VOLVO

Volvo Cars of North America, Inc
Rockleigh, New Jersey

Service Bulletin Cars

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2	22	805	July 1996

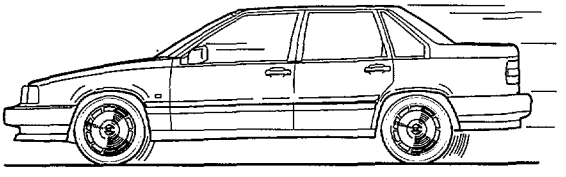
Measuring oil consumption
850

REFERENCE: TP 2101201, SECTION 2 (20-22, 25-26), B5204, B5234, B5252, B5254 ENGINES; 850 1992-

High oil consumption, fault-tracing and corrective action

It is normal for a car engine to use a certain amount of oil when running. Oil consumption can vary considerably depending on a number of factors:

- Condition of the engine - how well it has been maintained.
- Blocked air filter
- Driving conditions - heavy loads or a lot of idling
- Quality and viscosity of oil
- Cylinder volume - larger engines generally use more oil than small ones
- Engine power - a more powerful engine uses more oil than less powerful ones
- Oil level - too high a level (above the max line on the dip stick) results in increased oil consumption.



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Service personnel: Please circulate, read and initial

Service Manager	Parts Manager	Workshop Manager		Workshop Foreman		Service Technicians						

Normal oil consumption

During a breaking-in period of approx. 5,000 km (3,100 miles) for new or reconditioned engines (piston ring replacement), up to 1 litre of oil per 1,000 km (1.70 qt per 1,000 miles) can be consumed.

After the breaking-in period, with a mixture of highway and town driving, up to 0.4 liters per 1,000 km (0.68 qt per 1,000 miles) is considered normal.

The above oil consumption figures can be used as a guide if oil consumption seems abnormally high. In order to determine the exact oil consumption, a controlled test drive of at least 1,000 km (620 miles) has to be carried out. The oil should be weighed before and after the test distance is driven in order to determine the exact oil consumption.

Abnormally high oil consumption

If a customer complains that the oil consumption is abnormally high, a few basic checks should be carried out first before taking further action such as a test drive or carrying out any work on the engine:

- Ask the customer questions about the driving conditions (see "Causes of high oil consumption" on next page).
- Check if there is any oil leakages
- Check that the crankcase ventilation is not blocked
- Check that the dipstick must be pushed all the way in order for the correct oil volume reading to be given.

Causes of high oil consumption:

- **Overfilling.** If the oil is filled to a level above the recommended maximum level, a large amount of oil is thrown up against the cylinder walls and oil is thrown out through the crankcase ventilation. Do not fill the oil level above the MAX line on the dip stick.

- **Oil grade.** If an oil grade other than that recommended by Volvo has been used, this can result in increased oil consumption. If the oil is too thin, it will contain a larger proportion of volatile molecules. It becomes even more difficult for the oil to maintain an unbroken film around the cylinder walls at high temperatures, leading to increased engine wear and consequently increased oil consumption.

- **Hard driving.** Long, continuous driving at high engine revs leads to high oil temperatures, which in turn leads to the oil being thinner and consumption higher. Hard cornering at high engine revs results in the oil being thrown against the side of the cylinder block and against the cylinder walls, leading to increased oil consumption.

The same conditions arise during extended periods of driving at high revs in low gear on level roads (no inclines).

- **Driving in mountainous areas.** Frequent and extended engine braking heats the oil in the engine; it also results in more oil being sucked into the cylinders because of the high partial vacuum in the intake manifold.

- **Idling.** If the car is used in city traffic, getting caught in traffic jams etc., the engine can be running for a number of hours without covering much distance. This does not necessarily affect oil consumption, but the measurement result - quarts of oil/road distance covered - will be misleading.

- **Climate.** In very high temperatures, the engine also runs at a higher temperature, leading to increased oil consumption.

Mechanical causes:

Leaks	Worn crankshaft and crankshaft seal, external leakage, e.g., leaking gaskets, etc.
Crankcase ventilation	Overpressure in the crankcase caused by blocked crankcase ventilation.
Pistons and piston rings	Worn piston ring grooves. Fatigued, worn, scored, broken or scratched piston rings. Fouled oil control rings. Incorrectly installed rings.
Cylinder walls	Worn or scored.
Valves	Worn guides or valve stem. Worn, damaged or valve stem seals missing.
Cylinder head	Internal leakage between oil ducts and leakage into the combustion chamber.

Method measuring oil consumption, 850

This method determines a car's oil consumption. The method entails measuring the oil using the dipstick, before and after the customer drives a controlled distance of **2,000 km (1,200 miles ±100)**. This provides a satisfactory initial indication of oil consumption. In order to achieve as accurate a result as possible, you should drive the car on the road for about 20 minutes (not idling) to warm up the engine before making note of the oil level or draining the oil. To make sure that the oil in the engine during the control period has been approved by Volvo, change the oil and replace the oil filter. Also replace the air filter before performing any measurements.

When measuring/weighing the oil, the car should be on a level surface and in the same place both before and after driving the controlled distance.

Method:

- Change oil, replace oil filter and air filter. The oil must be of a type that is approved by Volvo.
- Drive the car on the road for 20 minutes to warm up the engine, bringing the temperature of the oil up to normal operating temperature.
- Switch off the engine and leave it off for 15 minutes.
- Check the oil level. If necessary, fill up oil if the level is below the minimum line on the dipstick.
- Run the engine for 5 minutes to mix the existing and added oil.
- Leave the engine off for 15 minutes and **then take a note of the oil level on the dipstick**. Note down the distance driven and information about the vehicle on the enclosed form on page 8.

Drive the car for 2,000 km (1,200 miles±100) or until its oil level has fallen to the minimum line on the dipstick.

The same filter should stay on the engine during the entire test.

After driving the controlled distance but before checking the oil level on the dipstick again:

- Drive the car on the road for 20 minutes to warm up the engine, bringing the temperature of the oil up to normal operating temperature.
- Switch off the engine and leave it off for 15 minutes.
- Take measurements on the dipstick with a sliding calliper, for example, and note down the oil level on the enclosed form.

If the measurement establishes abnormal oil consumption, the engine may need corrective action according to page 6.

Conditions

A new, improved type of piston ring was introduced into engine production from cars with engine number 396323 and later.

If the engine consumes more than 0.4 litres of oil/1,000 km (0.68 qt / 1,000 miles) (complaint limit), the following should be checked to give guidance as to whether the consumption problem lies in the cylinder head, the crankcase ventilation or in the piston ring/liner surface.

Check:

– Check spark plugs

Check if the spark plugs are damaged, coated with carbon etc. and replace if necessary.

– Check leak down

Perform a leak down test.

– Check cylinder compression

Perform a compression test.

– Remove the intake manifold

Check to see whether there is a film of oil or droplets of oil in the cylinder head intake passage and/or oil on the upper side of the valve stem/valve crown.

Conclusions:

If the intake passage and the valves are free of abnormal amounts of oil and:

- oil consumption, previously acceptable, has gradually started to increase rapidly

- oil consumption lies between 0.40 - 0.80 liters/1,000 km (0.68 - 1.36 qt / 1,000 miles).

this indicates a problem in the piston, piston ring or cylinder liner surface. (See also next page).
Faults in valve stem seals or internal leakage in the cylinder head, for example, cannot be completely eliminated.

If

– oil consumption has always been high

– *there are traces of oil on the intake passage and the valves*

– oil consumption is above 0.80 litres/1,000 km (1.36 qt / 1,000 miles)

the problem is probably in the cylinder head. (See also page 7.)

The cause may here be:

– leaking valve stem seals

– internal leakage in the cylinder head

– another fault in the crankcase ventilation other than blockage.

Corrective action

If the problem is assumed to be in the crankcase ventilation, this should be carefully examined and, if necessary, remedied before the cylinder head is reconditioned or replaced.

If the problem is in the piston, piston ring or cylinder liner surface, the engine should be reconditioned according to "Reconditioning" or, if necessary, replaced.

Reconditioning

Replace piston rings

Piston-ring replacement applies only to cars with engine numbers below 396323.

The first measure is to replace the two lower piston rings. If the upper piston ring is undamaged, **it should not be replaced**. If the upper piston ring is replaced, this *can* result in increased oil consumption.

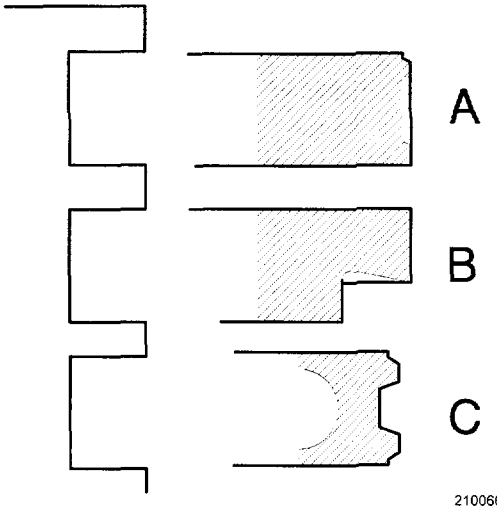
Important: Check that the oil control ring is facing up! See below.

The P/N for piston ring kits with the new piston rings is 272270-0 (dia. 81.0 mm = 3 3/16") and 272271-8 (dia. 83.0 mm = 3 17/64").

Note: The upper piston ring should be replaced only in exceptional cases.

Installing piston rings:

It is important that the upper and middle rings are installed facing up. The lower ring can be installed either way.



A. Compression ring (upper ring)
This is marked with text or a circle. **The mark should be facing up!** It can be difficult to see the text, and a magnifying glass is usually required.

B. Compression ring (middle ring)
The groove should be facing down and the text up on this ring.

C. Oil control ring (lower ring)
This ring is usually not marked and can be installed either way.

Corrective action, conclusions

Replacing piston rings

The piston rings should be replaced first. Use piston-ring kits 272270-0 (dia. 81.0 mm = 3 3/16") and 272271-8 (dia. 83.0 mm = 3 17/64").

The new type of piston rings is included in these kits.)

Normally only the middle and lower piston rings should be replaced. ***The upper ring should be replaced only when necessary****. See page 5 "Replace piston rings".*

Replacing valve stem seals

If traces of oil are found on the valve crown, in the ducts or on the valve stem, the valve stem seals should be changed.

Carefully examine the cylinder head to see if there is any internal leakage.

Replacing cylinder head

If traces of oil are found as above and defects in the cylinder head are discovered, indicating internal leakage etc., the cylinder head should be replaced.

Replacing engine block and pistons

If damage is discovered in the cylinder block (worn cylinder bore, deep score marks etc.), this should be replaced, along with the pistons and piston rings.

Use the following cylinder blocks for each engine.

Engine	Cylinder block, P/N
B5254FS	271933-4
B5252S	272173-6
B5234T	272176-9

The above cylinder blocks include pistons with the new type of piston rings.

Replacing the engine

The engine should be replaced if the problem cannot be solved with any of the above corrective measures.

Form for measuring oil consumption

Chassis type: .....

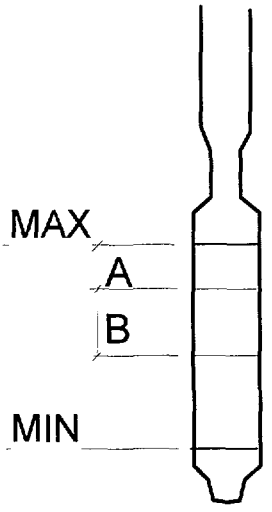
Chassis number: .....

Engine number. .....

Date received: .....

Driving distance: .....

Check carried out by: .....



1. Driving distance

Speedometer reading, before check	km/miles.....
Speedometer reading, after check	km/miles.....
Controlled distance driven during check	km/miles.....

2. Measuring (metric system)

Initial reading, distance between max- and oil level (A) (oil level *above* max. level not allowed)	mm .....
Oil consumed, mm on dipstick (B)	mm .....
Volume of oil used oil per 1000 km: - factor 67.5 x oil used (mm) devided by controlled distance driven	**litres/1,000 km**.....

2. Measuring (SAE system)

Initial reading, distance between max- and oil level (A) (oil level *above* max. level not allowed)	inch (decimal value).....
Oil consumed, inch on dipstick (B)	inch (decimal value).....
Volume of oil used oil per 1000 miles: - *factor 1812 x oil used (inch) devided by controlled distance driven*	***quarts/1,000 miles*** .....

Note: The allowable usage is 0.40 liters of oil/1,000 km (0.68 qt / 1,000 miles).

WARRANTY STATEMENT: Claims may be submitted under the New Car Limited Warranty when a documented customer complaint of oil consumption is present using claim type: 01

Operation No.	Labor description	Time allowance
02295-6	Measurement of oil consumption	1.7 hr