

Hydraulic oils

General

The development of modern hydraulic equipment etc. has imposed greater demands on the quality of hydraulic oils. Experience gained from the Scandinavian markets concerning hydraulic oil characteristics when operating at low temperatures has been of benefit, particularly where it applies to hydraulic oil used for hydraulically operated components such as bogie lifts, tippers, cranes, cab tilting cylinders etc.

Because of the above mentioned experiences, today's hydraulic oils as a rule contain polymers. The most notable aspect of these hydraulic oils, when compared to those oils without polymer additives, is that their temperature – viscosity dependence is less. In general these hydraulic oils have better characteristics at low temperatures, the chief characteristic being pumpability. This must be sufficiently good that when starting and warming up of the hydraulic components, abnormal wear and risk for breakdown is avoided. Listed below are some of the requirements necessary for a good quality hydraulic oil.

Good shear stability

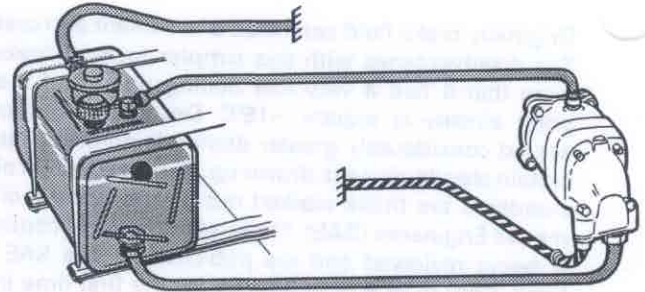
When an oil is subjected to high shearing stresses, for example in constricted channels, the polymers can be "cut off", which in turn leads to permanent viscosity losses. Constricted channels with high rates of shear can also cause the polymers in the oil to adapt themselves to the direction of flow, which gives rise to temporary viscosity losses. The above mentioned viscosity losses/reductions must not be so great as to interfere with the hydraulic function.

Less sensitivity to changes in temperature

The usual requirement for hydraulically operated systems used outdoors is that it must be reliable against moisture under highly diverging ambient temperatures. Modern hydraulic oils have, therefore, additives with which to improve the viscosity index.

High flash point

The temperature at which the oil gives off sufficient vapour to flash momentarily on the application of a small flame should be well above the highest existing operating temperature.



Good air expulsion qualities

Air bubbles make hydraulic oil spongy and cause disturbances in the function. To a great extent, the oil should therefore be able to expel air and be resistant to foaming.

Good lubrication ability

In addition to being a pressure medium, the hydraulic must protect valves, pumps and other moving parts from wear.

Protection against rust

Water can get into the system through condensation, etc. This can cause rusting which in turn can lead to seizure, wear and output losses. The oil, therefore, must also provide protection against rusting.

Cleanliness

Hydraulic oil must not contain any impurities which can cause wear or operational malfunction:

Miscibility

The user should not be tied to one make.

Makes

Volvo Hydraulic Oil BLV

The operating range of hydraulic oils can be considerably influenced by availing of the developed techniques associated with both lube oils and polymers. The hydraulic oil can even be adapted to a specific type of hydraulic system and the conditions under which it operates. AB Volvo has taken advantage of these possibilities and developed **Volvo Hydraulic Oil BLV**.

Volvo Art.-Nr. 116 1114-2 (208 litres)
 116 1115-9 (4 litres)
 116 1116-7 (1 litre)

Volvo Truck Corporation specially recommend this oil for bogie lifts, but can also be used for tippers, cranes and cab tilting cylinders.

Other hydraulic oils SH 15, SHS 32

The products listed in the table below are not to be regarded as a recommendation for any specific make. The table can however give some indication as to what products are marketed by well-known oil companies. Variations in the product programme of the oil companies may vary from market to market.

We would point out that it is the responsibility of the oil producers themselves to ensure that their various products correspond to the respective standards. AB Volvo disclaims any liability in each and every respect concerning this, likewise the consequences that can be caused by any changes in the product designation.

NOTE! The following table is not a recommendation for the makes indicated.

Hydraulic oils SH 15, SHS 32

Make	SH 15 "Light"	SHS 32 "Super"
Volvo	Volvo Hydraulic Oil BLV	
BP	Bartrans HV 15	Bartrans SHF S-32
Castrol	Hyspin AVH 15	Hyspin AVH 32
Chevron		
Christiernsson		
Duckham		Zircon HF 32S
Esso	Univis HP 22	Univis HP 32
Fina	Hydran HV 22	Hydran HV 32 Super
Finoil		
Gulf	Hydraulic Oil S15	Hydraulic Oil S32
Mobil	Flowrex 85	Flowrex Special
Norol		
Nynäs	Hydraulic Oil 12	Hydraulic Oil 15
OK	Delta Oil 15	Super Hydraulic Oil 32
Shell	Tellus Oil T15	Tellus Oil T32
SLR-Agrol		Hydraul Special SHS 32
Texaco	Rando Oil HDZ 15	Rando Oil HDZ 32
Valvoline	Hydraulic Oil EP 100	Hydraulic Oil EP 200

Cleaning agents

There are numerous solvents more or less suitable for the purpose. What is of interest in these fluids is the aromatic content. It is the aromas which give the fluid its ability to dissolve grease, tar, etc. The higher the aromatic content, the more effective the solvent and the more pungent the fluid.

From the viewpoint of efficiency, it is thus an advantage with a high aromatic content, but from the viewpoint of health a disadvantage.

AB Volvo has therefore divided solvents into two groups – cleaners naphtha and white spirit. There is also an emulsifying solvent for engine wash.

Cleaners naphtha

Cleaners naphtha has an aromatic content of max. 3 volume per cent and is used for degreasing and cleaning a new product, that is to say, not for removing hardened dirt. Among corresponding products are Nynäs Nysolvin 75 A and Esso Isopar G.

White spirit

White spirit has an aromatic content of max. 17 volume per cent and is intended as a solution to be used where cleaners naphtha is not effective. In other words for cleaning hardened underbody sealing, asphalt spots, etc. Among corresponding products are Varnolene, Crystal oil and Renoline.

Emulsifiable cold degreasing agents

An emulsifiable cold degreasing agent is a petroleum based solvent plus an emulsifier. The aromatic content and flash point are important values in an emulsifiable cold degreasing agent. The aromatic content details the dissolving capacity of the product and the flash point details the temperature at which the fluid emits flammable vapour.

Emulsifiable cold degreasing agents are used at room temperature and in concentrated form. They are not to be injected or diluted with water.

There are exceptions however, these are products based on both alkaline and organic solvents and can be diluted with water. These are commonly called in the motor trade as "car care products".

Sewage water – treatment

In connection with the publication of the Swedish Department for the Preservation of Nature, 1975:10 Sewage water – treatment at petrol stations and automobile workshops, the Swedish Petroleum Institute (SPI) has undertaken to keep an up-to-date list of all those cold degreasing agents which can be recommended in accordance with the advice and rulings of the Department.

As a result, SPI has received from its member companies and other suppliers of cold degreasing agents information about those agents which are being tested by the Institute for Water and Air Preservation Research according to a test method developed by this institute.

Regulations concerning the use and disposal of fluids vary from country to country. Local regulations should therefore be followed.

STANDARDS

Cleaners naphtha

Example of standard according to Volvo demands				Testing method
Density at 15°C	max.	kg/m ³	800	ASTM D 1298
Flash point		°C	60	ASTM D 93
Aromatic content	max.	volume %	1	ASTM D 1319
Aniline point	max.	°C	80	ASTM D 1012
Boiling interval		°C	150–250	ASTM D 86
Evaporation rate (ether = 1)			> 300	
Colour Saybolt			+ 30	ASTM D 156
Corrosion			1a	ASTM D 130
Inflammability class			Class 3	

Other requirements

Cleaners naphtha must not have a nauseating smell or contain substances injurious to the health and it must be suitable for the range of use indicated.

White spirit

Example of standard according to Volvo demands				Testing method
Density at 15°C	max.	kg/m ³	790	ASTM D 1298
Flash point		°C	30–55	ASTM D 93
Aromatic content	max.	volume %	17	ASTM D 1319
Aniline point	max.	°C	60	ASTM D 1012
Boiling interval		°C	150–250	ASTM D 86
Evaporation (ether = 1)	min.		55	
Colour Saybolt			+ 30	ASTM D 156
Corrosion			1a	ASTM D 130
Inflammability class			Class 2b	

Other requirements

White spirit with high aromatic content must not have a nauseating smell or contain substances injurious to the health and must be suitable for the range of use indicated.

Rustproofing agents

The standards laid down by AB Volvo for rust protection stipulate that penetrating rustproofing must be sprayed into cavities, hollow beams, etc. They also stipulate that a thicker rustproofing agent must be used as an additional underbody sealant for the underside of the cab, under the wings, etc. The standards also deal with temporary rustproofing agents. Refer to Service Manual Section 1(18) Rustproofing, Cab for details on how rustproofing is to be carried out.

Temporary rustproofing agents

Temporary rustproofing agents provide short-term corrosion protection and are intended to be used as protection with storage and transport of trucks and/or provide additional corrosion protection. Where the rustproofing agent is only used for protection during storage and transport, there are certain demands to be met concerning the type of degreasing agent used when removing the temporary rustproofing. In general terms, the degreasing agent used by itself or together with the rustproofing agent must be of a type that does not cause damage to the material it comes into contact with during the rustproofing removal process.

In other respects, regulations issued by the local authorities apply where it concerns the use and disposal of degreasing fluids.

Temporary rustproofing agents are divided up into classes:

- Class 1:** is specified for material which is exposed to insignificant corrosion attack, for example, indoors in air of varying temperature and humidity. (Risk for condensation).
- Class 2:** is specified for material which is exposed to moderate corrosion attack, for example, with a humid indoor atmosphere or risk for condensation, out of doors in inland areas, with the exception of industrial areas with high air pollution, or densely populated areas.

Class 3: is specified for material exposed to high corrosion attack, for example, outdoors in coastal areas, outdoors within industrial areas with high air pollution or in densely populated areas, sea transport under cover. Effective corrosion protection for up to 2 months.

Class 4: is specified for material exposed to high corrosion attack. The same as Class 3, but giving effective corrosion protection for up to 6 months.

Permanent rustproofing agents

Permanent rustproofing agents provide long-term corrosion protection and are not intended to be removed. In certain instances, temporary rustproofing agent, Class 4 may be used for additional permanent corrosion protection. Permanent rustproofing agents are divided up into classes:

Class 5: is specified for material exposed to high corrosion attack and mechanical wear, for example, the truck chassis.

Class 6: is specified for material exposed to high corrosion attack and hard mechanical wear, for example, flying gravel inside the wheel house.

Class 11: is specified wherever the rustproofing agent must have good penetrating qualities, for example, beams, internal cavities etc.

Before purchasing rustproofing agents, the works should first talk with its present suppliers. With any uncertainty regarding the demands required of the respective rustproofing agent, contact AB Volvo Technical Development Department. This department deals with and carries out extensive tests on all types of rustproofing agents to be found on the various markets.

Examples of standards for temporary and permanent rustproofing agents, according to Volvo demands, are shown overleaf.

STANDARDS

Temporary rustproofing agents

Example of standard according to Volvo's demands

Characteristics	Class Y 700				Testing method
	1	2	3	4	
Adhesion-Setting time 2 h (water flushing)	-	-	15 min Marking 0		STD 1029, 5463
Exposure – outdoors	No cracking				STD 5711, 101 Alt B
A Industrial environment Marking	-	-	2 months 10	6 months 10	STD 5715, 02
B Marine environment Marking	-	-	2 months 10	6 months 10	STD 5715, 102
Exposure – indoors	See below				
A Unheated storage Marking	1 month 10	6 months 10	12 months 10	24 months 20	STD 5715, 102
B Heated storage Marking	3 months 10	12 months 10	24 months 10	-	STD 5715, 102

Permanent rustproofing agents

Example of standard according to Volvo's demands

Characteristics	Class Y 700			Testing method
	5	6	11	
Adhesion – Setting time 2 h (water flushing)	15 min Marking 0			STD 1029, 5463
Exposure – outdoors	No cracking			STD 5711, 101 Alt B
A Industrial environment	12 months Marking 10			STD 5715, 102
B Marine environment	12 months Marking 10			STD 5715, 102
Penetration in a crevis Crevis > 50 µm	-	-	20 mm	STD 1024, 6765
Resistance to wear	See below			STD 1024, 7131
Wear agent at 20°C	90 l/mm	50 l/mm	-	
Wear agent at -30°C	30 l/mm	50 l/mm	-	
Coating thickness, dry	200±50 µm	2.0±0.5 mm	-	

General requirements

The rustproofing agent should not cause any damage to the treated material or impair its function.

Consumables

In addition to the lubricants and fluids detailed in this manual, AB Volvo, Parts Division market a range of additional products associated with service and preventive maintenance. A number of these products are termed consumables and cover a wide area of usage. These products are of the same high quality as other Volvo products.

The following products are a selection from the range:

Washer fluid is mixed with water and is used in the wind-screen washer and headlamp washer reservoirs. Most types of washer fluid not only release dirt but protect the washer water from freezing.

Volvo art.no.:

1129619-1 Bottle 1 l
1128179-7 Can 5 l

Rapid rust remover provides effective protection from corrosion, disperses water and provides long-term lubrication.

Provides electrical system with effective protection from humidity and corrosion. Recommended for use as universal oil, anti-corrosion oil and rust remover.

When parts are stuck by rust, spray on the oil and allow to act for a few minutes. Repeat if rusting is severe.

Volvo art.no.:

1161034-2 Spray 300 ml
1161118-4 Can 5 l

Flushing oil was previously used as a cleaning oil in conjunction with oil change in the engine and transmission.

Volvo Truck Corporation do not advise the use of this oil, since any oil left in the system breaks down the ordinary oil. If flushing is necessary, this should be carried out using the same type of oil that will later be filled in the unit.

All-round spray, a colourless and synthetic lubricant in a non-flammable solvent which, after evaporation, provides a transparent and vaseline like lubricating film. Recommended for links and joints, hinges, zip fasteners etc. Apply in the form of a thin coating.

Volvo art.no.:

1161036-7 Spray 180 ml

Lock spray is sprayed into locks. It has two functions, it defreezes locks and also protects against freezing.

Volvo art.no.:

281402-8

Lock fluid, normal. Lock fluid for bolts and nuts. Permits disassembly of bolting in the normal way. The lock fluid operates even on lightly oiled surfaces and prevents leakage.

Volvo art.no.:

1161053-2 Bottle 10 ml
1161054-0 Bottle 50 ml



Constructional adhesive of 2-component type for attachment of roof, mudguard reinforcements, tank filler casings etc. Apart from metals, this adhesive is also suitable for use with plastics, glass, rubber and wood. The surfaces to which it is applied must be completely clean and dry.

Mixing ratio:

1 part by volume of basic material (B), white
1.5 parts by volume of hardener (A), grey

Volvo art.no.:

1161088-8 Tube 100 ml
1161090-4 Tin 440 ml

Leakage tracer, liquid agent for checking leakages on gas plants and compressed-air systems. The driving agent is air and is pumped in with the cap. The agent has a delayed action effect and indicates if there is any leakage.

Volvo art.no.:

1161145-6 Bottle 350 ml

Sealing tape, plastic sealing profile for screwed on body components, such as front mudguards etc.

Profile form 6 mm Ø.

Volvo art.no.:

277 253-1 Roll 24 mm

Sealing tape, plastic sealing profile for screwed on body components.

Profile from 35×3 mm.

Volvo art.no.:

870 1000-5 Sold by the metre

Plastic sealer-soft for sealing, insulation and elimination of squeaking and rattling. Does not set.

Volvo art.no.:

116 1025-0 Tin 100 g

Sealing compound for windscreens fitted in rubber profiles. Applied by using compressed-air spray gun 998 6054 or manual spray gun 998 6055.

Volvo art.no.:

281 040-6 Tube 450 g

Welding primer, corrosion protection for flanges, applied to both metal surfaces before spot or plug welding.

Volvo art.no.:

116 1009-4 Tin 0,5 l

Insulation tape for insulation and protection of electrical connections and cables.

Width 15 mm

Volvo art.no.:

672 229-2 Roll 20 m

Glassfibre tape for attachment and protection where greater strength is needed.

Width 12, 19 and 50 mm.

Volvo art.no.:

116 0030-1 Roll 55 m (12 mm)

116 0041-8 Roll 55 m (19 mm)

112 8264-7 Roll 50 m (50 mm)

Thread tape for tube and hose connections under moderate pressure.

Width 12 mm

Volvo art.no.:

116 0010-3 Roll 12 m

Warning tape yellow/black striped tape to mark protective edges, handrails etc.

Width 50 mm

Volvo art.no.:

116 0602-7 Roll 66 m

Thread locking, strong, locking fluid for screws and nuts, difficult to remove in usual way. The locking fluid also functions on oily surfaces and prevents leakage. Removal is facilitated if the parts are heated up to approx. 250°C.

Volvo art.no.:

116 1075-5 Bottle 10 ml

Thread sealant agent for hydraulic, coolant and pneumatic connections. Light locking effect, permitting removal in usual way. Used up to 3/4", for larger diameters use flange sealer (116 1058).

Volvo art.no.:

116 1055-7 Bottle 10 ml

116 1056-5 Bottle 50 ml

Flange sealer used as sealing agent where gaskets are not used and a **certain tensile strength** is required. Does not run, can be applied to all surfaces, maintains a pretension of joint.

Volvo art.no.:

116 1058-1 Tube 50 ml

Flange sealer, high temperatures, used as sealing agents where gaskets are not used and **greater tensile strength** is needed. Does not run, can be applied to all surfaces, maintains pretension of joint.

Volvo art.no.:

116 1059-9 Tube 50 ml

Activator for locking fluids, thread sealing fluids and flange sealing. Used if a shorter hardening time is desired and also makes possible hardening under cold conditions.

Volvo art.no.:

282 946-3 Spray 165 ml

Packing compound, an adhesive sealing agent for gaskets. Holds gasket reliably in position during assembly, dries and becomes solid. Resistant to petrol, engine oil, automatic transmission fluid, anti-freeze etc.

Volvo art.no.:

116 1027-6 Tube 25 ml

116 1026-8 Tin 180 ml

Sealing agent, silicone, alcohol based silicone sealing agent for sealing flanges without disassembly, applied to dry and clean surface. Adheres to metals, plastics, glass, rubber, wood etc. Resistant to water, oil, lubricants, solvents etc.

Volvo art.no.:

116 1048-2 Cartridge 315 ml

Transparent contact adhesive is a light-resistant adhesive used for example to attach roof hatch weatherstrip.

Volvo art.no.:

116 1095-3 Tin 250 ml

Handling lubricants

MISCIBILITY

Oils of different makes and for different purposes consist mostly of base oils and additives of different origin and composition. Lubricants have consequently been produced to meet the standards imposed. Naturally, miscibility is therefore limited.

Main rules

The following three main rules apply for the miscibility of lubricating oils.

1. Oils which can be regarded as having the same quality and viscosity index can be mixed.

Example

Engine oil API CD SAE 10W can be mixed with engine oil API CD SAE 30.

Transmission oil API-GL-1 SAE 80W can be mixed with transmission oil API-GL-1 SAE 90.

Final drive oil API-GL-5 SAE 90 can be mixed with final drive oil MIL-L-2105 B SAE 90W.

2. Oils which differ concerning quality ought not to be mixed.

Example

Engine oil API CD SAE 20W should not be mixed with engine oil API CC SAE 20W.

Transmission oil API-GL-1 SAE 90 should not be mixed with final drive oil API-GL-5 SAE 90.

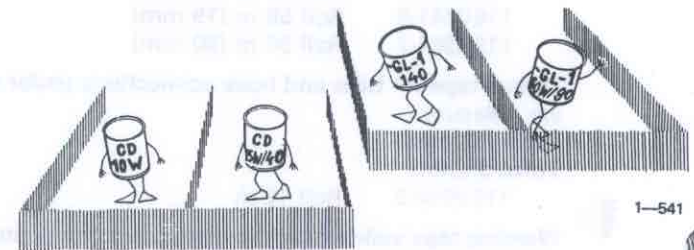
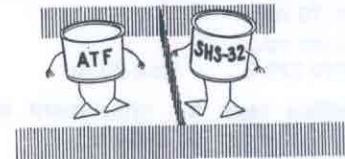
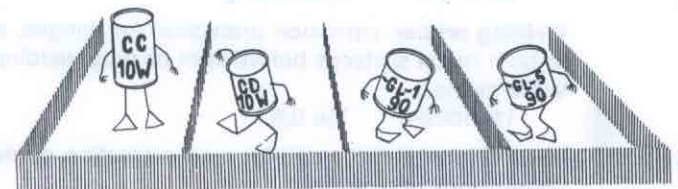
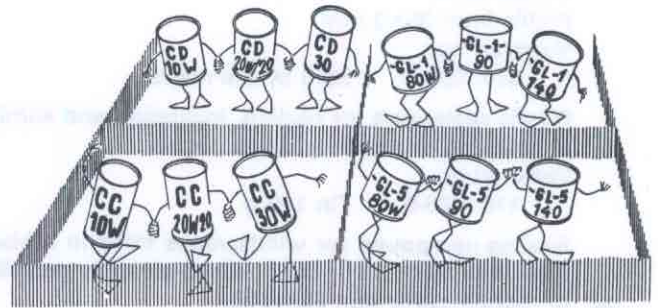
Automatic transmission fluid should not be mixed with hydraulic oil.

3. Oils with entirely different viscosity indexes must not be mixed.

Example

Singlegrade, for example engine oil API CD SAE 10W must not be mixed with multigrade oil for example engine oil API CD SAE 15W/40.

Transmission oil API-GL-1 SAE 140 must not be mixed with transmission oil API-GL-1 SAE 80W/90.



Extra additives

Volvo Truck Corporation will in the strongest possible terms, point out that extra additives of type STP must not under any circumstances be added to any lube oil used in Volvo products. The addition of these additives do not increase the quality of the lubricant and can in certain circumstances cause more harm than good.

Miscellaneous

As a general rule, oil of different makes should not be mixed. Experience has shown that in the long run better operating results are achieved if one and the same type of lubricant is used continuously compared to operating with oil mixtures of different makes.