



Language Code	Product	Group	No.	Version	Date	Page
GB	A	160	ART 8 K	6	2006-09-08	1/5
Regarding A20C, A20C, A25C, A25C, A25C 4x4, A25D, A25D 4x4, A30C, A30C, A30D, A35C, A35C, A35D, A40, A40, A40D						

Supersedes SB 160 ART 8 K Version 5 dated 2004-06-09. Changes are marked with lines in the margin.

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Oil analyses



WARNING!

Please pay attention to the safety instructions in the Operator's and Service Manuals concerned.

This Service Bulletin is to be considered as technical information only and is not subject to any reimbursement programs outside normal warranty.

Cause and action

Various companies carry out oil analyses on Volvo Construction Equipment machines. A great risk with these analyses is that their monitoring limits in certain cases lie at other levels as compared with ours.

This means that customers receive alarm reports and are worried entirely unnecessarily. The reason for, that other companies have different monitoring areas than Volvo Construction Equipment, is that they do not have detailed knowledge of the specific properties of our components, and believe that we have the same monitoring limits as our competitors. For Volvo Construction Equipment machines the monitoring limits according to tables 1 and 2 apply.

Table1. Monitoring limits for components made by Volvo

Particle		Engine C model	Engine D model	PT transmission	Dropbox	Unit
Aluminium	Al	30	10	50	30	PPM
Lead	Pb	40	20	50	30	PPM
Iron	Fe	200	100	100	500	PPM
Silica	Si	20	20	50	50	PPM
Copper	Cu	20	15	300	30	PPM
Chromium	Cr	20	10	20	20	PPM
Nickel	Ni	10	10	10	10	PPM
Tin	Sn	20	10	50	20	PPM
Fuel		3 **	3 **			%
Soot		2*	2*			%
Water		0.20	0.10	0.20	0.20	%

* When VDS-3 oil is used: < 3 %

** Applies in isolated cases. If the fuel quantity reaches 1–2 % or more over a longer time period, corrective action must be taken.

NOTE! The values are to be regarded as monitoring limits and not as absolute values. It is important to establish a trend and not to make judgements based on isolated samples.

Generally the engine oil should be able to carry up to 2% of soot for up to 500 operating hours. The engine oil should meet the requirements according to Service Bulletin 160 ART 28. If oil of a lower specification is used, the levels of soot will rise earlier.

Different oils have a varying ability of carrying soot depending on compounding and additives. The ability of oil to carry soot means that the soot particles stick to components in the oil and are carried around in the system, whereas in an oil that cannot carry soot the soot particles stick together and clog up the oil filter.

Higher levels of soot may arise because of lower fuel quality or poor operating conditions. Engines which are run at idling speed for long periods generate more soot in the oil.

Table2. Monitoring limits for components and hydraulic systems made by Volvo

Particle		Axles, AHW (a), AH (b)	Brake cooling oil system	Hydraulic system	Unit
Aluminium	Al	30	30	20	PPM
Lead	Pb	50	50	20	PPM
Iron	Fe	900	50	50	PPM
Silica	Si	50	50	20	PPM
Copper	Cu	150	200	150	PPM
Chromium	Cr	20	20	20	PPM
Nickel	Ni	10	10	10	PPM
Tin	Sn	20	20	20	PPM
Water		0.20	0.20	0,10	%

a) Axles, AHW: Axles with wet brakes.

b) Axles, AH: Axles with dry brakes.

NOTE! The values are to be regarded as monitoring limits and not as absolute values. It is important to establish a trend and not to make judgements based on isolated samples.

Hydraulic system: Cleanliness according to ISO/DIS 4406. Max. approved contamination grade, code 17/12.

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In cases where oil analysis shows a high PPM content, carry out:

- 1 Oil change and filter replacement.
- 2 Further oil analyses:
 - at first directly after the oil change and filter replacement.
 - and then three oil analyses at intervals of 100 hours.

These oil analyses provide an answer to the tendency, which may turn out as follows:

- 1 PPM content drops. Wear is normal.
- 2 PPM content remains at a high but stable level. Wear is normal.
- 3 PPM content continues to rise. This indicates abnormal wear and the customer should be informed.
- 4 PPM content varies greatly up and down. This indicates presence of foreign particles caused by working environment, storage of oil etc.

It is important to note that the iron content increases with a defective air cleaner system before one can note a rising silicon content. That is, in the case of rising iron content, the air cleaner system must be checked.

Oil sampling should be carried out as follows:

- The oil should be at normal operating temperature.
- The engine should be running at low idling and a draining hose should be connected to a pressure outlet for the transmission.
- Regarding engines where there is no pressure outlet, the oil should be sucked up with the aid of a "hand pump".

The sample bottle must not be filled directly from the drain plug, as the oil at the bottom of the sump may have a higher concentration of contaminants and this will lead to a misleading analysis. The possible origin of the different particles is shown in table 3.

NOTE! An oil analysis does not provide an absolute guarantee of entirely avoiding a future breakdown. It can only provide an indication of the condition of the machine.

Certain breakdowns can develop fairly quickly, that is, an oil analysis at x hours may show normal PPM contents and a breakdown may occur prior to the next oil sample. When in doubt as to what action should be taken as a result of the oil analysis, contact Volvo CE Service Department.

Other aspects of oil analyses

All oils contain a varying degree of different additives in order to achieve required quality and performance requirements.

These additives also contain the metals which show up in the analysis. Various amounts of metals occur depending on:

- 1 Which type of oil is being produced (engine, transmission, axle oil).
- 2 Which company is making the oil.
- 3 On which market the oil will be sold (price, quality, competition).
- 4 Which requirements the customer demands.

The following metals occur:

Barium	Ba
Calcium	Ca
Magnesium	Mg
Boron	B
Phosphorus	P
Zinc	Zn
Sodium	Na

Table4. Probable origin of particles

Particle		Engine	Transmission
Aluminium	Al	Pistons	Bearings, clutches and torque converter
Lead	Pb	Big-end and main crankshaft bearings (all types of plain bearings). Oil cooler	Clutch discs and oil cooler.
Iron	Fe	Cylinder liners, camshaft, valve tappets, valve guides and crankshaft.	Clutch discs and ferrous parts of the transmission.
Silica	Si	Dust, dirt etc.	Dust, dirt etc.
Copper	Cu	Big-end and main crankshaft bearings (all types of plain bearings). Water and oil coolers	Clutch discs and oil cooler.
Chromium	Cr	Piston rings and valves	Alloy metals
Tin	Sn	Slide bearings	Clutch discs
Water		Cooling and condensation water	Cooling and condensation water