

Document Title: <b>Engine, description (Deutz D6D EOE2)</b>	Function Group: <b>200</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
Profile: <b>EXC, EW145B [GB]</b>			

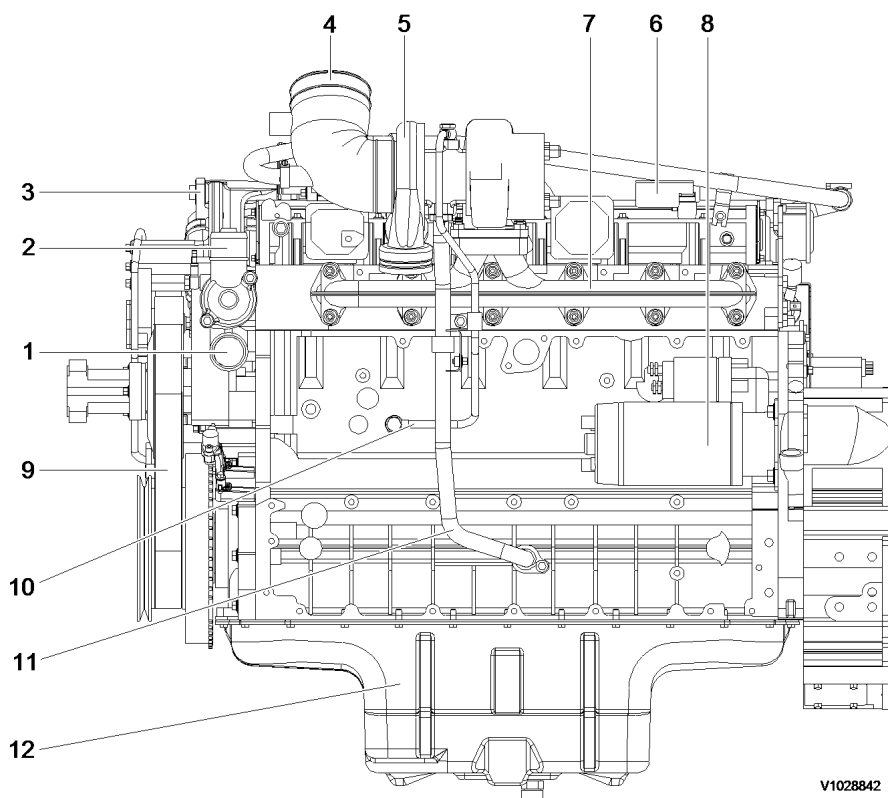
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## Engine, description (Deutz D6D EOE2)

The engine is a 6-cylinder, 4-stroke, direct injected, turbocharged, aftercooled with a cast iron block and cylinder head. Gears in the engine gear case are hardened helical type for strength and reduced noise, arranged to provide quiet, smooth transmission of power.

The cylinder block and head are designed with internal passages forming galleries for both lubricating oil and coolant. The fan belt is a poly type V-belt for improved performance and an auto tension adjuster maintains belt tension.

### Starter side view

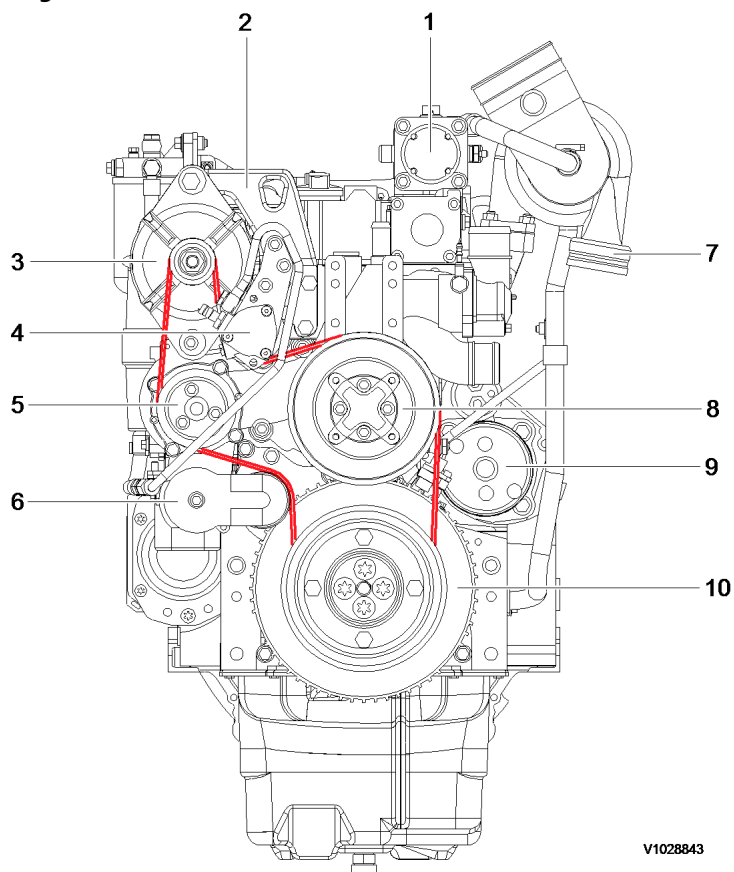


**Figure 1**  
**Engine, starter side view**

1. Coolant inlet (from radiator)
2. Coolant outlet (to radiator)
3. Coolant make up port
4. Air inlet (from air cleaner)
5. Turbocharger
6. Intake manifold
7. Exhaust manifold
8. Starter
9. Poly-V belt
10. Lube oil pipe (supply)
11. Lube oil pipe (return)

12. Engine oil pan

**Engine, front side view**



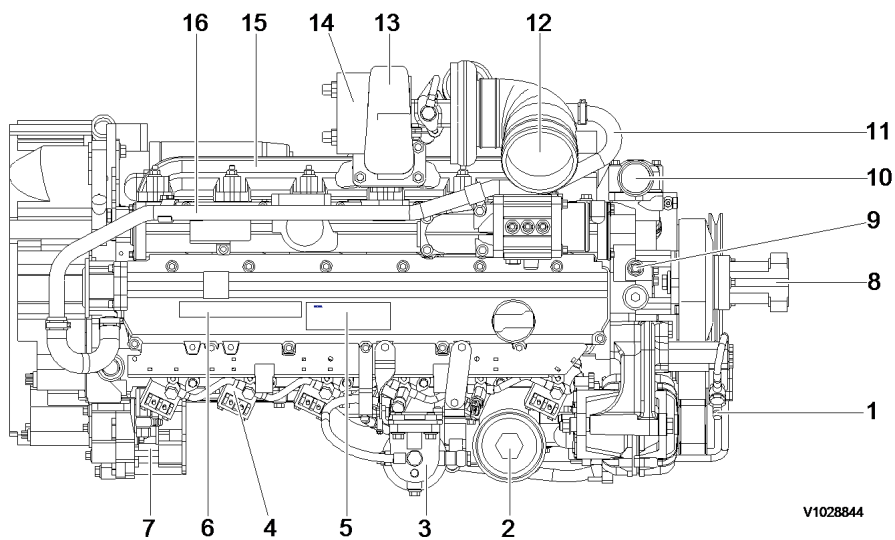
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**Figure 2**

**Engine, front side view**

1. Air inlet (from charge air cooler)
2. Lifting eye (front)
3. Alternator
4. Fuel feed pump
5. Coolant pump
6. Belt tension
7. Air outlet (to charge air cooler)
8. Fan drive pulley
9. Air conditioner compressor pulley
10. Pulley with vibration damper

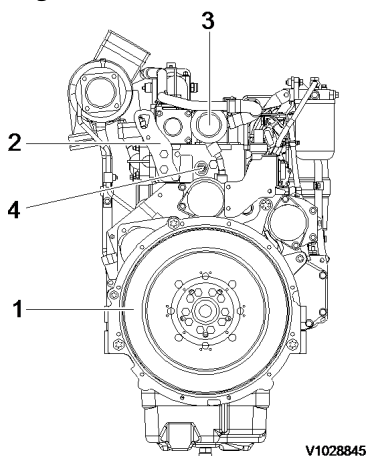
**Engine, top side view**



**Figure 3**  
**Engine, top side view**

1	Fuel suction port	9	Coolant make up port
2	Engine oil filter	10	Coolant outlet (to radiator)
3	Fuel filter	11	Blowby gas pipe
4	Unit injection pump	12	Air inlet (from air cleaner)
5	Emission label	13	Turbocharger
6	Engine name plate	14	Exhaust gas outlet
7	Power take off device	15	Exhaust manifold
8	Fan drive	16	Intake manifold

**Engine, rear side view**



**Figure 4**  
**Engine, rear side view**

1. Flywheel
2. Lifting eye (rear)
3. Crankcase breather
4. Coolant temperature sensor port

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## Engine, description

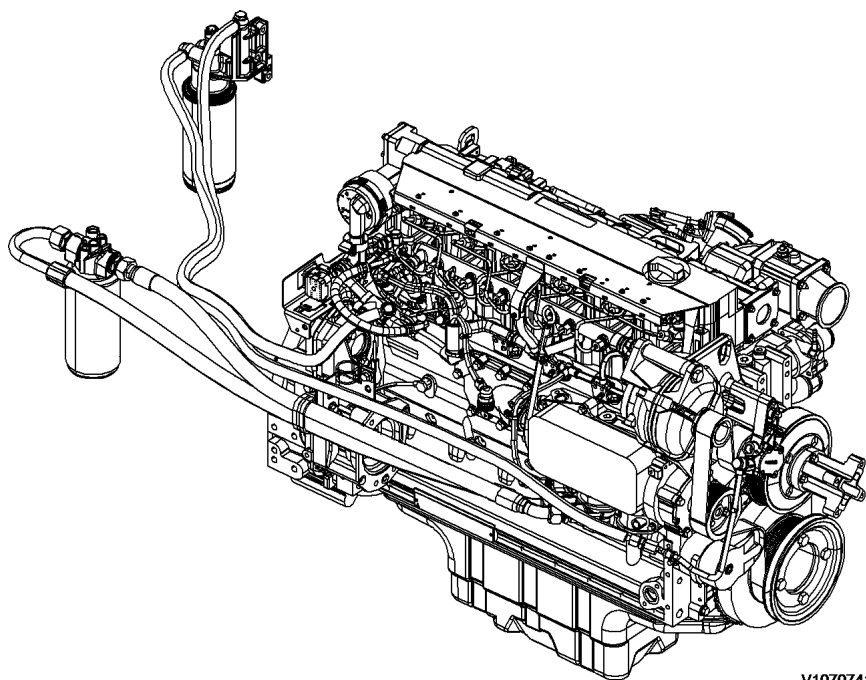
### D6E - tier 3 compliant

The D6E configuration is a four stroke, straight six cylinder, turbocharged, direct injected diesel engine with charge air cooling and wet, replaceable cylinder liners.

The D6E engine uses a Common Rail Fuel System controlled by the engine electronic control (E-ECU) software.

Electronically controlled IEGR (Internal Exhaust Gas Recirculation) reduces NO<sub>x</sub> formation and lowers emissions without the need for exhaust after treatment. Volvo's latest engine management system, E-ECU is used to control all engine electronic functions.

The cylinders are numbered consecutively beginning at the flywheel end. Engine rotational direction is counterclockwise as seen from the flywheel end.



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**Figure 1**  
**Engine, D6E**

Document Title: <b>Engine, tightening torques</b>	Function Group: <b>200</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Engine, tightening torques

### NOTICE

Regarding bolted joints which are not listed here, see “Volvo standard tightening torques”

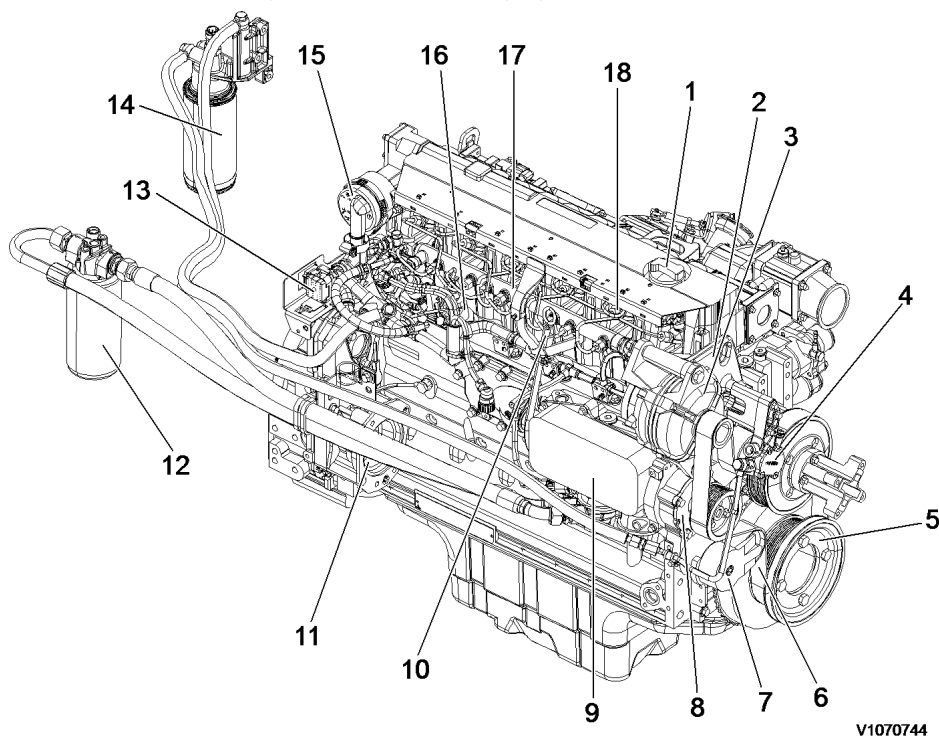
Engine, tightening torque	
Rocker arm bracket on cylinder head	30 Nm (22.2 lbf ft)
Cylinder head cover (M6) on cylinder head	13 Nm (9.6 lbf ft)
Exhaust return module on cylinder head	Step 1: 10 Nm (7.4 lbf ft) Step 2: 30 Nm (22.2 lbf ft)
Lock nut, valve adjusting screw	20 ±2 Nm (14.8 ±1.5 lbf ft)
Locking screw on cylinder head	34 Nm (25.2 lbf ft)
Solenoid valve on cylinder head	24 Nm (17.8 lbf ft)
Front cover on crankcase	Step 1: 3 Nm (2.2 lbf ft) Step 2: 21 Nm (15.5 lbf ft)
Drain plug on oil pan, M18	55 Nm (40.7 lbf ft)
Crankcase ventilation on cylinder head	21 Nm (15.5 lbf ft)
Return line to return stop valve	30 Nm (22.2 lbf ft)
Return stop valve to crankcase	80 Nm (59.2 lbf ft)
Impulse transmitter (crankshaft) on holder on front cover	9 Nm (6.7 lbf ft)
Impulse transmitter (camshaft) on gearcase	9 Nm (6.7 lbf ft)
Turbocharger on exhaust manifold	42 Nm (31.1 lbf ft)
Clamping shoe injector on cylinder head	16 Nm (11.8 lbf ft)
Injection lines on rail and injector, high pressure line on high-pressure pump	25 Nm (18.5 lbf ft)
Fuel supply pump on holder	22 Nm (16.3 lbf ft)
Holder fuel supply pump on holder	30 Nm (22.2 lbf ft)
V-belt pulley on fuel supply pump	27 Nm (20.0 lbf ft)
High pressure pump on crankcase, M10	Step 1: 10 Nm (7.4 lbf ft) Step 2: 50 Nm (37.0 lbf ft)
Fuel control valve	30 Nm (22.2 lbf ft)
Fuel pipe on high pressure pump	29 Nm (21.5 lbf ft)
Fuel pipe on control block	39 Nm (28.9 lbf ft)
Rail on cylinder head	30 Nm (22.2 lbf ft)
Pressure relief valve on rail	100 Nm (74.0 lbf ft)
Rail pressure sensor on rail	70 Nm (51.8 lbf ft)
Pipe clips, fuel line fastening	30 Nm (22.2 lbf ft)
Fuel line on control block, fuel filter console and rail	39 Nm (28.9 lbf ft)
Fuel pipe (return) on control block	49 Nm (36.3 lbf ft)
Fuel pipe (return) on cylinder head	29 Nm (21.5 lbf ft)
Fuel line on fuel filter8	39 Nm (28.9 lbf ft)
Fuel filter console/radiator tank on crankcase	30 Nm (22.2 lbf ft)

Fuel pressure sensor on fuel filter console	30 Nm (22.2 lbf ft)
Cover plate on cylinder cover, M6	30 Nm (22.2 lbf ft)

Document Title: <b>Component locations</b>	Function Group: <b>200</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Component locations

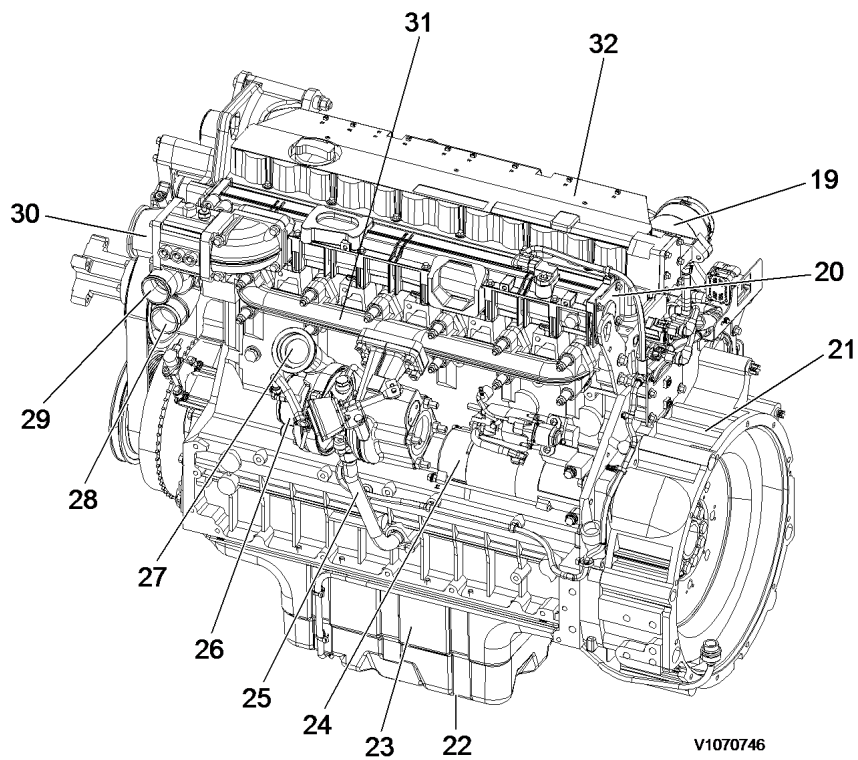
Component position, engine D6E. The following figures show the position of a number of components on engine D6E.



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**Figure 1**  
**Component locations, front side**

1	Engine oil filler	10	Oil dipstick
2	Transport eye	11	Power take off
3	Alternator	12	Engine oil filter
4	Fuel feed pump	13	Connection to E-ECU
5	V-rib belt drive on crankshaft	14	Fuel filter
6	V-rib belt	15	Crankcase bleeding valve
7	Automatic belt tensioner	16	High pressure fuel pump
8	Coolant pump	17	Common rail
9	Engine oil cooler	18	Injector



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**Figure 2**  
**Component locations, flywheel side**

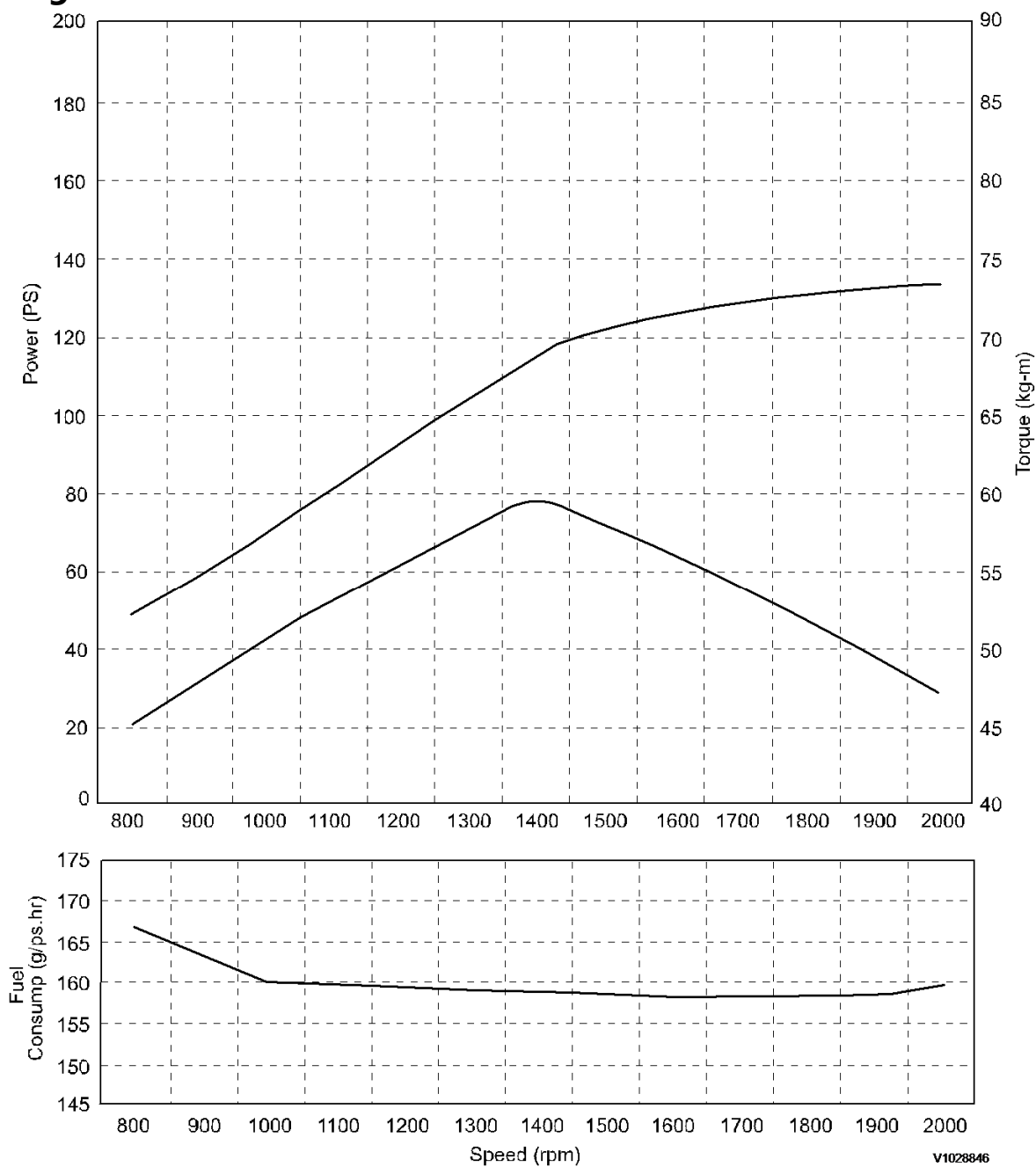
19	Crankcase bleeding valve	26	Turbocharger
20	Charge air manifold	27	Air outlet (to charge air cooler)Coolant inlet
21	Flywheel housing	28	Coolant inlet
22	Drain plug	29	Coolant outlet
23	Oil pan	30	Air inlet (from charge air cooler)
24	Starter motor	31	Exhaust manifold
25	Oil return line from turbocharger	32	Cylinder rocker arm cover



Document Title: <b>Engine characteristic curve</b>	Function Group: <b>210</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Engine characteristic curve

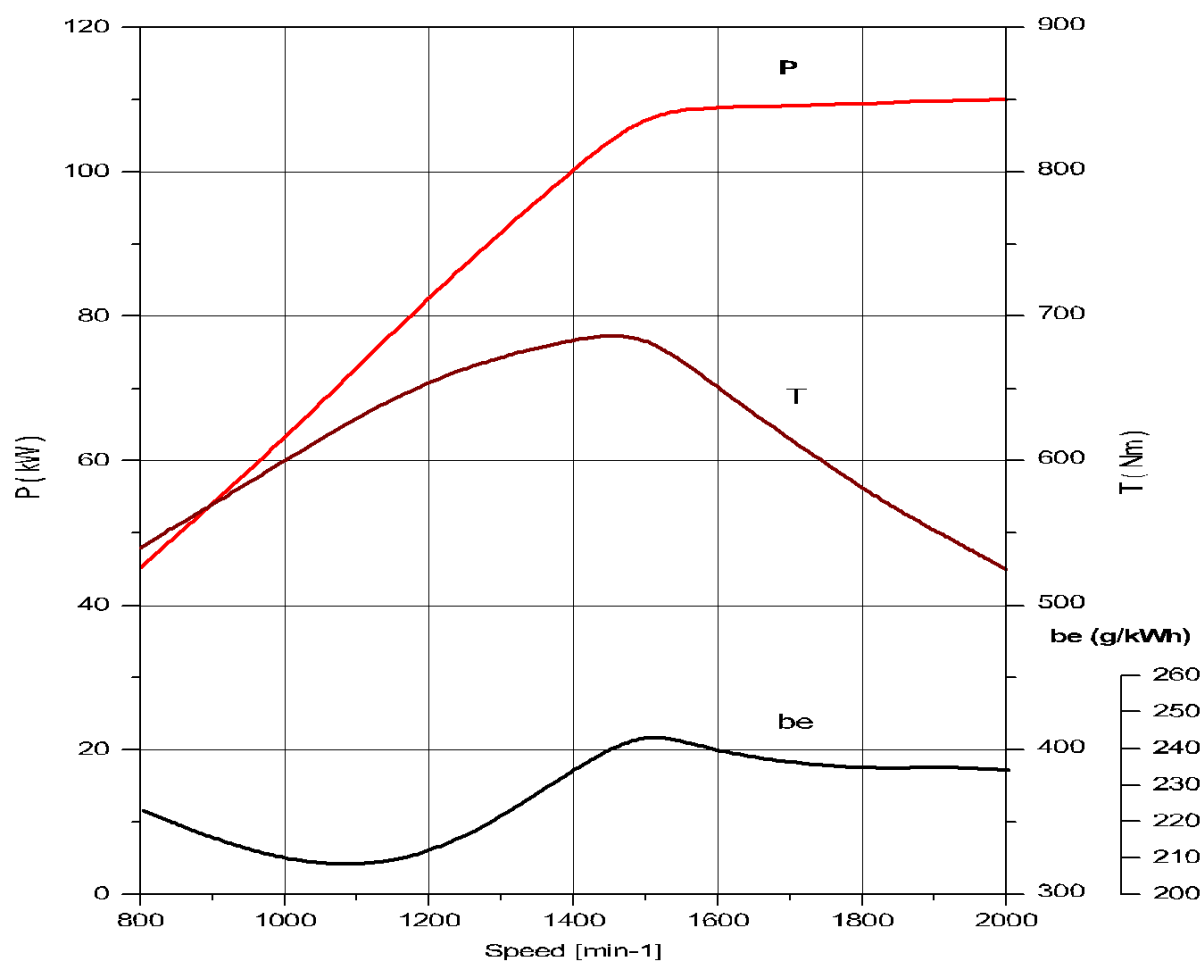


**Figure 1**  
**Engine, performance curve (power according to ISO 14396)**

Document Title: <b>Engine characteristic curve</b>	Function Group: <b>210</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Engine characteristic curve



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**Figure 1**  
Engine, performance curve (power according to ISO 14396)

Document Title: <b>Basic check, Engine</b>	Function Group: <b>210</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Basic check, Engine

### Purpose of the basic check



**Certain tests and checks are performed with unlocked control lockout lever. Make sure that the machine cannot operate unexpectedly when the control lockout lever is unlocked.**

The purpose of the basic check is to provide fast and accurate information about the general condition of the engine.

The basic check should be performed and evaluated according to instructions in the PC-tool VCADS Pro.

### Tests included in the basic check

The basic check which is divided into the following tests should be performed after **reading out error codes and checking parameters**.

#### Tests:

1. **Cylinder compression, test**  
The purpose of the test is to show if any cylinder has a deviating compression pressure. The test replaces the old pressure check method but does not give any absolute values.
2. **Cylinder balancing, test**  
The purpose of the test is to show if there is any deviation in the fuel injection to a cylinder.
3. **Feed pressure, test**  
The purpose of the test is to check that the feed pressure is as per specification.
4. **Sensor, test**  
The purpose of the test is to check the function of all sensors.

Document Title: <b>Cylinder head, description</b>	Function Group: <b>211</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Cylinder head, description

The cylinder head of the D6D engine is made of grey cast iron and designed as block type head. The combustion air enters vertically and the exhaust air is discharged laterally. Inlet and outlet are located on one side of the cylinder head.

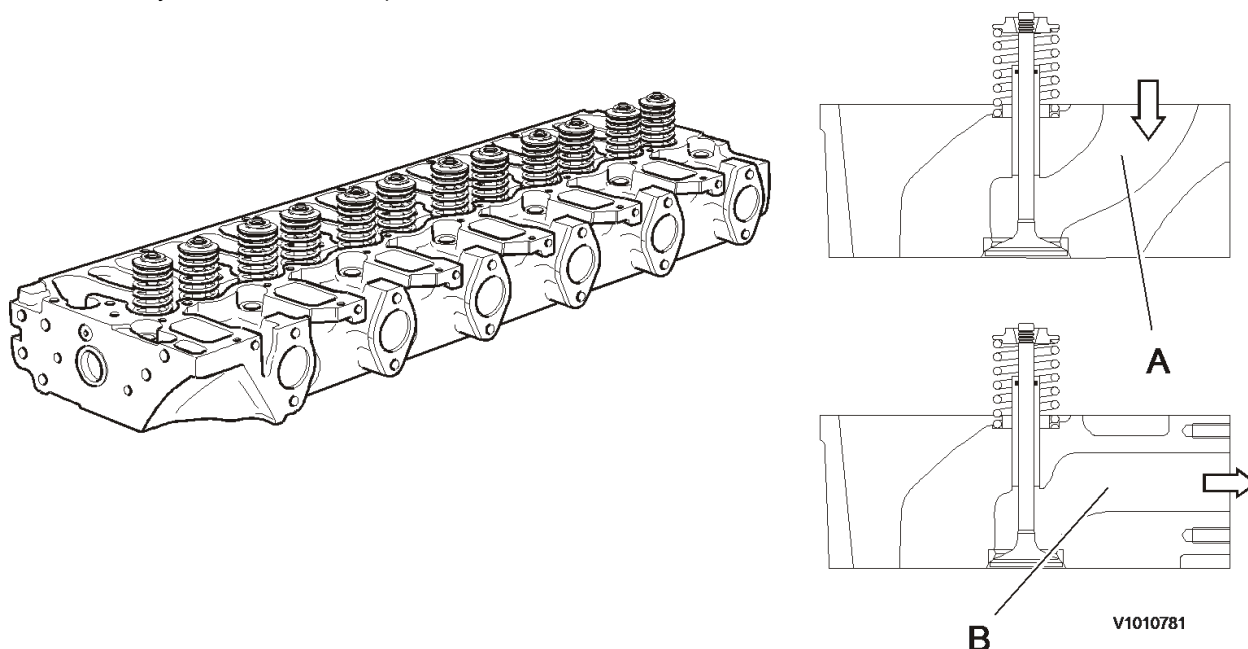
Document Title: <b>Cylinder head, description</b>	Function Group: <b>211</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
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## Cylinder head, description

The cylinder head is made of grey cast iron and is common for all cylinders. The induction air enters vertically (A) and the exhausts leave horizontally (B). Inlets and exhaust outlets are located on the same side of the cylinder block. Inlet and exhaust valve size is increased to optimize the gas exchange and combustion process. Valve guides are replaceable. Coolant flow in the cylinder head is modified to accommodate an outlet controlled cooling system.

On order for the engine to fulfill governing emission standards, there are 3 cylinder head gaskets of different thicknesses between the cylinder head and the piston.



**Figure 1**

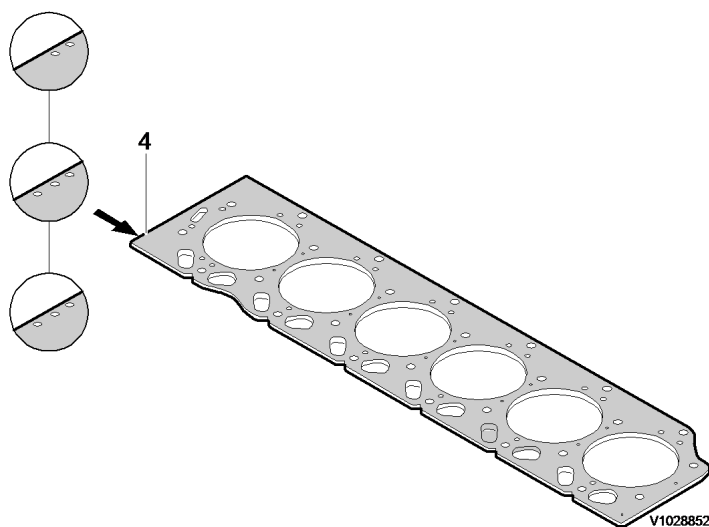
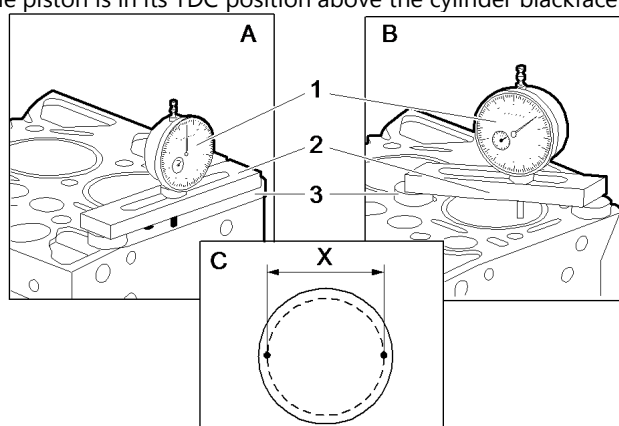
Document Title: <b>Determining cylinder head gasket</b>	Function Group: <b>211</b>	Information Type: <b>Service Information</b>	Date: <b>2014/4/27</b>
Profile: <b>EXC, EW145B [GB]</b>			

## Determining cylinder head gasket

- The thickness of the cylinder head gasket is responsible for the correct piston crown clearance of the engine. The piston crown clearance (0.65 mm) essentially influences the combustion and thus:
  - Power
  - Fuel consumption
  - Exhaust emission
- The piston crown clearance is adjusted by determining the piston projection and the thickness of the cylinder head gasket.

### Measuring piston projection

- A dial gauge with a fixture is needed to measure the piston projection.
- The piston is in its TDC position above the cylinder blackface.



**Figure 1**  
**Piston projection, measurement**



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