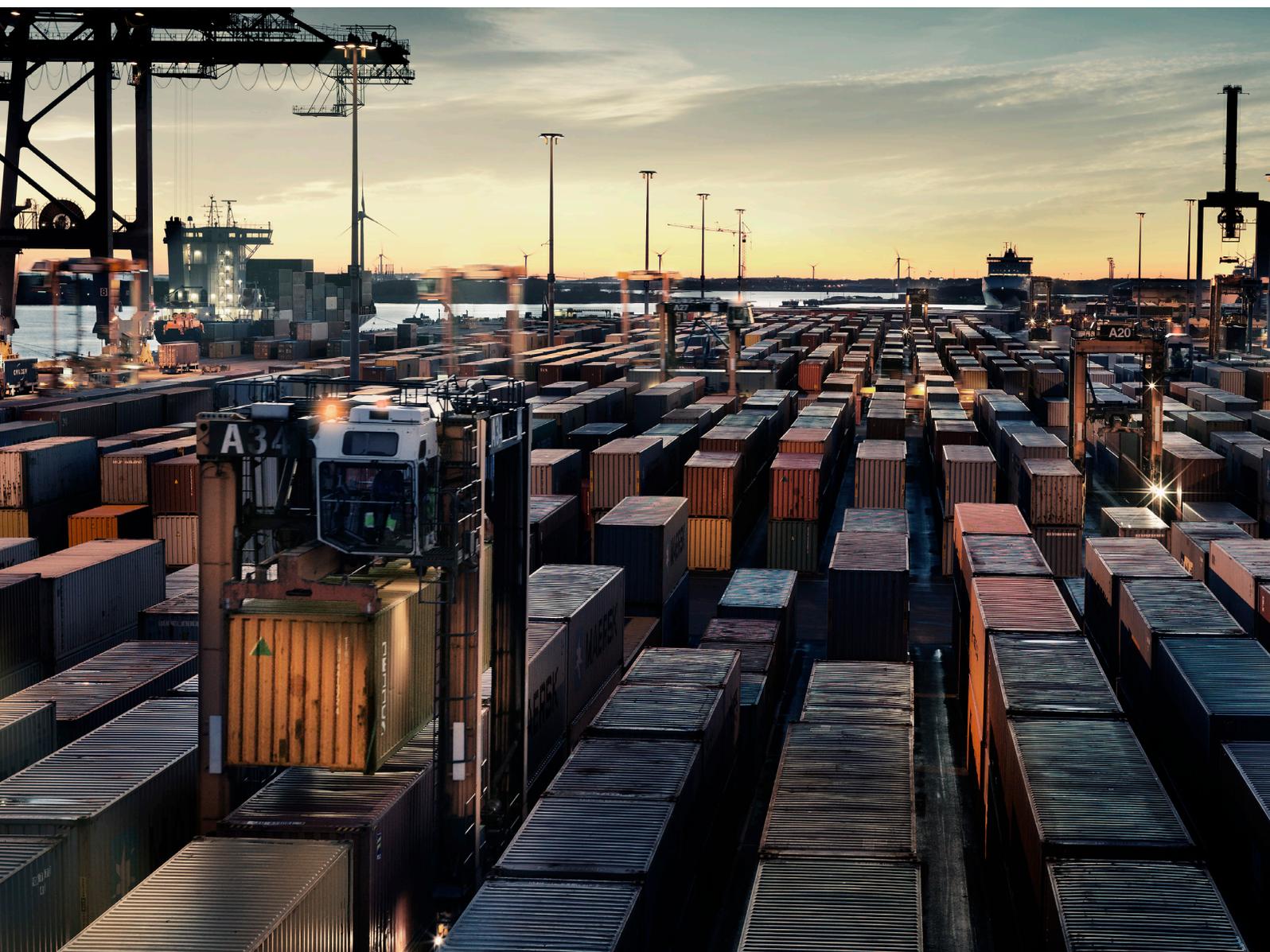


V O L V O P E N T A

OPERATOR'S MANUAL

17L





WARNING!

Operating, servicing and maintaining a marine vessel can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead which are known to the State of California to cause cancer and birth defects or other reproductive harm.

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust when operating, servicing and maintaining the engine.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Wear gloves or wash your hands frequently when servicing the vessel.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information

www.P65warnings.ca.gov/marine

www.p65warnings.ca.gov/products/diesel

Table of Content

Foreword	3
Safety Information	4
Before start of engine	8
Introduction	12
Fuel, oils and coolant	13
Maintenance and replacement parts	13
Excessive strain on a product and components	14
Blue light mode	16
Volvo Penta Dealer Network	17
Volvo Penta Action Service	17
Presentation	18
Engines	18
ECM4 (Engine Control Module)	19
Instruments and Controls	20
Control Interface Module	20
Easy Link Instruments	24
Starting	25
Before Starting	25
Starting the Engine	25
CIM (Control Interface Module)	26
Starting Using Auxiliary Batteries	26
Operation	27
Reading the Instruments	27
Alarms	27
Maneuvering	27
Operation at low load	27
Engine Shutdown	29
Before Engine Shutdown	29
Stop the Engine	29
Auxiliary Stop	29
After Engine Shutdown	30
Fault handling	31
Diagnostic Function	31
CIM (Control Interface Module)	31
Erasing fault codes	32
Maintenance Schedule	33
Maintenance	34
Orientation	34
Engine, General	35
Lubrication System	36
Oil level, checking and topping up	36
Fuel System	37
Cooling System	38
Coolant Level, Checking and Topping Up	39
Electrical System	40
Main switch	40
Electrical Connections	40
Battery	41
Storage	43
Technical Data	46

Engines	46
Lubrication System	47
Fuel System	48
Cooling System	50
Coolant, Mixing	50
Water Quality	51
Identification Numbers	52
Index	57

Foreword

Welcome!

Volvo Penta engines are designed to fulfill Volvo's core values; quality, safety and environmental care. After more than 100 years as an engine manufacturer, the Volvo Penta brand has also become a symbol of reliability, technical innovation, top-of-the-range performance and long service life. Volvo Penta engines are used all over the world, in different operating conditions.

Make sure to thoroughly read through the Operator's Manual regarding operating and maintenance. It contains the information you need to be able to operate and maintain the engine safely and correctly. Pay careful attention to the safety instructions included in the manual.

As the owner of a Volvo Penta engine, you become part of a worldwide network of dealers and service workshop that assist you with technical advice, service requirements and replacement parts. Contact your nearest authorized Volvo Penta dealer for assistance.

It is possible to buy additional literature about your Volvo Penta engine. More information on how to do this can be found at www.volvopenta.com.

Information about your closest Volvo Penta dealer and other useful news and information can be found at www.volvopenta.com and by following Volvo Penta on Facebook.

**V O L V O
P E N T A**

www.volvopenta.com



www.facebook.com/volvopenta

Safety Information

This chapter describes how safety precautions are presented in the manual and on the product. Read the chapter through very carefully before you start the engine or do any maintenance or service. It has to do with your safety; an incorrect operation can lead to personal injury and damage to products or property. It also gives you an introduction to the basic safety rules for using and looking after the engine.

If anything remains unclear or if you are unsure of something, contact your Volvo Penta dealer for assistance.

IMPORTANT:

Always follow local safety instructions and regulations.

Safety texts have the following order of priority:

DANGER!

Indicates a hazardous situation, which, if not avoided, result in death or serious injury.

WARNING!

Indicates a hazardous situation, which, if not avoided, could result in death or serious personal injury.

CAUTION!

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate personal injury.

IMPORTANT:

Indicates a situation, which, if not avoided, could result in property damage.

NOTICE! Used to draw attention to important information that facilitates work or operations.



This symbol is may be used on the product to call your attention to the fact that this is safety information. Always read such information very carefully.

Make sure that warning and information symbols on the engine are clearly visible and legible. Replace symbols that have been damaged or have been painted over.



In some cases, this symbol is used on our products and refers to important information in the Operator's Manual.

Most chemicals such as engine and transmission oils, glycol, petrol and diesel oil and chemicals used in workshops such as degreasing agents, paint and solvents are harmful to health.

Carefully read the instructions on the product packaging! Always follow the safety regulations, such as the use of protective masks, goggles, gloves, etc. Make sure that other personnel are not exposed to substances that are hazardous to health. Ensure good ventilation.

Manage used and leftover chemicals in the prescribed manner.

Daily Checks

▲ WARNING!

Do not start the engine if there is reason to suspect fuel leaks or if there is explosive material nearby.

Make it a habit to give the engine and engine compartment a visual check before the engine is started and after operations, once the engine has stopped. This helps you to quickly discover fuel, coolant or oil leakages or any other abnormality that has occurred, or is about to occur.

Personal safety equipment

▲ CAUTION!

Always use appropriate safety equipment. Personal protective equipment does not eliminate the risk of injury but it will reduce the degree of injury if an accident does happen.

Some examples are ear protection, eye and face protection, protective footwear, personal protective equipment, head protection, protective clothing, gloves and respirators.

▲ WARNING!

Ensure that all machine guards and safety devices are in place and are functional.

▲ CAUTION!

Never use tools or products that show signs of damage.

Protect your eyes

▲ CAUTION!

Wear safety glasses.

Always wear safety glasses if there is a risk of splintering, sparks and spray from the electrolyte (so-called battery acid), or other chemicals. Your eyes are very delicate and damage can result in loss of sight!



P0024482

Protect your skin

⚠ CAUTION!

Risk of skin damage.

Avoid getting oil on your skin! Prolonged or repeated exposure to oil can dry out the skin. Thereafter, irritation, dryness and eczema and other skin problems may occur.

Use protective gloves and avoid oil-soaked clothes and rags. Wash regularly, especially before eating. Wear suitable protective creams to prevent skin from drying out and to facilitate cleaning.

Fire safety

⚠ WARNING!

Fire and Explosion Risk!

Accidental spark could ignite fuel vapors.

All fuels – as well as many lubricants and chemicals – are flammable. Do not allow open flames or sparks near them. **Smoking forbidden!** Hydrogen from the batteries is also very flammable and explosive in certain mixture with air.

Ensure that the workplace is well ventilated and take the necessary precautions before welding or grinding begins. Always ensure that there is a fire extinguisher close at hand in the work area.



P0024470

Spare parts — safety

⚠ WARNING!

Always use spare parts with the same quality as genuine Volvo Penta parts to minimize the risk of an explosion or fire.

Components in fuel systems and electrical systems on Volvo Penta engines are designed and manufactured to minimize the risk of explosions and fire, in accordance with applicable legal requirements.

Used oils, filters and chemicals etc.

⚠ WARNING!

Risk of fire.

Store fuel soaked rags and other flammable material so that there is no danger of them catching fire.

Oil-soaked rags can spontaneously ignite under certain circumstances.

IMPORTANT:

Used fuel and oil filters are environmentally hazardous waste and must be taken to an approved waste management facility for correct handling, as must any used lubricating oil, contaminated fuel, paint residue, solvents, degreasers and wash residue.

Prevent start of the engine

⚠ WARNING!

Immobilize the engine by turning off the power supply with the main switch(es) and lock it (them) in the off position before starting work. Place a warning notice at the main switch.

If the engine is equipped with BMS (Battery Management System), always disconnect both battery cables from the battery terminals.

Ventilation when running the engine

⚠ WARNING!

Only start the engine in a well-ventilated area. If operating the engine in a closed area ensure that there is exhaust ventilation leading out of the work area to remove exhaust gases and crankcase ventilation emissions.

The engine must not be operated in areas where there are explosive materials or stored gas.

Rotating parts and hot surfaces

⚠ DANGER!

Working with or approaching a running engine is a safety risk. Watch out for rotating components and hot surfaces.

If the engine is in operation and operates another device, you must not, under any circumstances, staying close to the engine.

Work on running engines is strictly prohibited. There are however adjustments that require the engine to be run. Approaching a running engine is a safety risk. Loose clothing and long hair can get caught in the rotating parts; careless movements or a dropped tool can lead to serious personal injury.

Be careful to avoid hot surfaces (exhaust pipes, turbochargers, charge air manifolds, start elements etc.) and hot fluids in pipes and hoses on engines that are running or have just stopped. Re-install all protective covers that were removed during maintenance work before starting the engine.

Information on the engine

IMPORTANT:

Make sure that all warning and information decals on the product are always visible. Replace decals which have been damaged or painted over.



P0024481



P0024808



P0024483



P0024688

Prohibition on use of start spray

⚠ WARNING!

Never use start spray or similar agents to start an engine. This may cause an explosion in the inlet manifold. Risk of personal injury.

Before start of engine

⚠ WARNING!

Never start the engine if there is reason to suspect fuel and/or gas leaks, or if there is explosive material nearby.

IMPORTANT:

Only start the engine with the air filter and protective caps fitted. Foreign objects in the inlet line could cause machine damage. Also make sure that no tools or other parts have been left next to the engine.

⚠ WARNING!

Never start the engine with the valve cover removed. There is a risk of personal injury. For engines with turbochargers, the rotating compressor turbine can in addition cause serious personal injuries.

Before any work on the electrical system

⚠ WARNING!

Always stop the engine first. Then disconnect the current at the main switches and any external power supply before working on the electrical system – to minimize the risk of electrical hazards.

IMPORTANT:

Never disconnect the current using the main switches when the engine is running or by disconnecting the battery cables. The alternator and electronics could be damaged.

Avoid damage to the engine control module and other electronics

IMPORTANT:

Switch off the main switch before connecting or disconnecting a connector.

Before welding work

IMPORTANT:

Before any work with electric weld can begin, the connection to all control units must be disconnected. After finished welding, re-connect the connection to all control units before connecting any battery cable.

Before any work on the cooling system

⚠ WARNING!

Stop the engine and let it cool before starting work on the cooling system. Hot fluids and hot surfaces can cause burns.

Hot coolant under pressure

⚠ CAUTION!

Hot coolant can cause burns. Avoid opening the filler cap for the coolant when the engine is still hot. Steam or hot coolant can spray out and system pressure is lost.

Open the filler cap slowly and release the pressure in the cooling system if the filler cap or valve must be opened – or if a plug or a coolant hose must be removed from a hot engine.

Hot oil under pressure

⚠ CAUTION!

Hot oil can cause burns. Avoid getting hot oil on the skin. Ensure that the lubrication system is not pressurized before starting any work. Never start or operate the engine without the oil filler cap is on. There is a risk that hot oil can spray out.

Refueling

⚠ WARNING!

There is always a risk of fire and explosion during refueling. Smoking is forbidden and the engine must be stopped.

Proper fuel quality

IMPORTANT:

Always use the fuel recommended by Volvo Penta. See *Technical Data* in Operator's Manual. Other fuel can damage the engine.

Wrong fuel quality can also lead to higher service costs.

⚠ WARNING!

Risk of personal injury.

Wrong fuel quality in a diesel engine can cause the fuel control mechanism to bind which can cause the engine to overspeed!

Legal requirements to use proper fuel

IMPORTANT:

To meet regulatory requirements for certified emission levels must always recommended fuel according to *Technical Data* in the Operator's Manual be used.



P0024477



P0024488

At any leak detection on the fuel system

⚠ WARNING!

Wear safety goggles!

Be extremely careful when searching for leaks in the fuel system high-pressure circuits. There is very high pressure in the jet from pipes and injectors. The fuel may penetrate the tissue and cause serious risk of blood infection (septicemia).

Handling of fuel pipes

IMPORTANT:

High pressure pipes for fuel must not be bent or straightened under any circumstances. Cracks may occur. Damaged pipes must be replaced.

Safe handling of batteries

⚠ WARNING!

Risk of fire and explosion. Never allow an open flame or electric sparks near the batteries.

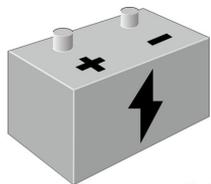
A spark caused by an incorrectly connected battery can be enough for the battery to explode with serious injuries.

Do not touch the connections during start attempts. Sparking hazard! Do not lean over batteries.

Correct polarity of the batteries

IMPORTANT:

Make sure that the positive (+) and negative (-) battery cables are correctly connected to the corresponding battery terminals. Wrong connection may cause severe damage to electrical equipment.



P0024468

Risks of electrolyte in batteries

⚠ WARNING!

Always wear protective goggles when charging or handling batteries.

Battery electrolyte is highly corrosive.

Rinse immediately with copious amounts of water if the electrolyte gets in your eyes. Search directly after the rinsing help by medical staff.

If it comes electrolyte to unprotected skin, wash immediately with soap and water.

Layout of the battery compartment

IMPORTANT:

Make sure the battery compartment is designed according to current safety standards.



P0024486

Cleaning the engine and components

IMPORTANT:

Never use a high pressure washer for cleaning of engine or engine components.

Cleanliness for sensitive components

IMPORTANT:

Observe meticulous cleanliness when handling system components.

Even minimal amounts of dirt could cause a breakdown.

Introduction

Check that you have received the correct operator's manual before continuing reading. If not, please contact your Volvo Penta dealer.

For engine designations, refer to *Engine*. The designation is stated on the engine plate, refer to , *page 52*.

The illustrations in this book may cover several product types, which means that there may be slight differences between the illustrations and the purchased product. This does, however, not affect the validity of the information and/or instructions in the manual. Volvo Penta reserves the right to make alterations to specifications, design features, and illustrations without prior notice.

To retain the dependability and exhaust emission control originally built into all Volvo Penta engines, it is essential that the engines and receive periodic maintenance according to the maintenance instructions.

At service, software that affects the functionality described in this manual can be updated.

About this manual

This Operator's Manual contains the information required for the correct, safe operation and maintenance of your Volvo Penta engine. Read the Operator's manual carefully and learn to handle the engine and other equipment in a safe manner before you start the engine.

Warranty

Your new Volvo Penta engine is covered by a limited warranty, subject to the conditions compiled in the Warranty Information. AB Volvo Penta's liability is limited to the specification in the Warranty Information and Emission Control System Warranty Statement.

Read the information carefully, as soon as possible after delivery. It includes important information about service and maintenance; the owner is responsible for being familiar with checking and implementing these. Otherwise AB Volvo Penta may deny its warranty obligations in part or in full.

Contact your Volvo Penta dealer if you have not received information on how to access the Warranty Information or recived the Service Book.

Extended Coverage

With the Extended coverage options, customized for each engine's particular needs and working conditions, you can take total control of upcoming operational costs.

For more information regarding our different Services, visit volvopenta.com or contact your Volvo Penta representative.

Running in the engine

The engine must be run in during its first 10 operating hours, as follows:

Run the engine in normal operations. However, full load may not be applied other than for short periods.

Higher oil consumption is normal during the first 100– 200 hours of operation. For this reason, check the oil level more frequently than the normal recommendation.

When a disengageable clutch is installed, it should be checked more carefully during the first days. Adjustments may be necessary to compensate bedding-in of the friction plates.

Fuel, oils and coolant

Only use the fuels and oils recommended in the Operator's Manual (Technical Data), other viscosity and quality may cause malfunctions, increased fuel consumption and possibly shorten the life of the engine.

Always change the oil, oil filters and fuel filters at the specified maintenance intervals.

Make sure to always use suitable and correctly mixed coolant.

If an unsuitable coolant has been used, or if the instructions for coolant mixture have not been followed, future warranty claims related to engine and accessories may be denied.

Maintenance and replacement parts

Volvo Penta engines are designed for maximum reliability and long life and built to withstand a demanding environment. The engines are also designed to have a minimal environmental impact. These qualities will be maintained through regular servicing and the use of spare parts with the same quality as genuine Volvo Penta parts. If reliable and purpose-built parts are not used, your safety, health, and the machine's function may be compromised. Volvo Penta has a world-wide network of authorized dealers.

The authorized dealers are Volvo Penta product specialists, and have the accessories, genuine parts, test equipment and special tools needed for high quality service and repair work. Remember to note the engine / transmission identification number when you **order service and spare parts**.

Excessive strain on a product and components

Volvo Penta products and components are not dimensioned for external loads. Never stand or step onto an engine, transmission or its components. Loads can bring about damage and the malfunction of a product or property.

Environmental care

Environmental care is a core value at Volvo Penta. Energy efficiency and low emissions are among the most important product related aspects and priority focus areas for Volvo Penta business. Several of the global challenges the world faces are directly or indirectly related to power industries and transports. We recognize that Volvo Penta is part of the environmental problems, but we are also convinced that we are a part of the solution.

Volvo Penta currently has a broad engine program in which great advances have been made in reducing exhaust emissions in the same time as the fuel consumption has been improved. Through regular maintenance, the Volvo Penta engines retain its low fuel consumption and low emissions. We hope that you will be keen to preserve these qualities.

Always follow the directions in the Operator's Manual regarding fuel grades, operation and maintenance to avoid unnecessary environmental impact. Contact your Volvo Penta dealer if you notice any changes such as increased fuel consumption or exhaust smoke.

Remember always to hand in environmental hazardous waste such as drained oil, coolant, old batteries, etc. for treatment at a recycling facility. Our united efforts can make a valuable contribution to the environment.

Certified engines

If you own an emission-certified engine used in an area where exhaust emissions are regulated by law, this places special demands on the care and maintenance you provide your engine.

NOTICE! Neglects or failure to follow the points listed here may invalidate the engine emission certificate. This means AB Volvo Penta can no longer guarantee engine conformity with the certified model. Volvo Penta is not responsible for damages or costs arising as a result of this.

- Certification means that an engine type has been checked and approved by the relevant authority. The engine manufacturer guarantees that all engines of the same type are equivalent to the certified engine.
- It is the responsibility of the operator/user to ensure that no intentional misuse of the engine takes place.
- Volvo Penta maintenance and service intervals must be complied with.
- Any case of malfunction must be rectified without delay.
- Only use genuine Volvo Penta parts or spare parts with the same quality as genuine Volvo Penta parts.
- Volvo Penta recommends that service to injection pumps, pump settings and injectors always are carried out by a qualified workshop.
- The engine must not be converted or modified in any way, except with accessories and service kits that Volvo Penta has approved for the engine.
- No installation changes to the exhaust pipe and engine air inlet ducts may be made.
- No warranty seals (where present on the product) may be broken by unauthorized persons.

NOTICE! All kind of tampering or modifications of the engine and it's EATS system will void the type-approval of this particular engine.

Stationary emergency application

If the engine is ordered for stationary emergency applications, it can only be used for emergency operations and required maintenance and testing.

Blue light mode

NOTICE! The functionality for Blue light mode only exists on engines ordered with this function.

The function has been developed for applications intended for use in a qualified emergency situation proclaimed by a national or regional government (authority), its emergency services (or its armed forces). All other use of the function constitutes a violation of the law. Examples of applications can be fire pumps, emergency vehicles or generators.

Activate

The function for Blue light mode is activated automatically and prohibits lowering of performance due to defects in the engine or the aftertreatment system. Triggers for derate due to engine protection are removed. The engine sends warning messages but is not going into derate or shut-down.

Volvo Penta Dealer Network

The Volvo Penta global network of authorized dealers is at your service. We strongly recommend that you take your product to an authorized Volvo Penta dealer for service and repair. They are specialists in Volvo Penta products and have the accessories, genuine Volvo Penta parts, the special tools and the latest service information for high quality service and repair work.

Dealer Locator Services

Locate the nearest Volvo Penta dealer through our dealer locator on www.volvopenta.com or download the dealer locator app to your smartphone.

Volvo Penta Action Service

Our global dealer network, your first line of contact, is backed up by Volvo Penta Action Service, a phone based breakdown and support service providing assistance 24 hours a day, every day of the year.

How it works

A dedicated operator will support you all the way through your case and keep you updated on status and progress.

Whenever on-site assistance or technical support is needed, the operator will put you in contact with the closest Volvo Penta dealer that can support your product.

Phone numbers

Find your Volvo Penta Action Service phone number and more information on www.volvopenta.com.



P0038980

Presentation

Engines

This Operator's Manual contains the industrial engine TWD1744GE.

TWD1744GE is a reliable, powerful and compact in-line 6 cylinder diesel engine. It's designed to power a wide range of stand-by and prime power generator sets.

This 17 liter diesel engine utilizes dual-stage turbochargers and heavy-duty steel pistons to provide excellent power density. It features a proven combustion technology with Common Rail injection system, resulting in high fuel efficiency and low exhaust emission levels.

The engine also features a compact and low weight design that is well-balanced, providing smooth operation with low noise. It's designed for easily accessible service points.



P0038057

ECM4 (Engine Control Module)

ECM4, an electronically controlled processing system which optimizes engine performance. It also include advanced facilities for diagnostics and fault tracing.

The instruments and controls connect to the engine via the CAN SAE J1939 interface.

Sensors for inputs such as: oil pressure, oil temp, boostpressure, boost temp, coolant temp, air filter pressure, water in fuel and fuel pressure.

Instruments and Controls

Control Interface Module

The Volvo Penta Control Interface Module (CIM) instrument panel communicates with the engine control unit and has a number of functions as control, monitoring and diagnostics.

NOTICE! Settings and the type of engine data presented on the display may vary depending on the installation and engine model.

NOTICE! The menus and illustrations shown here are the English version. Refer to the section *Settings* to change the display language.



P0018811

 Turn On/Off the ignition

 **START** Start the engine

 Reduce engine rpm

 Increase engine rpm

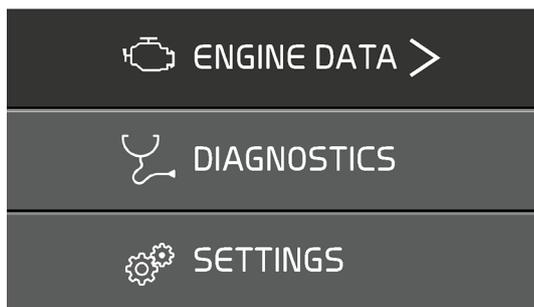
 **STOP** Stop the engine

 Scroll upwards in menus

 **OK** Select and confirm in menus

 Scroll downwards in menus

 Return to previous menu selection



P0028070

Display

The basic view shows three main menus.

- **ENGINE DATA** (ENGINE DATA), shows current engine data.
- **DIAGNOSTICS** (DIAGNOSTICS), shows fault codes.
- **SETTINGS** (SETTINGS), shows display and engine settings.

Press **OK** to proceed in the submenus and scroll using the panel arrow buttons.

Press **←** to return to previous menu.

Status bar

The status bar with symbols for active malfunctions is shown in the top right of the display.

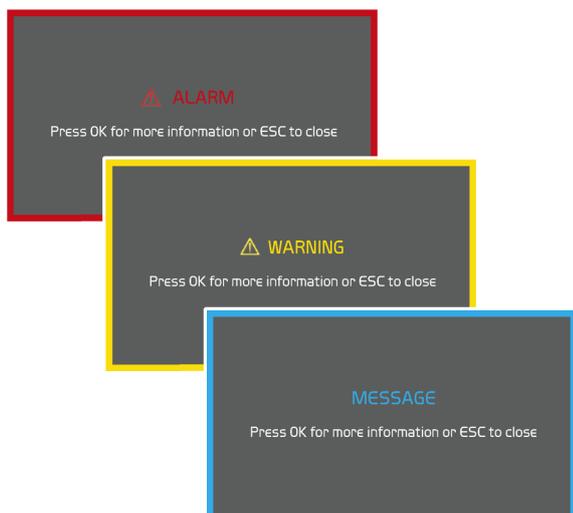
	Emission related malfunction
	EMS system malfunction

Alarms and messages

Messages to the operator are of three types, color coded according to degree of severity.

When a message is shown on the display, press **OK** to reach the diagnostic menu to get more information regarding registered faults and instructions for remedial actions.

- **ALARM** (ALARM), red text, the system has detected a serious fault — Volvo Penta recommends to immediately contact a qualified workshop .
- **WARNING** (WARNING), yellow text, the system has detected a fault — Volvo Penta recommends to contact a qualified workshop as soon as possible.
- **MESSAGE** (MESSAGE), blue text, non-critical engine message for the operator.



P0028068

ENGINE DATA

Fuel level	87 l ^
AdBlue/Def level	15 l
Soot load level	34 %
Exhaust temperature	211 °C
Engine speed	1500 rpm

P0028067

Menus

ENGINE DATA (ENGINE DATA)

Engine data shown may vary depending on the engine installation.

- **Engine Hours** (Engine Hour)
- **Engine Speed** (Engine Speed) (rpm)
- **Coolant Temperature** (Coolant Temperature) (°C/°F)
- **Oil Pressure** (Oil Pressure) (kPa)
- **Fuel Rate** (Fuel Rate) (l/h/gph)
Current fuel consumption.
- **Boost Temperature** (Boost Temperature) (°C/°F)
- **Boost Pressure** (Boost Pressure) (kPa)
- **Oil Temperature** (Oil Temperature) (°C/°F)
- **Battery voltage** (V)
- **Engine load** (%)
- **Fuel delivery pressure** (bar/psi)
- **Throttle/pedal percent** (%)
- **Fuel level** (l/g)
- **Def/Aus level** (l/g)
- **Soot load level** (%)
- **Exhaust temperature** (°C/°F)

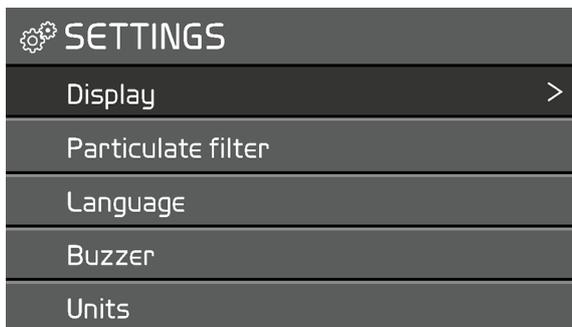
DIAGNOSTICS

- Coolant level low >
- Coolant temperature high
- Historical alerts

P0028065

DIAGNOSTICS (DIAGNOSTICS)

If the system detects a malfunction, the operator is informed via a pop-up message on the display. The fault codes are listed in the diagnostics menu; active fault codes. For more information regarding cause and remedies, use the arrow button to scroll to the fault concerned and press **OK**. This will also provide information about number of engine hours when the fault became active and the SPN and FMI codes.



P0028270

SETTINGS (SETTINGS)

Display (Display)

- **Set backlight time** (Set backlight time). On/OFF, sets backlight to run in standby mode. *On* is the default setting.
- **Set backlight brightness** (Set backlight brightness). Adjust display backlight brightness using the panel arrow buttons.
- **Set Instrument Brightness** (Set Instrument Brightness). Sets backlighting in the display instrument.
- **Change background color** (Change background color). Select background color, gray or white.

Particulate filter, only applicable for VE

- Start regeneration, here you can manually start the regeneration when all requirements for regeneration are met.

Language (Language)

Sets the display language; chooses between English, French, German, Spanish, Italian, Brazilian-Portuguese, Russian and Chinese.

Buzzer

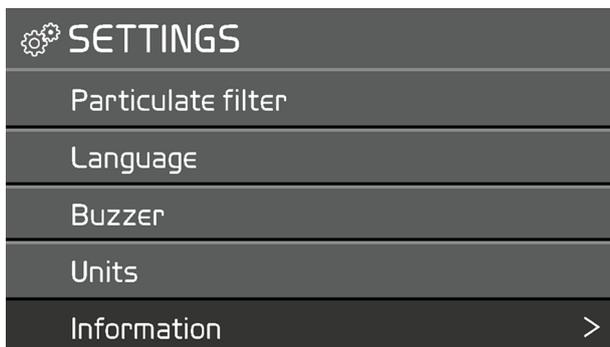
Enable/Disable (Enable/Disable)

Option to disable the built-in buzzer in the CIM.

Unit

- Metric
- imperial

NOTICE! Here you choose which devices you want to use, metric or imperial.



P0028160

Information

Reading CIM information

- **Engine Hardware ID** (Engine Hardware ID)
- **CIM hardware ID** (CIM hardware ID)
- **Engine Software ID** (Engine Software ID)
- **CIM Software ID** (CIM Software ID)
- **Chassis ID** (Chassis ID)

Easy Link Instruments

The following Easy Link instruments are available:

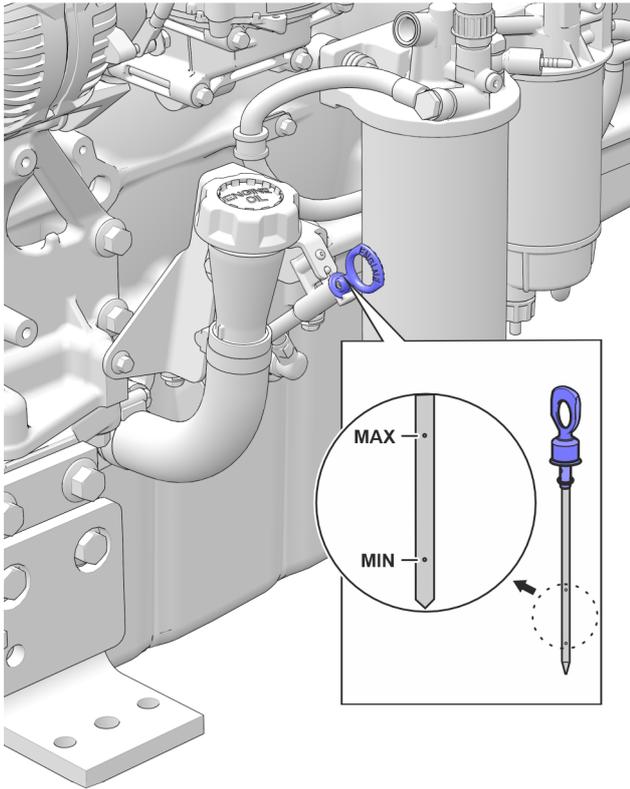
- Tachometer / hours counter (fault codes are also displayed on the tachometer display when the diagnostic button is pressed)
- Coolant temperature
- Oil pressure
- Oil temperature
- Battery voltage
- Alarm panel
- Turbo pressure

Starting

Make it a habit of giving the engine and engine room a visual check before starting. This will help you to discover quickly if anything abnormal has happened, or is about to happen. Also check that instruments and warning displays show normal values after you have started the engine.

⚠ WARNING!

Never use start spray or similar agents to start an engine. This may cause an explosion in the inlet manifold. Risk of personal injury.



P0039034

Before Starting

- Check that the oil level is between the MIN and MAX marks.
For filling refer to *Oil level, checking and topping up*.

NOTICE! The engine should be placed on a level position when the oil is checked. Dipstick can be read when the engine is stopped.

- Open the fuel valves.
- Check the fuel pre-filter; refer to *Draining condensate, fuel system*.
- Check the coolant level and that the radiator is not blocked externally. Refer to *Coolant Level, Checking and Topping Up, page 39* and *Charge Air Cooler, External Cleaning*

⚠ WARNING!

Do not open the coolant filler cap when the engine is hot, except in emergencies, as this could cause serious personal injury. Steam or hot fluid could spray out.

- Check that no leakage of oil, fuel or coolant is present.
- Turn the main switch(es) on.
- Move the engine speed control to idle, and open the disengageable clutch/gearbox if installed.

IMPORTANT:

Never break the circuit with the main switch while the engine is running. Alternator and electronics could be damaged.

Starting the Engine

The pre-heating time (optional) is adjusted to suit the engine temperature, and can last for up to 50 seconds both before and after starting.

The starter motor cranking time is maximized to 20 seconds. After that, the starter motor circuit is temporarily cut to protect the starter motor from overheating.



P0018811

CIM (Control Interface Module)

- 1 Press the  button to switch on the ignition. The display switches on at the same time.
- 2 If preheat is activated, wait until heating icon has disappeared until START is requested.
- 3 Press the START button to start the engine.

Starting Using Auxiliary Batteries

WARNING!

Explosion hazard. Batteries contain and give off an explosive gas which is highly flammable and explosive. A short circuit, open flame or spark could cause a violent explosion. Ventilate well.

- 1 Check that the auxiliary batteries are connected (series or parallel) so that the rated voltage corresponds to the engine system voltage.
- 2 First connect the red (+) jumper cable to the auxiliary battery, then to the flat battery. Then connect the black (-) jumper cable to the auxiliary battery and to a location that is **somewhere away from the discharged battery**, e.g. the main switch negative terminal or the negative terminal on the starter motor.
- 3 Start the engine.

WARNING!

Do not touch the connections during the start attempt: Risk of arcing.

Do not bend over any of the batteries either.

- 4 Remove the cables in the reverse order.

IMPORTANT:

The ordinary cables to the standard batteries must not under any circumstances be loosened.

Operation

Correct operating technique is very important for both fuel economy, environmental protection and engine life. Always let the engine warm up to normal operating temperature before operating at full power.

Reading the Instruments

Check all instruments directly after starting, and then regularly during operation.

NOTICE! On engines in continuous operation, it is recommended that the lubrication oil level is checked at least every 24 hours. Refer to *Oil level, checking and topping up*.

Alarms

If the Control Unit receives abnormal signals from the engine, the control unit generates fault codes and alarms, in the form of lamps and audible warnings. This is done by means of CAN signals to the instrument.

More information about fault codes and fault tracing can be found in the chapter , *page 31*.

Maneuvering

Operation at low load

Avoid long-term operation at idle or at low load. It takes a long time for the engine to reach working temperature, resulting in high viscosity of the oil and large clearances in the engine mechanics. In cold climate, it takes even longer.

The combustion temperature and cylinder pressure can become so low that an effective combustion cannot be ensured. At these conditions unburned fuel could dilute the lubricant oil. Because of the low cylinder pressure, the piston ring performance could be affected causing oil from the crankcase to pass the rings and go further out with the exhaust gases. This mixture of unburned fuel and oil in exhaust gases is referred to as “slobber”. A new engine produces more “slobber” at low load compared to an engine with more hours of operation.

At low load, the pressure in the turbocharger is low and oil could seep past the turbocharger seals and mix with the air into the engine. The consequences can be carbon build-up on valves, piston crowns and the exhaust turbine, which could affect engine performance.

Both conditions can lead to increased oil consumption and eventually external oil leakage from joints in the exhaust system. For example, leakage could be

seen at the exhaust manifold, before and after the turbo, around the muffler and in worse case even in the exhaust end pipe. Consequences could lead to clogged exhaust gas recirculation systems and exhaust aftertreatment systems.

Signs of oil leaking caused by "slobber" do not indicate an engine problem but indicates low load operation. To minimize the risk of malfunctions caused by operation at low load, follow these points as a complement to normal maintenance:

- Run in the engine as soon as possible.
- Load the engine so it reaches working temperature as soon as possible.
- For genset turn off the engine instead of running unloaded for longer periods.
- Avoid load levels below 20% as constant operation.
- If the engine is regularly tested without load, limit the duration of the operation to 5 minutes. Run the engine at full load for about 4 hours once a year, for the carbon deposits in the engine and exhaust system to burn off.
- If visible slobber has occurred, it can be burned off by running the engine on at least 30% load for about 40-60 minutes.

Engine Shutdown

Before Engine Shutdown

Let the engine run at high idle (1500 or 1800rpm) for a minimum of 5 minutes before the shutdown after normal use. Normal use is defined as minimum 50% load. After use with less than 50% load, high idle for approximately 3 minutes is sufficient. This allows engine temperature equalization and prevents boiling once stopped and also allows the turbochargers to cool down. This contributes to long, fault-free service life.

NOTICE! Do not turn off the main switch within 30 seconds after turning off the ignition. This is in order to save engine data to the engine control unit.

Stop the Engine

- 1 Disengage the clutch, if possible.
- 2 Press the STOP button to turn off the engine.
- 3 Press the  button to turn off the ignition.



P0018811



P0025697

Auxiliary Stop

For location of the extra stop, refer to , *page 34*.

WARNING!

Working with or approaching a running engine is a safety risk. Watch out for rotating components and hot surfaces.

After Engine Shutdown

- 1 Check the engine and engine compartment for leaks.
- 2 Turn off the main switches before any long stoppage.
- 3 Carry out maintenance in accordance with the schedule.

For longer breaks in operation

During longer breaks in operation, it is recommended that the engine is warmed up at least once every two weeks. This prevents corrosion in the engine.

If you expect the engine to be unused for two months or more, it should be conserved. Refer to , *page 43* .

IMPORTANT:

If there is a risk of freezing, the coolant in the cooling system must have adequate antifreeze protection.

Refer to , *page 38*.

IMPORTANT:

A poorly charged battery can freeze and burst.

Refer to *Battery, page 41*.

Fault handling

Despite regular service in accordance with the planned maintenance schedule and perfect operating conditions, faults may occur that must be remedied before operations continue. This chapter describes the diagnostics function.

Diagnostic Function

The purpose of the diagnostic function is to monitor, control and protect the engine and its surrounding system and components from damage, as well as to ensure a minimal environmental impact.

If a malfunction is detected the diagnostic function informs of the occurred fault in the form of a fault code. The fault code provides guidance when fault tracing. All fault codes and fault messages can be found in the *Fault Code Register*.

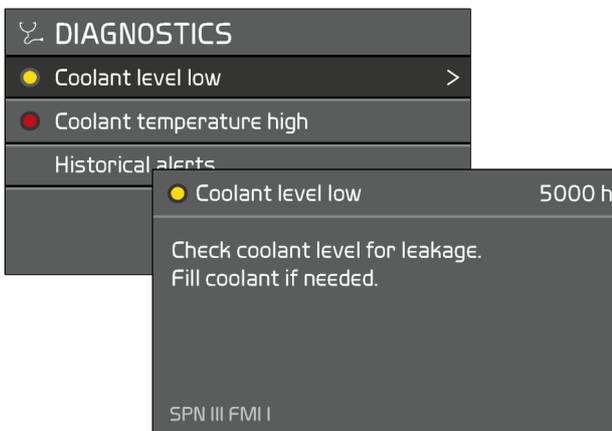
The operator is warned that there is a malfunction via the instruments. Depending on the instrumentation in use, the fault message is shown in various ways. Fault codes can also be read out by the Volvo Penta diagnostic tool.

Depending on the severity of the fault, the diagnostic function will take various actions to protect the engine and limit emissions (e.g. torque derate, idle speed only, engine shut down etc.)

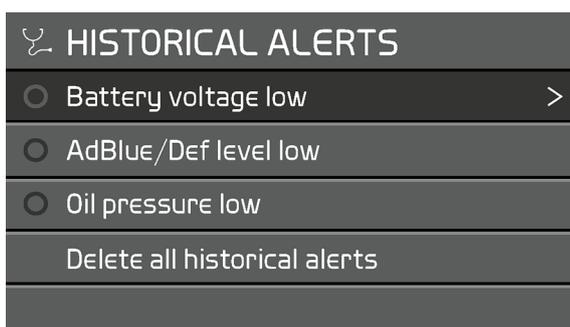
CIM (Control Interface Module)

DIAGNOSTICS

If the system detects a malfunction the driver/operator is informed via a pop-up message on the display. The fault codes are listed in the diagnostics menu; active fault codes. For more detailed information regarding the cause and remedies, use the arrow buttons to scroll to the fault concerned and press **OK**. This will also provide information about the number of engine hours when the fault became active and the SPN and FMI codes.



P0028529



P0028162

Historical Alerts

When fault codes are no longer active, they end up under "Historical Alerts". There you can delete an error code at a time or delete all at once.

Erasing fault codes

The memory of the diagnostic function is reset when the power to the engine is disconnected. When the power is switched on again, the diagnostic function will check if there are any malfunctions in the system. If so a new fault codes is registered.

If a malfunction has not been corrected it will be registered once again and has to be acknowledged again.

Maintenance Schedule

Your Volvo Penta engine and its equipment are designed for high reliability and long life. The engines are built to have the smallest possible environmental impact. If given preventive maintenance, according to the maintenance schedule, these qualities will be retained and unnecessary malfunctions will be avoided. In order for the warranty to be valid, the owner must make sure that the services in the service intervals are performed.

NOTICE! For emission related warranty rights see Emission Control System Warranty Statement.

Service Intervals

Service intervals and the service content can be found in the Service Protocol available for download at www.volvopenta.com.

Where both operational and calendar times are specified, perform the maintenance item at whichever time is the sooner.

NOTICE! Normal service interval for TWD1744GE is 1000 h.

Recommendation

For fuel consumption in excess of 65 l/h, Volvo Penta recommends an oil change interval of 500h or alternatively follow the procedure for extended service intervals with oil analysis.

Extended service intervals

The interval between engine oil changes may be extended in certain circumstances. To determine whether the service interval may be extended, Volvo Penta's conditions for extended service intervals must be met and an oil analysis performed. Contact your Volvo Penta dealer for further information.

Maintenance

When ordering service or spare parts, always specify the engine and transmission identification number. Refer to , page 52.

NOTICE! More information on how to perform service and maintenance can be found at www.volvopenta.com.

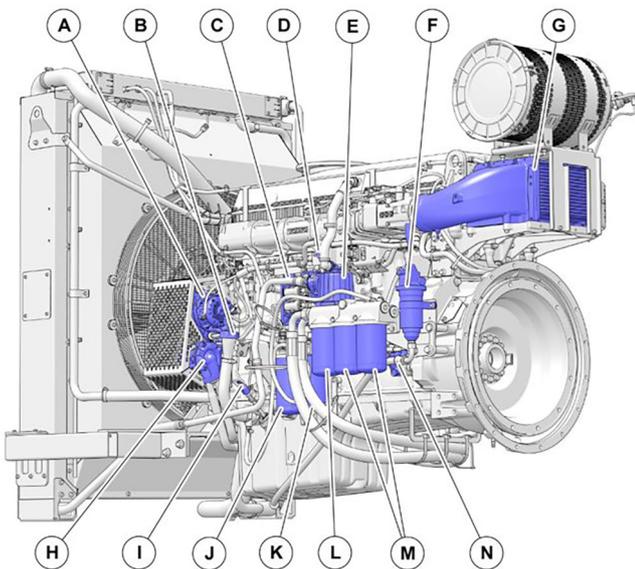
⚠ CAUTION!

Read through the safety advice before starting any work.

⚠ WARNING!

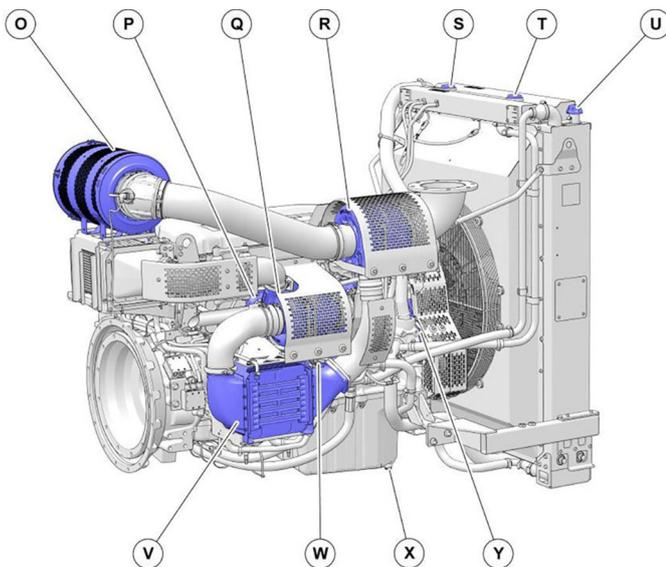
Care and maintenance work should be done with the engine stopped unless otherwise specified. Stop the engine before opening or removing the engine hatch/hood. Make it impossible to start the engine by removing the start key and cutting the system voltage with the main switches.

Orientation



P0039126

- A Alternator
- B Oil filler cap, engine
- C Control Unit
- D Auxiliary Stop
- E CCV-Unit
- F Hand pump, engine oil drain
- G Charge air cooler (High-Pressure Turbo)
- H Coolant pump, intercooler circuit
- I Oil dipstick
- J Fuel filter
- K Fuel prefilter with water monitor
- L By-pass filter
- M Full flow filter
- N Fuel feed pump



P0039127

- O Air Filter
- P Filler cap, lubricating oil cooler
- Q High-Pressure Turbo
- R Low-Pressure Turbo
- S Pressure cap, intercooler circuit
- T Pressure cap, cooling system
- U Filling cap, cooling system
- V Charge air cooler (Low-Pressure Turbo)
- W Oil valve housing
- X Drain plug, engine oil
- Y Coolant pump, cooling system

Engine, General

General inspection

Make it a habit to give the engine and engine compartment a visual inspection before starting the engine and after operation once the engine has stopped. This will help you to discover quickly if anything abnormal has happened, or is about to happen.

Look especially carefully at oil, fuel and coolant leakage, loose bolts, worn or poorly tensioned drive belts, loose connections, damaged hoses and electrical cables. This inspection only takes a few minutes and can prevent serious malfunctions and expensive repairs.

WARNING!

Risk of fire.

Remove all accumulations of fuel, oil and grease when detected on the engine or in the engine room.

WARNING!

If an oil, fuel or coolant leak is detected, the cause must be investigated and the fault rectified before the engine is started.

IMPORTANT:

Washing with a power washer: Never aim the water jet at radiators, charge air cooler, seals, rubber hoses or electrical components.

Lubrication System



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Volvo Penta only recommends the use of genuine Volvo Penta oils with the correct VDS (Volvo Drain Specification) standards.

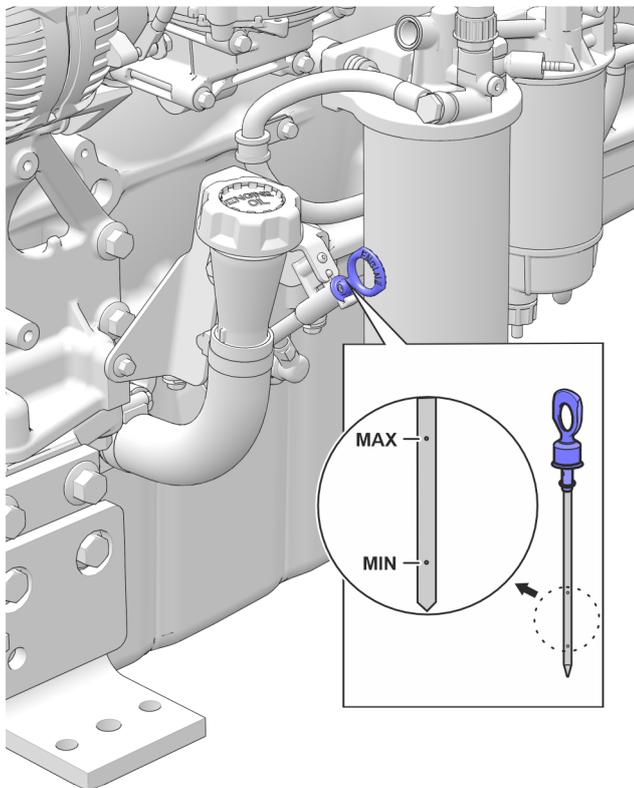
Genuine Volvo Penta oils are extensively tested and quality assured by Volvo Penta to optimize performance, reduce fuel consumption and maximize the life of the engine.

More detailed information regarding oil quality, viscosity and oil drain interval, refer to chapter Technical Data: *Lubrication System*.

Oil level, checking and topping up

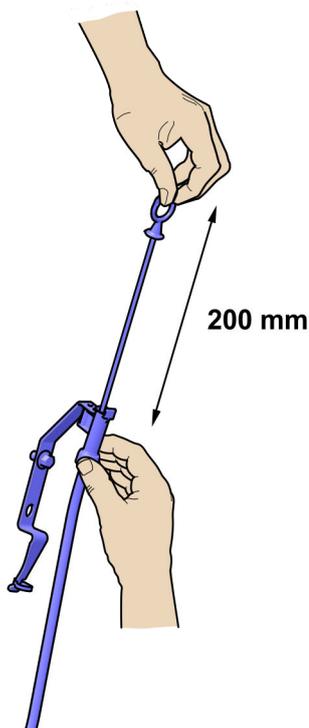
⚠ WARNING!

Working with or approaching a running engine is a safety risk. Watch out for rotating components and hot surfaces.



P0039034

- The engine should be placed on a level position when the oil is checked.
- The oil level is to be checked when the engine is stopped. Wait a few minutes before reading off the level, so that the oil has time to run down into the oil sump.
- The oil level must be inside the marked area on the dipstick. Never fill above the maximum limit on the oil dipstick.
- Only fill oil when the engine is stopped.
- Only use Volvo Penta recommended oils; refer to , *page 47*.
- The oil level sensor only measures the oil level when the ignition is switched to on, not continuously during operation.



P0026405

Checking the oil with a flexible dipstick

IMPORTANT:

Insert the dipstick in increments of around 200 mm, without bending the wire, for the entire length of the plastic tube.

Fuel System

⚠ WARNING!

Fire hazard. When carrying out work on the fuel system make sure the engine is cold. A fuel spill onto a hot surface or an electrical component can cause a fire. Store fuel soaked rags so that they cannot cause fire.

IMPORTANT:

Always observe the greatest cleanliness during refueling and work on the fuel system. Only use the grades of fuel recommended in the fuel specification.



P0002101



P0038119

Cooling System

The cooling system ensures that the engine operates at the correct temperature. It is a closed system that should always be filled with a coolant mixture.

IMPORTANT:

Coolant of a suitable chemical composition must be used all year round to protect the engine against internal corrosion, cavitation and freeze bursting. This even applies when there is no risk for freeze damage, to make sure the engine always has a complete corrosion protection.

Therefore, the use of anti-corrosion agents alone, or water alone as a coolant, is not permitted in Volvo Penta engines.

The coolant must be based on Organic Acid Technology (OAT). Using an improper coolant or mixing with another coolant will rapidly reduce the performance and lifetime of the engine. Material incompatibility can lead to leakages, which - in the worst case - can cause engine breakdown.

Volvo Penta strongly recommend the use of our own coolants, "Volvo Penta Coolant VCS-2 Ready Mixed" or the concentrate "Volvo Penta Coolant VCS-2", which ensure the protection of the cooling system components from corrosion, ageing, swelling and cracking, thereby ensuring optimal engine lifetime.

Over time the corrosion protection additives become less effective, and consequently the coolant must be changed at regular intervals to maintain sufficient protection of the engine. The latest Service Protocol that specifies service intervals can be found at volvopenta.com.

Coolant, Mixing

It is extremely important that the system is filled with the correct coolant concentration; refer to *Coolant, Mixing, page 50*.

The coolant should be mixed with distilled, deionized water. For Volvo Penta specified water requirements; refer to *Coolant, Mixing, page 50*.

NOTICE! If water quality can not be guaranteed, use ready mixed coolant.



P0038120

Coolant Level, Checking and Topping Up

▲ WARNING!

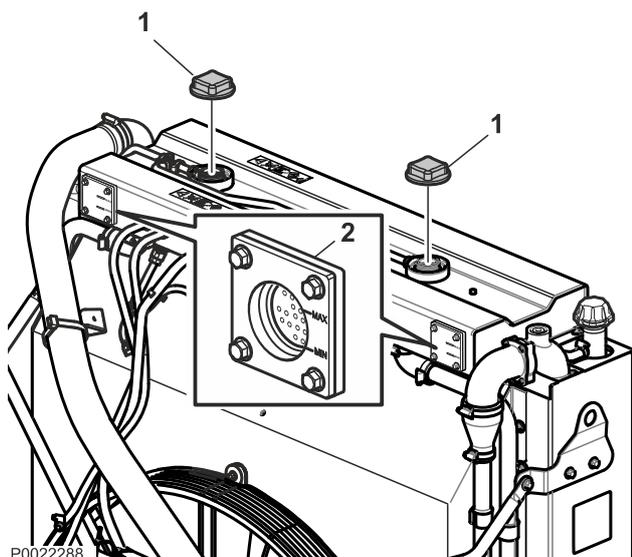
Do not open the coolant filler cap when the engine is hot, except in emergencies, as this could cause serious personal injury. Steam or hot fluid could spray out.

IMPORTANT!

Only use coolant recommended by Volvo Penta. Fill up with the same type of coolant that is in the system. VCS-2 will be backwards compatible with current VCS and they are mixable without risks.

Filling of coolant must be performed with the engine stopped. Fill up slowly, to allow the air to flow out. Check the coolant level daily before start.

- 1 Open the filler caps (1).
- 2 Check that the coolant reaches the MAX mark on the sight glass (2). Top up with coolant as required.
- 3 Close the filler caps.



Electrical System

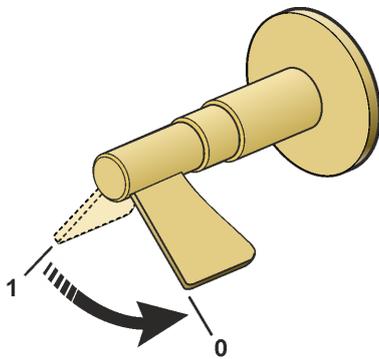
The engine is equipped with a 2-pole electrical system and an alternator.

⚠ WARNING!

Always stop the engine and break the current using the main switches before working on the engine.

IMPORTANT:

Contact a Volvo Penta dealer for information if any arc welding will be performed on the application. Arc welding can cause damage to the engine and the electronics.



P0002576

Main switch

IMPORTANT:

Never disconnect the current using the main switches when the engine is running or by disconnecting the battery cables.

The alternator and electronics could be damaged.

The main switches must never be switched off before the engine has stopped. If the circuit between the alternator and the battery is disconnected when the engine is running, the alternator and electronics may be damaged. For the same reason, the charging circuits must never be re-connected with the engine running.

Fuses

The engine is equipped with a 10 A circuit breaker which cuts the current if overloaded.

The circuit breaker is located on the left-hand side (cold side) of the engine.

The engine stops if the fuse trips. If the circuit breaker trips frequently, an authorized Volvo Penta workshop should be contacted to investigate the cause of the overload.

Electrical Connections

Check that electrical connections are dry, free from oxide, and that they are securely tightened.



P0002107

Battery

⚠ WARNING!

Risk of fire and explosion. Never allow an open flame or electric sparks near the batteries.

⚠ WARNING!

Battery electrolyte is a corrosive acid and should be handled with care. If you spill or splash electrolyte on any part of the body, immediately flush the exposed area with liberal amounts of water and seek medical attention as soon as possible.

⚠ WARNING!

Ventilate the engine compartment before working on batteries or battery connections.

IMPORTANT:

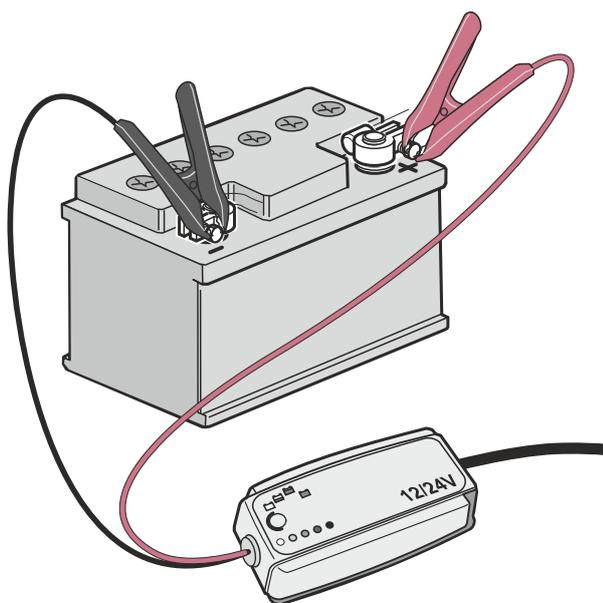
Batteries can be damaged if they are left discharged, and can also freeze and burst easier in cold weather. If the engine is not going to be used for a longer period of time, the batteries should be fully charged, trickle charged if possible.

Maintenance

It is important to always follow the battery manufacturer's recommendation and instruction when replacing and charging batteries. Depending on battery type, the instructions for maintenance and charging may vary.

Modern batteries are normally maintenance free.

NOTICE! If low starter battery alarm occur, the battery may get drained which might result in loss of functions and engine stopping.



P0022892

Replacing Battery

IMPORTANT:

Make sure that the new battery fulfills the specifications in *Technical Data*. Read the information supplied with the battery before you begin the installation.

IMPORTANT:

Do not disconnect the batteries with the engine running. Sensitive electrical components can be immediately damaged.

⚠ WARNING!

Never confuse the positive and negative poles on the batteries. Risk of arcing and explosion.

Disconnecting (A)

- 1 Untighten the nut and remove the – cable (black).
- 2 Untighten the nut and remove the + cable (red).

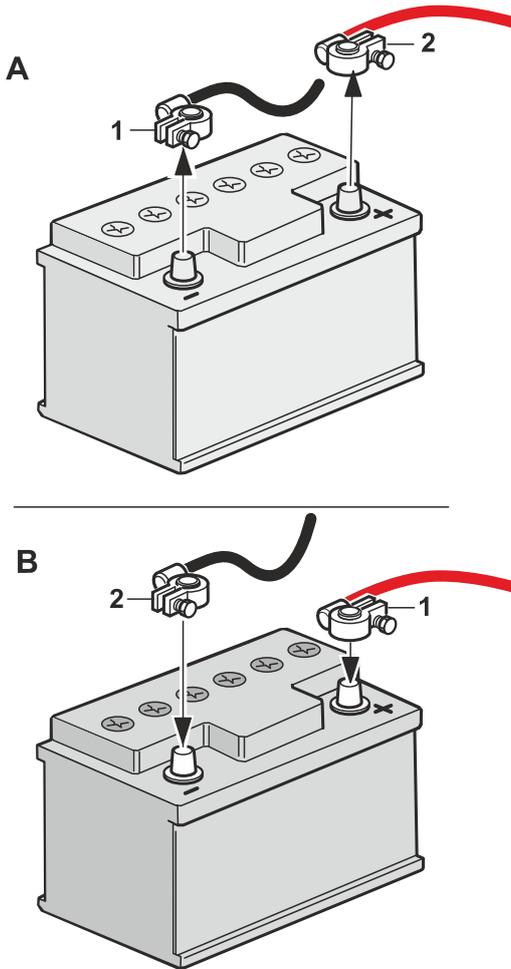
Remove the battery.

Connecting (B)

Place the new battery.

- 1 Connect the + cable (red) to the + pole on the battery and tighten the nut.
- 2 Connect the – cable (black) to the – pole on the battery and tighten the nut.

NOTICE! Hand in the old battery to a re-cycling station.



P0022893

Storage

To prevent the engine and other equipment from being harmed during long (2 months or more) periods out of service, it must be conserved. Conservation protects the engine from freezing and corrosion damages.

It is of utmost importance that the conservation is performed correctly, therefore we have compiled a checklist covering the most important points. Before taking the engine out of service for long periods, Volvo Penta recommends that the engine is checked by a qualified workshop for possible need for overhaul or repair.

⚠ CAUTION!

Read the chapter on Maintenance in the Operator's Manual before starting work. It contains instructions on how to carry out maintenance and service operations in a safe and technical correct manner.

IMPORTANT:

Washing with a power washer: Never aim the water jet at radiators, charge air cooler, seals, rubber hoses or electrical components.

For up to 2–8 month's taken out of service:

- Make sure the coolant has adequate antifreeze properties. Top up as necessary.
- The fuel system must be protected during storage to prevent internal oxidation and corrosion. Start and run the engine with FAME-free fuel before storage. Run the engine for at least 10 minutes to allow the fuel to reach all parts of the fuel injection system.
FAME = Biodiesel
B0 = Diesel with 0%
FAME B10 = Diesel with 10% FAME
- If B0 fuel is not available, fuel additives with anti-corrosion and anti-oxidation properties may be mixed in the fuel to protect the fuel system during storage. Fuels with a FAME-content greater than 10% may not be used as storage fuel.
- Drain water from the pre-filter to reduce the risk of bacterial growth. Drain any water and contamination from the fuel filters and fuel tank. Fill the fuel tank completely, to avoid condensation.
- Disconnect the battery cables, clean and charge the batteries. Trickle charge the batteries while the equipment is in storage. **A poorly charged battery can freeze and burst.** Always follow the battery supplier's recommendations.
- Clean the outside of the engine. Do not use a high pressure washer for engine cleaning. Touch up paint damage with Volvo Penta original paint.
- Put a note on the engine with the date, type of conservation.
- Cover the air filter, exhaust pipe and engine if necessary.

Taken out of service for more than 8 months

- Make sure the coolant has adequate antifreeze properties. Top up as necessary.
- The fuel system must be protected during storage to prevent internal oxidation and corrosion.
Start and run the engine with FAME-free fuel before storage.
Run the engine for at least 10 minutes to allow the fuel to reach all parts of the fuel injection system.
FAME = Biodiesel
B0 = Diesel with 0%
FAME B10 = Diesel with 10% FAME
- Change the oil and oil filter on the engine. Start or crank the engine shortly, just until oil pressure is achieved to ensure fresh oil reach all of the engine lubrication oil system.
- Drain any water and contamination from the fuel filters and fuel tank. Fill the fuel tank completely, to avoid condensation.
- Disconnect the battery cables, clean and charge the batteries. Trickle charge the batteries while the equipment is in storage. **A poorly charged battery can freeze and burst.** Always follow the battery supplier's recommendations.
- Clean the outside of the engine. Do not use a high pressure washer for engine cleaning. Touch up paint damage with Volvo Penta original paint.
- Put a note on the engine with the date, type of conservation.
- Cover the air filter, exhaust pipe and engine if necessary.
- Engines must wherever possible be laid up in heated spaces at an even temperature and normal relative humidity.

Actions every eight months

If the engine is not to be used after 8 month out of service.

- Check the engine oil level.
- Check the coolant level.
- Rotate the engine 2.5 revolutions.
- Check the engine for any condensation. Ensure good ventilation as necessary. Attach a tag to the engine showing the date and type of conservation.

New engines, not installed for more than eight months

- **Engine:** New engines must wherever possible be laid up in heated spaces at an even temperature and normal relative humidity. New engines that are to be stored for more than eight months must be conserved. If the oil in new engines has already been drained. Fill the engine with engine oil of the recommended oil quality and viscosity. Crank the engine 2.5 revolutions.
Spray a thin film of corrosion protection onto polished components such as shafts. Output shafts should preferably every three months to prevent oil leaks from the engine.
- Rotate the engine 2.5 revolutions every eight month.
- **Cooling System:** If the cooling system is mounted, fill the cooling system with a 40/60% mixture of Volvo Penta Coolant and water.

Attach a tag to the engine, showing the date and type of conservation.

Cover the engine air intake, exhaust opening and the engine, as necessary.

Putting into operation

NOTICE! Additional items if the engine has been out of service for longer than 18 months: Change the engine oil and oil filter.

- Remove any covers from the engine, air filter and exhaust pipe.
- Check the engine oil level. Top up as necessary.
- Install new fuel filters.
- Check the drive belt(s).
- Check all rubber hoses and re-tighten the hose clamps.
- Check the coolant level. Top up as necessary.
- Connect the fully-charged batteries.
- Start the engine and run until warm.
- Check that there are no oil, fuel or coolant leaks.

Technical Data

Engines

Type designation	TWD1744GE	
Power	Refer to the sales literature	
Torque	Refer to the sales literature	
No. of cylinders	6	
Bore, mm (inch)	149 (5.86)	
Stroke, mm (inch)	165 (6.50)	
Displacement, liter (inch ³)	17.26 (1053.3)	
Weight, wet, (engine only) kg (lb)	1900 (4190)	
Weight, wet (engine, cooling system, air filtration system) kg (lb)	2200 (4851)	
Firing order	1-5-3-6-2-4	
Compression ratio	16.5:1	
Dual speed, rpm	1500/1800	

Lubrication System

Oil change volume, including filter change	
Plastic sump (Standard)	52 liters (13,73 US gal)
Oil pressure, hot engine	
at operating speed	270-600 kPa (39–87 psi)
Oil filter	
Full flow filter	2
By-pass filter	1
Lube oil pump	
Type	Gear driven

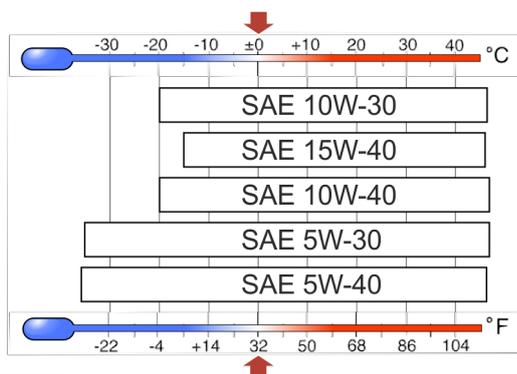
Oil recommendations

Oil quality	
VDS-4.5	
Application	
	Oil and oil filter change interval, reached first in operation:
Prime*	1000 hours or 12 month
Standby	500 hours or 12 month
Continuous (COP), <70% load of prime power*	1000 hours or 12 month
Continuous (COP), >70% load of prime power	500 hours or 12 month

NOTICE! Lube oil change intervals shall be halved, when Bio fuel B11-30 applied.

* Lube oil change intervals shall be halved when fuel with sulfur content above 2000mg/kg is used.

VDS = Volvo Drain Specification



P0028382

Select the viscosity according to the table.

The temperature values refer to stable ambient temperatures.

NOTICE! Volvo Penta recommendation for lowest possible fuel consumption and optimal durability is to use SAE 10W-30 oil when the viscosity table allows.

Fuel System

General requirements

Volvo Penta diesel engines are certified for compliance with emission legislations with the diesel test fuels specified by law. These fuels correspond with diesel fuel standards EN 590, ASTM D975, JIS K2204 and paraffinic diesel fuel standard EN 15940. However, the usage of other fuels, may have a negative impact on emissions and expected lifetime of the engine.

It is the responsibility of the fuel suppliers to always ensure that their fuels meet relevant requirements and are fit for their intended purpose. Their responsibility includes any use of additives for proper engine performance and function.

Special requirements are placed on cold-flow properties, that is, temperature limit values of fuel filterability during operation in winter conditions.

Restrictions for specified diesel fuels

- **Max density for ASTM D975 No 2-D: 860 kg/m³**
Insufficient density reduces the power and increases the fuel consumption. Excessive density endangers the durability and function of the fuel injection equipment.
- **Max lubricity (wsd 1.4) for JIS K 2204: 460 µm**
Sufficient fuel lubricity is essential to protect the fuel injection system against excessive wear.

Restrictions for other diesel fuels

Volvo Penta also approves the use of other diesel fuels as long as the here specified restrictions are followed. However, the usage of other fuels, may have a negative impact on emissions and expected lifetime of the engine.

NOTICE! Operators must check permission for usage of these fuels according to regional, national or local regulations.

- **Min cetane number: 40**
An insufficient cetane number ("ignitability") leads to poor startability and increased exhaust emissions.
- **Max density at 15 °C: 860 kg/m³**
Insufficient density reduces the power and increases the fuel consumption. Excessive density endangers the durability and function of the fuel injection equipment.
- **Viscosity between 1.9 to 4.6 mm/s² at 40 °C**
Insufficient viscosity reduces the power and increases the fuel consumption. Excessive viscosity endangers the durability and function of the fuel injection equipment.
- **Max lubricity (wsd 1.4): 520 µm**
Sufficient fuel lubricity is essential to protect the fuel injection system against excessive wear.
- **Max FAME (biodiesel) content: 10% (V/V)**
FAME is blended into diesel fuel.
- **Max sulfur content: 5000 mg/kg**

Paraffinic fuels - HVO and GTL

Paraffinic diesel fuels ("Synthetic Diesel") have higher cetane numbers and lower densities than diesel fuels. HVO (Hydrotreated Vegetable Oils) is renewable paraffinic fuels. GTL (Gas-To-Liquid) is fossil paraffinic fuels.

Volvo Penta approves the use of paraffinic diesel fuels that complies with standard EN 15940. The fuel guarantees compliance with emission legislation and fulfills the expected lifetime as long as the service requirements are followed.

Volvo Penta also approves the use of fuel blends between these paraffinic fuels and diesel fuels that comply with the quality requirements.

Biodiesel fuels

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

The use of biodiesel up to maximum 10% (B10) in and of itself, will not affect the manufacturers mechanical warranty, provided the biodiesel used in blend conforms to EN590, EN16734, ASTM D975 and ASTM D7467. Other relevant local fuel standards that fulfill the above mentioned standards may also be used. A minor drop in engine power will occur when using biodiesel.

NOTICE! Biodiesel manufactured by FAME (Fatty Acid Methyl Esther) process is hygroscopic and therefore increase the risk of bacterial growth in the fuel. This may lead to blocked fuel filters. Engine not consuming a full fuel tank within 4 weeks must not use biodiesel.

Higher levels of biodiesel, up to B30, may be used with restrictions. Fuel according to EN 16709 or ASTM D7467, or relevant local fuel standards that fulfill mentioned biodiesel fuel standards, must be used. Volvo Penta does not warrant the engine will conform to applicable emissions limits when operated on biodiesel or another alternative fuels, that are not substantially similar to specified test fuels used for certification.

Service restrictions for diesel fuel with FAME content between 11% and 30% (B11 to B30)

- Oil dilution may occur. Make sure that oil level is not exceeding maximum level, in that case change the oil.
- Lube oil change intervals shall be halved, or utilize oil sampling analysis.
- The engines should be fitted with fuel filters with water separators.
- A fuel heater is required, when high FAME diesel fuels are used below freezing point.
- Biodiesel is aggressive to some materials used in fuel system components. Inspect seals, hoses, rubber and plastic components daily. Replace any component that is damaged, softened or leaking. Clean biodiesel from painted surfaces immediately to prevent paint damage.
- Do not use these fuels for engines with long downtime periods.
- If the engine has not been used for a period of 4 weeks or more, the tank and the fuel system shall be flushed clean by running the engine on at least one full tank of diesel fuel.
- When shifting from diesel fuel to high FAME diesel fuel.
 - The fuel hoses and sealings shall be replaced.
 - The fuel tank shall be cleaned and the fuel filter shall be replaced after 50 h.

Cooling System

Type	Pressurized, sealed
Pressure cap, max opening pressure	100 kPa (14.5 PSI)
Volume (Volvo Penta cooling system)	
Engine circuit (Engine with radiator, hoses and expansion tank) (Pusher system)	59.5 liters (15.72 US gal)
Charge air cooler circuit (Charge air coolers, hoses and expansion tank) (Pusher system)	30.5 liters (8 US gal)
Thermostat	
Opening temperature	82 °C (179.6 °F)

Coolant, Mixing

⚠ WARNING!

All coolant is hazardous and harmful to the environment. Do not consume. Coolant is flammable.

NOTICE! Always use the same type of coolant that is already in the engine.

VCS-2 will be backwards compatible with current VCS and they are mixable without risks.

Coolant shall be based on Organic Acid Technology (OAT).



P0038119



P0038120

Follow the mixing recommendation on the product.

The coolant should be mixed with distilled, deionized water. For Volvo Penta specified water requirements; refer to *Water Quality*, page 51.

NOTICE! Always use “Ready Mixed” coolant if water quality cannot be determined or if it does not fulfill ASTM D4985.

NOTICE! Never mix more than 60% concentrated coolant with water. A greater concentration provides reduced cooling effect with the risk for overheating and reduced freeze protection.

Water Quality



P0002094

ASTM D4985:

Water requirements (extract from Volvo Group Standard STD 1285,1)

Total solid particles (acc. ASTM D5907)	<300 ppm
Total hardness (acc. ASTM D1126)	<120 ppm or 7 °dH
Chloride (acc. ASTM D512)	<40 ppm
Sulfate (acc. ASTM D516)	<100 ppm
pH value (acc. ASTM D1293)	6.5–8.5
Silica (acc. ASTM D859)	<20 ppm
Iron (acc. ASTM D1068)	<0.10 ppm
Manganese (acc. ASTM D858)	<0.05 ppm
Electrical conductivity (acc. ASTM D1125)	<400 µS/cm
Organic content, COD _{Mn} (acc. ISO15705:2002)	<8 ppm

Water requirements, Volvo Coolants

The Volvo coolants are available as both ready-mixed and concentrated. The ready-mixed coolants have different freezing protections, depending on the blending ratio.

Benefits of a correct mixture

- Prevents the coolant from freezing in cold temperatures.
- Prevents the coolant from boiling in hot temperatures.
- Prevents corrosion and rust of metal parts in cooling circuit and engine.
- Extends life of rubber and plastic components in the coolant system.
- Prevents electrolysis when coolant breaks down and becomes electrically charged.

Clean water for dilution

The concentrated coolant must be diluted with water to the correct mixture before use. The quality of the water used for dilution is crucial for the performance of the cooling system.

- The filling equipment must be kept clean.
- If water quality can't be secured, distilled, or demineralized water should be used for dilution, or the ready-mixed coolant should be used.
- Tap water quality differs depending on country and region. The water used for diluting the coolant should meet the requirements in the table below. Exceeding the value limitations can increase corrosion rate or create deposits or clogging in the cooling system.
- If such problems occur, the water quality used for coolant dilution should be checked.

Identification Numbers

NOTICE! The engine labels are placed on the valve cover.

Example of general label

V O L V O P E N T A	
<u>PRODUCT INFORMATION</u>	
PRODUCT DESIGNATION:	B
SPECIFICATION No.:	C
CHASSI ID:	D
SERIAL No.:	E
POWER (kW):	F
SPEED (rpm):	G
MADE IN:	H
	Part No. A

P0038721

- A Label part number
- B Product designation
- C Specification number
- D Chassis ID
- E Serial number
- F Power (kW)
- G Engine speed (rpm)
- H Country of manufacturing

Example of US/EPA certificate label

V O L V O P E N T A		AB VOLVO PENTA
<u>EMISSION CONTROL INFORMATION</u>		
ENGINE FAMILY:	B	POWER:
DISPLACEMENT:	D L	C1 kW/rpm
DATE OF MANUFACTURE:	E (mm-yy)	C2 kW/rpm
VALVE LASH: Inl.	F1 mm	C3 kW/rpm
	Exh. F2 mm	C4 kW/rpm
H		C5 kW/rpm
DIESEL FUEL ONLY		C6 kW/rpm
THIS ENGINE CONFORMS TO D U.S. EPA REGULATIONS LARGE STATIONARY COMPRESSION-IGNITION ENGINES. THIS ENGINE IS EXEMPTED FROM NONROAD CERTIFICATION REQUIREMENTS AS A "STATIONARY ENGINE". INSTALLING OR USING THIS ENGINE IN ANY OTHER APPLICATION MAY BE A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY. USE VOLVO SOFTWARE SERVICE TOOL TO VERIFY ACTUAL ENGINE SETTINGS.		
	Part No. A	

P0038722

- A Label part number
- B Engine Family
- C Power (kW/rpm)
- D Displacement (L)
- E Date of manufacture (mm-yy)
- F Valve Lash (mm) F1-Inlet F2-Exhaust
- G Model Year
- H Constant Speed

VOLVO PENTA

Declaration of incorporation for the installation of partially completed machinery in accordance with Machinery Directive 2006/42/EC, Annex II, 1B

Engine Manufacturer:

AB Volvo Penta
Gropegårdsgatan 11
SE 405 08 Gothenburg, Sweden

Product designation:

Engine size	Model
5 liter, VE	TAD540VE - TAD541VE - TAD542VE - TAD550VE - TAD551VE - TAD552VE - TAD570VE - TAD571VE - TAD572VE - TAD580VE - TAD581VE - TAD582VE - TAD583VE
8 liter, VE	TAD840VE - TAD841VE - TAD842VE - TAD843VE - TAD850VE - TAD851VE - TAD852VE - TAD853VE - TAD870VE - TAD871VE - TAD872VE - TAD873VE - TAD880VE - TAD881VE - TAD882VE - TAD883VE - TAD884VE
8 liter, GE	TAD840GE - TAD840GE-B - TAD841GE - TAD842GE - TAD843GE - TAD880GE - TAD881GE - TAD882GE - TAD851GE - TAD852GE - TAD853GE
11 liter, VE	TAD1140VE - TAD1141VE - TAD1142VE - TAD1150VE - TAD1151VE - TAD1152VE - TAD1170VE - TAD1171VE - TAD1172VE - TAD1180VE - TAD1181VE - TAD1182VE - TAD1183VE
13 liter, VE	TAD1340VE - TAD1341VE - TAD1342VE - TAD1343VE - TAD1344VE - TAD1345VE - TAD1350VE - TAD1351VE - TAD1352VE - TAD1353VE - TAD1371VE - TAD1372VE - TAD1373VE - TAD1374VE - TAD1375VE - TAD1381VE - TAD1382VE - TAD1383VE - TAD1384VE - TAD1385VE
13 liter, GE	TAD1341GE-B - TAD1342GE-B - TAD1342GE-B - TAD1343GE-B - TAD1344GE-B - TAD1345GE-B - TAD1346GE - TAD1350GE - TAD1351GE - TAD1352GE - TAD1353GE - TAD1354GE - TAD1355GE - TAD1380GE - TAD1381GE - TAD1382GE
16 liter, VE	TAD1640VE-B - TAD1641VE-B - TAD1642VE-B - TAD1640VE-C - TAD1641VE-C - TAD1642VE-C - TAD1643VE - TAD1643VE-B - TAD1650VE-B - TAD1651VE - TAD1670VE - TAD1671VE - TAD1672VE - TWD1683VE
16 liter, GE	TAD1640GE-B - TAD1641GE-B - TAD1642GE-B - TWD1644GE - TWD1645GE - TAD1650GE - TAD1651GE - TWD1652GE - TWD1653GE - TWD1672GE - TWD1673GE - TWD1683GE - TWD1683GE-B
17 liter, GE	TWD1744GE

Description: 4-cycle diesel engine.

Fundamental health and safety requirements applied to, and fulfilled by, the above-mentioned engines are described in the following items in Annex I:

1.1.3, 1.1.5, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.13, 1.6.1, 1.6.2, 1.7.1, 1.7.4, 1.7.4.1 and 1.7.4.3.

The relevant technical documentation is compiled as described in part B of Annex VII.

It is also in conformity with the relevant union harmonization legislation: EMC 2014/30/EU

The following harmonized standards have been applied:

EN ISO 12100:2010 // EN 1679-1+A1:2011 //

EN IEC 61000-6-1:2019 // EN IEC 61000-6-2:2019 // EN IEC 61000-6-3:2021 //

EN IEC 61000-6-4:2019 //

EN 12895:2015 + A1:2019 // EN-ISO 14982:2009 // EN 13766-1:2018

For engines equipped with Volvo Penta control interface module:

Paragraph 6.4 (Emergency stop) in 1679-1 + A1 2011 is not verified for engines equipped with Volvo Penta Control Interface Module. Responsibility lies with the machine manufacturer to add one or several emergencies stops in accordance with paragraph 1.2.4.3 (2006/42/EC).

For engines equipped with the Volvo Penta Start/Stop System the responsibility for the functional safety of the system lies with the machine manufacturer performing the integration.

Relevant information concerning the partially completed machinery will be provided in suitable form upon justified requests from competent national authorities. The individual authorized to compile the relevant technical documentation is the signer of this declaration.

The engines covered by this declaration may not be put into operation before the completed machinery into which they are to be installed has been declared to conform with the provision of Machinery Directive 2006/42/EC.

Name and function:

Anders B Berle, Director Safety Compliance

(The identity of the individual authorized to sign on behalf of the engine manufacturer or the latter's authorized representative.)

Signature and title:



Date and place of issue: 2024-04-04 Gothenburg

Phoenix no. 50334799

VOLVO PENTA

Declaration of incorporation for the installation of partially completed machinery in accordance with Supply of machinery (Safety) Regulations 2008, placed on the UK-market

Engine Manufacturer:

AB Volvo Penta
Gropegårdsgatan 11
SE 405 08 Gothenburg, Sweden

Product designation:

Engine size	Model
5 liter, VE	TAD540VE - TAD541VE - TAD542VE - TAD550VE - TAD551VE - TAD552VE - TAD570VE - TAD571VE - TAD572VE - TAD580VE - TAD581VE - TAD582VE - TAD583VE
8 liter, VE	TAD840VE - TAD841VE - TAD842VE - TAD843VE - TAD850VE - TAD851VE - TAD852VE - TAD853VE - TAD870VE - TAD871VE - TAD872VE - TAD873VE - TAD880VE - TAD881VE - TAD882VE - TAD883VE - TAD884VE
8 liter, GE	TAD840GE - TAD840GE-B - TAD841GE - TAD842GE - TAD843GE - TAD880GE - TAD881GE - TAD882GE - TAD851GE - TAD852GE - TAD853GE
11 liter, VE	TAD1140VE - TAD1141VE - TAD1142VE - TAD1150VE - TAD1151VE - TAD1152VE - TAD1170VE - TAD1171VE - TAD1172VE - TAD1180VE - TAD1181VE - TAD1182VE - TAD1183VE
13 liter, VE	TAD1340VE - TAD1341VE - TAD1342VE - TAD1343VE - TAD1344VE - TAD1345VE - TAD1350VE - TAD1351VE - TAD1352VE - TAD1353VE - TAD1371VE - TAD1372VE - TAD1373VE - TAD1374VE - TAD1375VE - TAD1381VE - TAD1382VE - TAD1383VE - TAD1384VE - TAD1385VE
13 liter, GE	TAD1341GE-B - TAD1342GE-B - TAD1342GE-B - TAD1343GE-B - TAD1344GE-B - TAD1345GE-B - TAD1346GE - TAD1350GE - TAD1351GE - TAD1352GE - TAD1353GE - TAD1354GE - TAD1355GE - TAD1380GE - TAD1381GE - TAD1382GE
16 liter, VE	TAD1640VE-B - TAD1641VE-B - TAD1642VE-B - TAD1640VE-C - TAD1641VE-C - TAD1642VE-C - TAD1643VE - TAD1643VE-B - TAD1650VE-B - TAD1651VE - TAD1670VE - TAD1671VE - TAD1672VE - TWD1683VE
16 liter, GE	TAD1640GE-B - TAD1641GE-B - TAD1642GE-B - TWD1644GE - TWD1645GE - TAD1650GE - TAD1651GE - TWD1652GE - TWD1653GE - TWD1672GE - TWD1673GE - TWD1683GE - TWD1683GE-B
17 liter, GE	TWD1744GE

Description: 4-cycle diesel engine.

Fundamental health and safety requirements applied to, and fulfilled by, the above-mentioned engines are described in the following items in Annex I:

1.1.3, 1.1.5, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.13, 1.6.1, 1.6.2, 1.7.1, 1.7.4, 1.7.4.1 and 1.7.4.3.

The relevant technical documentation is compiled as described in part B of Annex VII.

It is also in conformity with the relevant union harmonization legislation: EMC 2014/30/EU

The following harmonized standards have been applied:

EN ISO 12100:2010 // EN 1679-1+A1:2011 //

EN IEC 61000-6-1:2019 // EN IEC 61000-6-2:2019 // EN IEC 61000-6-3:2021 //

EN IEC 61000-6-4:2019 //

EN 12895:2015 + A1:2019 // EN-ISO 14982:2009 // EN 13766-1:2018

For engines equipped with Volvo Penta control interface module:

Paragraph 6.4 (Emergency stop) in 1679-1 + A1 2011 is not verified for engines equipped with Volvo Penta Control Interface Module. Responsibility lies with the machine manufacturer to add one or several emergencies stops in accordance with paragraph 1.2.4.3 (2006/42/EC).

For engines equipped with the Volvo Penta Start/Stop System the responsibility for the functional safety of the system lies with the machine manufacturer performing the integration.

Relevant information concerning the partially completed machinery will be provided in suitable form upon justified requests from competent national authorities. The individual authorized to compile the relevant technical documentation is the signer of this declaration.

The engines covered by this declaration may not be put into operation before the completed machinery into which they are to be installed has been declared to conform with the provision of Machinery Directive 2006/42/EC.

Name and function:

Anders B Berle, Director Safety Compliance

(The identity of the individual authorized to sign on behalf of the engine manufacturer or the latter's authorized representative.)

Signature and title:



Date and place of issue: 2024-04-04 Gothenburg

Phoenix no. 50334795

Index

A

After Engine Shutdown.....	30
Alarms.....	27
Auxiliary Stop.....	29

B

Battery.....	41
Before Engine Shutdown.....	29
Before start of engine.....	8
Before Starting.....	25
Blue light mode.....	16

C

CIM (Control Interface Module).....	26, 31
Control Interface Module.....	20
Coolant Level, Checking and Topping Up.....	39
Cooling System.....	38, 50

D

Diagnostic Function.....	31
--------------------------	----

E

Easy Link Instruments.....	24
ECM4 (Engine Control Module).....	19
Electrical Connections.....	40
Electrical System.....	40
Engine, General.....	35
Engines.....	18, 46
Erasing fault codes.....	32
Excessive strain on a product and components.....	14

F

Fuel System.....	37, 48
Fuel, oils and coolant.....	13

I

Identification Numbers.....	52
-----------------------------	----

L

Lubrication System.....	36, 47
-------------------------	--------

M

Main switch.....	40
Maintenance and replacement parts.....	13
Maneuvering.....	27

O

Oil level, checking and topping up.....	36
Operation at low load.....	27
Orientation.....	34

R

Reading the Instruments.....	27
------------------------------	----

S

Starting the Engine.....	25
Starting Using Auxiliary Batteries.....	26
Stop the Engine.....	29

V

Volvo Penta Action Service.....	17
Volvo Penta Dealer Network.....	17

W

Water Quality.....	51
--------------------	----



A series of 20 horizontal dotted lines spanning the width of the page, providing a guide for handwriting practice.

ENG

This Operator's Manual may be ordered in a different language free of charge up to 12 months after delivery, via internet.

<http://manual.volvopenta.com/coupon/>

If internet access isn't possible, please contact your Volvo Penta dealer.

GER

Diese Betriebsanleitung kann bis zu 12 Monate nach der Lieferung über Internet kostenlos in einer anderen Sprache bestellt werden.

<http://manual.volvopenta.com/coupon/>

Wenn Sie keinen Internet-Zugriff haben, kontaktieren Sie bitte Ihren Volvo Penta-Händler.

FRE

Ce manuel d'utilisation peut être commandé gratuitement sur Internet en différentes langues, jusqu'à 12 mois après la date de livraison.

<http://manual.volvopenta.com/coupon/>

Veuillez contacter votre Distributeur Volvo Penta si vous avez un problème d'accès à l'Internet.

SPA

El presente libro de instrucciones puede solicitarse en otro idioma diferente, libre de cargo, hasta 12 meses después de la entrega, mediante internet.

<http://manual.volvopenta.com/coupon/>

Si no se tiene acceso a internet, contacten al su concesionario Volvo Penta.

ITA

Il manuale per l'operatore può essere ordinato tramite Internet, in varie lingue e per consegna gratuita, entro 12 mesi dalla consegna del prodotto

<http://manual.volvopenta.com/coupon/>

Se l'accesso a Internet risulta impossibile, contattare la concessionaria Volvo Penta.

SWE

Denna instruktionsbok kan beställas via internet på ett annat språk gratis i upp till 12 månader efter leverans.

<http://manual.volvopenta.com/coupon/>

Kontakta din Volvo Penta-återförsäljare om du inte har tillgång till internet.

DUT

Dit instructieboek kan gratis via internet in een a dere taal worden besteld tot 12 maanden na aflevering.

<http://manual.volvopenta.com/coupon/>

Als toegang tot het internet niet mogelijk is, neem dan contact op met uw Volvo Penta dealer.

DAN

Denne instruktionsbog kan bestilles gratis på et andet sprog via Internettet i op til 12 måneder efter leveringen.

<http://manual.volvopenta.com/coupon/>

Hvis det ikke er muligt at bestille via Internettet, bedes du kontakte din Volvo Penta forhandler.

FIN

Tämä käyttöohjekirja on tilattavissa Internetin kautta veloituksetta eri kielillä 12 kuukauden ajan toimituksen jälkeen.

<http://manual.volvopenta.com/coupon/>

Jos sinulla ei ole Internet-yhteyttä, ota yhteys lähimpään Volvo Penta jälleenmyyjään.

POR

Este Manual do Operador pode ser encomendada em idiomas diferentes isento de custos até 12 meses após entrega, via internet.

<http://manual.volvopenta.com/coupon/>

Se não for possível aceder à internet, contacte o seu concessionário Volvo Penta.

GRC

Το παρόν Βιβλίο Χρήσης μπορεί να παραγγελθεί δωρεάν σε άλλη γλώσσα μέχρι 12 μήνες μετά την παράδοση, μέσω διαδικτύου.

<http://manual.volvopenta.com/coupon/>

Εάν δεν είναι δυνατή η πρόσβαση στο ιαδίκτυο, παρακαλούμε επικοινωνήστε με το δικό σας αντιπρόσωπο της Volvo Penta.

TUR

Bu Kullanım Kılavuzu, teslimden 12 ay sonrasına kadar İnternet yoluyla ücretsiz olarak farklı bir dilde sipariş edilebilir.

<http://manual.volvopenta.com/coupon/>

İnternet mümkün değilse, lütfen Volvo Penta yetkili satıcınızla temasa geçin.

CHI

本操作手册可通过互联网以不同的言进行订购, 交付后可免费使用达12个月。

<http://manual.volvopenta.com/coupon/>

如果无法访问互联网, 请与沃尔沃遍达经销商联系。

BZS

Este Manual de operador pode ser encomendado em um idioma diferente, gratuitamente, até 12 meses após a entrega, via internet.

<http://manual.volvopenta.com/coupon/>

Caso o acesso à internet não for possível, contatar seu distribuidor Volvo Penta.

JPN

このオペレーターズ マニュアルの他言語版が、発行後最高12か月間、インターネットより無料で発注可能です。

<http://manual.volvopenta.com/coupon/>

インターネットにアクセスできない場合は、担当のボルボペ
ンタディーラーまでご連絡ください。

ARA

من الممكن طلب دليل المشغل بلغة أخرى عبر الإنترنت لفترة تصل إلى 12 شهرين بعد التسليم.

[http:// manual.volvopenta.com/coupon](http://manual.volvopenta.com/coupon/)

فإن الوصول إلى الإنترنت غير متاح، فالرجاء الاتصال بوكيل Volvo Penta.

V O L V O P E N T A

