8.1 Engine fails to start

Cause of trouble	Remedies
Fault in charging generator	Charge or replace the generator
Fault in starting motor	Check and fasten connections
Air trapped in fuel system	Check fuel piping and release trapped air with hand delivery pump
Fuel filter blocked	Clean or replace fuel filter
Fault in delivery pump	Check fuel supply pipe and repair delivery pump
Fault in injector	Dismantle the injector and adjust it on test stand

Cause of trouble	Remedies
Valve clearance is too small	Adjust and lap the valve
Gas leak through cylinder head gasket	Replace the gasket and fasten bolts
Fault in piston ring	Renew, clean and adjust
Low temperature and too high oil viscosity	Pre−warm the engine and use specified oil
Faults in injection timing	Check and adjust
Contact with Xinchai service station	

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9.1 Nanjing Jinning Electronic Control VE Pump Fault Diagnosis and Flash Code introduction (Applicable to 4D27G31, 4D27T31, 4D30G31, 4D30T31, 4D32G31, 4D32T31, 4D27ZG32, 4D27ZT32 series non-road CN stage III models).

Nanjing Jinning VE36 system OBD fault alarm						
Error code	Trouble	Measures	Effect	OBD light status	Yes/No	Remarks
P0320	Speed sensor or line fault	Timing solenoid valve is closed	Fuel injection advance angle set as mechanical timing	Off	No	Can not be diagnosed by single speed sensor system
P0120	Throttle position sensor or line fault	Timing solenoid valve is closed	Fuel injection advance angle set as mechanical timing	Off	Yes	
P0115	Water temperature sensor or line fault	Set default water temperature	1、Preheating is required for each start 2、Fuel injection timing MAP according to the cold machine timing	Off	Yes	
P1300	Preheat relay open circuit or line fault	/	No preheating if failure	On	Yes	If the preheating function is not included in the electronic control system, no diagnosis will be made.
		/	Frequent preheating if failure	On		
P1301	Preheat relay contact sticking	/	Frequent preheating if failure	On	Yes	
P1302	Preheat relay contact is dead	/	No preheating if failure	On	Yes	
P1010	Return solenoid valve / KSB open circuit or line fault	/	Valve normally open if failure	On	Yes	f the electronic control system without the function of the return solenoid valve, no diagnosis will be made
		/	Valve normally closed if failure	Off		
P0409	EGR lift sensor or line fault	EGR solenoid valve closed	EGR valve closed (ECU control)	Off	Yes	If the EGR function is not included in the electronic control system, no diagnosis will be made
P0400	EGR valve stuck or unable to close	/	Valve normally open if failure	Off	Yes	
			Valve normally closed if failure	On		
			Open at a certain position when failure	Off		
P1000	Timing solenoid valve or line fault	/	When failure the timing is 0	Off	Yes	
			When failure, the timing is the largest	On		
P1201	Timing stuck	/	The valve is stuck at a certain position when failure, fixed timing	Off	Yes	
P1200	Timing stroke sensor or line fault	Timing solenoid valve closed	Mechanical timing	Off	Yes	
P2264	Oil water separator (water level sensor) line fault	/	Excessive moisture affects the oil pump	Off	Yes	If without oil-water separation alarm function, it will not alarm
P0520	Oil pressure sensor or line fault	/		On	Yes	If without oil temperature alarm function, it will not alarm
P0195	Oil temperature sensor or line fault	/		On	Yes	If without oil temperature alarm function, it will not alarm

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1.3 Engine Technical Performance Data

4D27、4D25 Series natural aspirated diesel engine data sheet:

Model		4D27G31	4D25G31	4D27T31/353	4D27T31/403	4D27T31/404	4D27T31/423	4D27T31/424	3D20T31/304	3D20T31/324	4D27ZG32	4D27ZT32/614	4D27ZT32/616	4D27ZT32/654
Type		In–line, water cooled, 4–stroke, direct injection, ring–like platform combustion chamber												
Aspiration		Natural aspiration									supercharging			
No. of cylinders–bore–stroke (mm)		4–90 × 105	4–90 × 100	4–90 × 105					3–90 × 105		4–90 × 105			
Total displacement (L)		2.67	2.54	2.67					2.00		2.67			
Firing order		1–3–4–2							1–3–2		1–3–4–2			
Compression ratio		18.5:1												
Rated power/speed (kW –r/min)		36.8–2500	36.8–2650	28.5–2300	29.5–2300	29.5–2400	30.9–2300	30.9–2400	22–2400	23.5–2400	42–2200	45–2500	45–2600	48–2400
Max. torque (N · m)		≥156	≥153	≥129	≥147	≥141	≥154	≥148	≥110	≥112	≥220	≥204	≥195	205
Max. torque speed(r/min)		1700 ~ 1900		1560 ~ 1700		1600 ~ 1800					1500 ~ 1700	1800 ~ 200		
Fuel consumption (g/kW · h)	Rated point	≤235									≤238			
	Max. torque	≤220									≤228			
Max.smoke at full load (RB)		≤2.5												
Free Acceleration Smoke (RB)		≤3.0												
Emission		GB 20891–2014 Non road stage Ⅲ												
Min. steady idle speed (r/min)		750 ± 30										800 ± 30		
Direction of crank rotation viewed from flywheel end		counterclockwise												
Noise dB(A)		≤111	≤112	≤110					≤109		≤112		≤113	≤112
Cooling system		closed cycle, forced water cooling												
Lubricating system		pressured and splashed												
Starting system		Electric motor												
Net weight (kg)		260		330					265		270	275		
Dimension length*width*height (mm)		746 × 569 × 694		787 × 726 × 719	758 × 584 × 700		726 × 763 × 719	797 × 726 × 729			746 × 565 × 732	722 × 610 × 735		
Application		Forklift		Tractor							Forklift	Tractor		

Note: The rated power is the power at standard condition that means the atmospheric pressure is 1 × 105Pa（760mmHg）,ambient temperature is 25℃, relative humidity is 30%, without air filter, muffler or cooling fan

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4.1 Maintenance Tools

Hexagon wrench

Spanner handle

Valve clearance gauge

Assembling and dismantling tool for spin–on filter

4.2 Maintenance Periods

These maintenance periods are suitable for general situation, if maintenance is required for the vehicles (cars, forklifts, tractors and so on) the shorter maintenance period is applied. When the engine operation should meet local regulations, the maintenance periods and procedures should be modified to ensure right operation.

▲ Note: Some maintenance periods should be shortened if the engine is worked in dusty environment or other rigorous conditions.

Engine maintenances are classified as follows:

1. Daily maintenance
2. Grade 1 maintenance (After 50 hours or 2500km)
3. Grade 2 maintenance (After 250 hours or 12500km)
4. Grade 3 maintenance (After 1000 hours or 50000km)

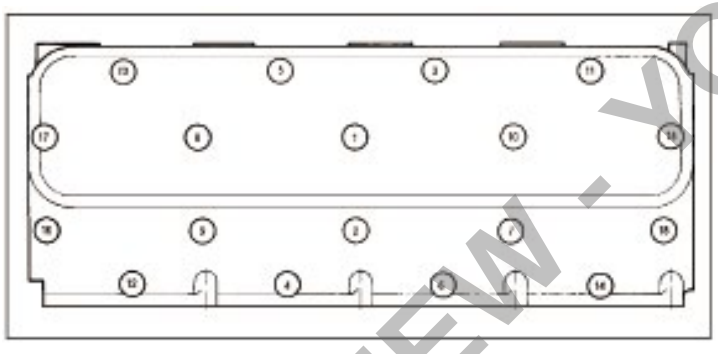
Interval	Maintenance Items
Daily Maintenance	1. Check the oil sump, air filter and the oil level in the injection pump. If the oil level rises, find out the cause and deal with it; if the oil is not sufficient enough, fill the oil to the specified value. 2. Check the cooling water level in the water tank and fill it if the cooling water is not sufficient enough. When the temperature goes below 5 ℃, all cooling water shall be drained out after the engine being shutting down (if there is no any antifreeze). 3. Check and fix bolts and nuts to eliminate any leakages phenomena. 4. Use the compressed air to eliminate the dust on the cartridge of air filter when working on the occasions with much dust. 5. Clean the mud, deposited dust and smear outside of the engine. 6. Pay attention to the sound when the engine is running. Watch the exhaust smoke and deal with the caused troubles and abnormal situations.
Grade 1 Maintenance	1. Same as the Daily Maintenance. 2. Clean deposited dust on the cartridge of air filter and dust bin. Renew the oil in the air filter. 3. Check and adjust the tightness of fan belt. 4. Fill the grease lubricant to the water pump bearing (except the shaft–connecting water pump). 5. Check every parts of engine make an adjustment if necessary. 6. Start the engine to check its operation condition after finishing the maintenance and deal with the caused troubles and abnormal situations.

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5.1 Tightening Sequence of Cylinder Head Bolts

The cylinder head is fixed on the cylinder block with cylinder head bolts. When tightening these bolts, torque wrench should be used and the specified tightening torque value should be reached step by step following the tightening sequence shown in the figure. If the cylinder head has been dismantled and remounted, the engine should be shut down and the cylinder head bolts should be re–tightened to the specified tightening torque as well as the valve clearances should be re–adjusted after the engine is warmed up in its first running.



5.2 Checking and Adjustment of Driving Belt

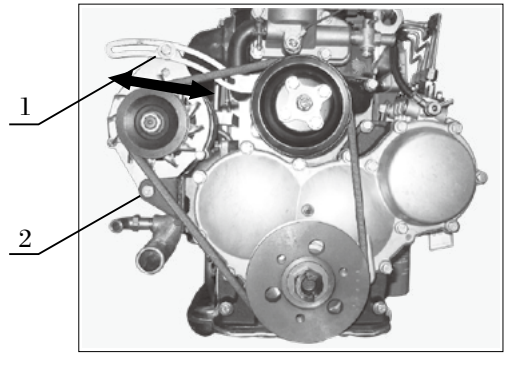
1）、Check the whole belt and renew the broken belt.

2）、Engine should work 15 minutes after the new belt is installed and then check the tightening of belt.

3）、Driving belt should be kept under a certain tension status. Normally when exerting a force of 29～49N at the middle part of the belt a depressed distance not exceeding 10～15mm is recommended. Too tight belt will lead to excessive wear of bearings in generator, fan and water pump. Too loose belt will lead to drop of speeds of accessories. As a consequence, voltage from generator, air flow from fan and/or water flow from water pump will drop and normal function of the engine will be affected.

4）、Adjust tension of belt:

- Loosen two fixing bolts.1 and 2
- Turn the generator to the right or left to adjust the tension of belt until it reaches an appropriate value.
- Tighten the two bolts 1 and 2



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Appendix 1 Consumable parts list

S/N	Name	Part No.	Number per Unit
1	Valve outer spring	See parts catalog	8
2	Valve inner spring	See parts catalog	8
3	Intake/exhaust valve	See parts catalog	4/4
4	Valve lock clip	See parts catalog	16
5	Upper/lower main bearing	See parts catalog	5/5
6	Cylinder head gasket	See parts catalog	1
7	Front oil seal	See parts catalog	1
8	Compression ring(top)	See parts catalog	4
9	Compression ring (second)	See parts catalog	4
10	Combination oil ring	See parts catalog	4
11	Connecting rod bearing	See parts catalog	4
12	Fan belt	See parts catalog	1
13	Oil filter	See parts catalog	1
14	Fuel filter	See parts catalog	1
15	Injector	See parts catalog	4
16	Cylinder liner	See parts catalog	4
17	Piston	See parts catalog	4

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8.2 Abnormal oil pressure

Cause of trouble	Remedies
Low oil level and oil viscosity	Fill or replace the oil
Broken oil pipeline, leakage at pipe connection, damaged oil pressure gauge	Weld or replace
Broken pressure regulating spring	Replace
Too big bearing clearance	Check and repair
Loose screw plug	Check and repair
Fault in pressure regulating valve. Oil return passage blocked	Check and adjust
Too low ambient temperature or too high oil viscosity	Pre−warm the engine and use specified oil

Cause of trouble	Remedies
No oil reaches rocker arm, oil passage blocked in cylinder head or in rocker arm bracket	Clean and make the oil passage through
Contact with Xinchai service station	

8.3 High exhaust smoke

Cause of trouble	Remedies
Nozzle chocked by carbon deposit or seized needle valve	Check, repair, or replace faulty parts
Too heavy load	Adjust the load within specified range
Too late injection timing	Adjust the injection timing

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9.3 Nanyue electronic control unit pump fault diagnosis and flash code introduction（Applicable to 4D32ZG31、4D32ZT31、4D35ZG31、4D35ZT31、4D32ZG32、4D32ZT32、4D35ZZG32、4D35ZT32、4K41ZG31、4K41ZT31 series non-road CN stage III models）

Nanyue electronic control ECU022 non-road controller diagnostic fault flash code table									
Evt ID	Description	Flash code	J1939DTC	DTC	Evt ID	Description	Flash code	J1939DTC	DTC
0	No	555	0	0	24	reserve	555	0	0
1	Fuel injection drive 1st cylinder circuit failure	332	0x0105028B	P0201	25	Reserve	555	0	0
2	Fuel injection drive 2nd cylinder circuit failure	334	0x0105028C	P0202	26	reserve	555	0	0
3	Fuel injection drive 3rd cylinder circuit failure	336	0x0105028D	P0203	27	reserve	555	0	0
4	Fuel injection drive 4th cylinder circuit failure	342	0x0105028E	P0204	28	reserve	555	0	0
5	Fuel injection drive 5th cylinder circuit failure	344	0x0105028F	P0205	29	reserve	555	0	0
6	Fuel injection drive 6th cylinder circuit failure	346	0x01050290	P0206	30	Oil pressure signal voltage abnormal (extended)	421	0x01040064	P0521
7	Crankshaft position sensor failure	143	0x010C00BE	P0335	31	Engine 1st cylinder working abnormally (extended)	661	0	0
8	Cam position sensor failure	142	0x010C02D3	P0340	32	Engine 2nd cylinder working abnormally (extended)	662	0	0
9	Abnormal battery voltage	41	0x010400A8	P0561	33	Engine 3rd cylinder working abnormally (extended)	663	0	0

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