WEBM4D9801

Shop Manual

KOMATSU®

4D98 SERIES
4D106 SERIES
S4D106 SERIES

DIESEL ENGINE

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August 1999

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(3) 4TNE106

Engine name		Unit	4TNE106					
Engine specification class		–	CL		VM			
Type		–	Vertical, in-line, 4-cycle, water-cooled diesel engine					
Combustion chamber		–	Direct injection					
Number of cylinders		–	4					
Cylinder bore × stroke		mm × mm	106 × 125					
Displacement		ℓ	4.412					
Continuous rating	Revolving speed	rpm	1500	1800	–			
	Output	kW (hp)	44.9 (60.2)	53.7 (72.0)	–			
Rated output	Revolving speed	rpm	1500	1800	2000	2200	2400	2500
	Output	kW (hp)	49.3 (66.1)	58.8 (78.8)	56.6 (75.8)	61.4 (82.3)	65.5 (87.8)	67.7 (90.7)
Fuel injection timing (FID, bTDC)		deg	13~15					
Fuel injection pressure		MPa (kgf/cm²)	21.57~ 22.55 (220~230)					
Ignition order		–	1–3–4–2 (No. 1 cylinder on flywheel side)					
Power take off		–	Flywheel					
Direction of rotation		–	Counterclockwise (viewed from flywheel)					
Cooling system		–	Radiator					
Lubrication system		–	Forced lubrication with trochoid pump					
Starting system		–	Electric					
Applicable fuel		–	Diesel oil-ISO 8217 DMA, BS 2869 A1 or A2 (cetane No. 45 min.)					
Applicable lubricant		–	API grade class CD					
Battery capacity		V-AH	12–88 (5HR) or above					
Lubricant capacity (oil pan)	Total	ℓ	12.5					
	Effective	ℓ	5.5					
Cooling water capacity (engine only)		ℓ	6.0					
Engine dimensions	Overall length	mm	789					
	Overall width	mm	535					
	Overall height	mm	750					
Engine weight (dry)		kg	301					

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2.2 Troubleshooting by Measuring Compression Pressure

Compression pressure drop is one of major causes of increasing blowby gas (lubricating oil contamination or increased lubricating oil consumption as a resultant phenomenon) or starting failure. The compression pressure is affected by the following factors:

1. Degree of clearance between piston and cylinder
2. Degree of clearance at intake/exhaust valve seat
3. Gas leak from nozzle gasket or cylinder head gasket

In other words, the pressure drops due to increased parts wear and reduced durability resulting from long use of the engine.

A pressure drop may also be caused by scratched cylinder or piston by dust entrance from the dirty air cleaner element or worn or broken piston ring. Measure the compression pressure to diagnose presence of any abnormality in the engine.

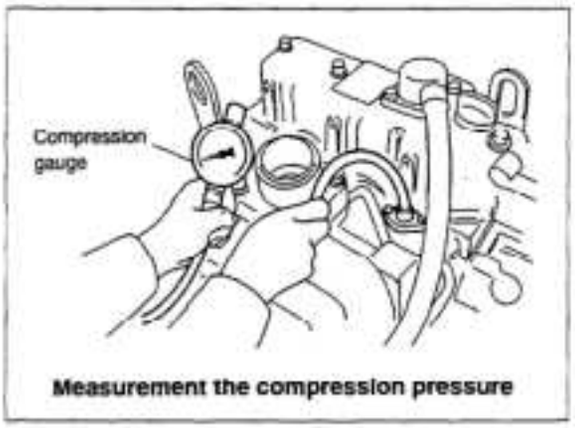
(1) Compression pressure measurement method

① After warming up the engine, remove the fuel injection pump and valves from the cylinder to be measured.

② Crank the engine before installing the compression gage adapter.

*1. Perform cranking with the regulator handle at the stop position (no injection state).

*2. See 11.2 – 18 in Chapter 11 for the compression gage and compression gage adapter.



Measurement the compression pressure

③ Install the compression gage and compression gage adapter at the cylinder to be measured.

*Never forget to install a gasket at the tip end of the adapter.

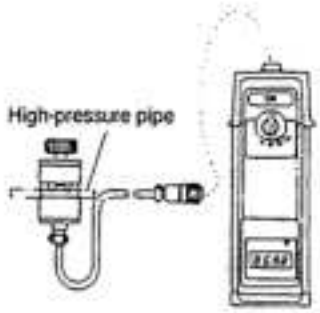
④ With the engine set to the same state as in ② *1, crank the engine by the starting motor until the compression gage reading is stabilized.

(2) Standard compression pressure

[Engine compression pressure list (reference value)]

Engine model	Compression pressure Mpa(kgf/cm²) at 250 rpm		Dispersion among cylinders (kgf/cm²)
	Standard	Limit	
4TNE94/98/106(T)	3.43±0.1(35±1)	2.75±0.1(28±1)	0.2–0.3(2 – 3)

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No.	Instrument name	Application	Illustration
16	Speedometer: Fuel high-pressure pipe clamp type	Measures the revolution regardless of the center or periphery of the revolving object.	
17	Circuit tester	For measuring resistance, voltage and continuity of electrical circuits	
18	Compression gage kit	For measuring compression pressure Yanmar code No.: TOL-97190080	

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	Trouble symptom / Cause	Starting failure: Engine does not start.	Starting failure: Engine starts but stops soon. Exhaust smoke: None	Starting failure: Engine starts but stops soon. Exhaust smoke: Little	Starting failure: Engine starts but stops soon. Exhaust smoke: Much	Insufficient engine output: Exhaust color: Ordinary	Insufficient engine output: Exhaust color: White	Insufficient engine output: Exhaust color: Black	Poor exhaust color: During work: White	Poor exhaust color: During work: Black	High-knocking sound during combustion	Abnormal engine sound	Uneven combustion sound	Hunting: During idling	Hunting: During work	Large engine vibration	Difficulty in returning to low speed	Excessive fuel consumption	Lubricating oil: Excessive consumption	Lubricating oil: Dilution by fuel oil	Lubricating oil: Mixture with water	Lubricating oil: Low L.O. pressure	Lubricating oil: Much blow-by gas	Cooling water: Overheat	Cooling water: Low water temperature	Air intake: Pressure drop	Air intake: Pressure rise	Exhaust temperature rise	Corrective action
Cooling Water System	Excessive cooling effect of radiator								○									○							○				Defective thermostat (kept closed) (See 3.9 (1) in Chapter 3.)
	Insufficient cooling effect of radiator							○																○				○	Defective thermostat (kept opened) (See 3.9 (1) in Chapter 3.) or slipping fan belt (See 3.4 in Chapter 3.)
	Insufficient cooling water level							○																○				○	Check water leakage from cooling water system.
	Cracked water jacket																				○	○		○					Repair or replace.
	Slackened fan belt							○																○				○	Adjust the belt tension. (See 3.4 in Chapter 3.)
	Defective thermostat							○	○															○	○				Check or replace. (See 3.9 (1) in Chapter 3.)
Lubricating System	Improper properties of lubricating oil	○	○			○													○			○	○						Use proper lubricating oil. (See 1.3 (2) in Chapter 1.)
	Leakage from lubricating oil piping system																		○			○							Repair.
	Insufficient delivery capacity of trochoid pump																					○							Check and repair. (See 5.5 in Chapter 5.)
	Clogged lubricating oil filter																					○	○						Clean or replace.
	Defective pressure regulating valve																					○							Clean, adjust or replace.
	Insufficient lubricating oil level		○																			○							Add proper lubricating oil. (See 3.1 in Chapter 3.)
Fuel System	Too early timing of fuel injection pump								○	○	○				○														Check and adjust. (See 3.7 in Chapter 3.)
	Too late timing of fuel injection pump						○	○	○	○							○											○	Check and adjust. (See 3.7 in Chapter 3.)
	Improper properties of fuel oil					○	○	○	○	○				○															Use proper fuel oil. (See 1.3 (1) in Chapter 1.)
	Water entrance in fuel system	○			○		○		○					○	○	○													Perform draining from the fuel filter.
	Clogged fuel filter	○	○			○																							Clean or replace.
	Air entrance in fuel system	○	○			○																							Perform air bleeding.
	Clogged or cracked fuel pipe	○	○			○																							Clean or replace.
	Insufficient fuel supply to fuel injection pump	○	○			○																							Check the fuel tank cock, fuel filter, fuel pipe, and fuel feed pump.
	Uneven injection volume of fuel injection pump						○	○	○	○				○	○	○	○											○	Check and adjust. (See Chapter 7.)
	Excessive fuel injection volume									○								○	○				○	○		○	○		Check and adjust. (See Chapter 7.)
	Poor spray pattern from fuel injection nozzle						○	○	○	○				○	○	○	○	○											Check and adjust. (See 3.6 in Chapter 3.)
	Priming failure	○																											Foreign matter trapped in the valve inside the priming pump. (Disassemble and clean.)
	Clogged strainer at feed pump inlet					○																							Clean the strainer.

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