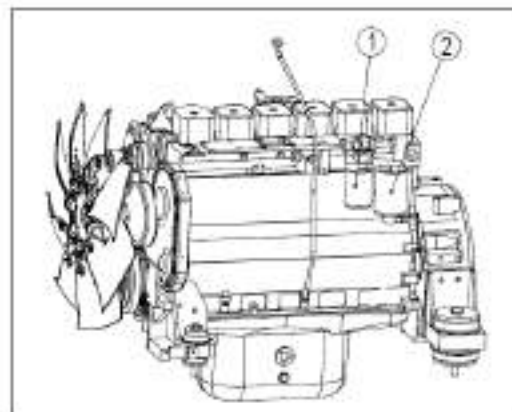
Prepare a filter cartridge wrench and an oil container to receive the fuel.

a) Lay a container under the filter cartridge to receive the fuel.

b) Turn the filter cartridges (1) and (2) anticlockwise with the filter cartridge wrench to dismantle them, as seen in Figure 4-14.

c) Clean the filter seat and add clean fuel to the new filter cartridge. Coat the sealing surface with engine oil and then install the filter cartridge on the filter seat.

d) After the sealing surface touches with the sealing surface of the filter seat, tighten it for 1/2 round further.



**Figure 4-14 Change the fuel filter cartridge**

If the filter cartridge is screwed too tight, the sealing will be damaged, resulting in fuel leak. If the filter cartridge is screwed too loose, the fuel will leak from the sealing. Therefore, the filter cartridge must be tightened to an appropriate position.

**After changing the fuel filter cartridge, discharge the air in the system by using the following methods:**

- a) Add the fuel to the fuel tank (add until the floater is at the highest position).
- b) After changing the filter cartridges (1) and (2), loose the exhaust screw-plug on the filter cartridge.
- c) Loose the button on the fuel pump and press it up and down repeatedly with hands to make the fuel flow out until there isn't any more bubble in the fuel flowing from the exhaust screw-plug. Then tighten the button on the fuel pump.
- d) Tighten the exhaust screw-plug and use genuine Zoomlion filter cartridge. After changing the filter cartridge, start the engine and check whether the sealing surface of the filter cartridge leaks oil.

Notes: when the fuel is used up, discharge the air in the fuel system with the fuel pump.

**4.3 Initial 500 Hours**

The following maintenance is done only when new machines are initially used for 500 hours.

Change the oil-return filter cartridge of the hydraulic oil

Change the reducer oil of the slewing motor

Change the reducer oil of the travel motor

Specialized tools are needed for inspection and maintenance, so please contact Zoomlion or Zoomlion dealers. The details about the methods of change or maintenance can be seen in the part “Every 250 hours, Every 500 hours, Every 1000 hours, Every 2000 hours and 4000 hours”.

## 4.4 Every 500 Hours

Conduct the maintenance of every 250 hours in the meantime.

### 4.4.1 Check the Level of the Grease in the Slewing Pinion and Add Grease

Prepare a dipstick.

a) Dismantle the bolts (1) (2 pieces) on the upper part of the rotating rack and dismantle the lid (2), as seen in Figure 4-15.

b) Insert the dipstick into the grease and check that the level of the grease in the parts which the pinion passes by should be at least 14mm (0.6 in). If necessary, add more grease.

c) Check whether the grease is milky. If so, it must be replaced. Please contact Zoomlion or Zoomlion dealers.

d) Use the bolt (1) to install the lid (2).

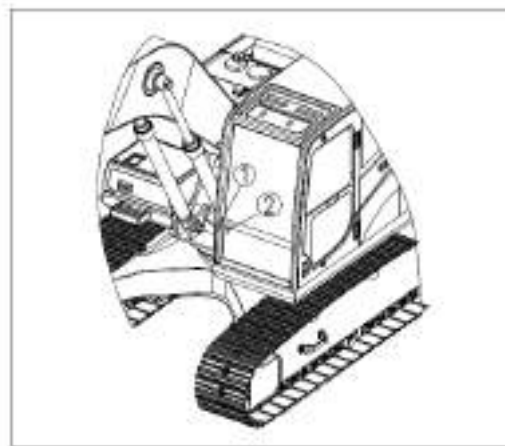


Figure 4-15 Check the Height of the Grease in the Rotary Pinion

### 4.4.2 Check the Oil Suction Filter of Hydraulic Oil Cylinder

The oil suction filter of hydraulic oil tank should be checked every 500 hours.

### 4.4.3 Clean and Check the Radiator Fins, the Oil Cooler Fins and the Condenser Fins



**1. If any compressed air, high-pressure water or vapor attacks your body directly, or if you use them to blow away the dust or dirty things, there is risk of severe damage. Goggles, dust cover or other protection equipments must be used.**

When compressed air is used, the radiator fins may be damaged if the nozzle is too close to the radiator fins. When cleaning them, keep an appropriate distance to prevent the radiator fins from being damaged. Don't spray air to the radiator core directly. If the radiator is damaged, water leakage and overheating may occur. In the working places with much dirt, do such inspection every day without being limited by the maintenance cycle. The procedures of cleaning and checking the radiator fins, the oil cooler fins and the condenser fins can be seen in Figure 4-16:

- a) Open the engine cover.
- b) Loose the bolts and unload the cooler.
- c) Clean the protection net and reinstall it.
- d) Before installing the protection net, check for dust, dirty things and dry leaves on every cooler fin. If any, blow them away with compressed air. Apart from compressed air, vapor or water can also be used.
- e) Check the rubber hose. If fissures are found in the hose or the hose has become hard because of aging, replace it with a new hose. Besides, check whether the hose has gotten loose.

f) Dismantle the bottom cover and clear away the dust, dirty things and dry leaves on it.

**4.4. 4 Clean the Interior of the Air Conditioner System**



1. If any compressed air, high-pressure water or vapor attacks your body directly, or if you use them to blow away the dust or dirty things, there is risk of severe damage. Goggles, dust cover or other protection equipments must be used.

2. Check the filter cartridge of air conditioner every 1000 hours, and, change the inner and outer filter cartridges together if necessary.

**4.4. 5 Change the Filter Cartridge of the Ventilation Device in the Hydraulic Oil Cylinder**

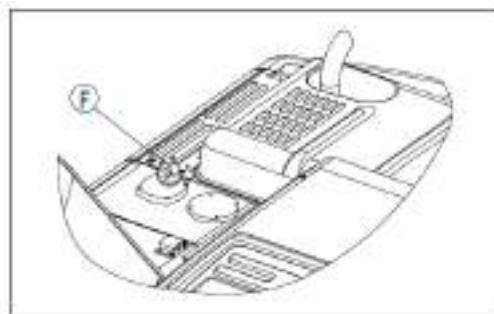


1. After shutting down the engine, the parts and the oil are still hot, this may cause serious scalding. Before cleaning the filter cartridge of the ventilation device in the hydraulic oil tank, wait until the temperature drops.

2. When dismantle the lid of the oil filling port, the oil will spray. So turn the lid slowly to release the interior pressure and then dismantle it with caution.

a) Dismantle the lid from the oil filling port (F) on the top of the hydraulic oil tank, as seen in Figure 4-17.

b) Change the filter cartridge in the interior.



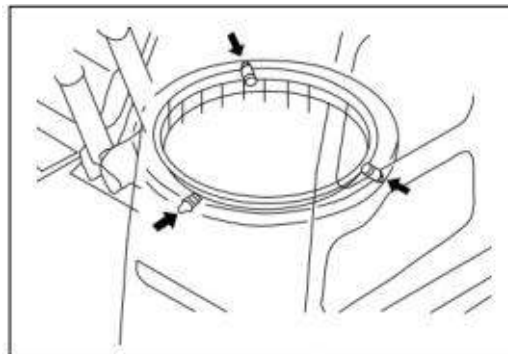
**Figure 4-17 Change the filter cartridge of the ventilation device in the hydraulic oil cylinder**

**4.4. 6 Check and Adjust the Valve Clearance of the Engine**

As special tools are required for dismantling and adjusting parts, please ask Zoomlion or Zoomlion dealers for maintenance work.

**4.4.7 Lubricate the Slewing Bearings**

- a). Lower the working device down to the ground.
- b). Pump grease by the grease gun through the nozzle indicated by the arrow in Figure 4-18.
- c). After the grease is added, please wipe off the squeezed old grease.



**Figure 4-18 Lubricate the slewing bearing**

## 4.5 Every 1000 Hours

The maintenance work of every 250 hours and every 500 hours should be done at the same time. The oil in the swing mechanism case and the terminal transmission case needs to be changed in the initial 500 hours.

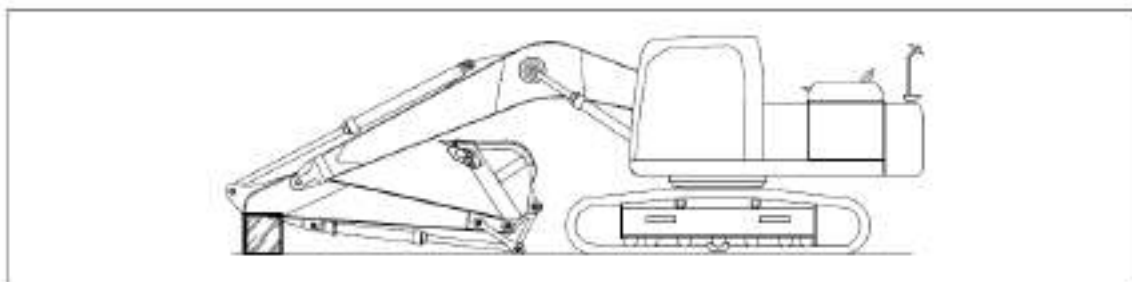
### 4.5.1 Change the Oil-return Filter Cartridge of the Hydraulic Oil



**1. After shutting down the engine, the parts and the oil are still hot, which may cause serious scalding. Before cleaning the strainer screen of the hydraulic oil tank, wait until the temperature drops.hot**

**2. When dismantle the lid of the oil filling port, the oil will spray, so turn the lid slowly to release the interior pressure and then dismantle it with caution.**

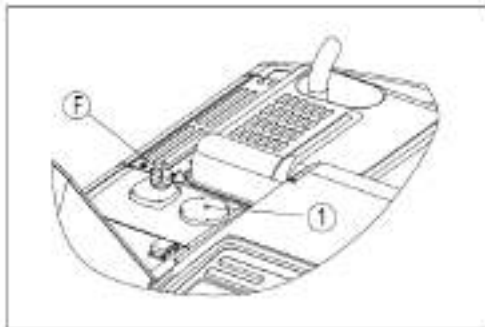
If the machine is installed with a hydraulic breaker, the hydraulic oil will go bad more quickly compared with machine with only bucket operation. The details for conducting maintenance work can be seen in “Maintenance for Using the Hydraulic Breaker”.



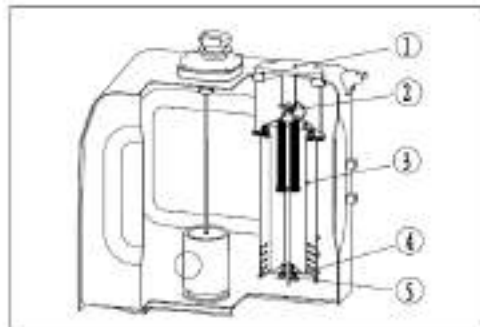
**Figure 4-19 Maintenance posture of working device**

The procedures of changing the filter cartridge of hydraulic oil are as follows:

- a) Lay the working device on firm and flat ground in accordance with the maintenance posture seen in Figure 4-19, then lower the working device down to the ground and shut down the engine.
- b) Dismantle the lid from the oil filling port (F) and release the interior pressure, as seen in Figure 4-20.
- c) Loose four bolts and dismantle the lid (1). When dismantling the lid, the lid will fly out under the the spring (2)’s force. Therefore, when dismantling the bolts, hold the lid downward.
- d) Take out the spring (2) and oil-return filter (3), as seen in Figure 4-21.
- e) Dismantle the fitting screw and the oil-return seat of by-pass valve in the oil-return filter. Take out the oil-return filter cartridge to replace it with a new one. Then install the oil-return seat of by-pass valve and the fitting screw.



**Figure 4-20 Dismantle the lid from the oil filling port to release the interior pressure**



**Figure 4-21 Take out the spring and the oil-return filter pressure**

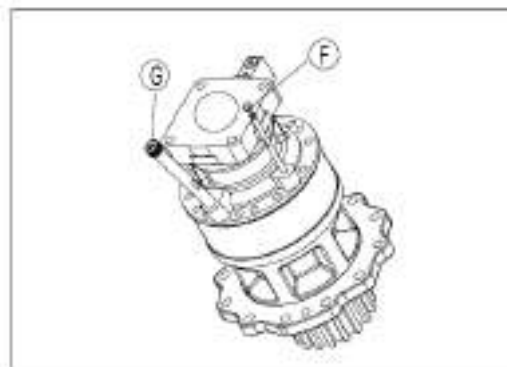
- f) Install the oil-return filter to the previous position.
- g) Install the spring (2) on the top of the oil-return filter.
- h) Lay the lid (1) on the installing position. Then press the lid down with hands and install the lid with the mounting bolt.
- i) Install the lid of the oil filling port.
- j) In order to discharge the air, start the engine in accordance with the requirements of “Start the Engine” and operate the engine at a low speed for ten minutes.
- k) Shut down the engine.

**4.5.2 Change the Oil in the Slewing Motor’s Reducer**



**1. After shutting down the engine, the parts and the oil are still hot, which may cause serious scalding. Before starting operation, wait until the temperature drops.**

- a) Lay a container under the drain valve at the bottom of the machine to receive the oil.
- b) Open the drain valve at the bottom of the machine to discharge oil and then tighten it.
- c) Dismantle the lid of the oil filling port (F) and then add engine oil with specified amount through the oil filling port (F), as seen in Figure 4-22.
- d) Pull out the dipstick (G), and wipe off the oil on the dipstick with a cloth.
- e) Insert the dipstick (G) thoroughly into the dipstick tube and then pull it out.
- f) The oil level is appropriate if it is between the Mark H and Mark L (F). If the oil level doesn’t reach the Mark L, add oil through the oil filling port (G).
- g) If the oil level is higher than Mark H, discharge the superfluous engine oil from the drain valve and recheck the



**Figure4-22 Location of filling port and dipstick**

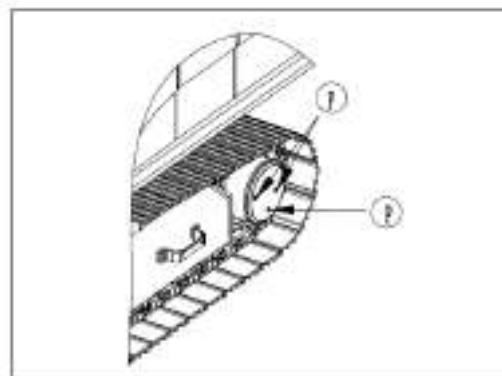
engine oil, pull out the hose from the check hole and then open the drain valve.

### 4.5.3 Change the Oil in the Traveling Reducer



1. After shutting down the engine, the oil is still hot. hot Before starting operation, wait until the temperature decreases.
2. If there is remaining pressure in the case, the oil or the screw-plug will fly out. So loose the screw-plug slowly to release the pressure.

- A hex wrench
  - a) Have the reducer oil level horizontal to the ground.
  - b) Lay an oil container under the screw-plug (P).
  - c) Dismantle the screw-plugs (P) and (F) with the hex wrench and discharge the oil. Check whether the O-ring on the screw-plug is damaged. If necessary, replace it with a new one.



**Figure4-23 Change the Oil in the Travel Motor Reducer**

- d) Tighten the screw-plug (P).as shown in Figure 4-23.

- e) Add engine oil through the hole of the screw-plug (F).
- f) When the oil overflows from the screw-plug (F), install the screw-plug (F).

Tighten the screw-plugs (P) and the screw-plug (F) to the torque of  $38 \pm 9.8 \text{ Nm}$

Notes: There are two screw-plugs (F). It is relatively easy to refuel through the hole of the screw-plug through which you cannot see the interior gears.

### 4.6 Every 2000 Hours

The maintenance work of every 250 hours, every 500 hours and every 1000 hours should be conducted at the same time.

#### 4.6.1 Clean the Strainer Screen of the Hydraulic Oil Tank (Replace the Oil Suction Filter, in the Initial 1000 hours)



- 1 After shutting down the engine, the parts and the oil are still hot, which will cause serious scalding.
  - 2 Before cleaning the strainer screen of the hydraulic oil tank, wait until the temperature drops.
- When dismantling the lid of the oil filling port, the oil will spray out. Therefore, turn the lid slowly to release the interior pressure and then dismantle it with caution.

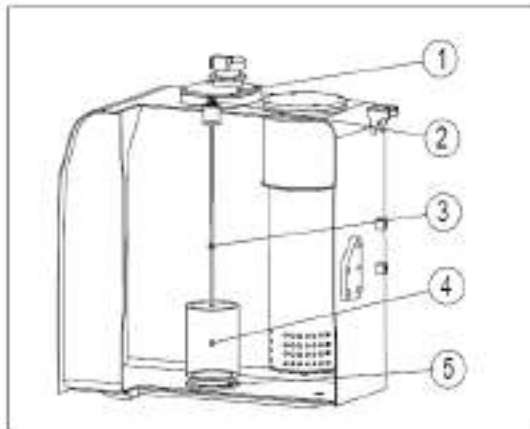
a) Loose four bolts and then dismantle the lid (1), as seen in Figure 4-24. At this time, the lid may fly out under the spring (2) force. Therefore, press down the lid when dismantling the bolts.

b) Pull out the upper part of the rod (3) and remove the spring (2) and the strainer (4).

c) Clear away the dirty things adhered to the strainer screen (4) and then wash it in clean diesel or flushing oil. If the strainer screen (4) is damaged, replace it with a new one.

d) Reinstall the strainer screen (4) and insert it into the bulge (5) of the oil tank.

e) When assembling them, make the bulge under the lid (1) fasten the spring (2) firmly and then tighten it with bolt.



**Figure 4-24 Clean the strainer screen of the hydraulic oil cylinder**

**4.6.2 Clean and Check the Turbocharger**

Please contact Zoomlion or Zoomlion dealers for cleaning and inspection work.

**4.6.3 Check the Alternating Engine and the Starter Motor**

If the electric brush is worn down or the bearing’s grease is used up, please contact Zoomlion or Zoomlion dealers for inspection or repairing work.

If the engine starts frequently, check it every 1000 hours.

**4.6.4 Change the Oil in the Hydraulic Oil Tank**



**1. After shutting down the engine, the parts and the oil are still hot which will cause serious scalding. Before cleaning the elements of the ventilation device in the hydraulic oil tank, wait until the temperature drops.**

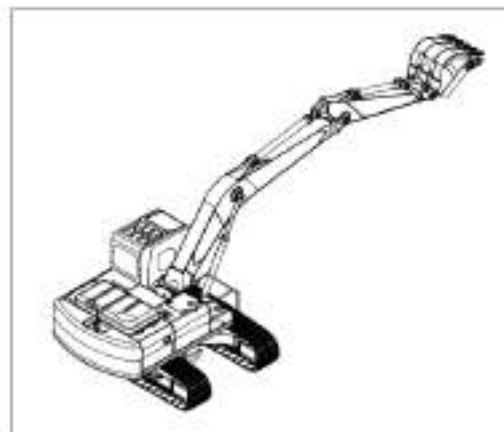
**2. When dismantling the lid of the oil filling port, the oil will probably spray out. Therefore turn the lid slowly to release the interior pressure.**

Make the following preparations:

Prepare a handle used on a socket spanner.

a) Slew the upper structure, making the drain plug under the suction tube locate in the middle part of the left track or the right track, as seen in Figure 4-25.

b) Fully retract the bucket arm cylinder and the bucket



**Figure4-25 Slew the upper mechanism**



cylinder, and then lower the boom to have the bucket teeth touch the ground.

c) Lock the safety locking lever and shut down the engine. d) Dismantle the lid of the oil filling port (F) on the upper part of the hydraulic oil tank, as seen in Figure 4-26.

e) Lay a container under the drain plug at the bottom of the machine to receive oil. Use the handle to dismantle the drain plug and discharge oil. Check the O-ring installed on the plug. If it is damaged, replace it. After discharging the oil, tighten the drain plug (1).

Tightening torque:  $69 \pm 10$  Nm. Please pay attention not to let the oil splash on your body when dismantling the emission plug.

f) Add engine oil with specified quantity through the oil filling port (F). Check the oil level and it should be between H and L on the sight gauge. The details about the methods of exhausting can be seen in the chapter “Exhaust the Air in the Hydraulic System”.

**4.7 Every 4000 Hours**

The maintenance work of every 250 hours, every 500 hours, every 1000 hours and every 2000 hours should be conducted at the same time.

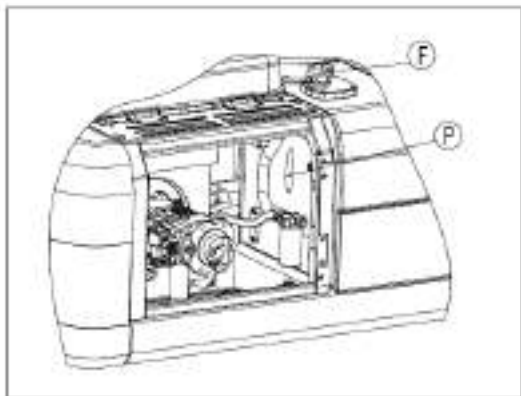


Figure 4-26 Change the oil in the hydraulic oil cylinder

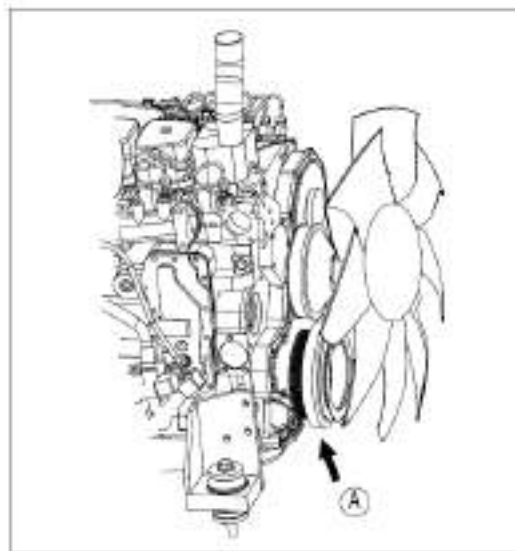


Figure 4-27 Check the water pump

**Check the water pump**

As there may be end play at the belt pulley that results in oil or water leakage or vent (A) blockage (see Figure 4-27), please contact Zoomlion or Zoomlion dealers for inspection, overhauling or replacement work.

**4.8 Maintenance If necessary**

**4.8.1 Check, Clean and Replace the Filter Cartridge of the Air Filter**

**4.8.1.1 Check and Replace the Filter Cartridge**



1. If inspection, cleaning or replacement is done when the engine is running, the dust will enter

into the engine and cause engine damage. Before doing these operations, be sure to shut down the engine.

2. When compressed air is used, dirty things may fly out, which may cause risk of personnel injuries. In this case, wear protection goggles, dust mask or other protective devices.

3. When dismantling the outer filter cartridge of the air filter, it is dangerous to pull out the outer filter cartridge. When working on a high point with an unstable foothold, pay attention not to fall down due to the reacting force produced from pulling out the outer filter cartridge.

**4.8.1.1.1 Check**

If the air filter is blocked and the alarm “air filter blocked” on the monitor gives out an alarm, it is time to clean the air filter cartridge, as seen in Figure 4-28.

**4.8.1.1.2 Replacement**

**a) Replace the filter cartridge and the O-ring**

If it has been over one year from installing the filter cartridge or if the air filter is blocked after cleaning the filter cartridge, it is time to replace the outer filter cartridge, the inner filter cartridge and the O-ring.

**b) Replace the vacuum relay valve**

If the vacuum relay valve is damaged or the rubber deforms obviously, replace it.

Notes: Before the alarm “air filter blocked” on the monitor gives out an alarm, don’t clean the air filter cartridge. Otherwise, the air filter will not fully display its functions and the cleaning effect will become worse. In addition, in the process of cleaning operation, much dust adhered to the filter cartridge will fall into the inner filter cartridge.



**Figure 4-28 Check the filter cartridge of the air filter**

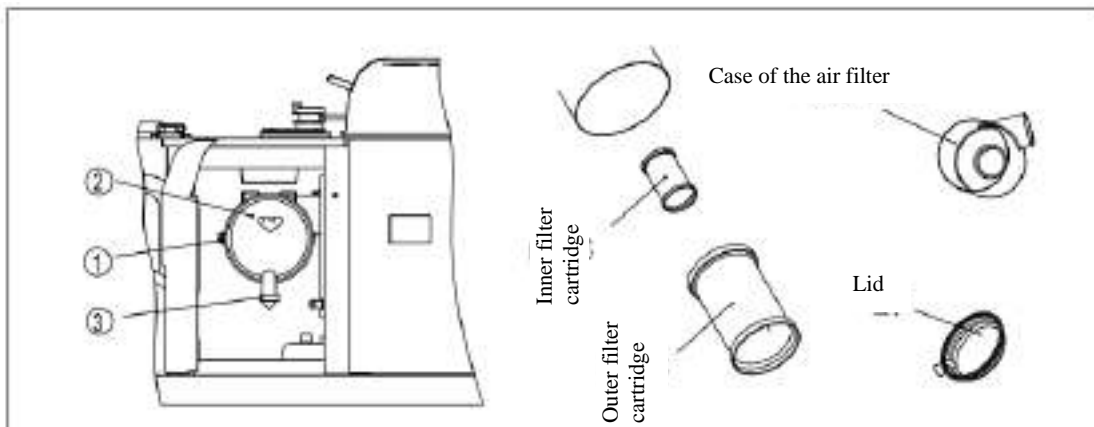
**4.8.1.2 Clean the Outer Filter Cartridge**



**1. Pay attention not to let the filter cartridge be exposed to the sunshine before and after cleaning the filter cartridge.**

a) Open the rear left door of the machine, dismantle the four clips (1) and then dismantle the lid (2), as seen in Figure 4-29.

b) Hold the outer filter cartridge and shake it up and down from side to side gently. In the meantime, turn the filter cartridge from side to side and pull out it vertically. Pay attention not to dismantle the interior filter cartridge, otherwise the dust will come in to cause engine faults. Don’t use screw driver or other tools.



**Figure 4-29 Clean the outer filter cartridge**

c) After dismantling the outer filter cartridge, cover the air inlet in the case of the air filter with a clean cloth, so as to prevent dust or dirty things to enter it.

d) Wipe off or brush off the dirty things adhered to the interior of the lid (2) and the case of the air filter. And clean the accumulated dust or dirty things on the vacuum relay valve (2) installed on the lid (3), as seen in Figure 4-30.

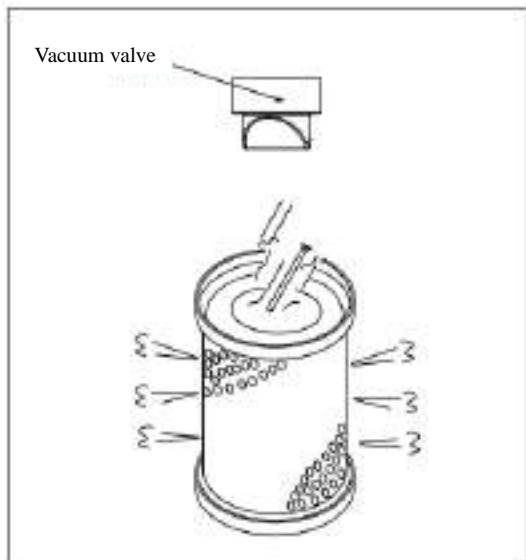
e) Blow compressed air (lower than 0.69MPa) from the inner side of the filter cartridge along the crease to the outer side. Then blow from the outer side along the crease and from the inner side to the out side again.

- Each time after cleaning the filter cartridge, dismantle one seal from the filter cartridge.
- Change the outer filter cartridge which has been cleaned repeatedly for five times or has been used for a whole year. Change the inner filter cartridge in the meantime.
- If the indicator light on the instrument flickers before long the cleaned outer filter cartridge is installed, change the outer filter cartridge and the inner filter cartridge at the same time even though the filter has not been cleaned for five times.

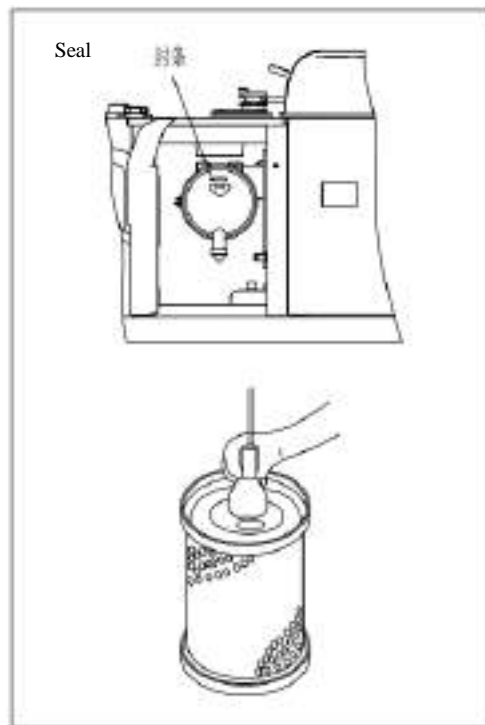
When changing the filter cartridge, affix the seal encapsulated in the case the same as the filter cartridge. Affix the seal on the position shown in the Figure 4-31.

f) Take down the cloth or seal installed in step 3.

g) Check the filter cartridge with lamp after cleaning, change it if any small holes or thin parts on it are found. Pay attention not to strike or beat the filter cartridge when cleaning and do not use filter cartridge whose crease, sealing gasket or seal is damaged.



**Figure 4-30 Vacuum valve**



**Figure 4-31 Seal and inspection  
after replacement**

**4.8.1.3 Installation of the Air Filter**

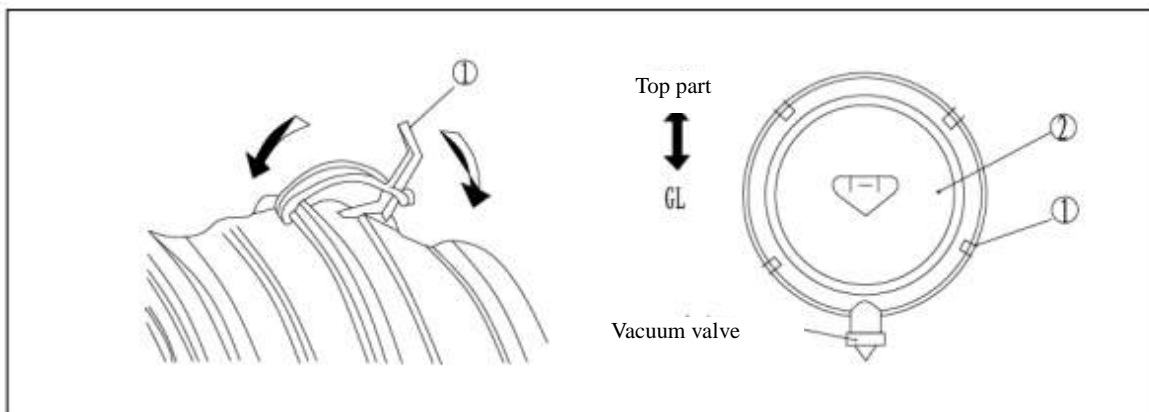


1. Don't use filter cartridges whose sealing gasket, seal or crease is damaged.
2. When a filter cartridge or an O-ring has been used for over one year, it will cause problems if cleaned or used again. So replace it with a new one.
3. The sealing parts of the counterfeit component lack precision, which will make dust come in and cause engine damage. Therefore, do not use such counterfeit components.
4. Under the circumstance that the inner filter cartridge is dismantled, do not operate the engine, otherwise it will cause engine damage.
  - a) Check whether any dust or oil stain adheres to the sealing part of the new filter cartridge or cleaned filter cartridge.
  - b) When the outer filter cartridge has been dismantled, make sure that the inner filter cartridge remains at the original position. If the inner filter cartridge is oblique, use hands to insert the filter cartridge and push it upright.
  - c) When installing the outer filter cartridge on the case of the air filter, use hands to push it upright. It is easy to insert the filter cartridge by using hands to hold it and shaking it slightly up and down from side to side at the same time when you push the filter cartridge.

Pay attention that when inserting the filter cartridge, there will be risk of damaging the cover or the case of the filter if the rubber in the terminal part dilates or the outer filter cartridge isn't pushed upright and you still make a hard push to install the lid (2) on the fastener (1). Therefore, pay much attention in installation.

d) Install the lid (2) according to the following steps, as seen in Figure 4-32.

- 1) Align the lid (2) and the filter cartridge.
- 2) Rotate the lid (2) clockwise until it can't rotate, and press down the fastener (1) to the bottom.
- 3) If the fastener (1) can't be pressed down to the bottom smoothly, please check whether the lid (2) rotates in place.
- 4) When installing the lid (2), make the vacuum relay valve face the ground.
- 5) When installing the lid (2), check that the gap between the case of the air filter and the lid (2) should not be too large. If the gap is too large, reinstall it.



**Figure 4-32 Install the filter cartridge of the air filter**

#### 4.8.1.4 Replace the Inner Filter Cartridge of the Air Filter

- a) Dismantle the outer filter cartridge at first, and then the inner filter cartridge.
- b) Use a piece of clean cloth to cover the air joint (the side of the air outlet).
- c) Clean the interior of the case of the air filter and then dismantle the lid from the air inlet.
- d) Install a new inner filter cartridge to the joint and then tighten the nut. Pay attention not to clean and reuse the inner filter cartridge. When changing the outer filter cartridge, change the inner filter cartridge in the meantime.
- e) Install the outer filter cartridge in the right position and then lock the lid (3) with the clip (2).

#### 4.8.2 Clean the Interior of the Cooling System



1. After shutting down the engine, the coolant is still hot and the radiator has a relatively high

interior pressure. If dismantling the lid to discharge the coolant now, there is risk of scalding. Before dismantlement, wait until the temperature drops and turn the lid slowly so as to release the pressure.

2. Do cleaning when the engine is running. When standing up or leaving from the operator’s seat, adjust the safety locking lever to the LOCK position.

3. The details about starting the engine can be seen in section of Chapter four “Start the Engine” in the *Operation Manual*.

4. If the protecting cover in the bottom is dismantled, there is risk of touching the fan. When the engine is running, don’t enter the rear part of the machine.

Clean the interior of cooling system and replace coolant and corrosion inhibitor according to Table 4-1.

**Table 4-1 Change the cooling liquid and corrosion inhibitor**

Types of cooling liquid	Clean the interior of cooling system and change coolant	Change the anti-corrosion device (optional)
Permanent antifreeze (applicable in all seasons)	Change every year (in autumn) or every 2000 hours, whichever arrives first	Every 1000 hours or when cleaning the interior of the cooling system and changing the cooling liquid
Impermanent antifreeze which contains glycol (applicable only in winter)	Change every six months (in spring and in autumn). (Discharge antifreeze in spring and add antifreeze in autumn)	
When antifreeze is not used	Change every six months or every 1000 hours, whichever arrives first	

As the mixture ratio of the additive in different antifreezes is different, please do not mix them up. Please clean and change after shutting down the machine in a flat place. The mixture ratio varies with the ambient temperature. The minimum ratio should be 30% in accordance with the volume.

When determining the proportion of the antifreeze and the water, check the previous lowest temperature and determine it according to the mixture ratio table given. Meanwhile, you’d better underestimate the temperature by 10℃.



1. The antifreeze is inflammable, hence put it far away from flame.

2. The antifreeze is poisonous, so pay attention not to let the coolant with the antifreeze splash into eyes when dismantling the drain plug. In case of an emergency, use a large amount of water to wash the eyes and seek medical treatment immediately.

The tap water should be used as the coolant. If the river water, well water or other such water sources must be used, please contact Zoomlion or Zoomlion dealers. In order to control the mixture ratio, the densitometer is recommended for use. Prepare a container to receive the discharged coolant and prepare a hose to add water. The operation methods as follows:

- a) Turn the radiator lid (1) slowly and dismantle it, as seen in Figure 4-33.

b) Dismantle the bottom cap, and then lay a container under the drain valve to receive the coolant. Open the drain valve on the bottom of the radiator to discharge the cooling liquid.

c) After discharging the coolant, close the drain valve and add tap water. When the radiator is added full with water, start the engine and run it at a low speed to have the temperature rise to at least 90 °C, and then continue operating it for about ten minutes.

d) Shut down the engine and open the drain valve to drain the water.

e) After draining the water, clean the radiator with the detergent. As to relevant cleaning method, please comply with the instructions of the detergent.

f) Close the drain valve.

g) Install the bottom cap.

h) Add water to the water injecting hole through the water injector.

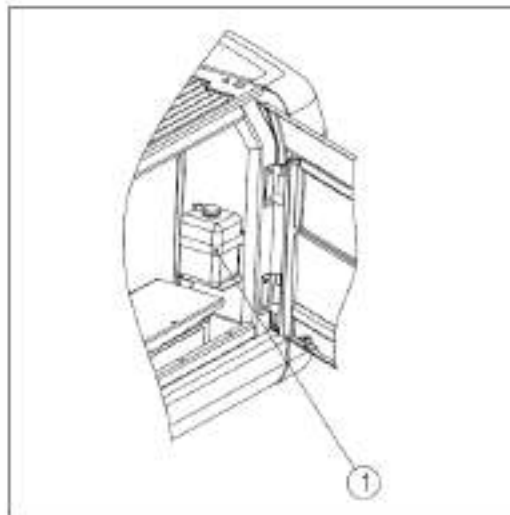
i) Operate the engine for about five minutes at a low speed and then operate it for five minutes at a high speed so as to discharge the air mixing in the coolant (at this time, the radiator lid (1) has been dismantled).

j) After discharging the coolant in the auxiliary water tank (3) (as seen in Figure 4-34), clean the interior of the auxiliary water tank and then add water until the liquid level is between Full level and Low level.

k) Shut down the engine. About three minutes later, add water through the water injecting hole and then tighten the radiator lid.



**Figure 4-33 Radiator lid**



**Figure 4-34 Reserve water tank**

### 4.8.3 Check and Tighten the Bolt on the Track Shoe

If the machine is used in the situation that the bolt (1) on the track shoe is loose (as seen in Figure 4-35), the bolt will be broken. Therefore, tighten the loose bolt right away.

#### 4.8.3.1 Tightening Methods

**a) Track shoe**

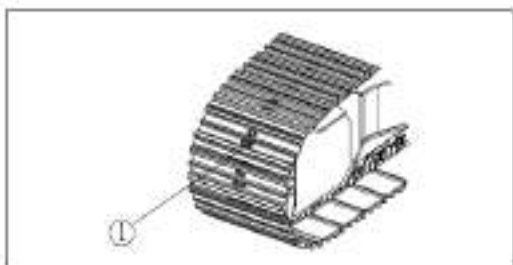
Tighten with a tightening torque of  $490\pm 49\text{Nm}$  ( $50\pm 5\text{kgfm}$ ), and then check whether the nut and the track shoe get in touch closely with the contacting surface of the chain. After checking, further tighten it by  $120\pm 10^\circ$ .

**b) Road pad**

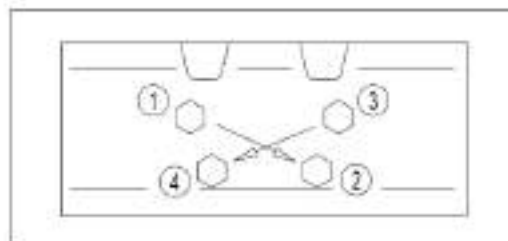
Tighten with a tightening torque of  $549\pm 59\text{Nm}$  ( $56\pm 6\text{kgfm}$ ), and then check whether the nut and the track shoe get in touch closely with the contacting surface of the chain link.

**4.8.3.2 Tightening Sequence**

Tighten the bolt according to the sequence shown in Figure 4-36. After tightening, check whether the nut and the track shoe get in touch closely with the mating surface of the chain link.



**Figure 4-35 Check and tighten the bolt on the track shoe**



**Figure 4-36 The tightening order of the bolt**

**4.8.4 Check and Adjust the Tension of the Track**

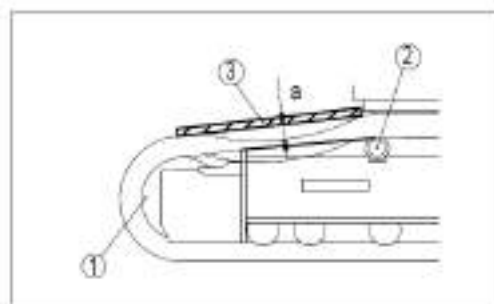
The wearing condition of the pins and pin bushes on the lower part of the machine varies with the operation conditions and the soil type. Therefore, check the tension of the track regularly to keep standard tension. Stop the machine on flat and firm ground when checking and maintaining it.

**4.8.4.1 Check**

a) Run the engine at a low idle speed. Move the machine forward for a distance that equals the ground contact length of track and then halt the machine.

b). As seen in the right figure, choose a long rod and put it on the track above the idler (1) and the carrier roller (2), as seen in Figure 4-37.

c). Measure the maximum distance between the upper surface of the track and the bottom of the long rod.



**Figure 4-37 Check the tension of the track**

The standard distance: the sag “a” should be 10 ~30 mm (0.4 ~1.2 in). If the tension of the track is not within the standard value, adjust it according to the following methods.

**4.8.4.2 Adjust**





1. The screw-plug (1) may fly out under the high pressure of the grease. So make sure not to lose the screw-plug (1) for more than one round.
2. Don't lose any parts except the screw-plug (1) and don't face towards the installing direction of the screw-plug (1).
3. If the methods provided here can not make the tension of the track loose, please contact Zoomlion or Zoomlion dealers.

**4.8.4.2.1 When augmenting the tension**

Prepare a grease gun and operate as the following steps:

- a) Use the grease gun to add grease through the nozzle (2) (seen in Figure 4-38) (the nozzle (2) and the screw-plug (1) become one).
- b) To check whether the tension of the track is appropriate, move the machine forward slowly (7-8 m).
- c) Check the tension of the track again. If the tension is not appropriate, adjust it again.
- d) Continue to add grease until the size S is zero (0), as seen in Figure 4-39. If the tension is still loose, maybe it is due to the excessive wearing of the pin and the pin bush. Therefore, turn it upside down or replace it; please contact Zoomlion or Zoomlion dealers for the repair work.

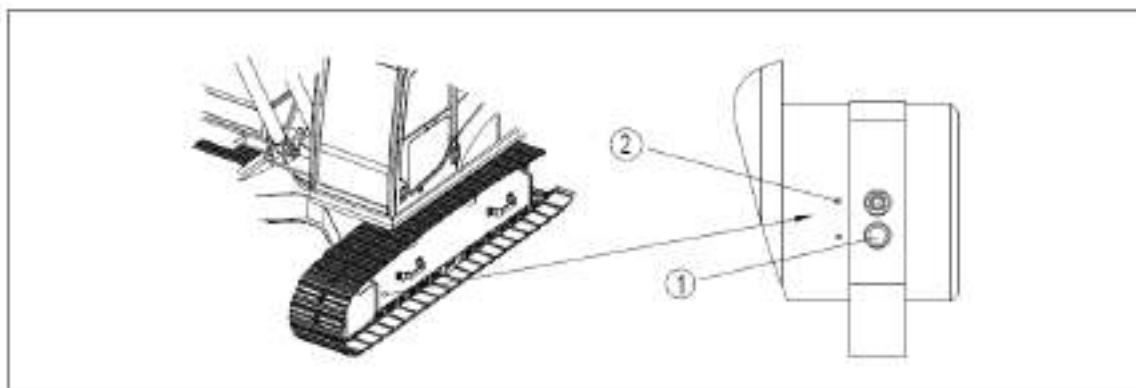


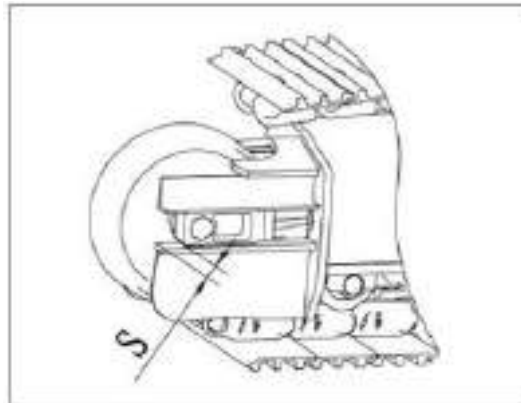
Figure 4-38 Steps for adjusting the tension of the track ( I )

**4.8.4.2.2 When loosening the tension**



1. Apart from the procedures provided below, it is very dangerous to drain the grease using any other procedures.
  2. If the tension of the track can not be loosened according to this procedure, please contact with Zoomlion or Zoomlion dealers for the repair work.
- a) Loosen the screw-plug (1) (as seen in Figure 4-39) gradually to discharge the grease.

- b) Turn the screw-plug (1) for at most one round.
- c) If the grease can not come out smoothly, move the machine forward or backward for a short distance.
- d) Tighten the screw-plug (1).
- e) To check whether the tension of the track is appropriate, move the machine forward slowly by 7-8m.



**Figure 4-39 Steps for adjusting tension of the track (II)**

**4.8.5 Replace the Bucket Teeth**

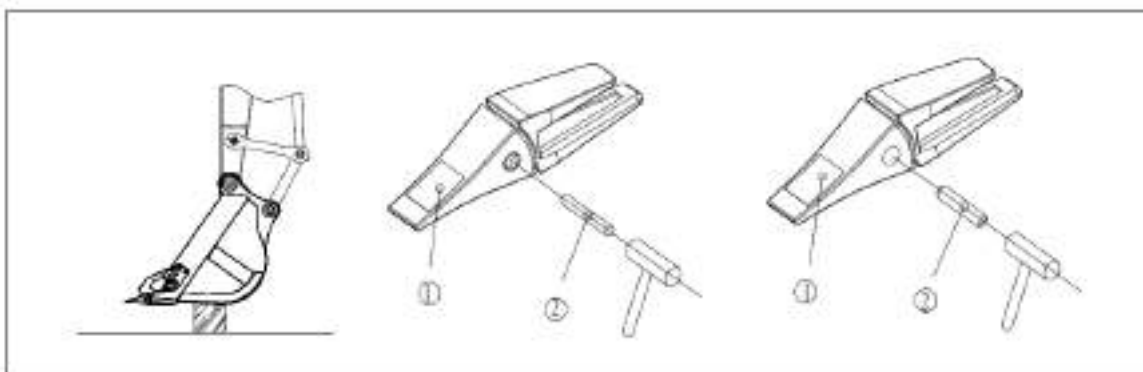
Before the bucket teeth seat is worn down, change the bucket teeth according to the following methods:



1. **When changing the bucket teeth, it is very dangerous if the working device moves due to incorrect operation. Please place the working device in a stable state and then shut down the engine and lock all the operating levers firmly.**
2. **If using too strong force to strike the lock pin, the lock pin may fly out. So check to make sure that there are no people in the surrounding areas.**
3. **When conducting replacement, there will be flying objects. Therefore, please wear safety goggles, gloves and other protection equipments.**

a) Lay the bottom of the bucket on the cushion block so that the pin (1) can be dismantled, as seen in Figure 4-40. Check that the working device is in the stable state and then place the safety locking lever to the locked position. Lay the bottom of the bucket horizontally.

b) Put a metal rod on the pin head and use a hammer to strike the metal rod, so as to tap out the pin (1). Then dismantle the bucket tooth (2).



**Figure 4-40 Replace the bucket teeth**

Remark: need to use a metal rod whose diameter is a little smaller than the pin.

c) Clean the installing surface and install the new bucket tooth (2) on the tooth seat. Use hands to push the pin (1) partially and then use a hammer to strike and lock the pin so that the bucket tooth is installed on

the tooth seat.

**4.8.6 Adjust the Gap of the bucket**



**1. When adjusting the gap, it is very dangerous if the working device moves due to incorrect operation.**

**2. Please place the working device in a stable state and then halt the engine and lock the safety locking lever firmly.**

a) Place the working device in a state that is shown in Figure 4-41. Halt the engine and lay the safety locking lever in the locked position, as seen in Figure 4-42. Remove the O-ring (1) of the connecting rod and measure the clearance “a”.

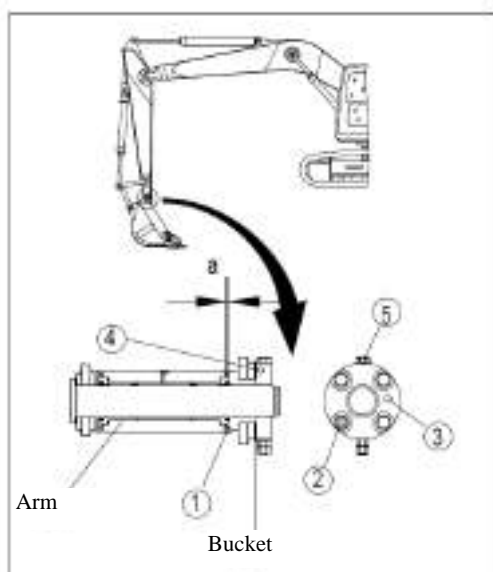
b) If moving the bucket to one side or measuring the total clearance at one place, the measuring work will be much easier. (The left-hand position is seen in the picture) It will be easy to use plug (clearance) gauge to measure precisely.

c) Loosen the four fixed screw-plugs (2) and then loosen the plate (3). Because snap ring spacer is adopted, the operation can be done with the bolts not dismantled.

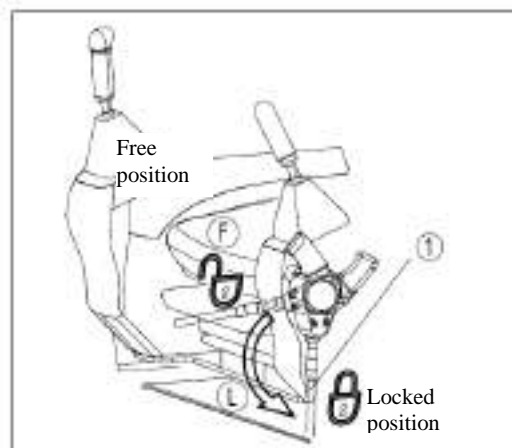
d) Dismantle the spacer (4) according to the clearance quantity “a” measured above.

[For example]: when the clearance is 3mm, dismantle two spacers of 1.0mm and a spacer of 0.5mm, and the clearance turns to be 0.5mm. For the spacer (4), two types (1.0mm and 0.5mm) are adopted. When the clearance is smaller than a spacer, do not do any maintenance.

e) Tighten the four bolts (2). If the bolt (2) can not be tightened easily, pull out the stop pin bolt (5) to facilitate tightening.



**Figure 4-41 Adjust the gap of the bucket**



**Figure 4-42 Lay the locking lever on the locked position**

**4.8.7 Check the Liquid Level of the Cleaning Fluid of the Window Washer and Add the**

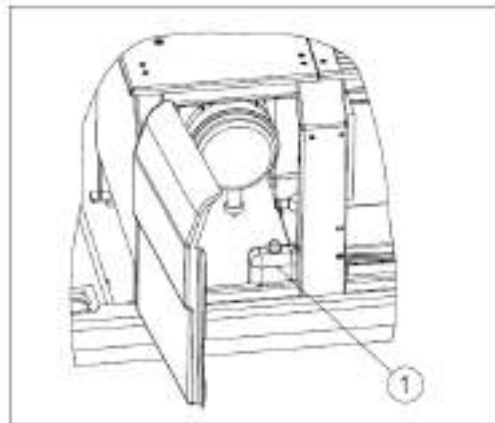
**Liquid**

The liquid storage tank (1) is in the left rear door of the machine. If there is air in the cleaning fluid of the window washer, check the liquid level of the liquid storage tank (1). If necessary, add the cleaning fluid of the window washer, as seen in Figure 4-43.

When adding the liquid, pay attention not to let the dusts enter.

As the mixture ratio varies with the ambient temperature, please add the cleaning fluid based on the mixture ratio in Table 4-2 which has taken the ambient temperature into consideration.

The pure cleaning fluid is divided into two types: one type is applicable to -10°C (14°F) (for general use) and the other type is applicable to -30°C (-22°F) (used in cold regions). Use the pure cleaning fluid according to the operating regions and seasons.



**Figure 4-43 Liquid storage tank**

**Table 4-2 Mixture ratio of the cleaning fluid**

Operating regions	Mixture ratio	Anti-freeze temperature
General region	Pure cleaning fluid 1/3: Water 2/3	-10°C (14°F)
Cold regions in winter	Pure cleaning fluid 1/2: Water 1/2	-20°C (-4°F)
Extremely cold regions in winter	Pure cleaning fluid	-30°C (-22°F)

**4.8.8 Check and Adjust the Air Conditioner**

**4.8.8.1 Check the Liquid Level of the Refrigerant (gas)**



**1. If the refrigerant enter into your eyes or moisten your hands, there is risk of blindness or frostbite. So don't get in touch with the refrigerant. Do not loosen any parts in the pipeline of the refrigerant.**

**2. Don't let any open flame get close to location of refrigerant leaks.**

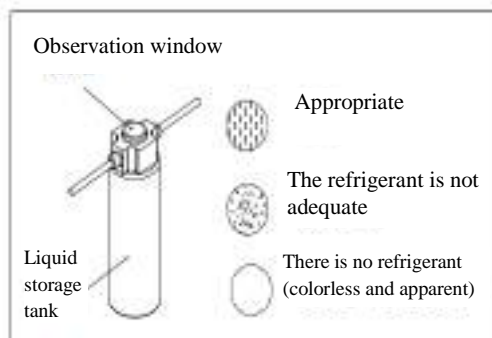
In case of refrigerant shortage (R134-a), the cooling performance will be very poor.

When the engine is running at high idle speed, the air conditioner is in the state of strong refrigeration. There should be no bubbles in the observation window (inspection window) installed on the liquid storage tank of the condenser, as seen in Figure 4-44.

- No bubbles flow in the refrigerant: ok
- There are bubbles flowing in the refrigerant (the bubbles go through successively): the liquid level of the refrigerant is low

- Colorless and transparent: there is no refrigerant

Note: when there are bubbles, the liquid level of the refrigerant will be low. At this time, please contact Zoomlion or Zoomlion dealers to add the refrigerant. If the air conditioner works when the liquid level of the refrigerant is low, the compressor will be damaged.



**Figure 4-44 Check the liquid level through the observation window on the liquid storage tank**

**4.8.8.2 Check in the Spare Seasons**

When the machine is not used for a long time, please operate the cooler for three to five minutes once a month to provide lubrication for all the parts of the compressor. The inspection and maintenance items for the cooler can be seen in Table 4-3.

**Table 4-3 List of inspection and maintenance items for the cooler**

Inspection and maintenance items	Contents	Maintenance cycle
Refrigerant	Adding quantity	Twice a year, in spring and in autumn
Condenser	Radiator fin is blocked	Every 500 hours
Compressor	Function	Every 4000 hours
V-shape belt	Damage and tension	Every 250 hours
Air fan motor and the air fan	Function (check whether there is abnormal sound)	If necessary
Control mechanism	Function (check whether the function is normal)	If necessary
Connecting pipeline	installing condition, (check if the connecting part is loose or if there is gas leak or damage)	If necessary

**4.8.9 Stop Methods for Machines on the Slope**

Generally speaking, the machines should not be parked on slopes; when it must be parked on slopes in special situations, do according to the following methods:

**4.8.9.1 Method of using Slope**

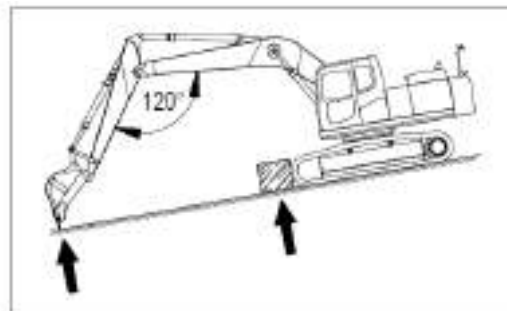


**Attention**

1. Choose a stiff and flat place.
2. Put a cushion block under the track to prevent the machine from moving and insert the working device into the ground.

a) Stop the machine and make the working device be on one side of the downhill, as seen in Figure 4-45.

b) Put a cushion block under the track and insert the working device into the ground.



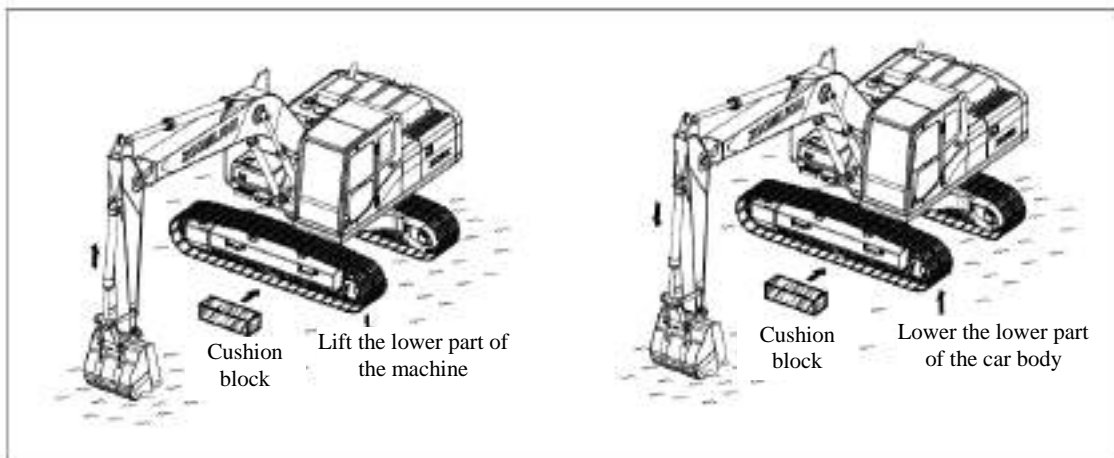
**Figure 4-45 Posture of parking the machine on a slope**

**4.8.9.2 Methods of Using the Cushion Block**



**Attention**

1. Choose a stiff and flat place.
2. Lay a solid cushion block under the under part of the machine to stabilize the machine. Pay special attention when operating it.



**Figure 4-46 Using the cushion block to tilt the machine**

a) Use the boom and the bucket arm to put up the lower part of the machine, as seen in Figure 4-46. At this moment, operate the control lever slowly.

b) Insert the cushion block firmly between the ground and the tracks which are put up to make sure that the machine is stable.

c) Lift the boom slowly and lower the machine. At this moment, check to make sure that the machine is stable all the time.

**4.8.10 Discharge the Air in the Hydraulic System**

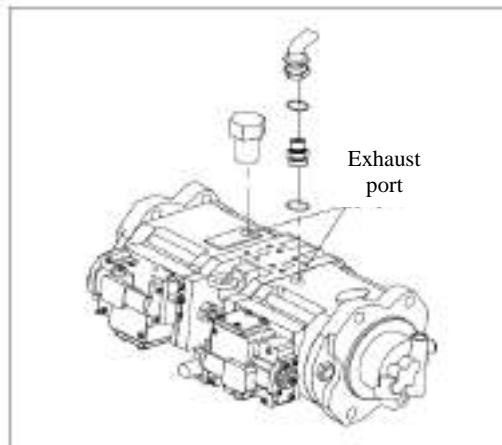
The relevant details can be seen in section of Chapter four “Start the Engines” in the *Operation Manual*.

**4.8.10.1 Discharge the Air in the Pump**

a) Loosen the exhausting screw-plug and check whether there is oil leakage.

b) If there is no oil leakage, dismantle the discharging hose from the hydraulic pump and add the hydraulic oil through the vent to the hydraulic pump, as seen in Figure 4-47. Fix the dismantled hose firmly and make the mouth of pipe higher than the oil level in the hydraulic oil tank so that the oil cannot eject form the hose.

c) After finishing exhausting, tighten the exhausting screw-plug at first and then install the discharging hose.



**Figure 4-47 Discharge the air in the pump**

Notes:

- If you install the discharging hose at first, the oil will spray from the exhausting screw-plug.

If you operate the pump when the pump is not fully filled with oil, the pump will overheat and cause premature damage to pump.

**4.8.10.2 Start the Engines**

The relevant details can be seen in the section of Chapter four “Operation for the Engines” in the *Operation Manual*. After starting the engine, operate it for ten minutes at a low speed and then start operation.

**4.8.10.3 Discharge the Air in the Cylinder**

a) Operate the engine at low speed. Extend or retract the cylinders to a position that is 100mm (3.9in) from the end of stroke for four or five times (pay not to fully extend or retract the cylinders).

b) Then fully operate every cylinder for three or four times.

c) At last, fully operate every cylinder for four or five times to discharge the air completely.

Notes:

If immediately run the engine at high speed or fully operate the cylinder, the air in the cylinder will damage the piston seal.

**4.8.11 Methods of Releasing the Interior Pressure in the Hydraulic Pipeline**

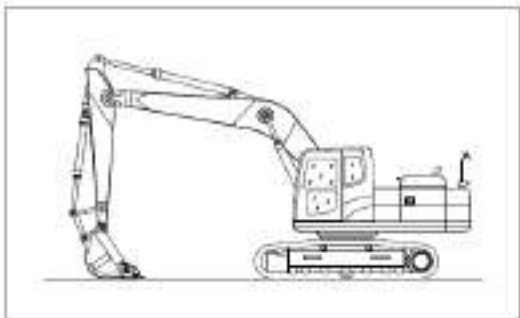


**1. The hydraulic oil pipeline is under high pressure all the time, so you should release the pressure in the pipeline before checking or changing the pipes or hoses. If the pressure is not released, the high pressure oil will spray and cause serious personal injuries.**

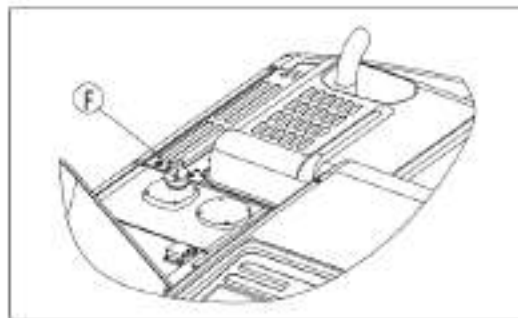
**2. After shutting down the engine, the parts and the oil are still hot, which will cause severe scalding. Before starting operation, wait until the temperature drops.**

**3. When dismantling the lid of the oil filling port, the oil will spray out. Therefore, before dismantling the lid, turn it slowly to release the interior pressure.**

- a) Stop the machine on horizontal and stiff ground, as seen in Figure 4-48.
- b) Within the fifteen seconds after halting the engine, turn the starter switch to ON position and fully operate the control levers (for the working device or traveling) towards different directions to release the interior pressure.
- c) Loosen the refueling lid (F) on the top surface of the hydraulic oil tank (as seen in Figure 4-49) to release the interior pressure.



**Figure 4-48 Park the machine on horizontal ground**



**Figure 4-49 Loosen the refueling lid to release the pressure**

#### **4.9 Maintenance of Hydraulic breaker**

If the machine is installed with hydraulic breaker, the maintenance schedules of some parts will be different.

For the machine installed with hydraulic breaker, the hydraulic oil deteriorates more quickly than that with only bucket excavating operation. Hence, adjust the maintenance schedule in accordance with the following steps.

##### **4.9.1 Change the Hydraulic Filter Cartridge**

As for the new machines, change the filter cartridge after the first 100 to 150 hours and conduct further replacement according to Figure 4-50.

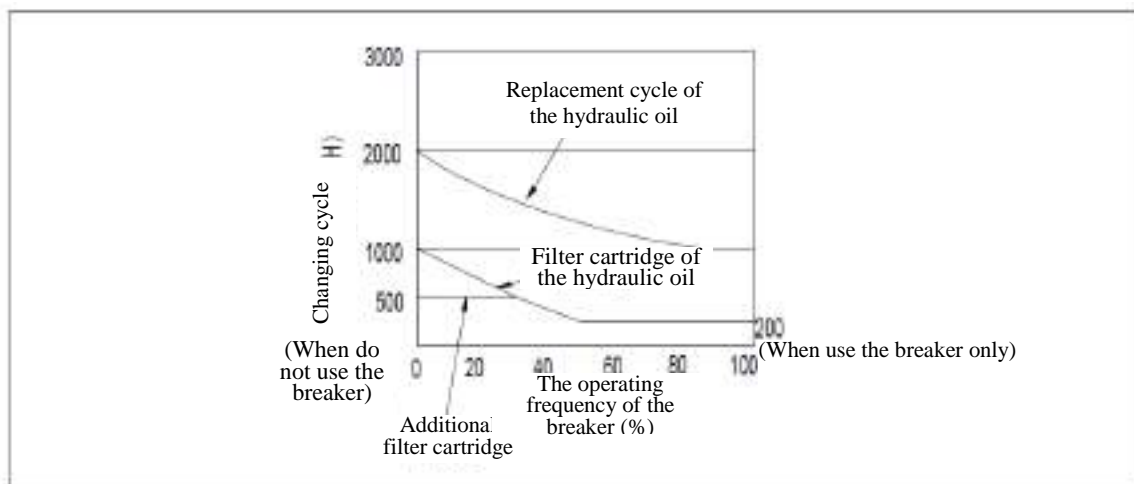
##### **4.9.2 Change the Oil in the Hydraulic Oil Tank**

Change the oil in accordance with the Figure 4-50.

##### **4.9.3 Change the Additional Filter Cartridge Used for the breaker**

Use the breaker's 250 hours of usage as guide (the operating frequency of the breaker: more than 50%) and change the filter cartridge in accordance with the Figure 4-50.





**Figure 4-50 Curve of the changing cycle of the hydraulic breaker**





ZE205E/ZE230E HYDRAULIC EXCAVATOR  
MAINTENANCE MANUAL

**Chapter Five: Troubleshooting of Common Faults**





## Chapter Five: Troubleshooting of Common Faults

### 5.1 Description of Normal Phenomena instead of Faults

Please notice that the following phenomena are not faults:

1. When the arm is retracted, the moving speed declines instantaneously when the bucket arm exceeds or is below the vertical line.
2. When the bucket teeth exceed or are below the horizontal line, the speed of arm declines instantaneously.
3. When doing heavy-load excavation, the bucket or bucket arm vibrates.
4. When starting or stopping slewing, there is noise of brake valve.
5. When marching down an abrupt slope at a low speed, the travel motor makes noise.
6. When operating the bucket or bucket arm, the control valve makes noise.
7. When operating the bucket arm or bucket with the engine idling, the bucket arm or bucket works slowly.
8. When the engine starts or the engine is almost idling, the vibration of the machine becomes intense. But if the engine speed is increased slowly, this co-vibration will disappear.



1. In the following tables 5-1, 5-2 and 5-3, please contact Zoomlion or Zoomlion dealers when dealing with items in the brackets.
2. If any faults or reasons not listed in the following tables appear, please contact Zoomlion or Zoomlion dealers for repair.

### 5.2. Electrical System

The common faults and the troubleshooting methods of the electrical system can be seen in table 5-1.

**Table 5-1 Troubleshooting of common faults of electrical system**

No.	Fault description	Main causes	Solutions
1	Even if the engine is running at high speed, the illuminating light is still off	Wire fault or battery deterioration	(Check and repair the loose terminals and open circuits or change batteries)
2	When the engine is running, the illuminating light flashes	The fan belt is loose	Check the tension of the fan belt and change it
3	Even if the engine is running, the charging indicator doesn't go off	Alternator fault	(Change)
		Wire fault	(Check and repair)
4	The alternator makes abnormal noise	Alternator fault	(Change)
5	When starting the machine, the starter motor doesn't work	Wire fault	(Check and repair)
		Fault of starter motor	(Change)
		The battery storage is undercharged	Charge
6	The pinion of the starter motor sometimes works but sometimes doesn't work	The battery storage is undercharged	Charge
		Fault of safety relay	(Change)

No.	Fault description	Main causes	Solutions
7	The starter motor drives the engine slowly	The battery storage is undercharged	Charge
		Fault of starter motor	(Change)
8	Before the engine starts, the starter motor disconnects	Wires fault, the circular pinion's fault	(Check and repair)
		The battery storage is undercharged	Charge
9	When the engine is shut down, the engine oil pressure indicator doesn't work (the starter switch is at the ON position)	Indicator fault	(Change)
		Fault of the warning light switch	(Change)

### 5.3 Hydraulic System

The common faults and the troubleshooting methods of the hydraulic system can be seen in Table 5-2.

**Table 5-2 Troubleshooting of common faults of hydraulic system**

No.	Fault description	Main causes	Solutions
1	The hydraulic pressure functions slowly	The oil level is low	Refill the oil collector to the full scale
		The oil is cold	Preheat the machine
		The engine speed is too low	Increase the speed or contact with your designated dealer
		Pilot circuit	Contact your designated dealer
		The pump is worn down	Contact your designated dealer
		The suction pipeline of the pump is blocked	Contact your designated dealer
2	The hydraulic oil is too hot	Gas leak of the pump's suction pipe	Contact your designated dealer
		The filter is blocked	Install a new filter
		The radiator or oil cooler is blocked	Clean and straighten the blade
		Travel motor	Contact your designated dealer
3	The oil foams	Gas leak of the pipeline from the oil collector to the pump	Contact your designated dealer
		The oil pipeline is twisted or pitted	Check the pipeline
		There is water in the oil	Change the oil
		The oil level is high or low	Adjust the oil level
4	The hydraulic cylinder works but can't hoist the load	The hydraulic pump is worn down	Contact your designated dealer
		The pressure of the main safety valve is low	Contact your designated dealer
		The hydraulic oil level is low	Add oil
		The suction filter is blocked	Clean the filter and the system
		The suction pipeline of the pump leaks	Check the suction pipeline

No.	Fault description	Main causes	Solutions
5	A hydraulic cylinder doesn't work	Its control valve stem is damaged or it is polluted by dirty things	Contact with your designated dealer
		The hydraulic pipeline is damaged	Repair or change
		The joint is loose	Fasten
		The O-ring in the joint is damaged	Install a new O-ring
		Pilot valve or pilot pipeline	Change or repair
6	Both travel motors don't work	Fault of central joint	Contact your designated dealer
7	A travel motor doesn't work	Travel motor	Contact your designated dealer
		The brake doesn't release	Contact your designated dealer
		Pilot valve	Contact your designated dealer
		Pilot pipeline	Repair or change
8	The machine travels unsteadily	Track adjusts	Adjust the tension
		The track tension pulley or the roller is damaged	Contact your designated dealer
		The track frame is twisted	Contact your designated dealer
		Stone or mud is blocked in the track frame	Remove and repair
		The travel brake can't be released	Contact your designated dealer

## 5.4 Engine Parts

The common faults and the troubleshooting methods of the engine can be seen in Table 5-3.

**Table 5-3 Troubleshooting of common faults of engine**

No.	Fault description	Main causes	Solutions
1	The engine oil pressure indicator light is on	The engine oil filter is blocked	Change the filter
		The oil pipe and the joint are loose, or the damaged part leaks oil	(Check and repair)
		Fault of engine oil pressure sensor	(Change the sensor)
		Indicator fault	(Change)
2	The vapor squirt from the top of the radiator (the pressure valve)	The liquid level of the cooling liquid is low, water leak	Check, add water, and repair
		The fan belt is loose	Check the tension of the fan belt; adjust and change
		Dirty things or lime scale is accumulated in the cooling system	Change the cooling liquid, and wash the interior of the cooling system

**Table 5-3 (Continued)**

No.	Fault description	Main causes	Solutions
3	The radiator coolant level indicator light is on or the coolant temperature pointer points to the red zone	The cooling fin is blocked or damaged	Clean or repair it
		Thermostat fault	(Change the thermostat)
		The lid of the coolant injection port on the radiator is loose (high altitude operation)	Fasten the radiator lid or change the seal
		Fault of coolant level and temperature sensors	(Change the sensor)
4	The engine doesn't start when the starter motor rotates	Indicator fault	(Change)
		The fuel is not enough	Refuel
		There is air in the fuel system	Repair the part that sucks air
		Fault of injection pump or injection nozzle	(Change the injection pump or the injection nozzle)
5	The exhausting gas becomes white or blue	The starter motor starts the engine slowly	Contact your designated dealer
		Compression fault (the valve clearance is not correct)	Contact the designated dealer (adjust the valve clearance)
6	The exhausting gas sometimes becomes black	The oil inside the oil pan is too much	Adjust the oil to the specified oil level
		The fuel is not suitable	Change to the specified fuel
7	The exhausting gas becomes black	The filter cartridge of the air cleaner is blocked	Clean or change
		Fault of injection nozzle	(Change the injection nozzle)
		Compression fault	(Refer to the above compression fault )
		Turbocharger fault	Clean or change the turbocharger
8	Air bleeding sound can be heard occasionally in the burning noise	Fault of injection nozzle	(Change the injection nozzle)
8	Abnormal noise is heard (burning or mechanical)	The fuel grade used is low	Change to the specified fuel
		It is too hot	Refer to the above fault "The radiator coolant level indicator light is on".
		The interior of the muffler is damaged	Change the muffler
		The valve clearance is too large	(Adjust the valve clearance)



## Appendix 1: Maintenance Table

Inspection or maintenance areas	Maintenance cycle						
	Every day	Every 250 hours	The first 500 hours	Every 500 hours	Every 1000 hours	Every 2000 hours	Every 4000 hours
① Slewing ring	√			○			
② Working device	○						
③ Coolant level	√						
④ Engine oil level	√						
⑤ Fuel tank oil level	√						
⑥ Water and sediment inside the fuel tank	△						
⑦ Oil-water separator	△						
⑧ Hydraulic tank oil level	√						
⑨ Hydraulic oil						△	
⑩ Hydraulic oil return filter			⊙		⊙		
⑪ Hydraulic tank ventilation filter				⊙			
⑫ Hydraulic tank blotter filter				√	⊙ (first)	⊙	
⑬ Engine oil		△ ⊙					
⑭ Engine fuel filter		⊙					
⑮ Engine valve clearance						■	
⑯ Air-conditioning compressor belt		■					
⑰ Radiator, oil cooler fin				□			
⑱ Condenser fin				□			
⑲ Internal of air-conditioning systems				□			
⑳ Air filter		□					
㉑ Battery status		√					
㉒ Rotary motor reducer oil			△		△		
㉓ Travel motor reducer oil			△		△		
㉔ Travel motor reducer oil level		√					
㉕ Turbocharger						□	
㉖ Start motor						√	
㉗ Pump							√