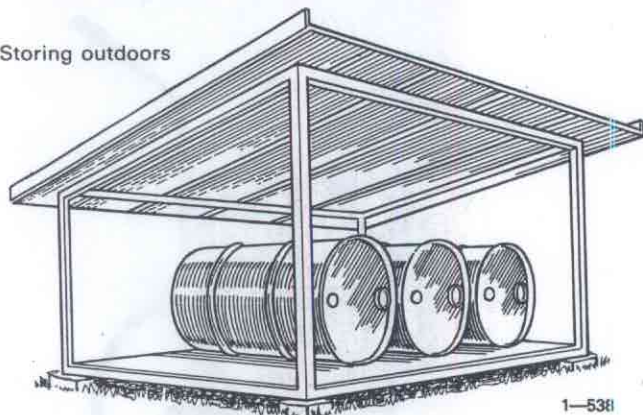


STORING

If oil barrels are stored outdoors, they should be provided with some sort of roof cover. If a roof cover cannot be arranged, the barrels should be stored horizontally and preferably under a tarpaulin.

If an oil barrel is allowed to stand outdoors, the top of the barrel can accumulate rain water and moisture. When the volume of the oil reduces in cold weather, air is sucked into the barrel, even through well tightened filler and venting plugs.

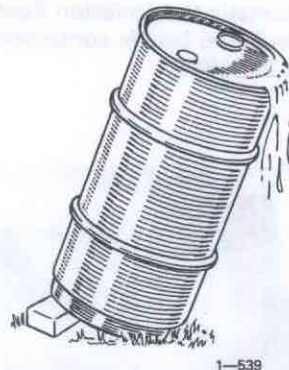
Storing outdoors



ting plugs. Water can then accompany the air into the barrel and mix with the oil. To avoid this, the barrel should be placed tilted at an angle in such a way that the drain and venting plugs are not under water.

With long-term storage (a number of years), the barrel should be shaken so that any products in the oil that have separated out can be mixed in again.

Alternative



REPLACING

General rule

The workshop manual for the respective vehicle tells you when to check and replace the lubricant. As a general rule, the oil should be drained immediately after driving, that is, the oil should be warm when drained. If the change is carried out when the oil is cold and viscous, an unnecessary amount of the old oil remains which later mixes with the new.

Always follow the oil recommendations given in the service manuals and lubricating charts.

Reason

An oil loses its ability to lubricate due to the following:

1. **Impurities**, e.g., metal particles, combustion products, condensation water etc.
2. **Unfavourable operating temperature**, e.g., high temperature – caused by driving at high speeds on motorways. This has a negative effect on the additives in the oil. The oxidation speed of an oil doubles for every 10°C increase in the temperature.
3. **Ageing**. The lubricant undergoes an ageing process due to the fact that the additives are broken down.

Changing intervals

The length of the changing intervals can be seen from the lubricating chart for the particular vehicle in question. Our aim is to make the intervals as long as possible without causing any damage to a component. Naturally, the servicing occasions must be coordinated. Your are, therefore, recommended to follow the lubricating chart.

Lubricating with grease gun

The lubricating chart indicates the number and location of the lubricating nipples. All the nipples can be lubricated with an air operated grease gun. Generally the following applies:

1. Clean the nipple.
2. Apply grease at every lubrication point until new grease squeezes out and is visible, that is to say the old grease is forced out. If no new grease appears there is a fault which must be rectified immediately.
3. Clean the nipple and surrounding area on completion of lubrication.

Waste oil

Used oils, so-called waste oils are classified as waste products with a negative effect for both health and environment. Waste oil should be sent to an approved destruction company. The local authorities can provide details on which companies are licenced to handle and dispose of waste oil.

Always follow the regulations issued by your local authorities concerning the disposal of waste oil.

NOTE! Waste oil must not be used as diesel fuel.

Reclaimed oil

Waste oil is often sent to so-called cleaning plants for cleaning and topping up with new additives. The cleaning process can vary from a simple filtering or centrifuging to a complete distillation and re-refining of the oil.

Volvo's experience is that such cleaned waste oil has a poorer quality than the original product. Re-refined oil is therefore **not recommended** to be used as an engine oil in Volvo's engines.

TOPPING UP

There is a great risk of dirt, etc. getting into the lubricant when checking the oil level, and topping up. Always make it a habit, therefore, of first cleaning round the level or filler plug before removing them. Even tiny particles of dirt, etc. can impair the function of automatic transmissions, hydraulic systems and power steering. The greatest possible cleanliness should, therefore, be observed to avoid this. This can be achieved by adhering to the following measures:

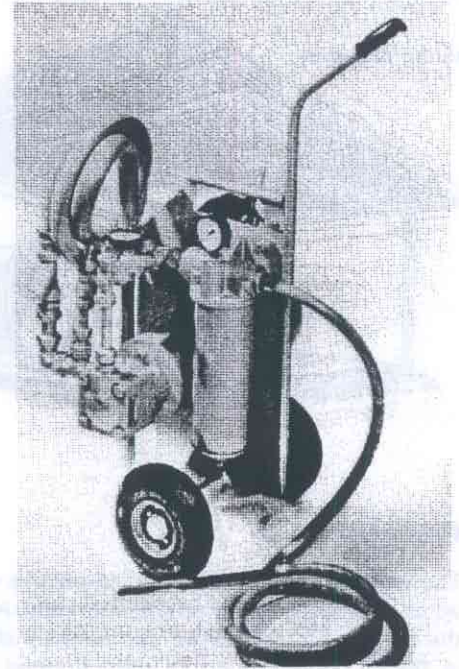
1. Do not use a container larger than necessary for topping up. Automatic transmission fluid type Dexron IID is available in 5 litre plastic containers. Volvo art.no. 282 996-8.



2. If oil is taken from a barrel, the barrel should be in a stationary position and the oil drained through a tap. The use of a pump or moving of the barrel increases the risk for contamination.

3. Cleaning of the oil can be carried out with a so-called filter trolley, which is available in different models.

When we speak of for example 10 micro filtration degrees, we mean that the filter does not permit the passage of particles larger than 10 micro.



Additional handling recommendations

Mineral oil and additives can injure the skin under lengthy and frequently repeated operations. Inhalation of oil vapour and oil smoke can also be injurious. The hygienic limit value for oil spray is 5 mg/m³ air.

If oil gets into your eyes, rinse with copious amounts of tepid water. If oil is swallowed, do not remedy by vomiting. Consult a physician. Handle the lubricant in such a way as to prevent polluting both the ground and water systems. One litre of oil can ruin one million litres of drinking water.

1-540

Glossary of terms

Certain concepts and terms referring to lubricants used in workshops.

A

Absolute viscosity	A measurement of the viscosity of the fluid. Calculated after measuring the rate of flow and forces. Stated in poise (P) or centipoise (cP).
Acid refining	Cleaning process in the production of base oils.
Acid value	The amount of free acid in the lubricant.
Additive	Additives of various types are used to improve certain characteristics of the base oil.
Aerometer	An apparatus used to measure density.
Aluminium grease	Lubricating grease on an aluminium base.
API	The American Petroleum Institute.
API system	A classification system for lubricating oils depending on conditions of operation.
Ash content	The percentage of non-combustible material.
ASTM	The American Society for Testing and Materials.
Automatic oil	An older name for metal working oil used on machine tools.

B

Barium grease	Lubricating grease with a barium base.
Basic number	The amount of free bases in the lubricant.
Boundary lubrication	A form of lubrication where the viscosity of the oil is not sufficient to hold metal surfaces separated. EP lubricant is used in such cases.

C

Calcium grease	Lubricating grease with a calcium base.
Carbon residue	Remainder of a petroleum product after combustion.
Centipoise (cP)	The unit of absolute viscosity. 1 centipoise = 1 mNs/m ² .
Centistokes (cSt)	The unit of kinematic viscosity. 1 centistoke = 1 mm ² /s.
Central lubrication	The lubrication of several lubricating points from one apparatus on the vehicle.
Cetane index	See firing response.
Cetane rating	See firing response.
Chassis grease	Lubricating grease for motor vehicles. Outstanding characteristics are toughness and a high degree of adhesion.
Chlorinated oil	An oil containing chlorine.

Circulation lubrication	Lubrication with an oil pump in a closed system
Cleveland Open Cup (COC)	An apparatus to determine the flash point.
Cohesion	A property of a lubricant to withstand mechanical breakdown.
Compounded	Designation of mineral oil which contains grease, fatty oil or wax.
Compounding agent	Fat, fatty oil or wax which is mixed with mineral oil.
Consistency	In the case of lubricating grease this refers to stiffness, adhesion, etc.
Corrosion	The attack on material through chemical or electro-chemical reaction with the surroundings.
Crude oil	A description of petroleum as it is taken out of the ground.

D

DEF	Defence Specification (Great Britain).
Demulsification	The separation of oil from water.
Density	Weight per unit of volume. (An older designation for weight per unit of volume.)
Detergent	An additive which has a cleansing effect and contributes to keeping sludge particles in suspension.
Diesel fuel oil	Fuel for diesel engines.
Di-ester lubricating oil	Type of synthetic lubricating oil.
Dispersal	The distribution of finely divided solid particles or droplets in a fuel.
Distillation	Evaporation by boiling and condensation by cooling.
Doublegrade oil	Lubricating oil which covers two adjacent SAE ratings.
Dynamic viscosity	See "Absolute viscosity."

E

Emulsification	The capacity to form an emulsion with water.
Emulsion	A finely-divided mixture of one fluid in another for example oil in water.
Engine oil	Lubricating oil intended for use in combustion engines.
Engine fuel oil	See diesel fuel oil.
Engler degrees	A measurement of viscosity.
EP	Extreme Pressure.
EP lubricant	Lubricant with special additives with the ability to withstand high surface pressure.

F

- Fat oil** Oil of animal or vegetable origin.
- Film strength** The capacity of a lubricant to form and maintain a thin layer which prevents metal to metal contact.
- Firing response:**
- a) Cetane rating** The firing response of a diesel fuel determined in a special engine (CFR).
- b) Cetane index** The calculated value of the firing response of a diesel fuel.
- Flash point** The lowest temperature at which an inflammable fluid evaporates to such an extent that the vapours can be ignited.
- Fuel oil** See "Diesel fuel oil".

G

- Gel** A liquid or solid body including a finely divided component which forms an internal structure in the body. Lubricating grease is an example of a gel.
- Gel former** A substance which swells in a liquid to form a gel.
- Graphite** A form of pure carbon.
- Graphite grease** A lubricating grease containing a large proportion of graphite.
- Grease** Solid or semi solid product consisting of a liquid lubricant which is thickened by the addition of one or more metal soaps or inorganic thickening agents.

H

- HD** Heavy Duty.
- HD oil** Older API classification for engine lubricating oil intended for severe operating conditions.
- Heat stability** The tendency of a lubricating grease to separate oil under certain conditions.
- Hydraulic fluid** The pressure-transferring medium in a hydraulic system.
- Hydraulic oil** A mineral or synthetic oil used as hydraulic fluid.
- Hydrodynamic lubrication** A type of lubrication in which movement of the sliding surfaces produces a liquid film with sufficient pressure to separate the surfaces concerned.
- Hydrostatic lubrication** Type of lubrication in which lubricant is fed in under sufficient pressure to separate the surfaces resting against each other.
- Hypoid oil** Lubricating oil specially intended for hypoid gears (final drives).

I

- Inhibitor** An additive which delays or prevents a certain chemical reaction.
- IP** The Institute of Petroleum, Great Britain.
- ISO** International Standards Organization.

K

- Kinematic viscosity** A measure of the viscosity of a liquid. Calculated after measuring the rate of flow and density. Quoted in Centistokes (cSt).

L

- Lanoline** Refined wool fat.
- Lard oil** Animal fat oil.
- Lead grease** Lubricating grease with a lead base.
- Lead naphthenate** Lead soap, used for example in EP lubricants.
- Long-duration grease** High-class lubricating grease specially intended for wheel bearings.
- Lowest pour point** The lowest temperature at which a petroleum product can flow. Usually stated as 3°C above solidification point.
- Lubricating grease** Plastic lubricant which is produced by thickening a lubricating oil with the help of a gel former.

M

- MIL** The collective designation for the specifications set up by the American military authorities.
- Mineral oil** Oil produced from natural or synthetic petroleum.
- Mixed base grease** Lubricating grease based on two or more metallic soaps.
- Mixed base oil** Mineral oil consisting of naphthene base oil and paraffin base oil.
- Molybdenum disulphide** Solid chemical compound with a viscous structure. Used as solid lubricant to reduce friction.
- Multigrade oil** Lubricating oil which covers three or more SAE-ratings.
- Multi-purpose grease** Lubricating grease which is intended to replace several different types.
- Multi-purpose oil** Lubricating oil which is intended to replace several different types.

N

- Naphthene base oil** Mineral oil which primarily contains or is characterized by naphthene hydrocarbons.
- Neutralization value** The collective name of the basic value and the acid value.
- NLGI** National Lubricating Grease Institute, USA. This institute has worked out systems for the classification of lubricating grease with respect to penetration.

O

- Octane rating** The ability of petrol to prevent self ignition during the compression stroke.
- Operating temperature** The temperature of the lubricating point. Min. and max. state the limit within which a lubricating grease can satisfy the demands made upon it.

Oxidation	A chemical reaction during the absorption of oxygen.	SIS	Swedish Industrial Standards.
Oxidation inhibitor	An additive to prevent or delay oxidation.	Sludge	A description of the deposits resulting from oxidation, carbon or water etc in engine lubricating oil.
P		Soap	Chemical compounds of fatty acids and metals. Soaps are used as gel formers in the production of lubricating grease.
Paraffin base oil	Mineral oil which mainly contains or is characterized by paraffin hydrocarbons.	Soda grease	Lubricating grease with a sodium base.
Penetration	A measure of the consistency of lubricating grease.	Sodium grease	Lubricating grease with a sodium base. Also called soda grease.
Pensky-Martens (PM)	A apparatus for the determination of flash point.	Solidification point	See "Lowest pour point".
Petroleum	A substance occurring in the crust of the earth mainly consisting of a mixture of various types of hydrocarbons.	Solvent refining	A cleaning process in the production of base oils.
Poise	The unit of absolute viscosity.	Splash lubrication	A lubricating system in which rotating machine components splash oil to the lubricating points.
Pour point	The temperature at which a grease begins to run.	SSU (SUS)	Saybolt Seconds Universal.
Premium oil	An older API classification of engine lubricating oil, the range of which is between regular oil and HD oil.	Stability in heat	The tendency of a lubricating grease to separate oils under certain conditions.
Pressure lubrication	A lubricating method, where the lubricant is fed to the lubricating points under pressure.	Stokes	The unit for kinematic viscosity.
Pyknometer	An apparatus for the determination of specific gravity of a liquid.	Synthetic lubricating oil	Chemical compounds produced synthetically.
R		T	
Refining	A production process, cleaning.	Thixotropy	When a material becomes soft while being worked and returns to its original consistency when left alone, this is known as thixotropy.
Redwood	An older British unit of measurement stating viscosity.	Transmission oil	Lubricating oil for the power transmission units such as gearbox and final drive.
Regular oil	An older API classification of engine lubricating oil without additives.	Turbidity point	The temperature at which a diesel fuel, when being cooled down, starts to become cloudy or turbid due to precipitation.
Rock oil	Petroleum, crude oil.	U	
Rust inhibitor	An additive which prevents or delays the formation of rust.	Ubbelohdes viscosimeter	An apparatus for the determination of kinematic viscosity.
S		V	
SAE	The Society of Automotive Engineers, USA.	Viscosity	The thicker a liquid is, the higher its viscosity. See absolute and kinematic viscosity.
SAE-classes	A system made up by SAE for classification of lubricating oils depending on viscosity.	Viscosity index (VI)	The measurement of the degree to which the viscosity of an oil changes with temperature. The lower the change in viscosity, the higher the viscosity index.
Saponification	The hydrolysis of grease by the action of alkalis.	W	
Saponification number	This states the content of saponifiable substance.	Waste oil	Used lubricating oil.
Saybolt viscosity	An American unit of measurement to state viscosity.	Water content	The relative amount of water in lubricating grease.
SCL oil	Final drive oil with additives of sulphur, chlorine and lead.		
Sediment	Solid particles which collect at the bottom in a liquid.		
Shale oil	Crude oils produced by the pyrolysis of oil shales.		
Silicones	Organic derivatives of polysiloxens. Available in the form of silicone grease and silicone oil which are characterized by a high index of viscosity and good stability at high temperatures.		

This bulletin is a revision of and replaces SB T-16 0-3 of 12.86.

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7.87	160	03	1(7)

Lubricants for overhaul work

This bulletin complements the present Service Manual, Section 1(16) Lubricants, pages 6-10.

Lubricants for overhaul work

To facilitate the choice of lubricants in connection with overhaul work, the following pages list suitable lubricants which can be used. This list is not exclusive - other makes can also be used - but we have striven to limit the assortment.

Main rule: During assembling, the parts should be oiled or greased with the same type of lubricant they usually operate with. For example, the master cylinder piston with brake fluid, the synchro rings with gear oil, and so on.

The table overleaf also includes exceptions to the above main rule.

Note: "Lube grease Li/EP" is an abbreviation of our standard recommendation "Lube grease on lithium base with EP-additive and with consistency NLGI No. 2". Greases which correspond to this recommendation are those which meet the requirements according to the standards for "Durable grease for wheel bearings" or "Molybdenum disulphide grease".

