KDI 1903 M - 2504 M

WORKSHOP MANUAL

KOHLER® Diesel KDI



KOHLER

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2.10 Lubrication circuit

2.10.1 Lubrication circuit diagram

The oil pump is driven by the crankshaft on the timing system side.
On the parts of the systems shown in green on In the parts in green, the oil is in intake, in the parts in red, the oil is under pressure and in those in yellow the oil is returning towards the oil sump 2 (not under pressure).

Tab. 2.17

COLOUR	DESCRIPTION
	Oil in intake
	Oil under pressure
	Oil returning to the oil sump

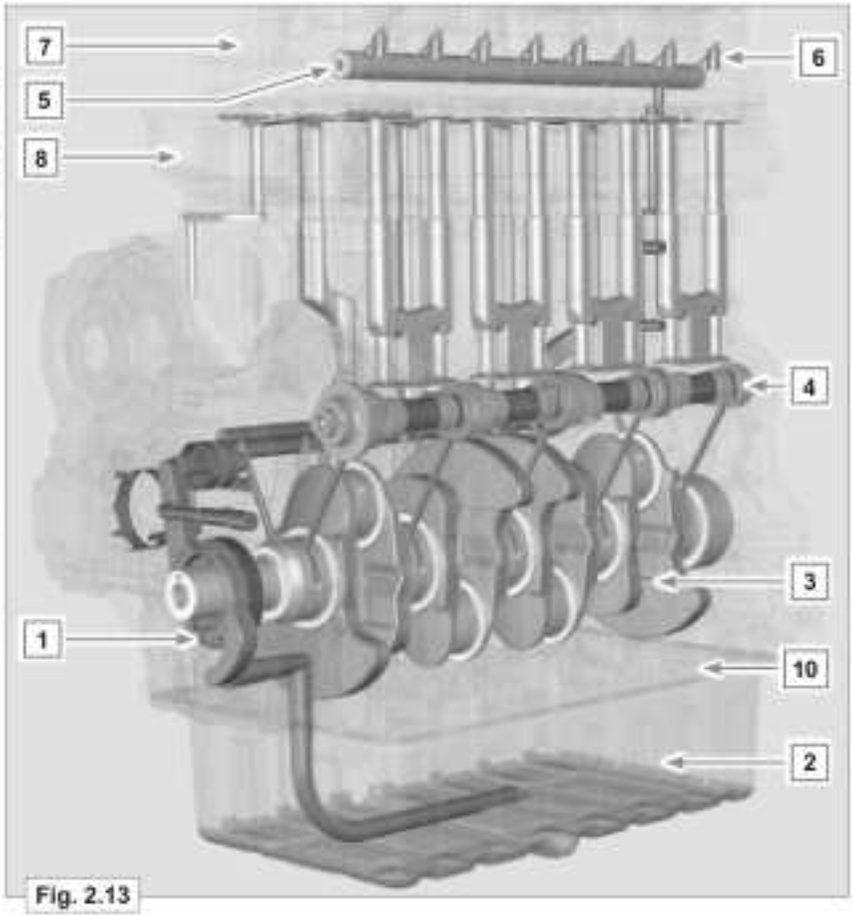


Fig. 2.13

Tab. 2.18

POS.	DESCRIPTION
1	Oil pump rotors
2	Oil sump
3	Crankshaft
4	Camshaft
5	Rocker arm pin
6	Hydraulic tappets
7	Rocker arm cover
8	Cylinder head
9	Upper crankcase
10	Lower crankcase
11	Oil filter
12	PTO 3rd/4th gear housing

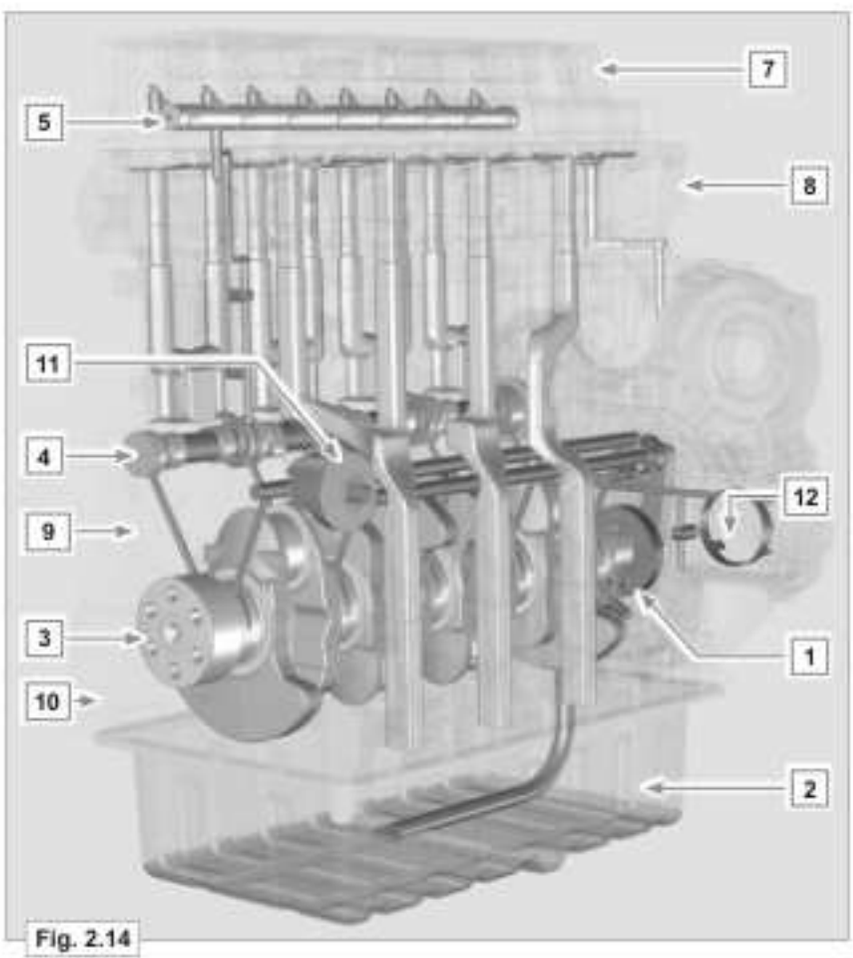


Fig. 2.14

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8.4.2 Checking the axial clearance of the crankshaft

Perform the operations described in **Par. 9.3.5** e **9.3.6.**

Using a dial gauge, measure the axial shift of crankshaft **E**.

Axial shift must be a **MIN** of 0.18 mm and **MAX** 0.38 mm..
If the values measured do not correspond, replace shoulder rings **D**.

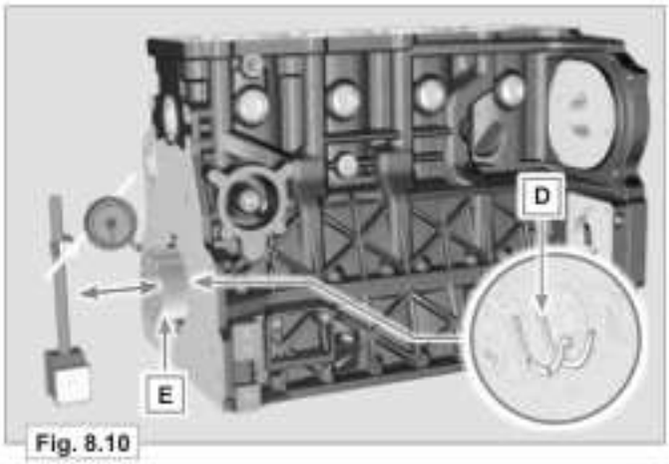


Fig. 8.10

8.5 Connecting rod - piston assembly

8.5.1 Connecting rod dimensions check

Important

- Before assembling the connecting rod and pistons (**Par. 9.3.7** and **9.3.8**), check that the difference in weight between the complete connecting rod and piston units do not exceed 8 gr to prevent weight imbalances during rotation of the crankshaft and consequent damage.
- Mark some references on the connecting rods, caps **Q**, pistons and gudgeon pins to prevent unintentionally confusing the components during assembly. Failure to do this may result in engine malfunctions..
- Connecting rod half-bearings **S** must be replaced at each assembly.

Check that the contact surfaces are perfectly clean and intact.

Assemble the connecting rod cap **Q** to the connecting rod with the half-bearings **S** and tighten capscrews **P** (tightening torque at **25 Nm**).
With a dial gauge, measure diameters B and D.
The **MAX** allowed value of wear for B and D is 0.06 mm.


Fig. 8.11

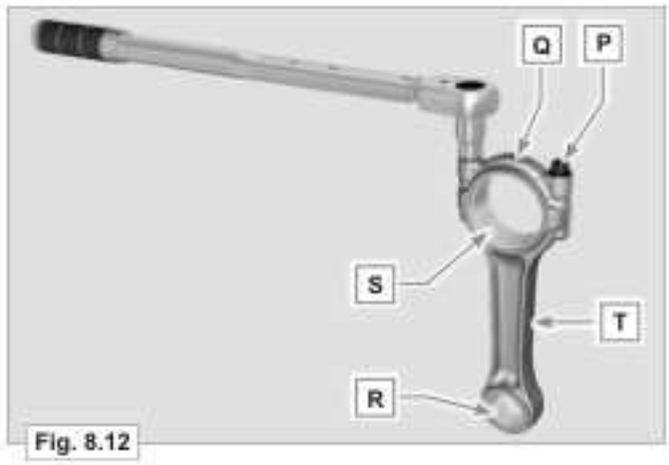


Fig. 8.12

Tab. 8.6

REF.	DIMENSIONS (mm)	CLEARANCE VALUE (mm)
A	169.980 - 170.020	
B	30.020 - 30.030	0.025 - 0.030
C	29.995 - 30.000	
D	54.035 - 54.066	
E	67.700 - 68.000	
F	29.750 - 29.790	

Important

- **Tab. 8.6** details the dimensional values of new components only.
- Check that the connecting rod and crankshaft half-bearings are coupled properly.
- Refer to the warnings in **Par. 8.4.1** for value D decreased.
- If the clearance value between B and D is not observed, you are required to replace bearing **R** (**Fig. 8.12**).

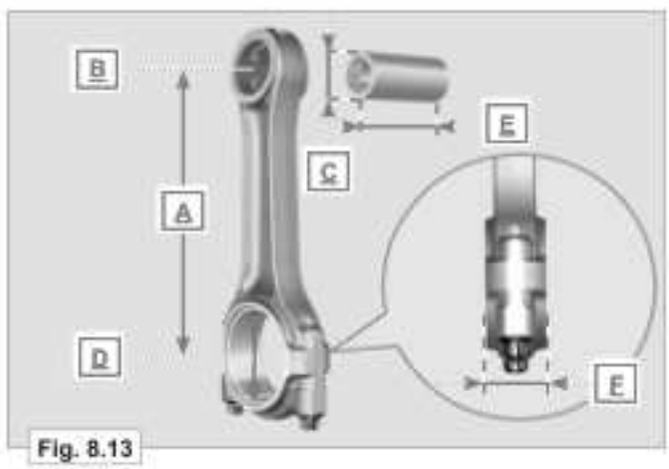


Fig. 8.13

Measure value A, C, D, E and F and confront them with those described in **Tab. 8.6**.
If the measured values do not follow those described in **Tab. 8.6**, replace connecting rod **T**.

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	POSSIBLE CAUSE	TROUBLES													
		Engine does not start	Engine starts and stops	No acceleration	Variable speed	Black smoke	White smoke	Low oil pressure	Oil level increase	Excessive oil consumption	Oil and fuel leaking out from the exhaust	Engine overheats	Inadequate performance	High noise level	The Warning Lamp switches on
LUBRICATION CIRCUIT	Oil level too high						■			■	■	■	■	■	
	Oil level low							■				■	■		
	Dirty or blocked pressure regulating valve							■							
	Worn oil pump							■							
	Air in the oil suction pipe							■							
	Oil suction hose clogged							■							
	Oil steam exhaust pipe clogged													■	
INJECTION	Damaged injectors	■		■		■	■		■		■	■	■	■	
	Damaged injection pump	■		■									■		
	Wrong injector IMA codes				■	■	■						■	■	
COOLING CIRCUIT	Insufficient coolant											■			
	Defective fan, radiator, or radiator cap											■			
	Blockage inside the radiator or the coolant ducts											■			
	Heat exchange surface of the radiator clogged											■			
	Defective thermostatic valve											■			
	Coolant leaking from the radiator, manifolds, crankcase or from the coolant pump											■			
	Defective or worn coolant pump											■			

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* *Alternatively to the capscrew replacements, with "Dri-loc"*

OPTIONAL COMPONENTS (CHAP. 11)

OIL DIPSTICK ON CYLINDER HEAD

Component	Thread (mm)	Torque (Nm)	Sealer
Oil dipstick tube fastening capscrew	M6x1	10	

HEATER

Component	Thread (mm)	Torque (Nm)	Sealer
Flange intake with heater fastening capscrew	M8x1.25	25	

IDLE GEAR (FOR 3TH /4TH PTO)

Component	Thread (mm)	Torque (Nm)	Sealer
Gear drilled fastening capscrew	M14x1.5		Molyslip

3TH PTO

Component	Thread (mm)	Torque (Nm)	Sealer
Pump support fastening capscrew	M8x1.25	25	Loctite 2701*
Pump fastening capscrew	M8x1.25	25	

4TH PTO

Component	Thread (mm)	Torque (Nm)	Sealer
Grooved crankshaft support fastening capscrew	M8x1.25	25	Loctite 2701*
Cover fastening capscrew (3rd PTO side)	M8x1.25	25	
Sump support fastening capscrew	TG6	10	
Pump fastening capscrew	M8x1.25	25	

BALANCE SHAFTS (4 CYLINDERS)

Component	Thread (mm)	Torque (Nm)	Sealer
Housing closing panel fastening capscrew	M6x1	8	
Shafts support fastening capscrew	M10x1.5	50	

REMOTE OIL FILTER

Component	Thread (mm)	Torque (Nm)	Sealer
Head fixing joint on crankcase	M20x1.5	25	Loctite 2701
Crankcase head nipple and oil filter support	M14x1.5	40	
Tube union on crankcase head	G3/8	30	
Tube union on filter support	G3/8	35	
Oil filter	M20x1.5	20	
Filter support head air bleeding cap	M8x1.25	25	

INTAKE CIRCUIT

Component	Thread (mm)	Torque (Nm)	Sealer
Air filter support plate fastening capscrew (on flange bell)	M8x1.25	25	
Air filter support fastening capscrew	M8x1.25	25	

EXHAUST CIRCUIT

Component	Thread (mm)	Torque (Nm)	Sealer
Muffler brace support fastening capscrew	M8x1.25	25	
Muffler fastening capscrew on muffler	M8x1.25	25	
Muffler fastening nut	M8x1.25	25	

COOLING CIRCUIT

Component	Thread (mm)	Torque (Nm)	Sealer
Blower fastening capscrew	M6x1	10	
Radiator support fastening capscrew	M16x1.5	150	
Shroud radiator fastening capscrew	M6x1	10	
Radiator lower brace fastening capscrew	M8x1.25	25	
Radiator on anti-vibrating	M8x1.25	25	
Vibration-damping nut fixing (on radiator support)	M8x1.25	25	
Anti-vibrating and brace fastening capscrew (upper)	M6x1	10	
Upper brace fastening capscrew (on engine cylinder head)	M8x1.25	25	
Side bulkheads fastening capscrew	M6x1	10	

ENGINE SUPPORT

Component	Thread (mm)	Torque (Nm)	Sealer
Side feet fastening capscrew (on flange bell or crankcase)	M12x1.75	50	
Rear feet fastening capscrew	M16x1.5	200	

* *Alternatively to the capscrew replacements, with "Dri-loc"*

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2.1 Engine specifications

Tab. 2.1

MANUFACTURER SPECIFICATIONS AND OPERATION			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
Operating cycle		diesel - 4-stroke	
Cylinders	No.	3	4
Bore x stroke	mm	88x102	
Displacement	cm³	1861	2482
Compression ratio		17:1	
Intake		Atmospheric pressure	
Cooling		Liquid	
Crankshaft rotation (view from flywheel side)		Counterclockwise	
Combustion sequence		1-3-2	1-3-4-2
Timing System			
Valves per cylinder		4	
Timing System		Rods and rocker arms - Camshaft in the crankcase	
Tappets		Hydraulic	
Injection		Direct	
Engine dry weight	Kg	210	244
MAX inclination 30" continuous operation	α	25°	
MAX inclination 1' continuous operation	α	35°	
Volume of aspirated air (2600 rpm)	m³/h	2.2	2.9
POWER AND TORQUE			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
MAX. operating speed	Rpm	2600	
MAX. operating power (ISO TR 14396 - SAE J1995 - CE 97/68)	kW	31	41
Maximum torque (at 1500 rpm)	Nm	133	170
Admissible axial load on crankshaft	Kg	300	
CONSUMPTIONS			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
Specific fuel consumption (best point)	g/kWh	210	
Oil consumption	%Fuel	< 0.05	
FUEL SUPPLY SYSTEM			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
Type of fuel		Diesel UNI-EN590 - ASTM D975	
High-pressure fuel injection pump		STANADYNE - DB	
Fuel supply		Low pressure electric pump	
Fuel filter			
Filtering surface	cm²	2300	
Degree of filtration	µm	5	
Maximum pressure at injection pump inlet	bar	0.2	

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