Operator's manual en

Diesel engine

D936 A7-03 / D946 A7-03 / MCC

From serial number 2019040001

LIEBHERR

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1.1.7 Engine control unit type plate (ECU2)

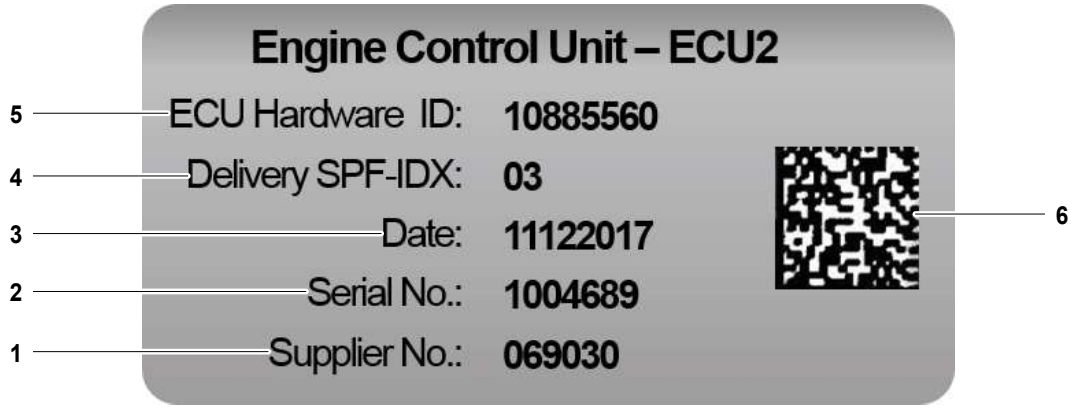

Fig. 9: Engine control unit type plate ECU2 (example)

1 Supplier number
2 Control unit serial number
3 Creation date
4 Software version at delivery
5 Control unit identification number
6 2D bar code

Attachment point

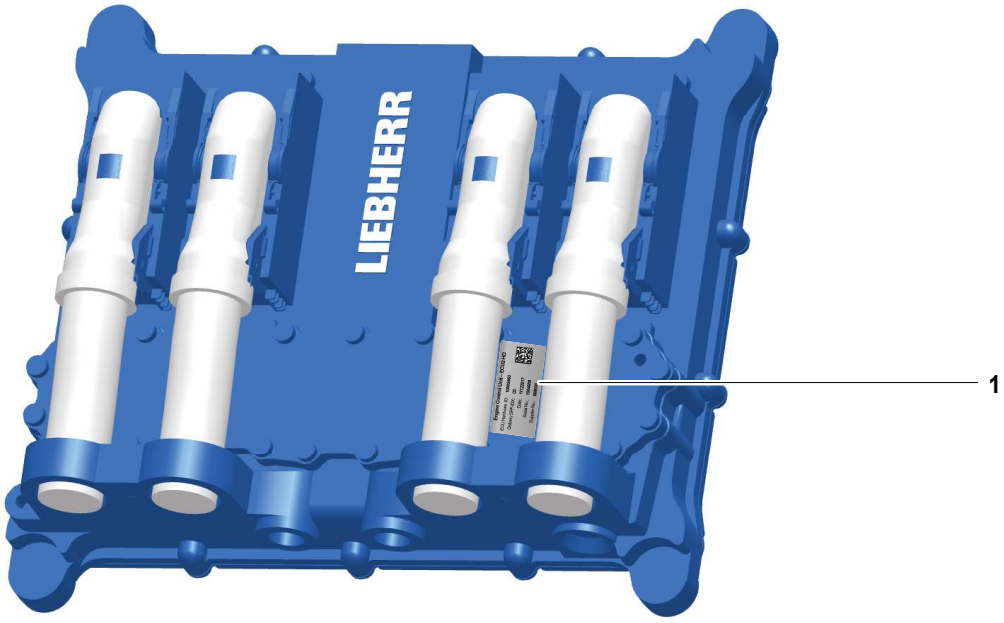

Fig. 10: Type plate on engine control unit

1 Type plate on engine control unit

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Safety helmet
– Protection against
  • Falling or flying object
  • Bumping your head

Wear a safety helmet in the immediate vicinity of the engine.

Safety shoes
– Foot protection against
  • Falling objects
  • Pinching of the foot in heavy parts
  • Against slipping

Wear safety shoes in the immediate vicinity of the engine.

Safety gloves
– Protection against hot elements and chemicals

  Wear safety gloves when working with hot parts, for example,
  • shrinking the gear ring onto the flywheel.
  • Working with operating fluids (See manufacturer's specifications for the operating fluids and safety data sheet for the operating fluid.)

Safety goggles
– Protection against:
  • Flying fragments
  • Chemical splashes
– Wear safety goggles when:
  • Handling operating fluids (See manufacturer's specifications for the operating fluids and safety data sheet for the operating fluid.)
  • Wear during mechanical interventions, for example, using compressed air.

Hearing protection
– Protection against noise

Wear hearing protection around the diesel engine when it is running.

2.8 Operating areas and maintenance areas

2.8.1 Safety instructions

Trapping points and mechanical parts flying around when the engine is ready for operation or in operation

Serious injuries and risk of death:
– Keep away from the operational engine.
– Wear personal protective equipment.
– Technicians may reside in safety zone “A” for measurement purposes, if nothing else has been stated by the device manufacturer.

Hot parts when the engine is ready for operation or in operation.

Risk of burns:
– Keep away from the operational engine.
– Wear personal protective equipment.

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3.3.2 Transport device

Wood transport device

DANGER
Instability during transport!
Leads to death or serious injuries.

- ▶ Only use the original transport device.
- ▶ Secure the transport device, including the mounted engine, against slipping and falling down.
- ▶ Make sure that the transport device is in technically perfect condition.
- ▶ Secure the transport device against slipping and falling down in all directions.
- ▶ Observe the center of gravity.
- ▶ Bolt the engine securely to the transport device.

Fig. 32: Wood transport device

- ▶ Only transport the engine using the transport device.

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If the engine does not start with the second attempt:
▶ Wait at least five minutes until the next attempt.

▶ Start engine.

If the engine does not start with the third attempt:
▶ Determine cause and rectify. (For more information see: 6.1 Faults - Cause - Remedy, page 119.)

▶ Check oil pressure gauge immediately after starting the engine.

If no oil pressure is built up within 5 seconds:
▶ Turn off engine immediately.

▶ Determine cause and rectify. (For more information see: 6.1 Faults - Cause - Remedy, page 119.)

NOTICE
Impermissible loading of the engine in cold condition!
Damage to engine.

▶ Let the engine warm up until the operating temperature is reached.

If the engine start was successful:
▶ Warm up the engine.
  ▷ Coolant temperature >60 °C

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Checking the alternator belt drive

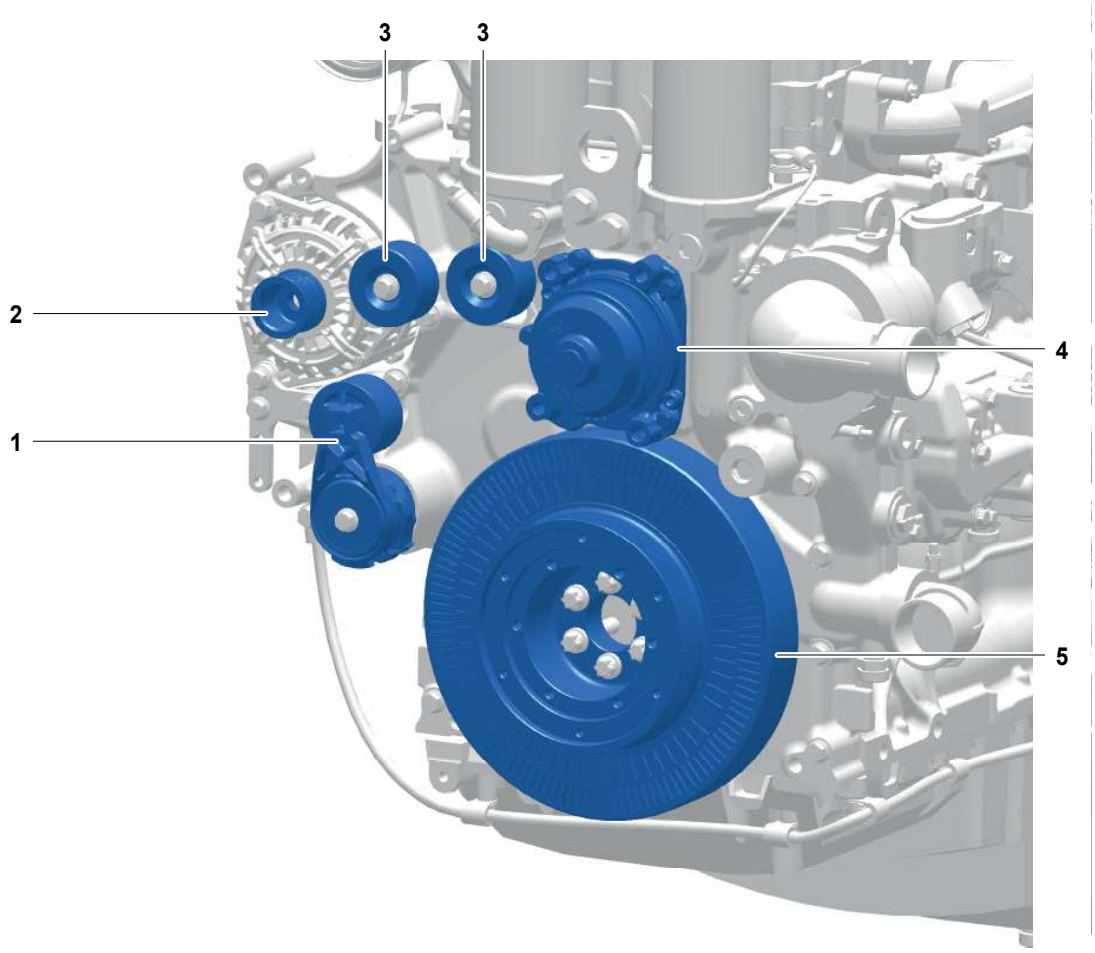

Fig. 39: Checking the alternator belt drive

1 Tension pulley (self-tensioning)
2 Alternator belt pulley
3 Deflection pulley
4 Coolant pump
5 Belt pulley on the crankshaft

▶ Check components for damage.

If components are damaged:
▶ Do not start engine.

▶ Replace defective components, see repair instruction.

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5.4.2 Checking the engine oil level

CAUTION
When opening the lines of the engine oil system, possible lubricant contact with the environment, eyes, mouth or skin.
Damage to health and environmental damage possible.

- ▶ Wear chemical safety gloves, chemical safety goggles, chemical work clothing and chemical safety shoes.
- ▶ Make sure that no lubricants get into the environment.
- ▶ Observe national and international guidelines for disposal.

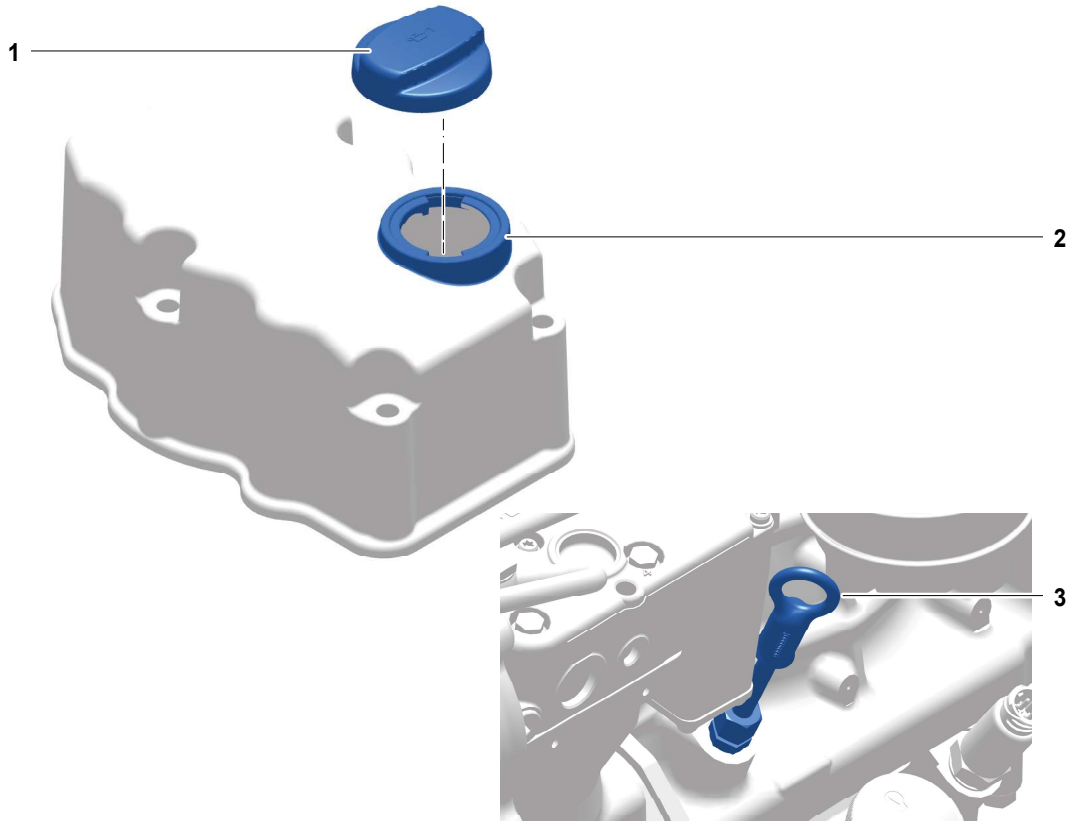

Fig. 49: Checking the engine oil level

1 Oil filler neck cover
2 Oil filler neck
3 Oil dipstick

- ▶ Start the engine.
- ▶ Bring engine to operating temperature 80 ±2 °C.
- ▶ Turn off the engine.
- ▶ Wait 5 minutes.
- ▶ Pull out the oil dipstick **3**.
- ▶ Wipe engine oil off of oil dipstick **3** with a clean cloth.
- ▶ Insert oil dipstick **3**.

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5.5 Cylinder head

5.5.1 Checking and setting the valve clearance

Removing the cylinder head cover

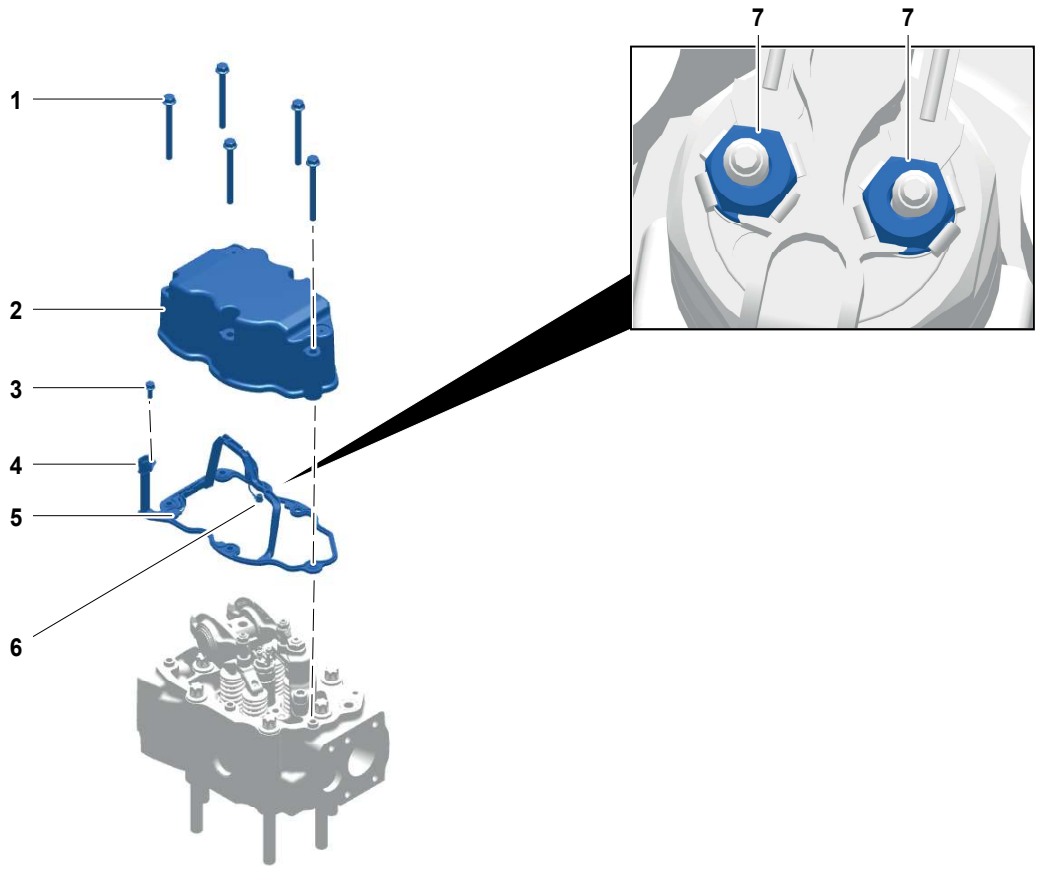

Fig. 62: Cylinder head cover

1 External hex bolt (5x)
2 Cylinder head cover
3 External hex bolt
4 Electrical plug connection
5 Cylinder head cover seal
6 Electrical connection for the injector
7 M4 hex nut

▶ Disconnect the electrical line from the electrical plug connection **4**.

▶ Unscrew the external hex bolt **3**.

▶ Unscrew the external hex bolts **1**.

▶ Remove the cylinder head cover **2**.

▶ Release the hex nuts **7**.

▶ Remove the seal **5**.

▶ Repeat the process for all cylinder head covers.

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Removing the turning device from the crankshaft

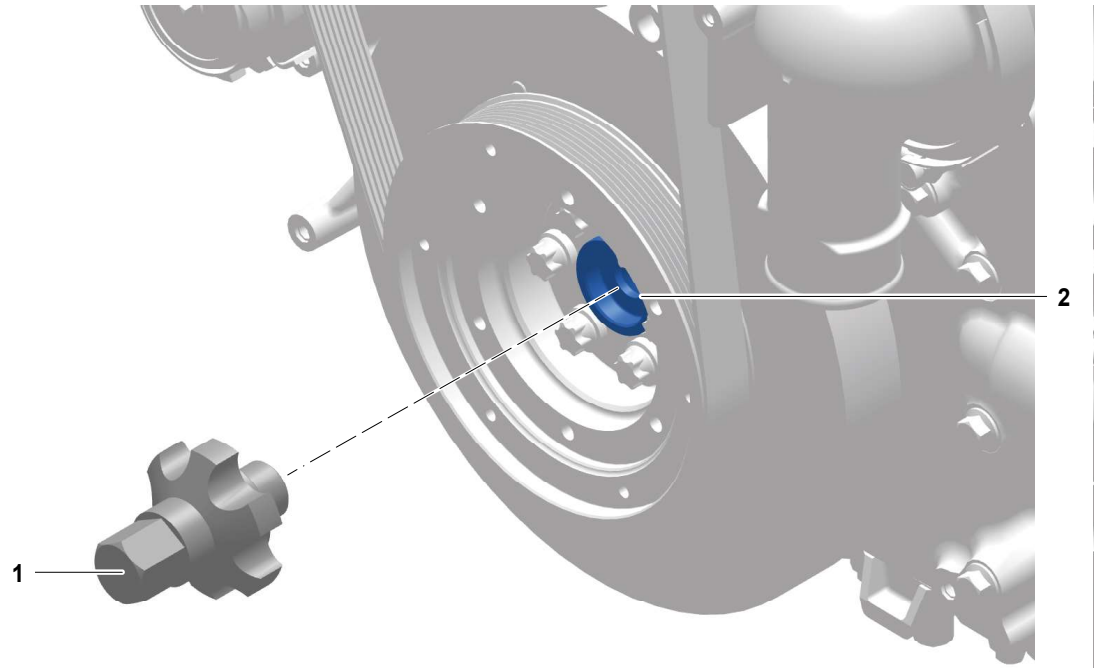

Fig. 72: Removing the turning device from the crankshaft

1 Turning device **2** Crankshaft

▶ Remove turning device **1** from crankshaft **2**.

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5.7 Fuel system

5.7.1 Checking the fuel system for leaks and damage

WARNING
When the diesel engine is running, the fuel lines are constantly under a fuel pressure of up to 2400 bar
Escaping liquids can penetrate the skin and will lead to injuries.

- ▶ Only work on the fuel and injection system when the diesel engine is turned off.
- ▶ Reduce pressure to below 20 bar with diagnostics software.
- ▶ Check the residual pressure with diagnostics software.
- ▶ Wear suitable protective equipment when working on the fuel and injection system.
- ▶ Do not open any fuel connections that are under pressure.
- ▶ Do not remove any fuel lines and hoses that are under pressure.
- ▶ Protect hands, face and body against escaping liquids when searching for leaks on lines and hoses that are under pressure.
- ▶ Screw connections on the injection system tight with the prescribed tightening torques.

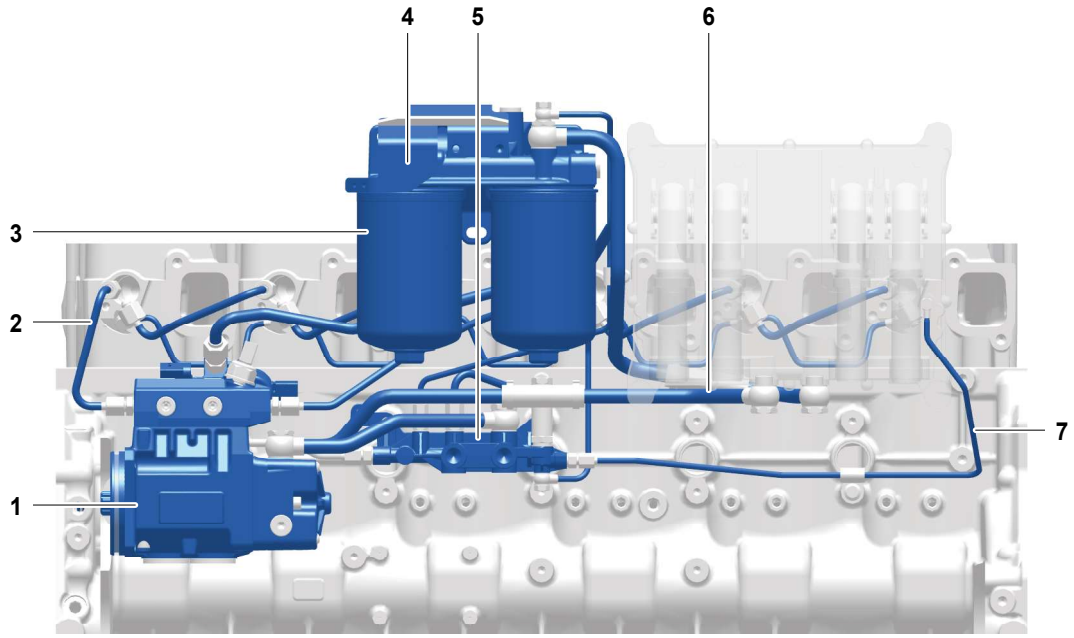

Fig. 82: Components

1 Fuel high pressure pump
2 Injection lines
3 Fuel fine filter
4 Fuel fine filter console
5 Distributor block
6 Fuel pre-feed pump fuel line - engine control unit
7 Fuel return line

- ▶ Check components for damage.
- ▶ Check components for proper fastening.

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Checking the heating flange for sooting

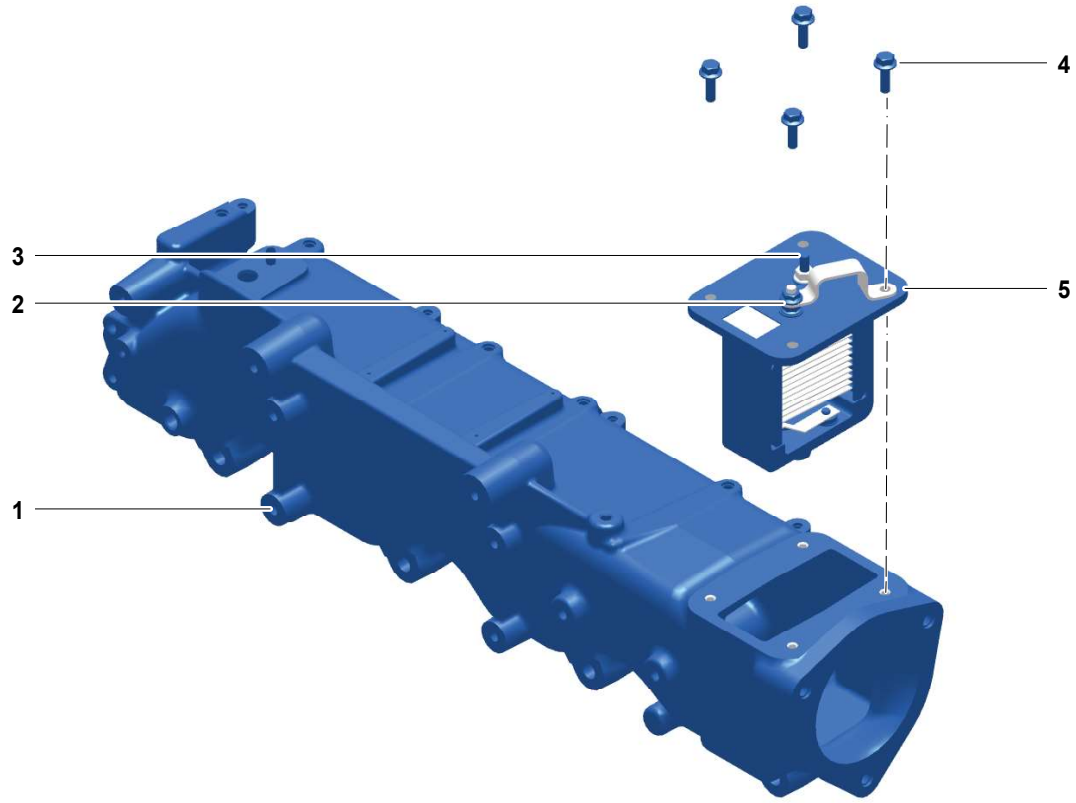

Fig. 90: Checking the heating flange for sooting

1 Air intake pipe (example)
2 Ground
3 Positive pole
4 External hex bolt
5 Heating flange

▶ Disconnect the electrical connection cable from the positive pole **3**.

▶ Unscrew external hex bolt **4**.

▶ Remove heating flange **5**.

NOTICE
Undiscovered damage on the exhaust gas turbocharger!
Oil residues in the exhaust gas recycling pipe or connection line.

▶ Check the exhaust gas turbocharger for oil loss.

▶ Check heating flange **5** for sooting.

▶ Check the air intake pipe **1** for sooting.

▶ Check the air intake pipe **1** for oil residues.

If the heating flange is sooted:

▶ Clean the heating flange with brake cleaner.

▶ Remove brake cleaner residues from the heating flange.

▶ Install heating flange.

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Malfunction / error	Cause	Remedy
Engine turns off inadvertently.	Leak or too low pressure in the fuel low pressure circuit	▶ Perform leak test (visual inspection). ▶ Have checked by Liebherr customer service.
Engine turns off inadvertently.	Fault of the electronics	▶ Contact Liebherr customer service.
Engine turns off inadvertently.	Fuel supply not ensured	▶ Check fuel system.
Power reduction of the engine	Fuel system defective	▶ Perform visual inspection. ▶ Replace filter.
Power reduction of the engine	Charging pressure too low	▶ Check clamps, seals, hoses and air filter.
Power reduction of the engine	Charge air temperature too high	▶ Check charge air cooler, fan and ambient temperature.
Power reduction of the engine	Coolant temperature too high	▶ Check cooler for contamination. ▶ Check fan. ▶ Check thermostat. ▶ Check coolant level.
Power reduction of the engine	Fuel temperature too high	▶ Contact Liebherr customer service.
Power reduction of the engine	Oxygen content of the air too low since application > 1800 m above sea level	No defect, engine power automatically reduced.
Power reduction of the engine	Injectors stick or do not spray.	▶ Contact Liebherr customer service.
Power reduction of the engine	Engine compression too low	▶ Contact Liebherr customer service.
Power reduction of the engine	Fault of the electronics	▶ Read error memory of the engine control unit.
Power reduction of the engine	Exhaust aftertreatment system clogged	▶ Contact Liebherr customer service.
Power reduction of the engine	For engines without hydraulic tappets: Valve clearance not set correctly. For engines with hydraulic tappets: Hydraulic tappet defective.	▶ For engines without hydraulic tappets: Check valve clearance. If necessary, set valve clearance. For engines with hydraulic tappets: Contact Liebherr customer service.
Power reduction of the engine	Too little reducing agent in reducing agent tank	▶ Fill up reducing agent.
Insufficient engine brake power	Engine brake flap without function	▶ Check engine brake flap for function and damage. ▶ Contact Liebherr customer service.
Insufficient engine brake power	Fault of the electronics	▶ Contact Liebherr customer service.

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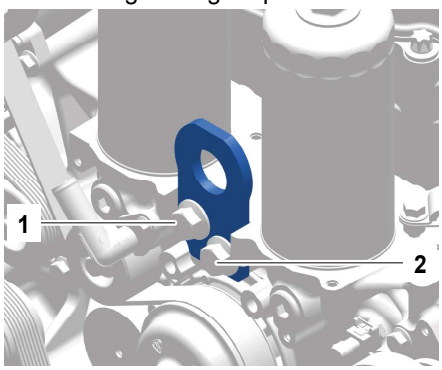
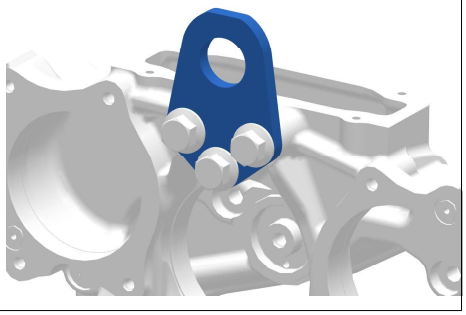
Tightening instruction for M16x50 8.8 FLZN hex bolt		
Lubricant	-	Tightening sequence 
Locking agent	-	
Part contact surfaces	-	
Screws	Reusable	
Stage	**Tightening torque**	
1.	Standard torque	

Tab. 38: Tightening instruction

Tightening instruction for M16x35 10.9 FLZN hex bolt		
Lubricant	-	
Locking agent	-	
Part contact surfaces	-	
Screws	Reusable	
Stage	**Tightening torque**	
1.	Standard torque	

Tab. 39: Tightening instruction

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