



## Oils and Filters

This information provides specifications for Oil and Filters applications in Volvo vehicles.

**Note:** We have attempted to cover as much information as possible. However, this information does not cover all the unique variations that a vehicle chassis may present. Note that illustrations are typical but may not reflect all the variations of assembly.

All data provided is based on information that was current at time of release. However, **this information is subject to change without notice.**

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# Standardized Design Solutions / Maintenance

## Oil and Filters, Engine Transmission, Axle and Fuel Tank

### D11, D13 and D16 Engines

Engine	Oil Capacity in quarts
D11 (for VAHs that are built before June 4th, 2022 and all VHDs)	44 (42 L)
D16	55 (52 L)

### D11 Engine (only for VAHs that are built on or after June 4th, 2022)

All units in quarts	Total volume of oil in filter	Oil pan volume	Minimum oil pan volume	Pre-fill (dry engine)	Total volume of oil (dry engine)	Oil change volume
<b>Steel oil pan</b>	6 (5.7 L)	22.7 (21.5 L)	17.4 (16.5 L)	30 (28.4 L)	30 (28.4 L)	29 (27.5 L)
<b>Note:</b> The steel oil pan introduced on June 4th, 2022 is backward compatible with VAHs that are built with EM-USA17 and later emissions. The new steel oil pan is not applicable for VHD.						

### D13 Engine

All units in quarts	Total volume of oil in filter	Oil pan volume	Minimum oil pan volume	Pre-fill (dry engine)	Total volume of oil (dry engine)	Oil change volume
<b>Vehicle with three full flow oil filters</b>						
<b>Steel oil pan</b>	6.3 (6 L)	32.7 (31 L)	26.4 (25 L)	4.7 (4.5 L)	43.8 (41.5 L)	39 (37 L)
<b>Composite oil pan</b>	6.3 (6 L)	28.5 (27 L)	20 – 21 (19 – 21 L)	4.7 (4.5 L)	39.6 (37.5 L)	34.9 (33 L)
<b>Aluminum oil pan</b>	6.3 (6 L)	33.8 (32 L)	25.4 (24 L)	5.3 (5 L)	45.4 (43 L)	40.2 (38 L)
<b>Vehicle with two full flow oil filters</b>						
<b>Steel oil pan</b>	4.2 (4 L)	32.7 (31 L)	26.4 (25 L)	4.7 (4.5 L)	41.7 (39.5 L)	36.9 (35 L)
<b>Composite oil pan</b>	4.2 (4 L)	32.7 (31 L)	24.3 (23 L)	4.7 (4.5 L)	41.7 (39.5 L)	36.9 (35 L)
<b>Aluminum oil pan</b>	4.2 (4 L)	33.8 (32 L)	25.4 (24 L)	5.3 (5 L)	43.3 (41 L)	38 (36 L)

## Approved Oils

**Note:** For a complete list of Approved Oils used in Volvo Engines, transmissions and other components, Body builders should contact their local Volvo dealer to obtain the approved oil list.

# D11, D13 and D16 Engine Oil Type / Quality

**Note:** For Cummins engine oil specifications, refer to the Cummins owner's manual.

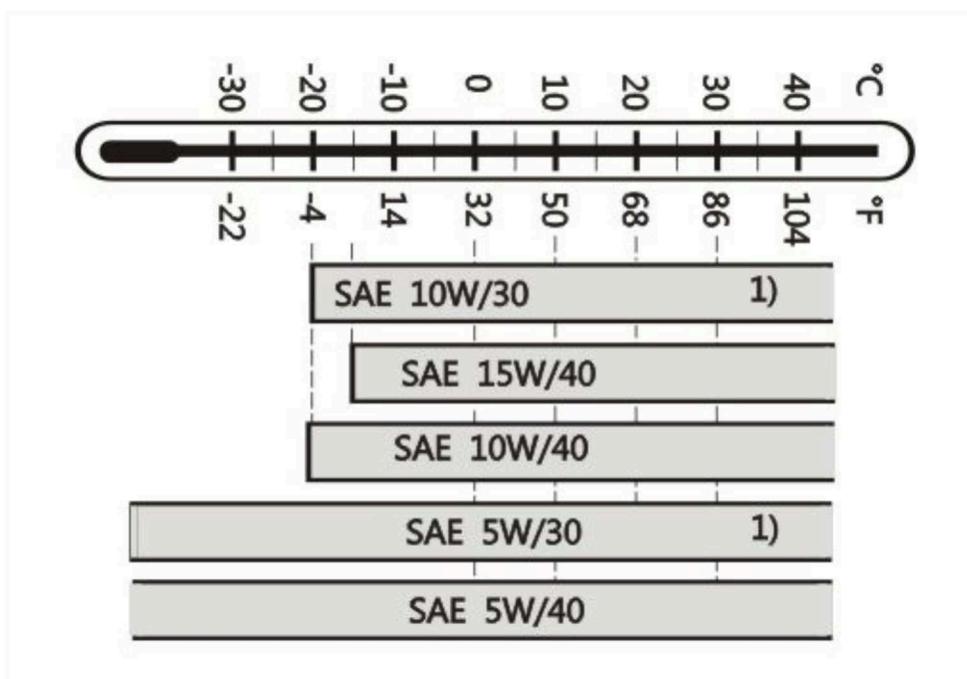
EO-O Premium Plus or VDS-4 (Volvo Drain Specification-4) diesel engine oil is mandatory for use in all US 2010 emission compliant VOLVO engines. Chassis equipped with a US 2010 emission compliant engine, which can be identified by the presence of an aftertreatment Selective Catalytic Reduction (SCR) system, also require the use of ultra low sulfur diesel (ULSD) fuel. EO-O Premium Plus oils exceed the new American Petroleum Institute (API) service category CJ-4.

Engines meeting the 2010 and later emissions requirements are designed with exhaust aftertreatment systems requiring an oil that meets Volvo EO-O Premium Plus quality standards for model year 2010 and later Volvo engines. The Volvo EO-O Premium Plus quality standard is based on the API CJ-4 engine oil specification, but has additional performance requirements essential to adequately protect the Volvo engines at the drain intervals specified. Pre-2010 engines also work better with the recommended engine oils. They are not required, but are strongly recommended.

Model Year	Recommended VDS Specification/ API standard	Minimum VDS Specification/ API standard
2021 and Newer	VDS-5.0/FA-4	VDS-4.5/CK-4
2017–2020	VDS-4.5/CK-4	VDS-4.5/CK-4
2010–2016	VDS-4.5/CK-4	VDS-4.0/CJ-4

**Note:** VDS corresponds to API standard: VDS-4.0/CJ-4, VDS-4.5/CK-4, VDS-5.0/FA-4.

## Viscosity Diagram, Engine



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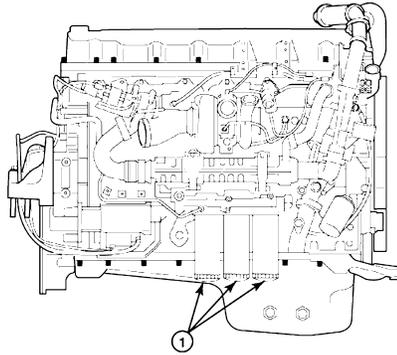
Only VDS-4 / VDS-4.5 / VDS-5 approved oils can be used above +30 °C, non VDS-4 / VDS-4.5 / VDS-5 approved oils can be used up to +30 °C.

**Note:** Based on cold starting temperature.



## CAUTION

Extra oil additives must never be added to any engine oil used.



W2055691

1 Typical Spin-On Oil Filter (D13 Engine Shown)

**Note:** The oil filter housing consists of two full flow filters and a bypass filter. From the model year 2020 D13 engines with VGT (Variable Geometry Turbocharger) and from the model year 2021 D13 engines with turbocompound, will not have the bypass oil filter.

## Rear Axle Oil Viscosity

“See vendor information for rear axle oil viscosity”.

## Rear Axle Oil

“See vendor information for rear axle lube type and capacity”.

## Transmission, Lubrication

### *Manual Transmission Oil*

“See vendor information for transmission lube type and capacity”.

## Check I-Shift Transmission Oil Level

Check the I-Shift transmission oil level at each service interval. To do so, park the vehicle on a level surface and check the transmission oil level through the sight glass on the right side of the transmission. Add Volvo-approved synthetic transmission oil as needed. Note that the drain plug indicates the type of oil used in the transmission.

Silver Drain Plug	SAE50 I-Shift Heavy Duty
Brass Drain Plug	75W-80 I-Shift Standard

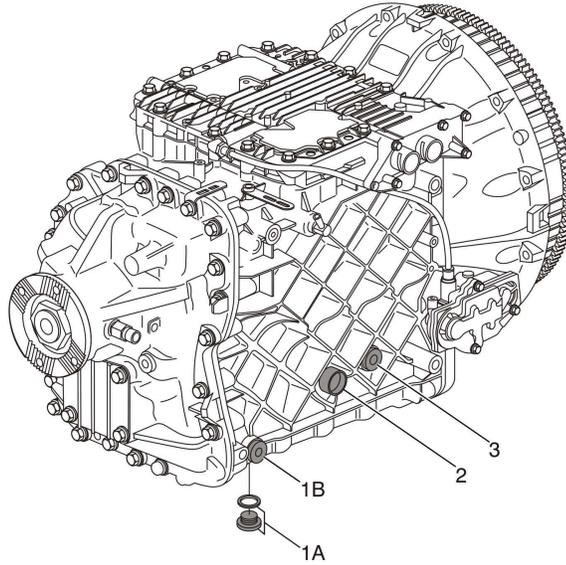
### **Recommended SAE Grades for I-Shift Transmissions**

Volvo Synthetic Gearbox Oil

75W-80, 75W-90

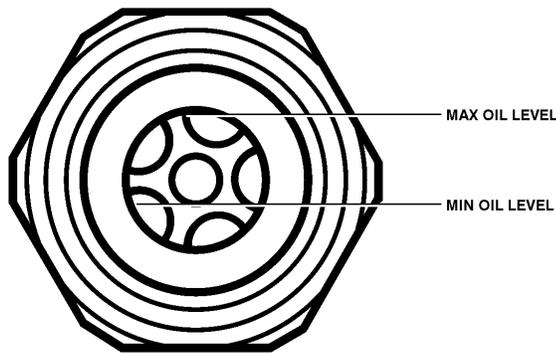
**Volvo Oil Types and Part Numbers**

Oil Grade	Part Number and Alternative
75W-90	85146530 or Mobile Delvac Synthetic Transmission Oil V50
75W-80	VPO120549 or Mobile Delvac Synthetic Transmission Oil V30



W4002904

- 1A Drain Plug
- 1B Drain Port
- 2 Sight Glass
- 3 Fill Plug and Oil Level



T4021684

Sight Glass for Checking Transmission Oil Level.

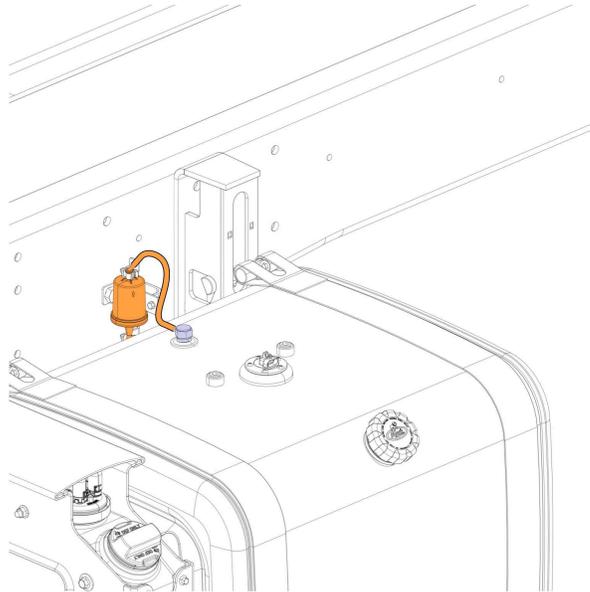
# I-Shift Lubrication Capacity

Transmission	Oil Type	Capacity Including Cooler
<b>I-Shift – Volvo</b>		
ATO 12	Refer to the approved oils list (SB 175–61)	<b>17.9 quarts</b>
ATO 13/ATO 14	Refer to the approved oils list (SB 175–61)	<b>20.5 quarts</b>

## Fuel Ventilation

### *Fuel Tank Ventilation Filter*

Some vehicles are equipped with a fuel tank ventilation filter. This filter must accompany the fuel tank if the tank is relocated.



W2085894

Frame Rail-Mounted Filter

# Fuel



## CAUTION

Diesel engines for US 2007 vehicles are designed to operate only with ultra low sulfur diesel (ULSD) fuel. Use of fuel other than ULSD reduces the efficiency and durability of the engine, permanently damage the advanced emission control systems, reduce fuel economy and possibly prevent the engine from running at all. Manufacturer's warranties are likely to be rendered void by usage of improper or incorrect fuel, and usage of fuels other than ULSD fuel in diesel-powered vehicles is illegal and punishable with civil penalties. Use of fuel additives to compensate for the lower sulfur content is NOT recommended by Volvo Trucks North America.

Fuel sold for use in diesel-powered engines for US 2007 vehicles may only contain a maximum sulfur content of 0.0015% by weight. This was done to reduce particle emissions in the exhaust.

## Biodiesel Fuel

### Description

There is a trend in the trucking industry toward the use of biodiesel fuel; a processed fuel derived from renewable biological resources such as vegetable oil. The most common such fuel available in the United States is derived from soybean oil (a product called "Soy Methyl Ester" [SME or SOME]). In its pure form, biodiesel fuel is designated B100 (or "Neat Biodiesel"), which means that the fuel is 100% biodiesel. The 100% product is then blended with petroleum-based Ultra Low Sulfur Diesel (ULSD) fuel in concentrations of 2% biodiesel to 98% petroleum-based diesel, 5% biodiesel to 95% petroleum-based diesel, 20% biodiesel to 80% petroleum-based diesel and higher. The resultant biodiesel fuel blends are then designated as B2 (for a 2% blend), B5 (for a 5% blend), B20 (for a 20% blend) and so on.

### Biodiesel Emissions

Volvo D11, D13 and D16 engines are certified to comply with U.S. EPA and California emissions standards based on the use of test fuels with specifications established by these regulatory agencies.

Alternative fuels, including biodiesel, that are not substantially similar to the required test fuels may adversely affect engine emissions compliance. As a result, Volvo does not warrant the engine conforms to applicable Federal or California emissions limits when operated on biodiesel or other alternative fuels that are not substantially similar to specified test fuels used for certification.

### Warranty Policy

The engine warranty covers defects in material and workmanship on the part of the manufacturer. Failures caused by fuel are not warrantable. Refer to the Warranty Certificate in the vehicle operator's manual for complete details on engine and emission systems warranty coverage including limitations and exclusions.

For 2017 to 2021 GHG emissions, the maximum allowable limit of biodiesel is B10 concentration (10% blend). For pre-2017 engines, the maximum allowable limit of biodiesel is B20 concentration (20% blend).

The use of biodiesel fuel will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the biofuel used in the blend conforms to ASTM D6751, B1 to B5 blends conform to ASTM D975, and B6 to B20 blends conform to ASTM D7467.

Note that engine and aftertreatment emissions system component warranties are valid providing the B20 blend meets the respective ASTM standard.

# ASTM Standards

The American Society for Testing and Materials (ASTM) standard D6751 defines B100. Any B100 product used in the manufacture of the blend intended for use in a Volvo vehicle must conform to the ASTM D 6751 standard.

ASTM standard D975 defines the minimum accepted values for the properties of petroleum-based diesel fuel. Any petroleum-based diesel fuel used in a Volvo vehicle, either alone or when blended with B100 for the maximum approved concentration (up to B5), must meet the ASTM D975 standard.

## Certified Biodiesel Required

The National Biodiesel Accreditation Commission conducts quality certification and accreditation programs for producers and marketers of biodiesel products. The B100 used in the approved blend must be produced by a BQ-9000 Accredited Producer and the blend must be supplied by a Certified Marketer.

## Storage of Biodiesel

The standard storage and handling procedures used for petroleum-based diesel fuel apply to biodiesel (reference the operator's manual for information concerning the handling and storing of diesel fuel). Compared to petroleum-based diesel fuel, biodiesel fuel has lower oxidation stability and there are greater concerns for water contamination and microbial growth. Biodiesel should be stored in a clean, dry, dark environment. Acceptable storage tank materials include aluminum, steel, fluorinated polyethylene, fluorinated polypropylene or Teflon®. Storage containers which contain copper, brass, lead, tin or zinc should not be used to store petroleum-based diesel nor biodiesel. Use of such containers will result in corrosion of the container and contamination of the fuel. Every effort should be taken to make sure that the biodiesel product is used within six months of the date of manufacture.

## Renewable Diesel Fuel

Similar to conventional biodiesel, renewable diesel fuel is derived from biomass feedstocks, including animal fats and oils. However, unlike biodiesel, renewable diesel fuel is produced using a different process and maintains physical properties and performance similar to petroleum diesel, meeting the same ASTM D975 standard.

# Coolant Requirements

Currently, Volvo Trucks North America utilizes the Chevron Delo ELC (Extended Life Coolant) at its New River Valley, VA plant facility as its premium coolant. This coolant is manufactured by and purchased from Chevron Products Company. Please be advised that the Texaco ELC Coolant and Chevron Delo ELC Coolant brands are the same product and suitable for all Volvo vehicles that come factory filled with the Chevron Delo ELC (red) Coolant. In addition, the Chevron Delo ELC Coolant and Texaco ELC brand coolant meet the same Volvo Truck North America warranty requirements.

## Coolant

### Regular Coolant

Standard Factory Fill Color: Purple (Pink)

<b>Coolant Type</b> .....	A 50/50 mixture of clean water and Antifreeze that meets or exceeds ASTM D6210 or TMC RP329.  ASTM D6210: Standard Specification for Fully Formulated Ethylene-Glycol-Base Engine Coolant for Heavy-Duty Engines.  <b>Note:</b> A coolant mixture should never have less than 40% antifreeze and 60% clean water.
<b>Coolant Change Interval</b> .....	Replace the coolant every 250,000 miles (400,000 km) or 4000 hours or every two years, whichever comes first.
<b>Coolant Filter Change Interval</b> .....	The coolant filter is suitable for 50,000 miles (80,500 km) . The charged coolant filter contains eight units of SCA that are released slowly over time to maintain the recommended level during operation. If the SCA level tests above 3.0, DO NOT replace the coolant filter. When testing indicates that the SCA level has dropped below 1.5 units per US gallon (0.4 unit per liter) start changing the filter with the oil changes again.
<b>(SCA) Test Cycle</b> .....	Coolant SCA level must be tested at least twice a year and whenever coolant loss occurs. For maximum cooling system efficiency, test the system every 25,000 to 35,000 miles (40,000 to 56,000 km) depending on oil change interval or every 1000 hours or every 6 months (whichever comes first).
<b>(SCA) Test Kit</b> .....	Fleetguard® CC2602 3-Way™ Heavy Duty Test Kit.
<b>(SCA) Type</b> .....	Fleetguard® DCA 4 or Nalcool
<b>(SCA) level</b> .....	Between 1.5 and 3.0 SCA units per gallon (0.4 and 0.8 units per liter) of coolant.
<b>Cooling System Capacities</b> .....	Approximately 53 US quarts (50 liters) with a manual transmission For an automatic transmission, add 10 quarts (9.5 liters)

## Extended Life Coolant (ELC)

(Optional) Color: Red

<b>Coolant Type</b> .....	ELC Antifreeze is a single-phase, ethylene glycol type heavy duty diesel engine coolant/antifreeze. ELC must meet or exceed ASTM D6210 or TMC RP 329 for heavy-duty diesel service.
<b>Coolant Change Interval</b> .....	Replace coolant every 750,000 miles (1,275,000 km) or every 15,000 hours or every eight years, whichever comes first. A one-time ELC extender package must be added to the cooling system after 500,000 miles (850,000 km) or 10,000 hours or four years, to allow for Extended Coolant Service Life up to 1,000,000 miles (1,700,000 km) or 20,000 hours or eight years.
<b>Coolant Filter Change Interval</b> .....	When using ELC Antifreeze, use a coolant filter that does not contain SCAs. Replace filter every 150,000 miles (240,000 km) or 2500 hours or 15 months, whichever comes first, to prevent external rusting of the can). For vendor engines, refer to each manufacturer for information.
<b>Coolant Testing</b> .....	The slow depleting additive chemistry does not require regular testing, but the coolant can be tested with a FleetFix Maintenance Test Strip and the FleetFix Dilution Test Kit. The FleetFix Maintenance Test Strip (a measure for nitrite and carboxylate levels, while the FleetFix Dilution Test Kit can determine contamination of ELC and continued protection levels. The freeze protection level should be checked at least twice per year with a standard refractometer. -35°F (-2°C) is the freeze point of approximately 50/50 ELC coolant.

## Extended Service Coolant (E/S)

(Optional) Color: Blue

FleetGuard E/S Compleat

**Coolant Type** ..... E/S Antifreeze /Coolants are Extended Life formulations that contain Ethylene Glycol base fluids and are designed specifically for Extended Service use in heavy-duty diesel engines. E/S COMPLEAT contains conventional heavy-duty chemical inhibitors and eliminates hard water scale deposits.

**Coolant and Filter Change Interval** ..... When using E/S Antifreeze, use a coolant filter with ES slow release coolant filters or liquid E/S extender to provide simplified coolant maintenance while extending coolant service intervals to 12 months or 150,000 miles. E/S COMPLEAT can also be used in standard coolant service intervals with the use of SCA's and standard coolant filters. Replace filter every 150,000 miles (240,000 km) or 2500 hours or 12 months, whichever comes first, to prevent external rusting of the can). For vendor engines, refer to each manufacturer for information.

**(SCA) Test Cycle** ..... Coolant SCA level must be tested at least twice a year and whenever coolant loss occurs. For maximum cooling system efficiency, test the system every 35,000 miles (40,000 to 56,000 km) depending on oil change interval or every 1000 hours or every 6 months (whichever comes first).

**For more details, refer to the coolant manufacturer's guidelines.**

E/S Compleat is a trademark of FleetGuard®.

## Extended Life Coolant GHG 2017

For GHG 2017, Volvo's Extended Life Coolant (ELC) is nitrite free. The recommended coolant drain interval for extended life coolant will remain the same (750,000 miles for medium highway duty cycle). The Nitrite Organic Acid Technology (NOAT) and Organic Acid Technology (OAT) nitrite free are compatible with no mixing issues or reduction in coolant life.

## Water Specifications

Water Specification	Parts per million (ppm)	Grains per Gallon	pH	µS/cm	mg/KmnO4/l
Chlorides, maximum	< 40	< 2.34			
Sulfates, maximum	< 100	< 5.8			
Total dissolved solids, maximum	< 340	< 20			
Total hardness	< 170	< 10			
pH			5.5-9		
Silica	< 20	< 1.17			
Iron	< 0.10	< 0.0058			
Manganese	< 0.05	< 0.0029			
Conductivity				< 500	
CODMn					< 15

### Notes

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# Coolant

**Note:** DO NOT mix different coolant products, such as regular antifreeze and extended life antifreeze, etc.

## Coolant Requirements

Volvo Trucks North America recommends the use of low silicate ethylene glycol base coolant for heavy duty engines. This coolant must meet or exceed ASTM D6210 or TMC RP329.

Volvo does not recommend the use of antifreeze based on propylene glycol.

There are two types of coolants recommended for the Volvo engines. One type requires the addition of Supplemental Coolant Additives (**SCAs**) to maintain the desired properties of the coolant.

The other type uses no SCAs. This type of coolant is often referred to as **ELC** (Extended Life Coolant).

**Note:** The two types of coolant are not to be mixed since this would have negative effects on the coolant's properties.

**Note:** Antifreeze or premixed coolant meeting the standards ASTM D3306 or ASTM D4656 are primarily for automotive gasoline engines, containing high levels of silicate and are unacceptable for heavy duty diesel engines. The silicates will clog the radiator and leave unwanted deposits in the engine.

## Coolant Capacity

**Note:** Refer to your Owners Manual for Coolant Capacity.

### Coolant quality

The coolant currently used in most of the application is Volvo VCS (Red/Orange). **Effective August 24th, 2023,**

#### Product details:

- Color: Red/Orange
- Advanced Phosphate Organic Acid Technology (POAT)
- 2EHA & Nitrite Free Formula
- Cooling System Protection: 1.5 million mile/10 Years/36,000 hours
- Eliminates the need for Extenders and Supplemental Coolant Additives (SCAs)
- Superior Water Pump Protection: Perfect 10 water pump test rating
- Outstanding protection against corrosion, cavitation, scale, and deposits.

**Note:** Do not mix the coolant with any additives. Other chemical agents may not be compatible with coolant or with the cooling systems of Volvo products.

### Recommendations for coolant change

The systems in contact with VCS must be drained/purged and then completely rinsed or flushed with demineralized/deionized water before changing from VCS to VCS-2 coolant.

The coolant must be visually checked before using for the first time. The coolant color must be orange at the outlets.

**V O L V O**

**Volvo Trucks North America**

<http://www.volvotrucks.com>