

Document Title: Checking function, engine	Function Group: 210	Information Type: Service Information	Date: 2014/4/15
Profile:			

Checking function, engine

Op nbr

Testing for possible causes

1. **First check:**

- ☐ Fluid levels
- ☐ Control/warning lamps
- ☐ Instruments
- ☐ Battery voltage
- ☐ Fuses (correct rating)

2. **Separate systems:**

- ☐ If two or more systems, and/or circuits work together.
Check the systems/circuits individually.

3. **If the pulling power of the machine is poor, the fault may be in the engine or the transmission:**

- ☐ Then check the stalling speed, see specifications.
- ☐ If the engine stalling speed is within the prescribed values, the fault can be found in the transmission.
- ☐ If the engine stalling speed is low, check according to point below.

4. **Checking engine:**

- ☐ Check oil and coolant, discoloration, smell etc.
- ☐ Check exhaust pipe (sticky inside)
- ☐ Check air filter and turbo.
- ☐ If the engine runs unevenly (imbalance-noise).
- ☐ Check for overpressure in header tank.
- ☐ Crankcase breather (overpressure-clogged).
- ☐ Oil dipstick, remove (overpressure).
- ☐ Exhaust smoke (colour-impurities, smell).
- ☐ Bleed the fuel system.
- ☐ Slightly loosen the delivery pipes[1] ⓘ from the injectors (one at a time with the engine running).
- ☐ Check speed.
- ☐ Check feed pressure (before and after filter).
- ☐ Make a compression test (repeat with oil if incorrect).
- ☐ Check injectors.
- ☐ Check injection timing.

[1] This check must not be carried out on low-emission engines, as the fuel injection pressure in these engines is very high.

Document Title: Description	Function Group: 210	Information Type: Service Information	Date: 2014/4/15
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Description

Loader l150 is provided with a td102 type engine and loader l180 with a td122 type engine.

In both cases the engines are straight, six-cylinder, turbocharged, four-stroke direct-injection diesel engines.

Both engine types are available in a low-emission version.

The output and torque curves for the respective engines are shown in [Figure 1](#) and [Figure 2](#).

[Figure 3](#) and [Figure 4](#) show the torque curve for the low-emission engine in relation to a standard engine.

The engine type designation, part and serial numbers are stamped on the left side of the cylinder block. For repair work on the engine, please refer to the separate service manual, see the foreword.

Volvo bm l150

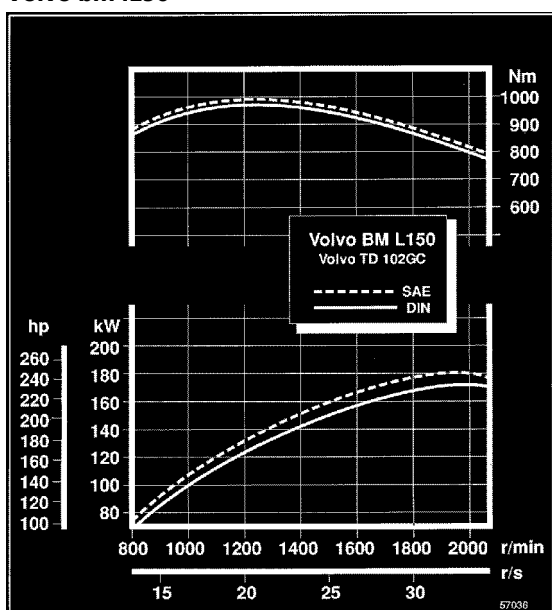


Figure 1

Output and torque curves, td102

Volvo bm l180

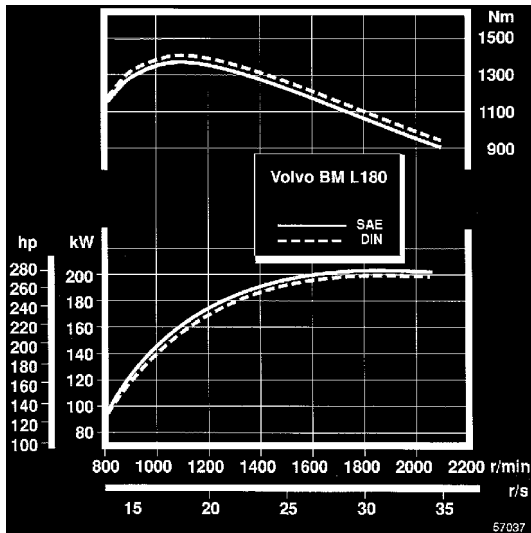


Figure 2
Output and torque curves, td122

Additional or new parts for low-emission engine

	L150	L180
Engine designation	TD102KCE	TD122KHE
Pistons	New	New
Camshaft	= Std.	Std.
Cylinder head	Std.	Std.
Turbo	Std.	Std.
Intercooler	T	T
Additional coolant pump	T Built-in	T Built-in
Injection pump	New	New
camshaft	New	NEW
pump element	New	New
cold-starting groove [1] ①	No	No
idling change-over	–	–
delivery valve	New	New
torque control	–	New
Delivery pipes	Std.	New
Injectors	Std.	New
Injection timing	New	New

Explanations:

- Std. Component which is included in the standard engine
- New New component as compared with the standard engine
- T Additional component as compared with the standard engine

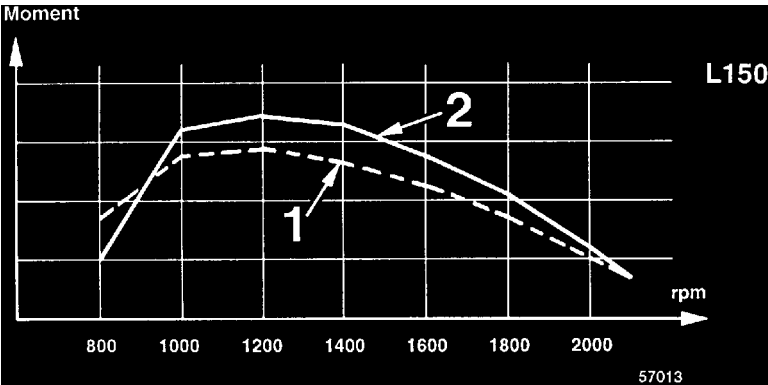


Figure 3

1	Torque curve standard engine L150
2	Torque curve, low-emission engine

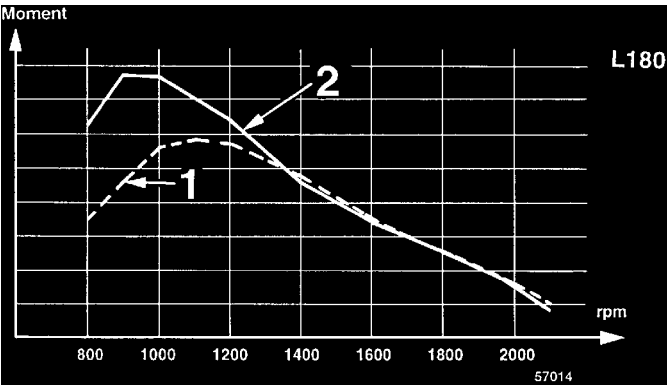


Figure 4

1	Torque curve, standard engine L180
2	Torque curve, low-emission engine

Standard L150	Low-emission L150	Standard L180	Low-emission L180
Output kW at rpm 2100	Output kW at rpm 2100	Output kW at rpm 2100	Output kW at rpm 2100
Torque N m at rpm 1200	Torque N m at rpm 1100	Torque N m at rpm 1100	Torque N m at rpm 900
NOx g/kWh	NOx g/kWh	NOx g/kWh	NOx g/kWh
HC g/kWh	HC g/kWh	HC g/kWh	HC g/kWh
CO g/kWh	CO g/kWh	CO g/kWh	CO g/kWh
PM g/kWh	PM g/kWh	PM g/kWh	PM g/kWh
NOx g/h	NOx g/h	NOx g/h	NOx g/h
HC g/h	HC g/h	HC g/h	HC g/h
CO g/h	CO g/h	CO g/h	CO g/h
PM g/h	PM g/h	PM g/h	PM g/h

Figure 5
Emission values according to ece r49

Standard L150	Low-emission L150	Standard L180	Low-emission L180
Output kW at rpm 2100	Output kW at rpm 2100	Output kW at rpm 2100	Output kW at rpm 2100
Torque N m at rpm 1200	Torque N m at rpm 1100	Torque N m at rpm 1100	Torque N m at rpm 900
NOx g/kWh	NOx g/kWh	NOx g/kWh	NOx g/kWh
HC g/kWh	HC g/kWh	HC g/kWh	HC g/kWh
CO g/kWh	CO g/kWh	CO g/kWh	CO g/kWh
PM g/kWh	PM g/kWh	PM g/kWh	PM g/kWh
NOx g/h	NOx g/h	NOx g/h	NOx g/h
HC g/h	HC g/h	HC g/h	HC g/h
CO g/h	CO g/h	CO g/h	CO g/h
PM g/h	PM g/h	PM g/h	PM g/h

Figure 6
Emission values according to california 8-mode and iso 8178

[1]Omitted as it is not required on the low-emission engine

Document Title: Specifications L150	Function Group: 210	Information Type: Service Information	Date: 2014/4/15
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Specifications L150

Engine, L150

Unless otherwise stated, the following data apply to all three versions of the engine i.e. The basic, the low-emission and the high-altitude versions.

General

Type designation

basic version and high-altitude version	TD102GC Engine no. 497294
low-emission version	TD102KCE Engine no. 497296

Flywheel output at 35 r/s (2100 rpm)

basic and high-altitude version	170 kW (231 hp) SAE J 1349 Net 170 kW (231 hp) DIN 70020 Net
low-emission version	172 kW (234 hp) SAE J 1349 Net 172 kW (234 hp) DIN 70020 Net

Output gross at 35 r/s (2100 rpm)

basic and high-altitude version	180 kW (246 hp) SAE J 1349 Gross
low-emission version	182 kW (248 hp) SAE J 1349 Net

Torque

basic and high-altitude version	980 N m (723 lbf ft) SAE J 1349 Net
at 20.0 r/s (1200 rpm)	980 N m (723 lbf ft) DIN 70020 Net 1000 N m (738 lbf ft) SAE J 1349 Gross
low-emission version	1010 N m (745 lbf ft) SAE J 1349 Net
at 18.3 r/s (1100 rpm)	1030 N m (760 lbf ft) SAE J 1349 Gross 1010 N m (745 lbf ft) DIN 70020 Net

Number of cylinders	6
Cylinder bore	120.65 mm(4.750 in)
Stroke	140 mm(5.512 in)
Cylinder capacity, total	9.6 litre
Compression ratio, basic version and high-altitude version	15 : 1
low-emission version	16 : 1
Compression pressure at starter motor revolutions	2.6 MPa (26 bar) (377 psi)
Order of injection	–5–3–6–2 –

Idling speed, low	10.8 ±0.5 r/s (650 ±50 rpm) (823 ±63 Hz)
high	37.9±1.0 r/s (2275 ±60 rpm) (2880±75 Hz)
Valve clearance, cool engine, inlet valve	0.40 mm (0.016 in)
exhaust valve	0.70 mm (0.028 in)

Stalling speed, basic and high-altitude versions

torque converter	33.8 ±1.25 r/s (2025 ± 75 rpm) (2560 ± 95 Hz)
torque conv. + work hydr. against overflow)	24.2 ±1.70 r/s (1450 ± 100 rpm) (1835 ±125 Hz)

Stalling speed, low-emission version

torque converter	33.7 ±1.2 r/s (2025 ±75 rpm) (2563 ±95 Hz)
torque conv. + work hydr. against overflow)	25.0 ±1.7 r/s (1500 ±100 rpm) (1899 ±>127 Hz)

Document Title: Specifications L180	Function Group: 210	Information Type: Service Information	Date: 2014/4/15
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Specifications L180

Unless otherwise stated, the following data apply to all three versions of the engine i.e. The basic, the low-emission and the high-altitude versions.

General

Type designation

basic and high-altitude versions	TD122GH Engine no. 499185
low-emission version	TD122KHE Engine no. 499167

Flywheel output at 35.0 r/s (2100 rpm)

basic and high-altitude versions	202 kW (275 hp) SAE J 1349 Net 202 kW (275 hp) DIN 70020 Net
low-emission version	198 kW (269 hp) SAE J 1349 Net 198 kW (269 hp) DIN 70020 Net

Output gross at 35.0 r/s (2100 rpm)

basic and high-altitude versions	211 kW (287 hp) SAE J 1349 Gross
low-emission version	209 kW (284 hp) SAE J 1349 Gross

Torque

basic and high-altitude versions	1380 N m (959 lbf ft) SAE J 1349 Net
at 18.3 r/s (1100 rpm)	1380 N m (1018 lbf ft) DIN 70020 Net 1390 N m (1025 lbf ft) SAE J 1349 Gross
low-emission version	1570 N m (1158 lbf ft) SAE J 1349 Net
at 15 r/s (900 rpm)	1580 N m (1165 lbf ft) SAE J 1349 Gross 1570 N m (1158 lbf ft) DIN 70020 Net

Number of cylinders	6
Cylinder bore	130.17 mm (5.125 in)
Stroke	150 mm (5.906 in)
Cylinder capacity, total	12.0 litre
Compression ratio, basic and high-altitude versions	15 : 1
low-emission version	16 : 1
Compression pressure at starter motor revolutions	2.6 MPa (26 bar) (377 psi)
Order of injection	1 – 5 – 3 – 6 – 2 – 4

Idling speed, low	10.8 ±0.5 r/s (650 ±50 rpm) (823 ±63 Hz)
high	37.9± 1.0 r/s (2275 ±60 rpm) (2880 ±75 Hz)
Valve clearance, cool engine, inlet valve	0.40 mm (0.016 in)
exhaust valve	0.70 mm (0.028 in)
Stalling speed, basic and high-altitude versions	34.2 ±1.25 r/s (2050 ±75 rpm) (2595 ±95 Hz)

torque converter	
torque conv. + lifting against overflow	25.0 ±1.70 r/s (1500±100 rpm) (1899±127 Hz)
torque conv. + tilting against overflow	26.7±1.70 r/s (1600±100 rpm) (2025±127 Hz)

Stalling speed, low-emission version torque converter	34.2±1.25 r/s (2050±75 rpm) (2595±95 Hz)
torque conv. + lifting against overflow	25.0±1.70 r/s(1500±100 rpm) (1899±127 Hz)
torque conv. + tilting against overflow	26.7±1.70 r/s (1600±100 rpm) (1899±127 Hz)

Document Title: Starting engine	Function Group: 210	Information Type: Service Information	Date: 2014/4/15
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Starting engine

Description of function

With the ignition switch sw1 in position 3 the coil in relay re14 receives current via the ignition switch terminal 50.

Relay re14 is activated and starter motor terminal 50 receives current via fuse fu15, relay re14 (30-87) and relay re13 (87a) and the starter motor is activated.

Relay re13, starter lock-out

When the selector control sw2a or any of switches sw43 or sw108 are moved to positions forward or reverse, the coil in relay re11 receives current, see description in section 4.

Relay re11 is activated and the coil in relay re13 receives current.

Relay re13 is activated and the current to the starter motor is interrupted, which prevents the starting of the engine with forward or reverse gear engaged.



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