VOLVO PENTA

OPERATOR'S MANUAL

5L, 8L

⚠ 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

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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.

VOLVO PENTA

www.volvopenta.com

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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

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

⚠ 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.

⚠ 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!

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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.

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.

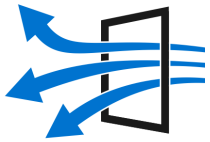
Oil-soaked rags can spontaneously ignite under certain circumstances.

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



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⚠ 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

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⚠ 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.

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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.

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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

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⚠ 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!

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.

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.

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Legal requirements to not alter system

IMPORTANT:
All kind of tampering or modifications of the engine or EATS system, effecting the emission of the engine, will lead to that the type-approval for the engine becomes invalid.

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

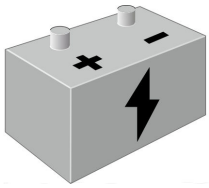
IMPORTANT:
High pressure pipes for fuel must not be bent or straightened under any circumstances. Cracks may occur. Damaged pipes must be replaced.

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.



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Correct polarity of the batteries

IMPORTANT:
Make sure that the positive (+) and negative (–) battery cables are correctly connected to the corresponding battery terminals. Incorrect connections may cause severe damage to electrical equipment.

Risks of electrolyte in batteries

⚠ WARNING!
Always wear safety 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. Seek help from medical staff immediately after rinsing.

If the electrolyte comes into contact with unprotected skin, wash it off immediately with soap and water.

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Layout of the battery compartment

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

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.

Adjustment of the clutch

⚠ CAUTION!
Clutch adjustments must be carried out with the engine stopped.

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 86*.

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.

Emission Aftertreatment System

AdBlue®/DEF

AdBlue®/DEF [1][2] is mandatory for the equipment/ vehicle to comply with emission directive certification.

When adding AdBlue®/DEF, the solution must fulfill ISO22241 standards. If the solution used don't fulfill the ISO standard, any warranty claims will be rejected.

Using an engine that does not use AdBlue®/DEF, or the use of low quality solution, where such is required to reduce air pollution is a punishable offense. A consequence of such a failure may entail invalidation of conditions and warranties provided in the country where the engine is used.

Filling should take place between scheduled service intervals. The consumption of AdBlue/DEF is a percentage of the fuel consumption and is varying depending on the operating conditions. For filling instructions, refer to *Filling AdBlue®/DEF , page 72*.

If the exhaust gas control system does not work correctly the operator will be informed by a fault indication.

1. AdBlue® = Registered trademark of the Verband der Automobilindustrie e.V. (VDA).
2. DEF = Diesel Exhaust Fluid

Emergency Situation Inducement Override

NOTICE! The functionality for Emergency Situation Inducement Override only exists on engines ordered with this function. The function temporarily disables emissions controls during a qualified* emergency situation. All other use of the function constitutes a violation of the law.

*A qualified emergency situation is one in which the condition of an engine's emission controls poses a significant direct or indirect risk to human life.
An example of direct risk would be an emission control condition that inhibits the performance of an engine being used to rescue a person from a life-threatening situation.
An example of an indirect risk would be an emission control condition that inhibits the performance of an engine being used to provide electrical power to a data center that routes “911” emergency response telecommunications.

Activate

The function is activated manually and delays the lowering of performance due to defects in the aftertreatment system. When the function is activated the normal lowering of performance is delayed by up to 120 hours in a single activation.
Once deactivated, either by the operator or by reaching 120 hours, it cannot be reactivated without contacting an authorized Volvo Penta dealer to reset the function to its original 120 hours.
Federal regulations prohibit activating the emergency inducement override for something other than a qualified emergency situation. This violation is subject to penalties under 40 CFR 1068.101 and may assess a civil penalty.

Deactivate

The Operator must cancel the function immediately after the emergency situation has ended, or after the cause of the lowering of performance has been corrected.
The function will automatically deactivate within a cumulative engine run time of 120 hours after the inducement override was initially activated.
The engine can be shutdown during the emergency situation, e.g. refueling, and the counter will be stopped during the shutdown. The Emergency Inducement Override will not be stopped by shutting down the engine, but needs to be manually canceled by the operator or it will automatically be deactivated if the 120 hours limit has been reached.
Failing to disable the Emergency Inducement Override after a qualified emergency situation ends, or after the problem causing the emission control strategy to interfere with engine performance has been fixed is a violation of Federal regulations and subject to penalties under 40 CFR 1068.101 and may assess a civil penalty.

Reactivate

The operator must request the resetting of Emergency Situation Inducement Override function to its original 120 hours after each deactivation.
To reset the function to its original 120 hours, contact an authorized Volvo Penta dealer.
The operator (or another person responsible for the engine/equipment) may request resetting the Emergency Inducement Override at any time. Volvo Penta may reset the function only if given evidence that the emergency situation is continuing, or after the operator provides the information required in the report described below, in writing or by any other means.

Report

The operator (or another person responsible for the engine/equipment) must send a written report to the manufacturer after each occasion the Emergency Situation Inducement Override function has been activated. The report must be sent to the manufacturer within 60 calendar days after activating the function.
The report must include the following:
(1) Contact name, mail and email addresses, and telephone number for the responsible company or entity.
(2) A description of the emergency situation, the location of the engine during the emergency, and the contact information for an official who can verify the emergency situation (such as a county sheriff, fire marshal, or hospital administrator).
(3) The reason for inducement override activation during the emergency situation, such as the lack of DEF, or the failure of an emission-related sensor when the engine was needed to respond to an emergency situation.
(4) The engine's serial number (or equivalent).
(5) A description of the extent and duration of the engine operation while the function was active, including a statement describing whether or not the override was manually deactivated after the emergency situation ended.

Volvo Penta will send the information from the operator's report to US EPA and California ARB. Federal regulation separately prohibits submitting false information.

Failing to notify the manufacturer and send reports as required above is a violation of Federal regulations and subject to penalties under 40 CFR 1068.101 and may assess a civil penalty. In addition, knowingly submitting false information is a violation of 18 U.S.C. 1001, which may involve criminal penalties.

Special Maintenance

NOTICE! The following special maintenance instructions apply solely for engine ordered with the Emergency Situation Inducement Override functionality.

When activated, the functionality will delay the lowering of performance due to defects in the after treatment system by up to 120 hours in a single activation. Continued operation after the trigger of emissions-control-system warning alarms can result in damage to the After Treatment system.
Special maintenance is required after deactivation of the Emergency Situation Inducement Override function.
Please contact an authorized Volvo Penta dealer for inspection and repair.

NOTICE! Operation and maintenance of engine in a manner not specified by these special maintenance instructions could result in a violation of law subject to penalties.

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

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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 the 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***.

Presentation

Engines

This Operator’s Manual covers the following industrial diesel engines:

TAD580VE, TAD581VE, TAD582VE, TAD583VE, in-line, direct injected, 4-cylinder engines.

TAD881VE, TAD882VE, TAD883VE, TAD884VE, TAD880GE, TAD881GE, TAD882GE in-line, direct injected, 6-cylinder engines.

All of the engines are equipped with turbocharger, charge air cooler, thermostatically controlled cooling systems.

The engines are equipped with EGR (Exhaust Gas Recirculation) and the EATS system (Exhaust Aftertreatment System) consist of a DOC (Diesel Oxidation Catalyst), DPF (Diesel Particular Filter), SCR (Selective Catalytic Reduction) and ASC (Ammonia Slip Catalyst), in order to fulfill the Stage V emissions.

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

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EMS (Engine Management System)

To control the engine and the exhaust aftertreatment system two control units are used. The EMS is used primarily for the diesel engine control and the ACM for the aftertreatment control. The control units are connected to all actuators and sensors and communicate internally on CAN.

The OEM control system communicates with the engine and exhaust aftertreatment control system on a CAN-link according to SAE J1939 standard with some additional Volvo Penta proprietary CAN messages.

System diagnostics

The control system includes diagnostic functionality to detect and locate any malfunctions in the control system, as well as to protect components from damage.

If a malfunction is detected, related fault codes will be transmitted on CAN to the OEM control system or Volvo Penta Controller Interface Module (CIM) if used. If there is a serious malfunction, the engine performance may be reduced or the engine is shut down completely (depending on the type of fault and application).

Two step inducement for VE: If the detected fault is emission related, there will be a two step Inducement (reduced performance) according to the StageV legislation. For genset the engine will be shut down after a certain time according to inducement settings. Fault codes can also be read by the Volvo Penta aftermarket tool VODIA for fault tracing.

EATS (Exhaust Aftertreatment System)

EATS (Exhaust Aftertreatment System) is used to reduce emissions and comply with statutory emission levels. The EATS system consist of a, DPF-system and a SCR-system. (Diesel particular filter system and a Selective catalytic Reduction system and Ammonia slip cat), AdBlue®/DEF is injected in the exhaust gases before they pass through the catalytic converter.Sensors measure nitrogen oxide (NOx) levels in the exhaust gases.

The engine control unit calculates the optimum amount of solution to be added in relation to engine load and engine speed, to achieve efficient reduction of nitrogen oxides.

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

AdBlue®/DEF

The solution that is injected in the exhaust gases is a clear, transparent liquid with a faint odor of ammonia; it consists of de-ionized water mixed with 32.5% urea (the solution must meet ISO 22241 standards / API AUS 32). The urea in the exhaust is broken down into ammonia which reacts with NOx to form harmless nitrogen and water vapor, which occur naturally in our surroundings.

The solution is not flammable or harmful to health with normal use; it is however very corrosive to metals, especially copper and aluminum.

IMPORTANT:
The use of solution that do not fulfill the ISO 22241 standard will compromise the aftertreatment system performance, increase emissions.
Any warranty claims will be rejected.

NOTICE! The urea solution has different names in different markets, e.g. DEF or AdBlue®. The solution is designated either AdBlue or AdBlue/DEF in display messages.

Monitoring

For VE: The system is monitored to ensure that all system components are working as they should, that the quality of the AdBlue®/DEF fulfills set standards and that the tank level is not too low. Should the system detect deviations, the maximum engine torque and engine speed will be reduced and related fault codes are communicated on CAN and stored in the control unit. For Genset the engine will be shut down. For further information refer to *EATS Inducements, VE-engines (EU), page 47*.

Shut-down

Should any solution remain in the hoses in freezing weather, the entire system can be damaged. To avoid this and any solution spillage, the system is equipped with automatic drainage when the engine is switched off so that hoses, the pump and injector are emptied and the solution runs back to the tank.

NOTICE! The automatic drainage only works when the engine is stopped using the ignition switch or the stop button on the instrument panel (depending on application), not if only the engine power supply is disconnected. If the system is not drained properly, solution may squirt out if the hoses are disconnected.

⚠ CAUTION!
The EATS system needs time to for automatically drainage and depressurizing.
Wait at least two minutes after the engine been turned off before removing the AdBlue/DEF hoses.

Overview

The system comprises:

1 Tank

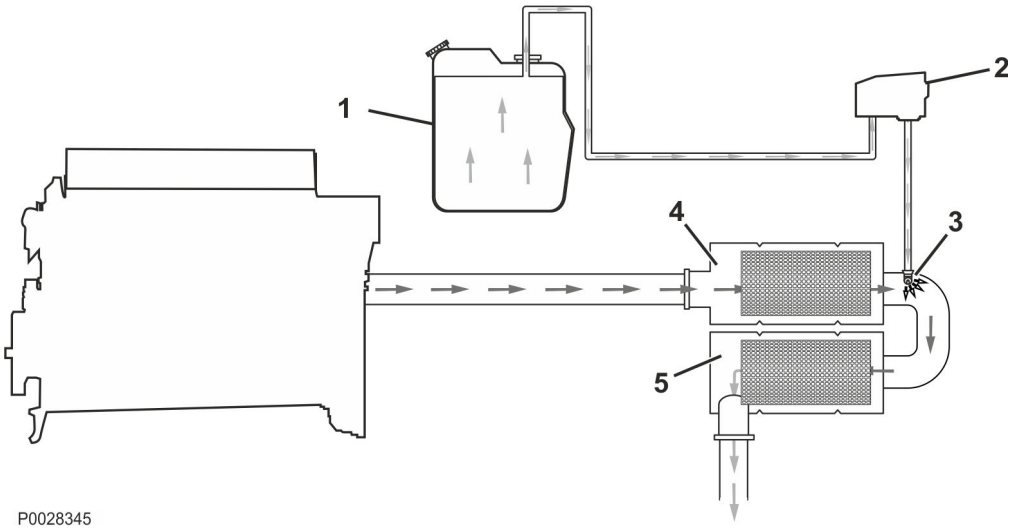
2 Pump

3 Injector

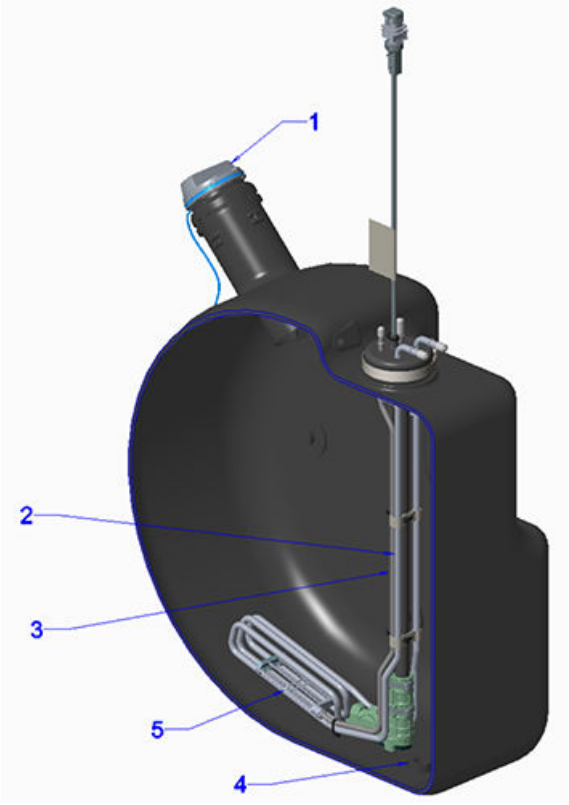
4 DPF-system

5 SCR-system

The atomized AdBlue®/DEF is sprayed into the exhaust gases after the DPF.



P0028345



P0028517

AdBlue®/DEF Tank

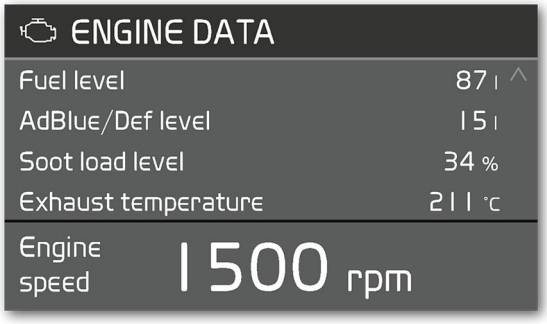
IMPORTANT:
Dirt/dust, oil, greases, detergents and any chemicals and natural products must be prevented from entering the Adblue/DEF tank.
The system will be damaged if dust or dirt enters the tank clogging the filters in the dosing system.
Keep the tank clean at all times.

The AdBlue®/DEF is stored in a separate, tank. The tank is available in different sizes.

There is a fitting in the tank that comprises a heating coil (2), a float (3) and a filter (5) on the suction line to prevent any particles from circulating through the system and causing disruptions. The fliter must be checked and cleaned as necessary.

There is a drain plug (4) on the bottom of the tank so that the solution can be emptied when necessary, e.g. for cleaning. The tank is fitted with a breather to equalize pressure changes.

The filler pipe (1) is equipped with a blue cap to clearly indicate that the tank contains AdBlue/DEF.

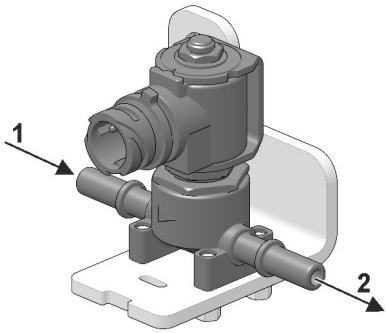


P0028067

Tank level

The solution consumption varies during operations. The level in the tank is shown on the gauge as a percentage of the total tank volume, or what the OEM choose to display.

The tank level signal is continuously read by the EMS. When the level falls below the set limit, the level sensor in the tank transmits a signal that stops AdBlue/DEF dosing. A fault code is set in the engine control unit, a warning lamp lights up and a fault message is shown on the control panel. If solution is not added, injection into the exhaust pipe will cease and engine torque and engine speed will be limited. When solution is added the fault message is canceled and the engine is able to revert to full power. For genset the engine will be shut down according to inducement settings.
Refer to *EATS Inducements, VE-engines (EU), page 47* for further information.



1. From engine
2. To tank

Heating

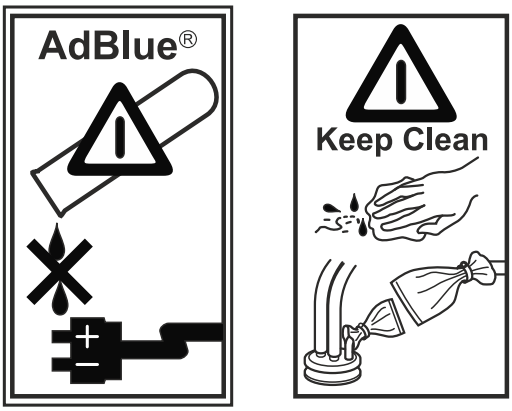
Because AdBlue®/DEF solution freezes at around –11 °C (12.2 °F) the tank is equipped with a heating coil that uses engine coolant. A solenoid valve controls the flow of coolant. The hoses between the tank, pump and injectors are electrically heated and the hose connections are equipped with extra insulation.

There is a temperature sensor in the tank that transmits a signal to the control unit so that the pump cannot start until the AdBlue®/DEF solution is fluid. The standard system can handle thawing from -40 °C (-40 °F). The system is emptied at shut down in order to prevent expansion damage due to freezing.

IMPORTANT:
Hoses must be handled carefully and not twisted or bent excessively in order to avoid damaging the heating system.

Storage

IMPORTANT:
To prevent breakdown and evaporation during longterm storage, AdBlue®/DEF may not be stored at temperatures higher than 25 °C (77 °F) or in direct sunlight.
Remember that the solution expands upon freezing and to leave room for expansion in the tank when storing in spaces where there is a risk of freezing.



P0011697

Operation

⚠ WARNING!
In the case of any contact with eyes or skin the affected area must be thoroughly rinsed with lukewarm water.
If you inhale any fumes, make sure you breathe fresh air.

⚠ CAUTION!
Risk of corrosive damage.
Contact with the fluid can cause irritation and corrosion.
Wear protective gloves!
Change gloves and clothing that have been in contact with the liquid.

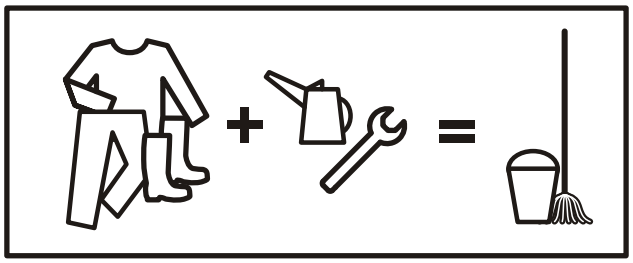
⚠ CAUTION!
Risk of material damage.
AdBlue®/DEF oxidises metal and the capillary action creeps through lines at a speed of approx. 0.6 metres per hour.
If spillage occurs, electrical connectors must be replaced immediately. Do not try to clean with water or compressed air.

AdBlue®/DEF is not a combustible product. When exposed to high temperatures it will convert to ammonia and carbon dioxide. However, do not allow the solution to come into contact with other chemicals or be mixed with other chemicals.

When handling AdBlue®/DEF it is important that electrical connectors are connected or well-encapsulated. The solution is corrosive toward certain metals such as copper and aluminum. Should oxidation occur, it cannot be removed.
If connectors come into contact with the solution they must be replaced immediately to prevent the solution from seeping further along the copper wiring.

If the solution is spilled onto the engine, wipe it away and flush with water. White crystals of concentrated AdBlue®/DEF may form in the event of a spill; wash the crystals away using water.

IMPORTANT:
AdBlue®/DEF spillages may not be washed into drains.
If a spill should occur, the solution must be absorbed using dry sand or other non-flammable material and handled according to local and national regulations.



p0013225

Cleaning tools and clothes

⚠ CAUTION!

Gloves must be changed. Take off contaminated clothes.

⚠ CAUTION!

Tools that come into contact with the fluid must be cleaned.

It is important that tools and clothes are thoroughly cleaned from AdBlue®/DEF so that the liquid or crystals are not transferred to other parts and cause them damaged.

Contact with AdBlue®/DEF

- **skin contact** — flush with copious amounts of water and remove contaminated clothing.
- **eye contact** — flush thoroughly for several minutes; contact physician as necessary.
- **inhalation** — breathe fresh air and contact physician as necessary.

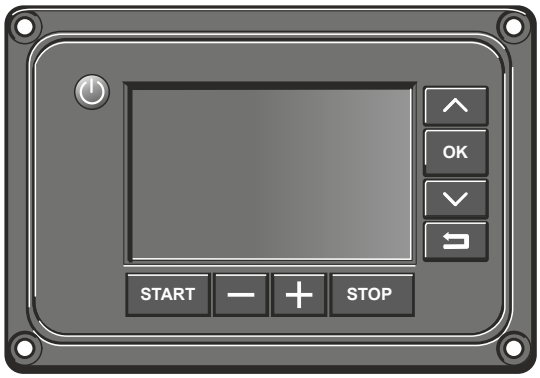
Instruments and Controls

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

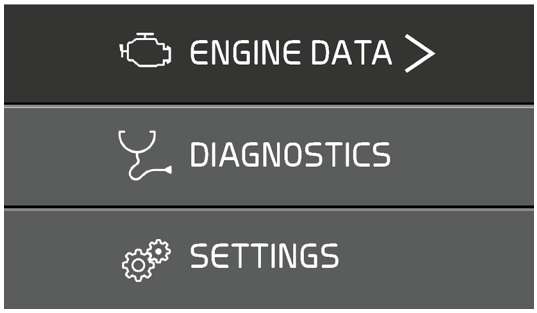
STOP Stop the engine

^ Scroll upwards in menus

OK Select and confirm in menus

v Scroll downwards in menus

↩ Return to previous menu selection



P0028070

Display

The basic view shows three main menus.

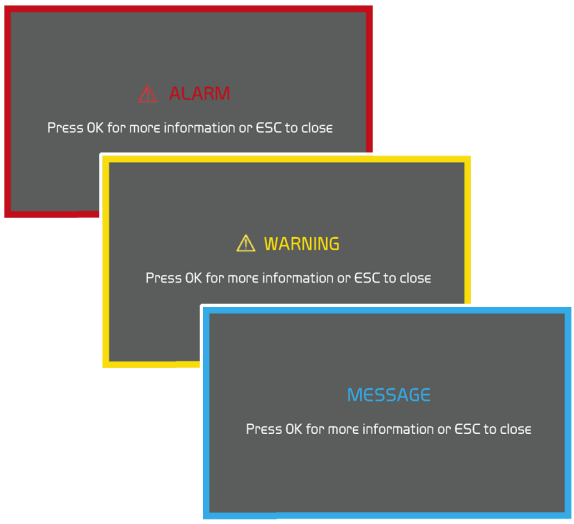
- **ENGINE DATA** (ENGINE DATA), shows current engine data.
- **DIAGNOSTICS** (DIAGNOSTICS), shows fault codes.
- **SETTINGS** (SETTINGS), shows display and engine settings.

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

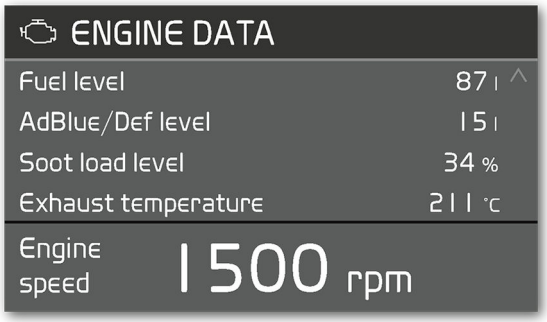


P0028068

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.



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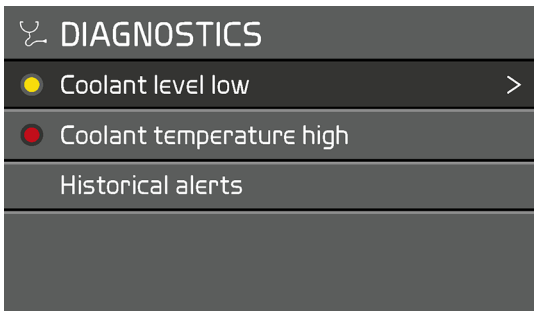


P0028065

Menus

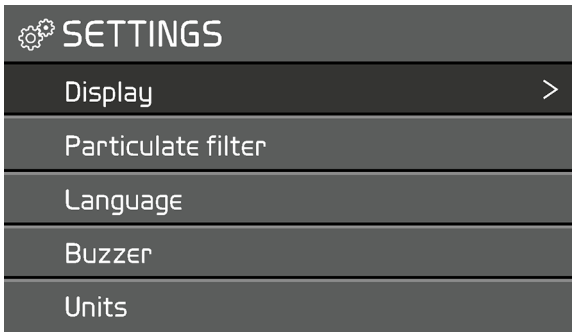
ENGINE DATA (ENGINE DATA)

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 (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 provied 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.

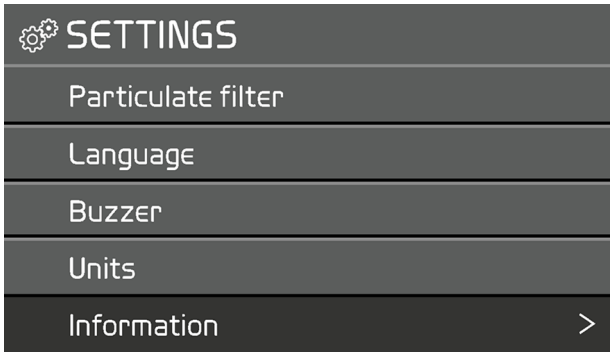
Buzzer

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

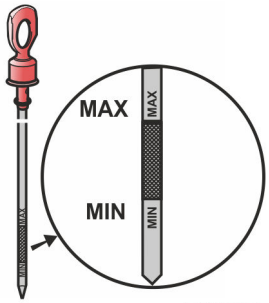
Reading CIM information

- **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)

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.



P0025664

Before Starting

- Check that the oil level is between the MIN and MAX marks. Refer to *Oil level, checking and topping up*. **NOTICE!** The engine should be placed on a level position when the oil is checked.
- Check the fuel pre-filter; refer to *Draining condensate, fuel system, page 62*.
- Check that no leakage of oil, fuel or coolant is present.
- Check the coolant level and that the radiator is not blocked externally. Refer to *Coolant Level, Checking and Topping Up, page 67* and *Charge Air Cooler, External Cleaning, page 69*.

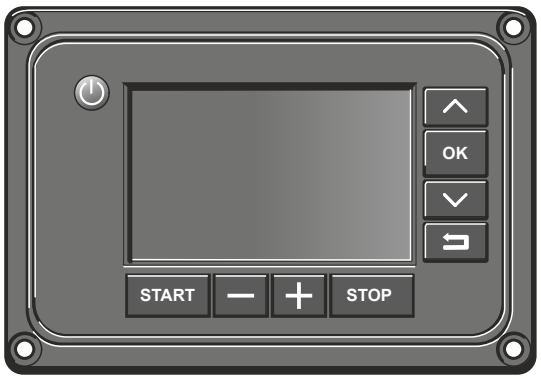
  ⚠ WARNING!
  Do not open the coolant filler cap when the engine is hot, except in emergencies, as this could cause serious personal injury. Steam or hot fluid could spray out.
- Turn the main switch on.

  IMPORTANT:
  Never break the circuit with the main switch while the engine is running.
  Alternator and electronics could be damaged.
- Move the engine speed control to idle, and open the disengageable clutch/gearbox if installed.

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 41*.

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 VE: Turn off the engine instead of running on idle for longer periods.
- 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.

Shutdown

During longer breaks in operation, the engine must be warmed up at least once every two weeks. This prevents corrosion in the engine. If you expect the engine to remain unused for two months or more, it must be preserved: Refer to the chapter *, page 77*.

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 2 minutes after turning off the ignition. This is in order to save engine data to the engine control unit.

Stop the Engine

P0018811

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.

Auxiliary Stop

P0025697

For location of the extra stop, refer to *, page 55*.

⚠ 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 77* .

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

Refer to *, page 66*.

IMPORTANT:
A poorly charged battery can freeze and burst.

Refer to *Battery, page 75*.

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

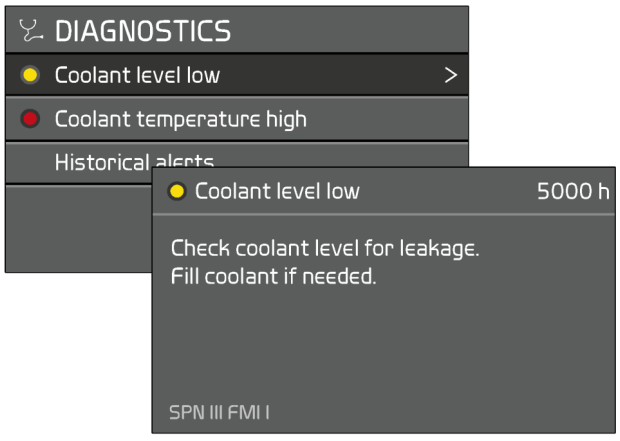
The purpose of the diagnostic function is to monitor, control and protect the engine and its surrounding system and components from damage, as well as to ensure a minimal environmental impact.

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.)

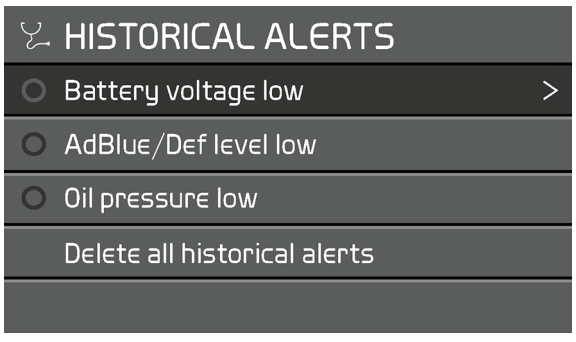
CIM (Control Interface Module)



P0028529

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.



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.

EATS Warnings and Inducements

EATS system monitoring checks the quality of the AdBlue®/DEF, the level in the tank and the correct function of the system components. If a fault is detected, the operator is warned via the instrument panel and the engine speed and torque is limited. To enable fault tracing and the remedy of any faults, the engine can be re-started according to a start schedule; refer to *EATS Inducements, VE-engines (EU), page 47*.

NOTICE! Warning messages and symbols may vary depending on the installation; shown here are those seen on panels sold by Volvo Penta.

Important! Take prompt action in case of error code indication

Warning Symbols

NCD symbol

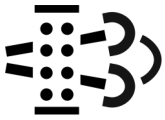
NCD - NOx Control Diagnostics

The NCD symbol will be shown if the reagent level is below 15%, the quality of the reagent is bad or if the dosing activity is un-normal. If no action has been taken to resolve the EATS malfunctions or refill the tank within certain time, the engine will be derated (applicable for VE engines). For genset the engine will be shut down according to inducement settings.

VE engines: The operator has the possibility to override the derate if the power reduction makes the application stuck in an unsuitable situation. An urgent repair or maintenance of the EATS system has to be performed when the combination of NCD symbol and yellow/red warning indicator are lit/flashing.

Light inducement	
 	• The warning symbol shines with a solid **yellow light**. • The NCD symbol shines with a solid light.

Severe inducement	
 	• The warning symbol shines with a solid **red light**. • The NCD symbol flashes.



PCD symbol

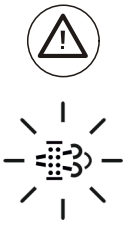
PCD - Particle Control Diagnostics

The control system detects the need of regeneration due to high EATS load level (high soot level in filter, high sulfur load or HC-formation). Beside this the system also notices if the DPF system has been removed from the engine or if there is a malfunction on the sensors.

VE engines: A parked regeneration is needed to reduce the EATS load level the PCD symbol starts to flash in yellow. If no action is taken the engine will go into derate and finally a filter replacement is required to get back to normal operation.

Genset engines: If the PCD symbol is flashing, contact a qualified workshop.

Light inducement	
	• The warning symbol shines with a solid **yellow light**. • The PCD symbol shines with a solid light.

Severe induement	
	• The warning symbol shines with a solid **red light**. • The PCD symbol flashes.

P0031752

Regeneration

Only applicable for VE engines

If the control system detects high EATS loads (high soot level in filter, high sulfur load or HC-formation) the engine is in need of regeneration. When requested, a parked regeneration should be performed as soon as possible. The regeneration will last for approximately 60 minutes and it should not be aborted.

Regeneration needed	
	• The warning symbol shines with a solid **yellow light**. • The PCD symbol flashes.

⚠ CAUTION!
During regeneration the exhaust gases gets hot. Make sure the vehicle is parked in a safe environment before regeneration is started.

NOTICE! Repeated regeneration interruptions will force the system in derate and Volvo Penta diagnostic tool is required to perform a service regeneration.

Engine derate information

If the soot load reaches >80%, full derate will be applied. Full derate keeps engine speed below 1500 rpm and torque is restricted.

If exhaust temperature gets above 440 °C for more than 300 seconds, while the EATS is fully loaded with sulfur, continued high power outtake will be restricted with a maximum of 28% derate in order to limit exhaust temperature. Fault code SPN 5018 FMI 0 signalises this condition. A parked sulfur regeneration is necessary to reset the limitation if high power outtake is needed.

NOTICE! Before starting a Sulfur regeneration triggered by fault code SPN 5018 FMI 0, contact the machine builder to secure that the correct prerequisites for a successful regeneration are fulfilled.

Regeneration calibration settings

- Target temp (VE), for soot/deposit regen is 470–490 °C and takes 40–60 min.
  For genset: Soot 60 min temperature elevated.
- Target temp for HC regen is 350–400 °C and takes about 17 min.
- Target temp (VE), sulfur parked regeneration is ~530 °C inside EATS and takes 90 min.

NOTICE! The Emission control using SCR-catalyst may sometime cause some deposits inside the Exhaust After Treatment System. A thin layer of deposits (few mm´s) is acceptable and should be expected - this requires no action. Occurrence of deposits may vary over time. Continuous operation at low load and low temperature increases the risk of accumulating deposits of crystallized AdBlue/DEF. If the engine is running very cold at low power for a long period, the crystals will not burn off naturally.

To avoid crystallization, operate the engine on higher load and temperature during extended periods of the driving cycles. If the driving cycles are alternated between cold and hot temperature, the crystals will be burnt off and removed due to the high exhaust temperatures.

To manage the EATS at sufficient temperature, avoid long periods of idling; it may also be necessary to use engine stop/start functionality, viscous clutch fan and do a careful insulation of pipes and muffler.

If deposits are present even though the engine is run at varying load and are larger in volume than a chicken´s egg, it is suggested to monitor the deposit size over time to ensure that there is not growth of the deposit. It is suggested taking photos including a reference object like a pen or a matchbox to be able to relate size when comparing photos over time.

Presence of deposits ***outside*** the exhaust lines is a sign of a bad sealing in exhaust line joints. Deposits can be removed by cleaning with water and a soft brush. Joint alignments should be checked and gaskets replaced before reassembly.

For cases with deposits larger in size – contact your local Volvo Penta representative to discuss the issue.

Quality shortcomings and component defects

If the system signals a quality shortcoming or component defect, check the following:

- that the QLT (Quality-Level-Temperaturesensor) in the AdBlue®/DEF tank is connected.
- that system hoses and the injection valve are not clogged or disconnected.
- that the injection valve is connected.
- that the AdBlue®/DEF pump is connected.
- that the SCR system electrical cables are connected.
- that the NO_x sensors are connected.
- that the exhaust temperature sensor is connected.
- that the temperature sensors for the AdBlue®/DEF is connected.
- that there are no leaks in the exhaust system where substantial amount of solution can escape.
- that the EGR valve is not stuck.

If the fault can not be remedied with any of the above, refer to *EATS Inducements, VE-engines (EU), page 47*.

EATS Inducements, VE-engines (EU)

AdBlue/DEF tank level

1 When the level in the tank falls to 15%, a yellow warning indicator is lit in combination with a solid NCD symbol.

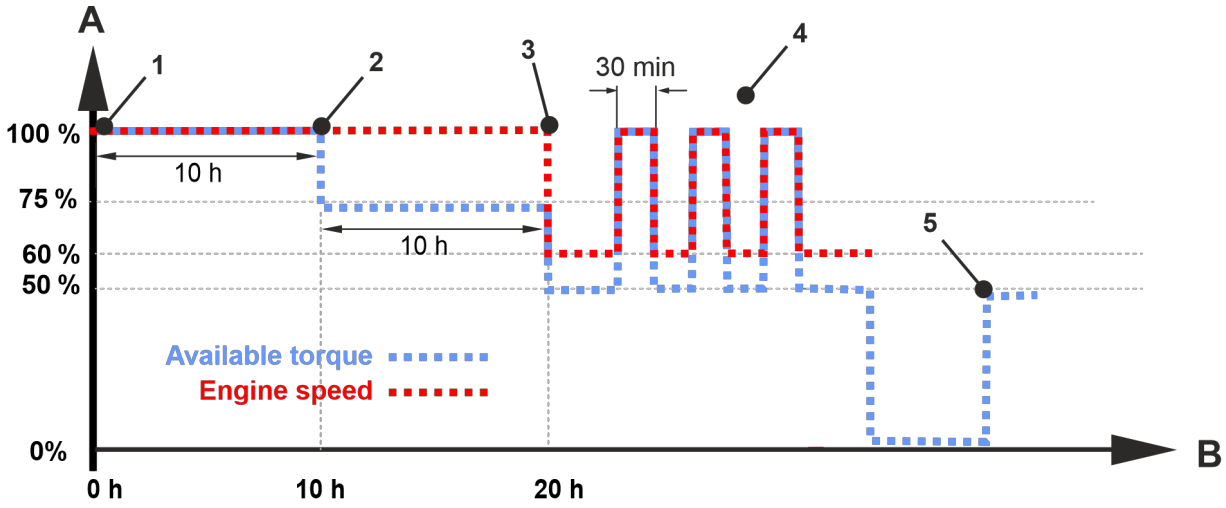
2 When the tank level reaches 6%, the warning indicator turns red and the NCD symbol starts to flash. The engine goes into light inducement, 75% of available torque.

3 If the tank is not filled up, the engine goes into severe inducement 7 minutes after the tank level has reached 6%. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed.

4 If the engine is restarted when the tank level is below 6%, the engine will run for 30 minutes and then again go into severe inducement. It is possible to restart the engine three times, thereafter the engine will remain in idle speed.

5 To revert the engine to full power, the tank level must be above 12%. To exit the inducement, the tank level must be above 21%.

AdBlue/DEF, dosing and quality



P0029877

A Engine rpm and torque

B Time axis

1 When a fault is detected a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not resolved within 10 hours the engine goes into light inducement, 75% of available torque. 7 minutes before going into inducement the warning indicator turns red and the NCD symbol starts to flash.

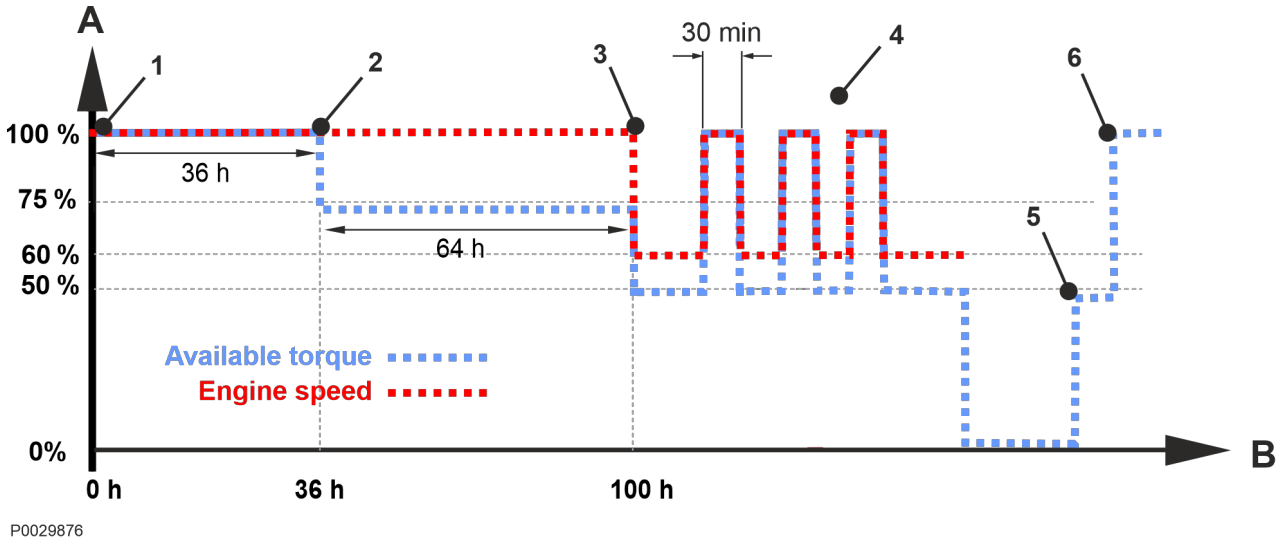
3 If the fault is still not resolved within the next 10 hours the engine goes into severe inducement. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed. Service tools is required to reset the system.

4 During severe inducement it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine again goes into severe inducement. Each 30-minute period requires a manual activation.

5 If an additional fault recurs within 40 hours after the first fault was remedied, severe inducement is activated after 2 hours.

6 If a fault recurs within 40 hours, default timers applies.

Component fault



P0029876

A Engine rpm and torque

B Time axis

1 When a fault is detected a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not remedied within 36 hours the warning indicator turns red and the NCD symbol starts to flash. The engine goes into light inducement, 75% of available torque.

3 After a further 64 hours the engine goes into severe inducement. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed.

4 During severe inducement it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine again goes into severe inducement. Each 30-minute period requires a manual activation.

5 Upon re-start the engine will run in severe indcuement mode.

6 When the fault is remedied the engine will revert to full power.

7 If a fault recurs within 40 hours, available running time will be reduced to 300 minutes from the moment the fault is detected.

EATS Inducements, VE-engines (China IV)

AdBlue/DEF tank level

1 When the level in the tank falls to 15%, a yellow warning indicator is lit in combination with a solid NCD symbol.

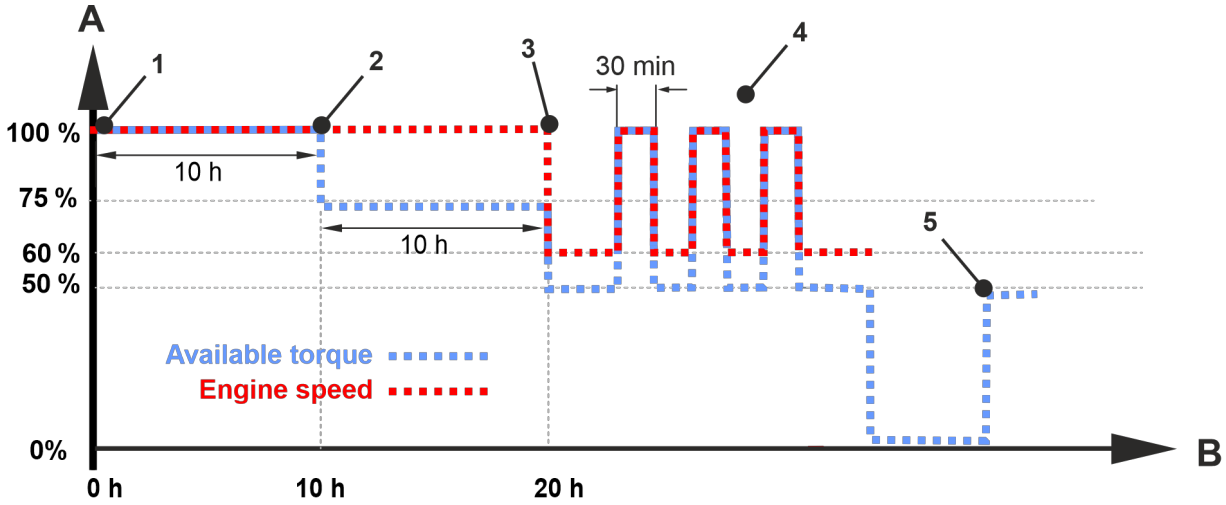
2 When the tank level reaches 6%, the warning indicator turns red and the NCD symbol starts to flash. The engine goes into light inducement, 75% of available torque.

3 If the tank is not filled up, the engine goes into severe inducement 7 minutes after the tank level has reached 6%. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed.

4 If the engine is restarted when the tank level is below 6%, the engine will run for 30 minutes and then again go into severe inducement. It is possible to restart the engine three times, thereafter the engine will remain in idle speed.

5 To revert the engine to full power, the tank level must be above 12%. To exit the inducement, the tank level must be above 21%.

AdBlue/DEF, dosing and quality



P0029877

A Engine rpm and torque

B Time axis

1 When a fault is detected a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not resolved within 10 hours the engine goes into light inducement, 75% of available torque. 7 minutes before going into inducement the warning indicator turns red and the NCD symbol starts to flash.

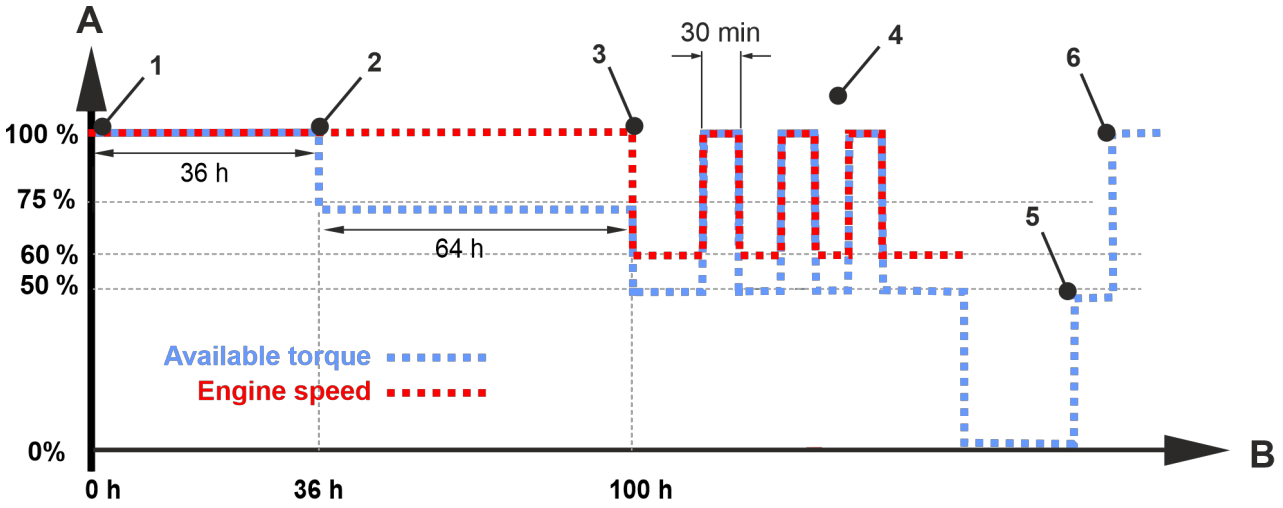
3 If the fault is still not resolved within the next 10 hours the engine goes into severe inducement. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed. Service tools is required to reset the system.

4 During severe inducement it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine again goes into severe inducement. Each 30-minute period requires a manual activation.

5 If an additional fault recurs within 40 hours after the first fault was remedied, severe inducement is activated after 2 hours.

6 If a fault recurs within 40 hours, default timers applies.

Component fault, NCD (NOx Control Diagnostics)



P0029876

A Engine rpm and torque

B Time axis

1 When a fault is detected a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not remedied within 36 hours the warning indicator turns red and the NCD symbol starts to flash. The engine goes into light inducement, 75% of available torque.

3 After a further 64 hours the engine goes into severe inducement. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed.

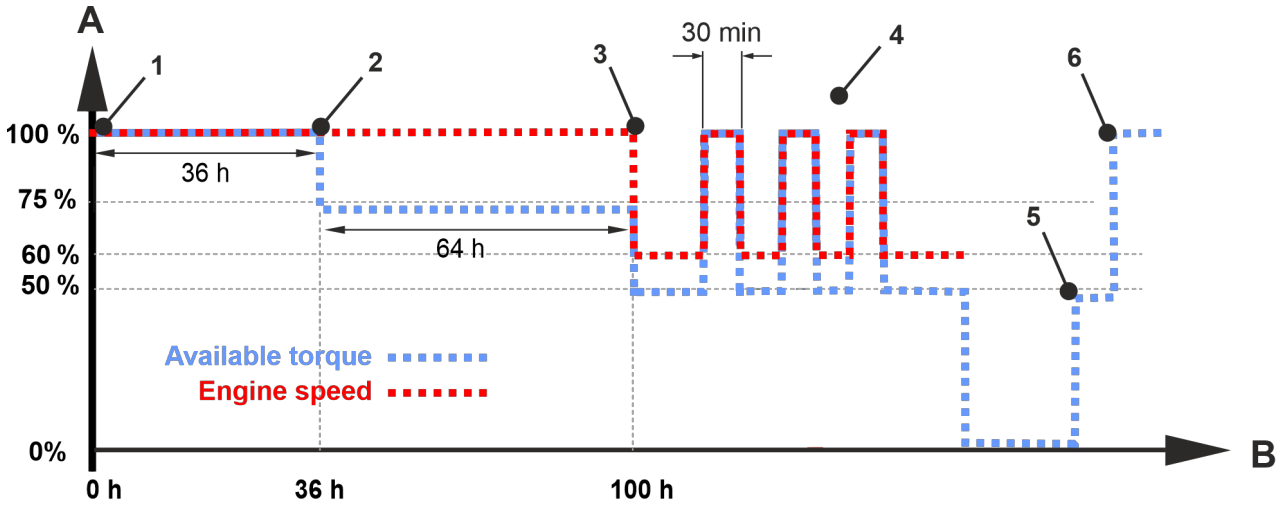
4 During severe inducement it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine again goes into severe inducement. Each 30-minute period requires a manual activation.

5 Upon re-start the engine will run in severe indcuement mode.

6 When the fault is remedied the engine will revert to full power.

7 If a fault recurs within 40 hours, available running time will be reduced to 300 minutes from the moment the fault is detected.

Component fault, PCD (Particle Control Diagnostics)



P0029876

A Engine rpm and torque

B Time axis

1 When a fault is detected a yellow warning indicator is lit in combination with a solid PCD symbol.

2 If the fault is not remedied within 36 hours the warning indicator turns red and the PCD symbol starts to flash. The engine goes into light inducement, 75% of available torque.

3 After a further 64 hours the engine goes into severe inducement. At severe inducement the engine drops to 50% of available torque level and is restricted to 60% engine speed.

4 During severe inducement it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine again goes into severe inducement. Each 30-minute period requires a manual activation.

5 Upon re-start the engine will run in severe indcuement mode.

6 When the fault is remedied the engine will revert to full power.

7 If a fault recurs within 40 hours, available running time will be reduced to 300 minutes from the moment the fault is detected.

EATS Inducements, VE-engines (combined EU/US, EU/MSHA/ CANMET)

AdBlue/DEF tank level

1 When the level in the tank falls to 15%, a yellow warning indicator is lit in combination with a solid NCD symbol.

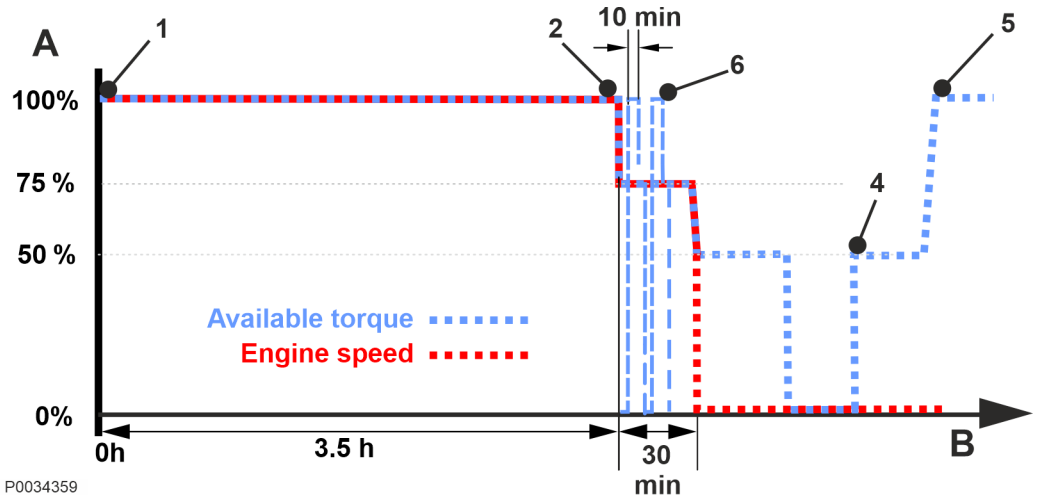
2 When the tank level reaches 6%, the warning indicator turns red and the NCD symbol starts to flash. The engine goes into light inducement, 75% of available torque.

3 If the tank is not filled up, the engine goes into severe inducement 7 minutes after the tank level has reached 6%. At severe inducement the engine drops to 50% of available torque level and is restricted to idle.

4 If the engine is started when the tank level falls below 6%, the engine will only run at idle.

5 To revert the engine to full power, the tank level must be above 12%. To exit the inducement, the tank level must be above 21%.

AdBlue/DEF high temperature, quality and component faults



A Engine rpm and torque

B Time axis

1 When a fault is detected, a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not resolved within 3.5 hours the engine goes into light inducement, 75% of available torque. The warning indicator turns red and the NCD symbol starts to flash.

3 After 30 minutes, the engine will drop to idle with a 50% torque reduction. The warning indicator turns red and the NCD symbol is flashing.

4 Following restart, the engine will run at idle with a 50% torque reduction.

5 When component faults are remedied, the engine will revert to full power.

6 During severe inducement, it is possible to manually override the system actions and run the engine at full power for 2 x 10 minutes. After 10 minutes the engine drops to 75% power. Each 10-minute period requires a manual activation.

7 If an additional fault recurs within 40 hours after the first fault was remedied, severe inducement will be activated 30 minutes from the moment the fault is detected.

EATS Inducements, GE-engines

AdBlue/DEF tank level

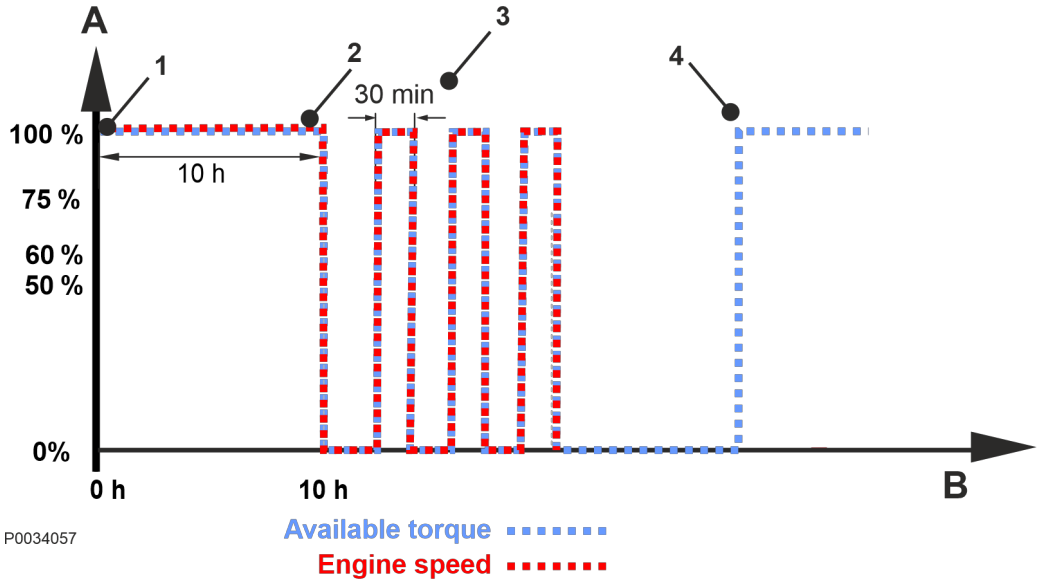
1 When the level in the tank falls to 15%, a yellow warning indicator is lit in combination with a solid NCD symbol.

2 When the tank level reaches 6%, the warning indicator turns red and the NCD symbol starts to flash. After 7 minutes the engine is stopped.

3 If the engine is started when the tank level falls below 6%, the engine will only run at idle speed.

4 To revert the engine to full power, the tank level must be above 12%. To exit the inducement, the tank level must be above 21%.

AdBlue/DEF, dosing and quality



A Engine rpm and torque

B Time axis

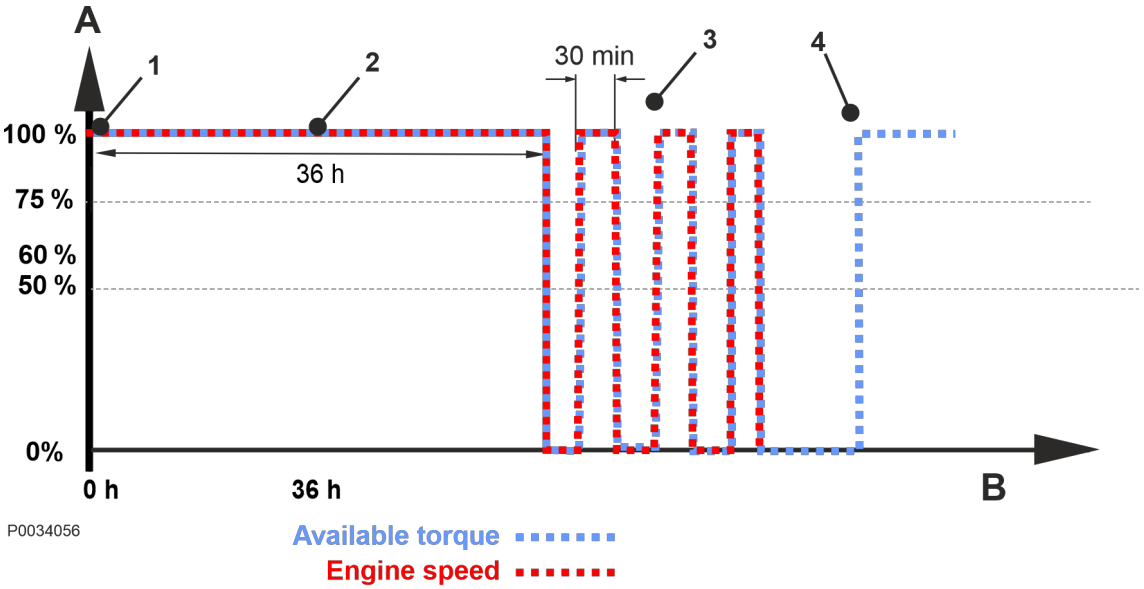
1 When a fault is detected, a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not resolved within 10 hours the warning indicator turns red and the NCD symbol starts to flash. After 7 minutes the engine will be stopped.

3 If the engine has stopped it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine shuts down again. Each 30-minute period requires a manual activation.

4 When the faults are remedied the engine will revert to full power.

Component fault



A Engine rpm and torque

B Time axis

1 When a fault is detected, a yellow warning indicator is lit in combination with a solid NCD symbol.

2 If the fault is not resolved within 36 hours the warning indicator turns red and the NCD symbol starts to flash. After 7 minutes the engine will be stopped.

3 If the engine has stopped it is possible to manually override the system actions and run the engine at full power for 3 x 30 minutes. After 30 minutes the engine shuts down again. Each 30-minute period requires a manual activation.

4 When the faults are remedied the engine will revert to full power.

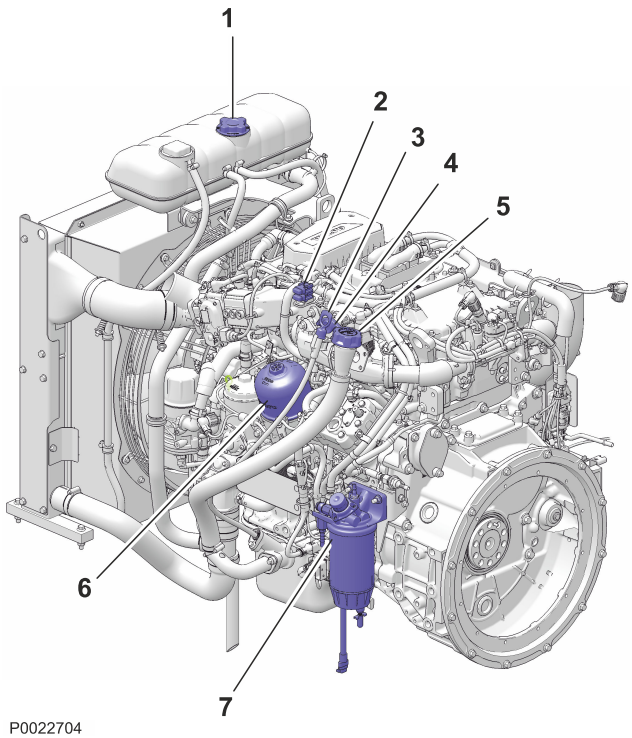
Maintenance

This chapter describes the most common maintenance items. Refer to *Maintenance Schedule* for service intervals. When ordering service or spare parts, always specify the engine and transmission identification number. Refer to *, page 86*.

NOTICE! More information on how to perform service and maintenance can be found in the Service and Maintenance handbook. Information on how to purchase the Service and Maintenance handbook 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.



P0022704

Orientation

1 Coolant filler cap
2 Fuse
3 Oil dipstick
4 Auxiliary stop
5 Oil filler cap
6 Oil filter
7 Fuel pre-filter

Engine, General

General inspection

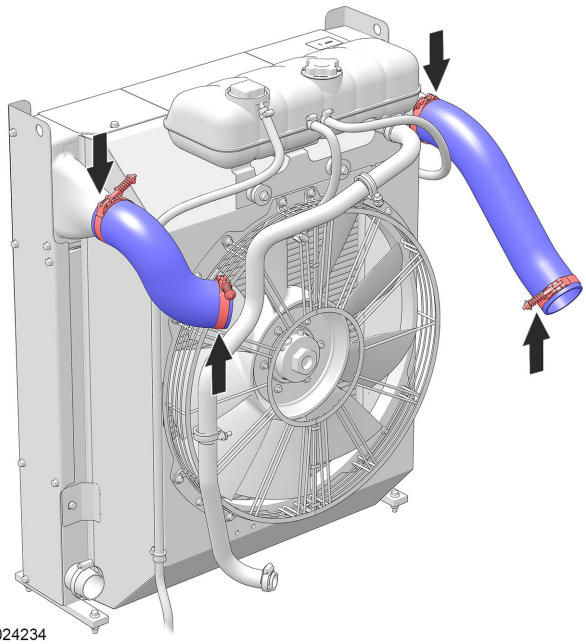
Make it a habit to give the engine and engine compartment a visual inspection before starting the engine and after operation once the engine has stopped. This will help you to discover quickly if anything abnormal has happened, or is about to happen.
Look especially carefully at oil, fuel and coolant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

Charge Air Pipe, Leakage Check


P0024234

Inspect the condition of the charge air hoses, hose unions and clamps for cracks and other damage. Change as necessary.

Check for leaks in the exhaust system. Leaks between the turbo and the muffler represent a risk for leakage of AdBlue/DEF.

Drive Belt, Check and Replace

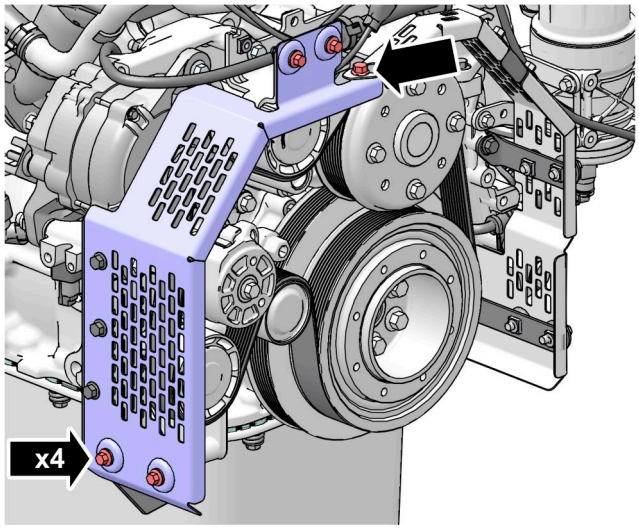
⚠ CAUTION!
Pinch hazard. Keep fingers clear.

IMPORTANT:
Always change a belt that is oily, worn or damaged.

Check

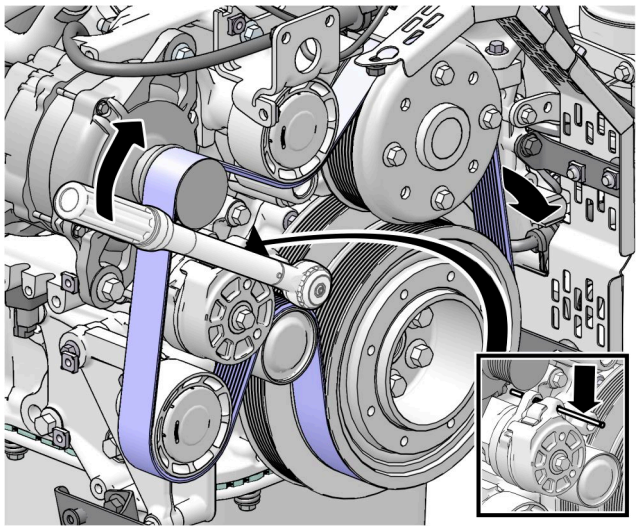
Check the drive belt after operation, when the belt is hot. It should be possible to depress the drive belt about 3-4 mm (0.12–0.16") between the pulleys. The drive belt has an automatic belt tensioner and therefore does **not** need to be adjusted.

Replacement



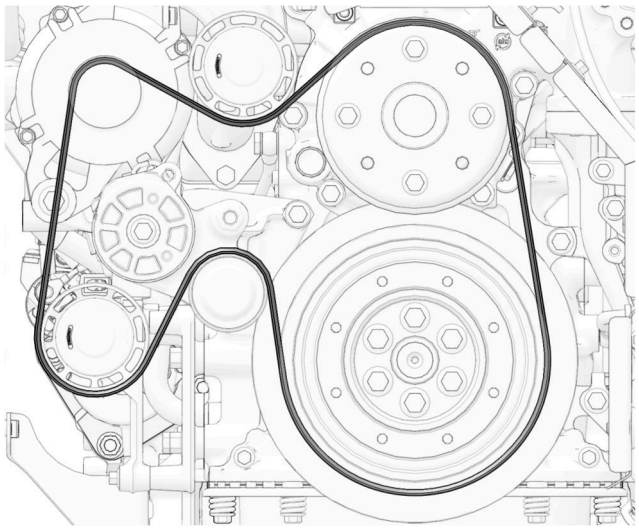
P0019257

1 Remove the right belt guard.



P0019255

2 Undo the belt tensioner and restrain it with a mandrel.
Remove the old drive belt.



P0019256

3 Fit the new drive belt.

4 Remove the mandrel restraining the belt tensioner.

5 Re-install the belt guards.

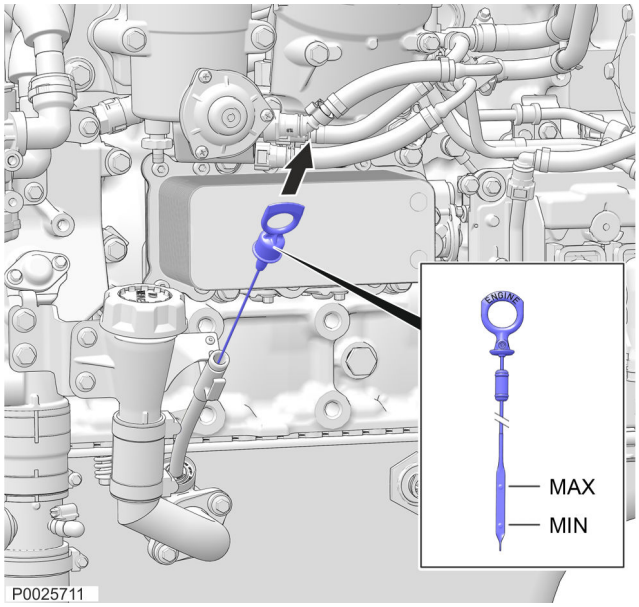
6 Check that the belts are correctly aligned in their grooves and are correctly tensioned. It should be possible to depress the drive belt about 3-4 mm (0.12–0.16") between the pulleys.

P0002089

Lubrication System

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*.



P0025711

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.

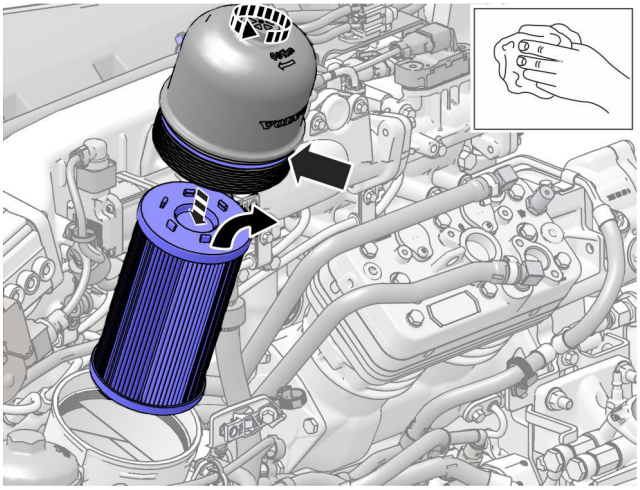
- The engine should be placed on a level position when the oil is checked.
- The oil level is to be checked when the engine is stopped. Wait a few minutes before reading off the level, so that the oil has time to run down into the oil sump.
- Only fill oil when the engine is stopped.
- Only use a recommended quality and viscosity of oil; refer to *Oil recommendations, page 80*.
- Make sure that the oil level is between the MIN and MAX marks. Do **not** fill above the maximum oil level.

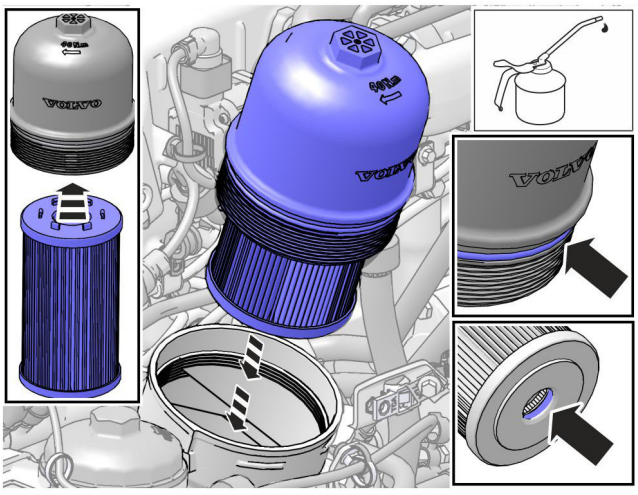
Depending on installation and application, some variants are equipped with digital oil level display, this function should be considered to be a complement to the engine oil dipstick and not a replacement.
The physical engine oil dipstick should always be consulted when filling up new oil in the engine, to not risk overfilling the system.

Oil Filter, Replace

⚠ WARNING!
Hot oil and hot surfaces can cause burns.

NOTICE!
Always follow the recommended oil change intervals. Always replace the oil filter at the same time as the oil change.





P0025714

Removal

1 Drain the oil according to the instructions in *Engine Oil, Replace, page 61*.

NOTICE! Place a collection vessel underneath the filter to avoid oil spillage.

2 Clean around the oil filter.

3 Carefully remove the filter cover together with the filter

4 Remove the O-ring and filter from the cover.

5 Let the oil drip off into a collection vessel.

Installation

1 Lubricate the new O-ring and the gasket of the new filter before installation.

2 Install the new filter and new O-ring in the filter cover. Make sure the filter is correct installed in the cover.

3 Install the filter cover and filter in the bracket. Tighten the cover to: 35 Nm (25.8 lbf.ft.)

4 Fill with required volume of oil; refer to *Engine Oil, Replace, page 61*.

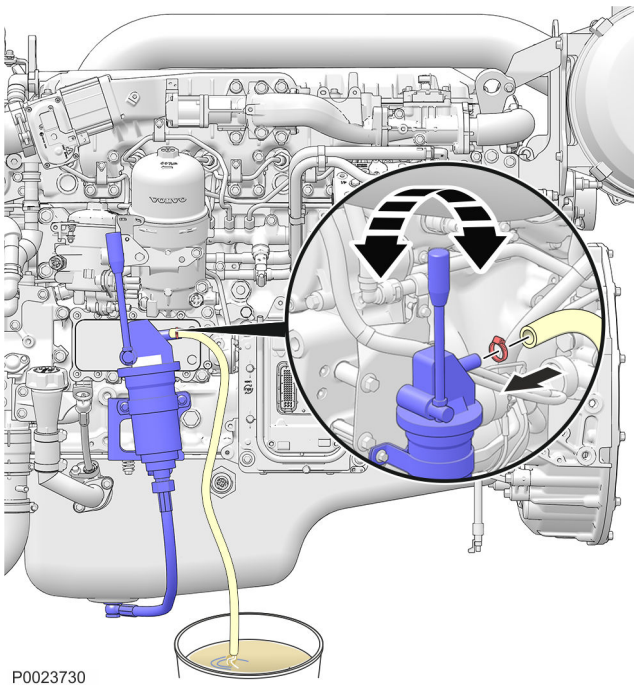
5 Start the engine and check that there is no oil leakage from the oil filter or drain nipple.

6 Switch the engine off and check the oil level after a few minutes. Top up with oil as necessary.

Engine Oil, Replace

⚠ WARNING!
Hot oil and hot surfaces can cause burns.

NOTICE! Always follow the recommended oil change interval and always change the oil filter in connection with oil changes.


P0023730

1 Run the engine until warm.

2 Remove the drain plug. Drain the oil.

NOTICE! Collect the old oil and old filters and hand them to a re-cycling station.

3 Install the drain plug with a new gasket.

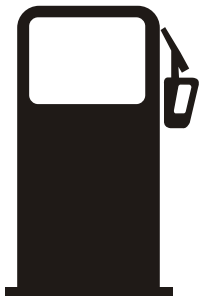
4 Change the oil filter, refer to *Oil Filter, Replace, page 60*.

5 Fill oil to the correct level, refer to *Oil level, checking and topping up, page 59*.

IMPORTANT:
Do not fill above the MAX level.

6 Start the engine and let it idle. Check that the oil pressure is normal.

7 Stop the engine. Check that there is no oil leakage around the filters. Check the oil level and top up with oil as necessary. Refer to *Oil level, checking and topping up, page 59*.



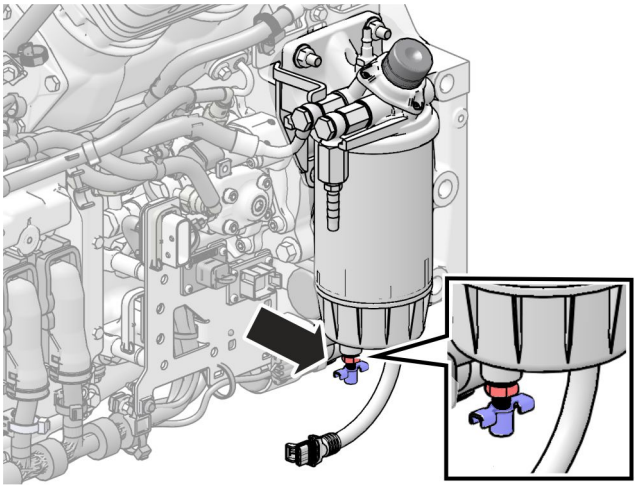
P0002101

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.

Draining condensate, fuel system



1 Stop the engine and close the fuel tap.
2 Put a collection vessel under the fuel pre-filter to collect the condensate and fuel.
3 Open the drain nipple at the bottom of the water separator.
4 Drain the water contained in the water separator into the collection vessel.

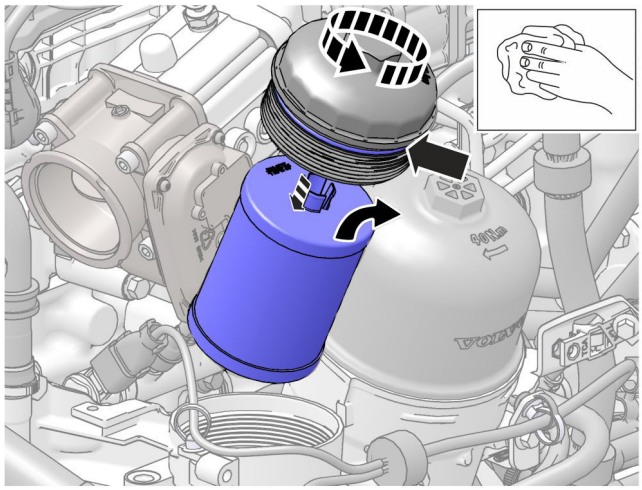
   NOTICE! Do not drain the water separator completely.

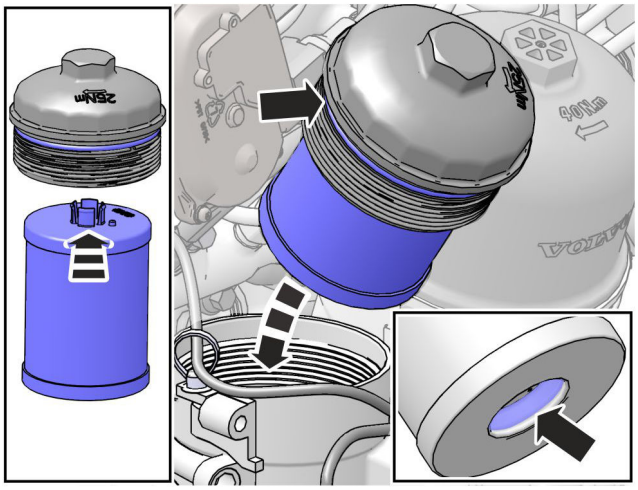
5 Tighten the drain nipple and open the fuel tap.
6 Start the engine and check there is no fuel leakage from water separator.

Fuel Filter, Replace

IMPORTANT:
Risk of material damage.
The wrong type of fuel filter may damage the fuel injection circuit.
Use only a fuel filter approved by the manufacturer.

IMPORTANT:
Take great care to keep fuel system unions clean. Even minimal amounts of dirt can cause engine breakdown.





P0025715

Removal

1 Clean around the filter cover and housing.

2 Carefully remove the fuel filter cover and filter.

NOTICE! Be prepared to gather up fluid. The filter is still full of fuel and there is a risk of spillage when the cover is removed.

3 Remove the O-ring and filter.
Let the fuel drip off into a collection vessel.

Installation

1 If the new filter housing is completely empty, lubricate with diesel around the inner section of the filter sealing surface.

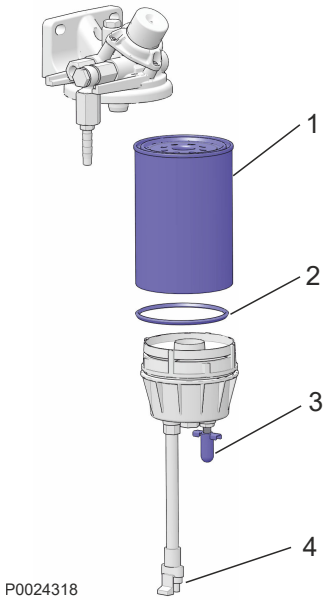
2 Lubricate the O-ring with diesel before installing the filter cover.

3 Install the filter in the filter cover. Make sure the filter seats properly in the cover.

4 Install the filter cover and filter in the bracket. Carefully screw in the cover and check that the O-ring does not get twisted. Re-lubricate the seal as necessary.
Tighten the cover to: 25 Nm (18.4 lbf. ft.)

5 Bleed the fuel system according to *Fuel Pre-filter, Bleeding, page 65*.

6 Start and warm up the engine. Check that no leakage occurs.



Fuel Pre-filter, Replace

⚠ CAUTION!
Always use protective gloves for work including contact with oil, fuel etc.

NOTICE! Put a collection vessel under the fuel filter to collect the condensate and fuel. Store the used filter in a suitable container.

Removal

1 Loosen the connector (4) to the water trap sensor.

2 Clean thoroughly around the pre-fuel filter and water separator.

3 Open the drain nipple (3) in the base of the fuel prefilter and drain the filter.

4 Tighten the drain nipple again.

5 Remove the fuel pre-filter (1) and seal together with the lower section of the water separator.

6 Remove the water separator and O-ring.

NOTICE! Put the used filter in a suitable container.

7 Clean the lower section of the water separator and the contact surfaces.

Installing

1 Clean the seal surfaces thoroughly and lubricate the gasket with diesel.

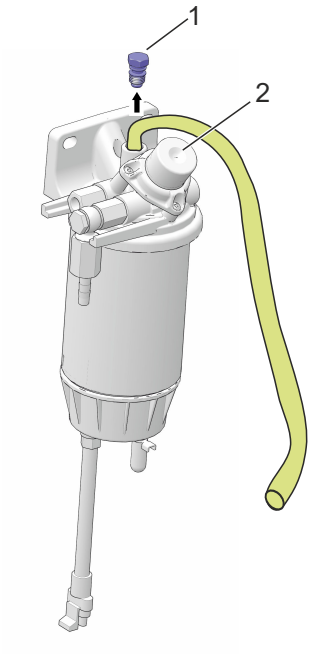
2 Lubricate a new O-ring (2) with diesel and install the lower part of the water separator to the new filter.

3 Screw the filter onto the filter bracket by hand until the rubber seal bottoms on the mating surface. Then tighten a further 1/2–2/3 turns.

4 Connect the cable from the water trap sensor.

5 Open fuel taps and purge the system, refer to *Fuel system, bleeding*.

6 Start the engine and check that no leakage occurs.



P0024319

Fuel Pre-filter, Bleeding

It is only necessary to purge the fuel system following maintenance on the system or if a fault has caused it to run dry.

NOTICE! Be prepared to gather up fluid.

1 Position a collection vessel.

2 Remove the plug (1) and place a nipple.

NOTICE! There is a special nipple for the filter housing, order through your Volvo Penta dealer.

3 Connect a transparent hose to the nipple.

4 Operate the hand pump (2) by pumping it until fuel flows without air bubbles.

5 Remove the hose and nipple.

6 Install and tighten the plug.

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.

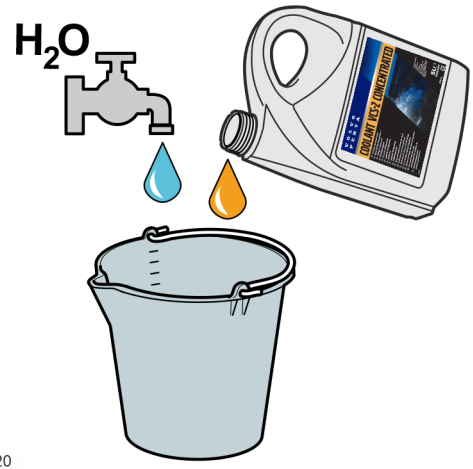
IMPORTANT:
Coolant of a suitable chemical composition must be used all year round to protect the engine against internal corrosion, cavitation and freeze bursting. This even applies when there is no risk for freeze damage, to make sure the engine always has a complete corrosion protection.

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*.

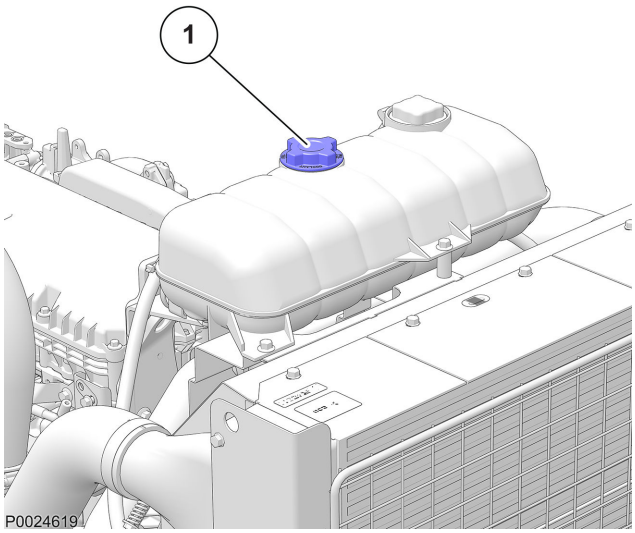


P0038120

Coolant, Mixing

It is extremely important that the system is filled with the correct coolant concentration; refer to *Coolant, Mixing, page 83*.
The coolant should be mixed with distilled, deionized water. For Volvo Penta specified water requirements; refer to *Coolant, Mixing, page 83*.

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



Coolant Level, Checking and Topping Up

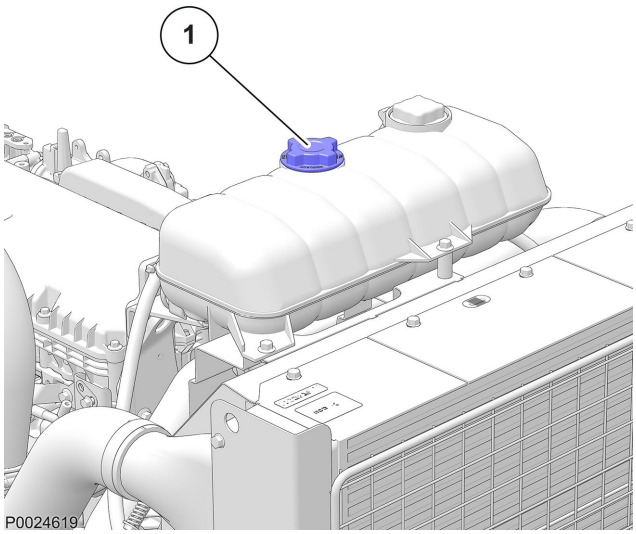
⚠ WARNING!
Do not open the coolant filler cap when the engine is hot, except in emergencies, as this could cause serious personal injury. Steam or hot fluid could spray out.

Coolant filling must be preformed with the engine stopped. Check the coolant level daily before starting.

IMPORTANT:
Only use coolant recommended by Volvo Penta.
Top up with the same type of coolant as already used in the system.
VCS-2 will be backwards compatible with current VCS and they are mixable without risks.

1 Only open the filler cap (1). Do not open the pressure cap.

2 Top up so that the coolant level is all the way up to the filler cap.



Refill of empty system

NOTICE! Mix the correct amount of coolant in advance to ensure that the cooling system is completely filled. Refer to , *page 83* for the correct coolant volume.

1 Check that all drain points are closed.

2 Only open the filler cap (1). Do not open the pressure cap.

3 Fill the coolant level all the way up to the filler cap. Fill slowly, to allow air to flow out.

4 Start the engine when the cooling system has been completely filled and bled. Open any bleeding nipples a short while after starting, to allow trapped air to escape.
If a heating unit is connected to the engine cooling system, the heat control valve should be opened and the installation vented during filling.

5 Run the engine at idle a while. Increase engine speed to 1600-1700 rpm (VE) over three minutes. For genset engines run at 1500 or 1800 rpm. Check the coolant level.

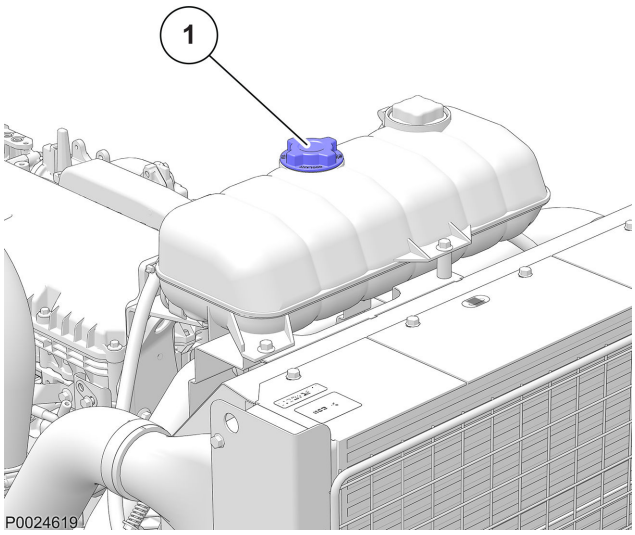
6 Start the engine and run it until it reaches operating temperature (thermostat open). Check the coolant level again, top up so the coolant level is all the way up to the filler cap.

7 Carry out a follow-up check of the coolant level after approx 1 hour's operation.

Coolant, Draining

⚠ 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:
The coolant contains corrosion-inhibiting additives. Never drain the engine cooling system on engines, which are to be put in storage.



1 Stop the engine.

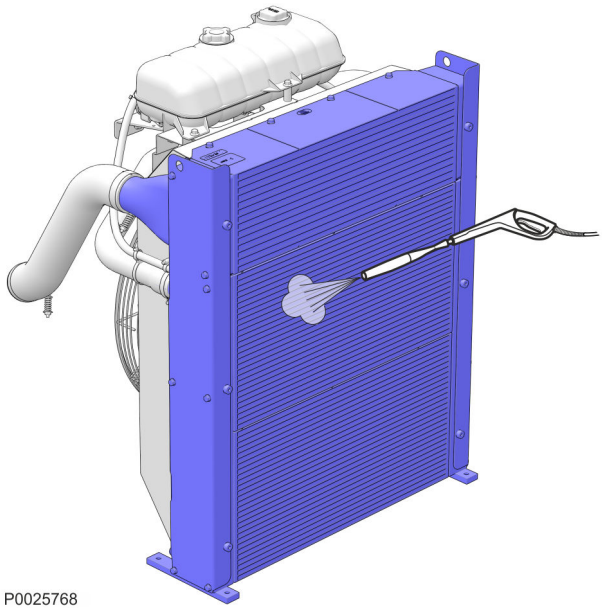
2 Remove the filler cap (1). Do not open the pressure cap.

3 Open all drain points. Drain the coolant from the radiator and engine block, using the drain hose. The drain nipples are situated under the radiator on the right side of the engine block.

4 Check that all coolant drains out. Deposits may be found inside the drain plug/tap, and need to be cleared away. There is otherwise a risk that coolant could remain and cause damage due to freezing. Check whether the installation has any further taps or plugs at the lowest points of the cooling water pipes.

5 Shut any taps and check that the spring-loaded covers on the nipples close completely. Install the rubber plugs.

Charge Air Cooler, External Cleaning



NOTICE! Regular inspect the charge air cooler visually.

1 Cover the engine before cleaning. The charged air cooler must be cold.

2 Clean with high pressure wash or compressed air. Be careful not to damage the radiator fins.
If detergent is used, make sure that it is not corrosive to aluminum.

Cooling System, Cleaning

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

IMPORTANT:
Never clean the cooling system if there is any risk of freezing, since the cleaning solution does not have any antifreeze properties.

IMPORTANT:
It is extremely important that the correct concentration and volume of coolant is added to the system.
Mix in a separate clean vessel before filling the cooling system. Make sure that the liquids mix properly.

IMPORTANT:
Always follow local safety instructions and regulations.

Cooling performance is reduced by deposits in the radiator and cooling galleries. The cooling system should be cleaned out when the coolant is changed.

1 Empty the cooling system. Refer to *Coolant, Draining, page 69*.

2 Put a hose into the expansion tank filling hole and flush with clean water, as specified by Volvo Penta– refer to section Water quality in *, page 83* until the water draining out is completely clear.

3 If there should still be some contamination left after flushing for a long time, cleaning can be done with coolant. Otherwise, continue as in item 8 below.

4 Fill the cooling system with 15-20 % mixture of concentrated coolant. Use only Volvo Penta recommended concentrated coolant mixed with clean water.

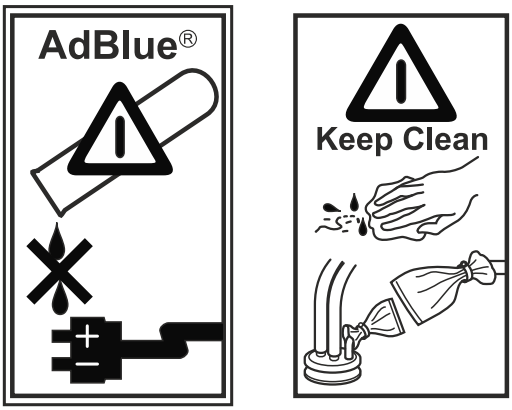
5 Drain the coolant after 1-2 days of operation. Remove the filler cap and possibly the lower radiator hose to increase the speed of emptying. To prevent suspended material from settling back in the system emptying should be done rapidly, within the space of 10 minutes, when the engine has not been standing still for a long time.

6 Flush the system immediately and thoroughly with clean hot water to prevent dirt from settling in the inner areas. Flush until the water that runs out is completely clean. Make sure that any heater controls are set to full heating during emptying.

7 If contamination should still be left after a long period of flushing, cleanout using Volvo Penta radiator cleaner, followed by finishing-off with Volvo Penta neutralizer. Carefully follow the instructions on the package. Otherwise, continue as in item 8 below.

8 When the cooling system is completely free from contamination, close the drain taps and plugs.

9 Fill up with Volvo Penta recommended coolant, following the instructions in the chapters entitled *, page 66* and *Coolant Level, Checking and Topping Up, page 67*.



P0011697

P0024301

Inlet and Exhaust System

Filling AdBlue®/DEF

⚠ CAUTION!

AdBlue®/DEF spilt onto hot components will quickly vaporize. Turn your face away!

⚠ CAUTION!

Risk of corrosive damage.
Contact with the fluid can cause irritation and corrosion.
Wear protective gloves!
Change gloves and clothing that have been in contact with the liquid.

⚠ CAUTION!

Risk of material damage.
AdBlue®/DEF oxidises metal and the capillary action creeps through lines at a speed of approx. 0.6 metres per hour.
If spillage occurs, electrical connectors must be replaced immediately. Do not try to clean with water or compressed air.

IMPORTANT:

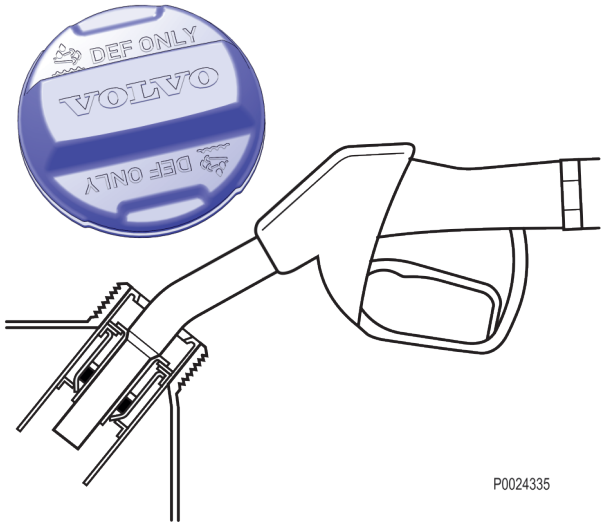
Dirt/dust, oil, greases, detergents and any chemicals and natural products must be prevented from entering the Adblue/DEF tank.
The system will be damaged if dust or dirt enters the tank clogging the filters in the dosing system.
Keep the tank clean at all times.

IMPORTANT:

Never start the engine if anything other than clean AdBlue®/DEF has been added to the tank.

IMPORTANT:

The use of solution that do not fulfill the ISO 22241 standard will compromise the aftertreatment system performance, increase emissions.
Any warranty claims will be rejected.



When topping off AdBlue®/DEF a nozzle with a built-in shut-off function should be used in accordance with ISO standard 22241. These nozzles are designed not to fit any other filling equipment.

The tank cover is blue and marked with the text 'AdBlue/DEF only' to avoid confusion when filling. The ratio between the consumption of Adblue®/DEF and diesel is dimensioned as at least 1:1 to avoid the solution's running out before the diesel.

Never fill with AdBlue®/DEF other than ISO 22241 as specified by Volvo.
If this instruction is not followed the aftertreatment system may be permanently damaged. Engine power may also be affected negatively and engine components risk damage. Damage and costs arising from a failure to meet these requirements are not covered by Volvo Penta warranty obligations.

If AdBlue®/DEF is filled from a can or pump that lacks a stop function, it is important to make sure the tank is not overfilled as the solution may leak out of the breather tube. If the tank is overfilled and the solution in it freezes at temperatures below -11 °C (12.2 °F), the tank and the hoses may be permanently damaged.

Take great care not to spill the solution as it is extremely corrosive toward many materials. If a spill should occur the solution must be absorbed using dry sand or other non-flammable material and handled according to local and national regulations. Avoid spills onto soil and into waterways.

Erroneus filling of diesel or AdBlue®/DEF

IMPORTANT:
The filling of diesel or AdBlue®/DEF in the wrong tank can result in damage to the engine.

In order to avoid confusion, the AdBlue®/DEF tank has a blue filler cap and a decal affixed to the tank.

Mistaken filling of AdBlue®/DEF in the diesel tank

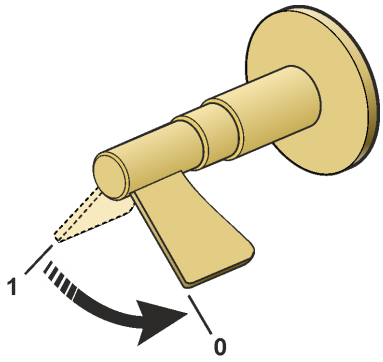
- The engine will not run at full power or will not run at all
- Injectors may be damaged
- Corrosion in the exhaust system between the turbocharger and aftertreatment system
- Expensive repairs

Mistaken filling of diesel in the AdBlue®/DEF tank

- The aftertreatment system may be seriously damaged
- The engine will no longer fulfill emission level requirements
- Expensive repairs

Electrical System

The engine is equipped with a single-pole electrical system and an alternator. System voltage is 24V.



P0002576

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

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 two fuses which cuts the current if overloaded. There is one is for the engine (15 A) and one for the ETAS system (25 A).

The engine stops if the fuse trips. If the fuse trips frequently, Volvo Penta recommends that a qualified workshop should be contacted to investigate the cause of the overload.
Refer to , *page 55* for location of the fuses.

Electrical Connections

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

P0002107

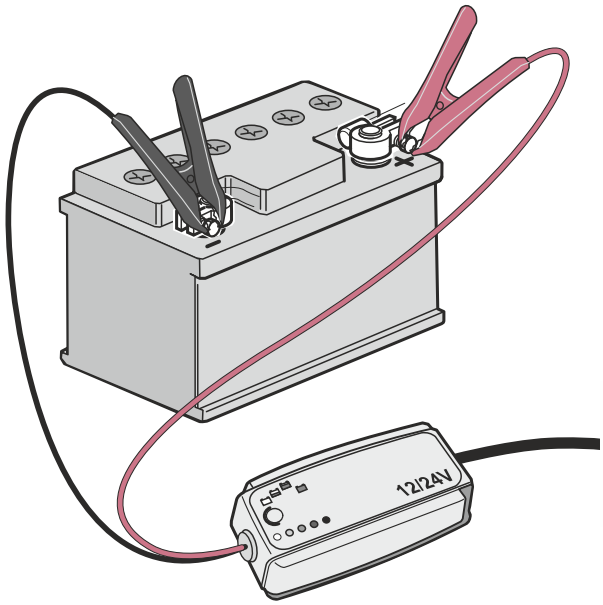
Battery

⚠ 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.



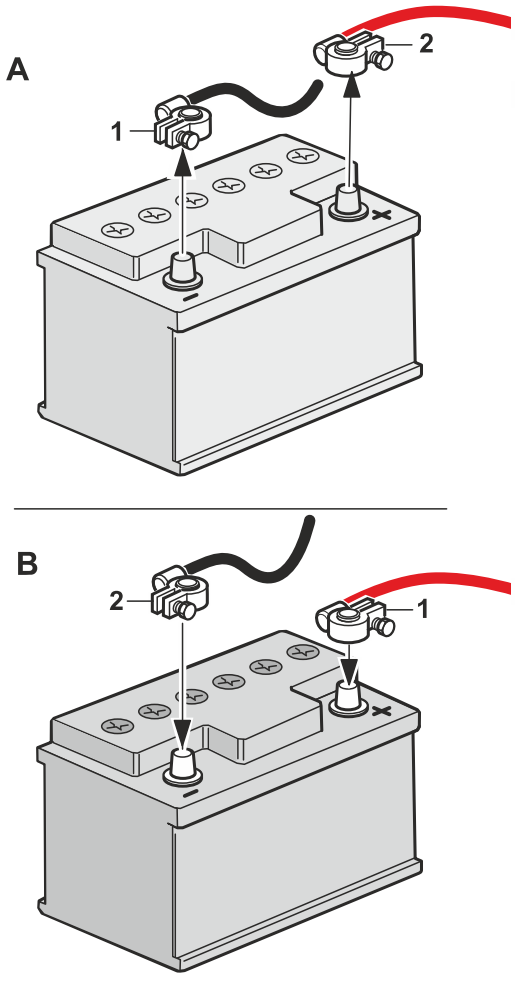
P0022892

Maintenance

It is important to always follow the battery manufacture'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, but there are some actions that are recommended to increase the battery service life and avoid accidents:

- Keep the batteries clean and dry. Contamination and oxide on the batteries and battery poles can result in stray currents, voltage drop and discharge, especially in wet weather.
- Remove oxidation from the battery poles and terminals, using a brass brush.
- Tighten the terminals securely and grease them with terminal grease or petroleum jelly. Loose battery connections may cause damage to the engine's electrical system.
- Charge the battery regularly. A battery that is kept fully loaded has a maximum service life. The easiest way to check if a battery needs charging is to use a voltmeter.

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



P0022893

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.

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.

⚠ WARNING!
Conservations oils can be flammable and dangerous to inhale. Ensure good ventilation. Use a protective face mask when spraying.

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

P0002089

- **For up to 8 month’s stoppage:**
  Change the oil and oil filter on the engine, then run the engine until warm.
  More than 8 month's stoppage:
  Conserve the lubrication and fuel systems with conservation oil. Refer to the section *Conservation of the lubrication and fuel systems for more than 8 months’ stoppage.*
- Make sure the coolant has adequate antifreeze properties. Top up as necessary.
  Alternatively, you can drain the coolant (also drain the coolant filter).
- 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**.
- 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 and the conservation oil used.
- Cover the air filter, exhaust pipe and engine if necessary.
- Empty the AdBlue/DEF tank and rinse it with distilled water.

Bringing Out of Storage

- Remove any covers from the engine, air filter and exhaust pipe.
- Fill the engine with the correct quality and viscosity oil into the engine, as necessary, refer to *Technical Data, Lubrication System*. Install a new oil filter if the filter was not changed during conservation.
- Install new fuel filters and bleed the fuel system.
- Check the drive belt(s).
- Check the condition of all rubber hoses, and retighten the hose clamps.
- Close the drain taps and install any drain plugs.
- Check the coolant level. Top up the coolant all the way up to the filler cap.
- Connect the fully charged batteries.
- Start the engine and warm it up at fast idle with no load.
- Check that no oil, fuel or coolant leakage occurs.
- Fill the AdBlue/DEF tank. The solution must fulfill ISO 22241 standards.

Conservation of the lubrication and fuel systems for more than 8 months' stoppage:

- Drain the engine oil and fill up with **conservation oil*** to just over the MIN marking on the dipstick.
- Connect the fuel suction and return hoses to a 1/3 full jerrican containing **conservation oil*** and 2/3 diesel fuel.
- Bleed the fuel system.
- Start the engine and run at a fast idle until about 2 liters (0.6 US gal) of the fluid in the jerrican have been used. Stop the engine and re-connect the fuel suction and return lines.
- Drain the conservation oil from the engine.
- Follow the other instructions on the previous page.

* Conservation oils are sold by oil companies.

Technical Data

Engines

TAD580VE, TAD581VE, TAD582VE, TAD583VE

Type designation	**TAD580VE, TAD581VE, TAD582VE, TAD583VE**
Power, prime/stand-by	Refer to the sales literature
Torque, prime/stand-by	Refer to the sales literature
No. of cylinders	4
Bore	110 mm (4.33 inch)
Stroke	135 mm (5.31 inch)
Displacement	5,13 dm^3 (313 in^3)
Weight, wet (engine only)	562 kg (1239 lb)
Firing order	1–3–4–2
Compression ratio	17.2:1
Idling speed	700–900

TAD880VE, TAD881VE, TAD882VE, TAD883VE, TAD884VE

Type designation	**TAD880/81/82/83/84VE**
Power, prime/stand-by	Refer to the sales literature
Torque, prime/stand-by	Refer to the sales literature
No. of cylinders	6
Bore	110 mm (4.33 inch)
Stroke	135 mm (5.31 inch)
Displacement	7.7 dm^3 (470 in^3)
Weight, wet (Engine)	723 kg (1594 lb)
Firing order	1-4-2-6-3-5
Compression ratio	17.2:1
Idling speed	600-900

TAD880GE, TAD881GE, TAD882GE

Type designation	**TAD880GE, TAD881GE, TAD882GE**
Power, prime/stand-by	Refer to the sales literature
Torque, prime/stand-by	Refer to the sales literature
No. of cylinders	6
Bore	110 mm (4.33 inch)
Stroke	135 mm (5.31 inch)
Displacement	7.7 dm^3 (470 in^3)
Weight, wet (Engine)	723 kg (1594 lb)
Firing order	1-4-2-6-3-5
Compression ratio	17.2:1
Idling speed	900

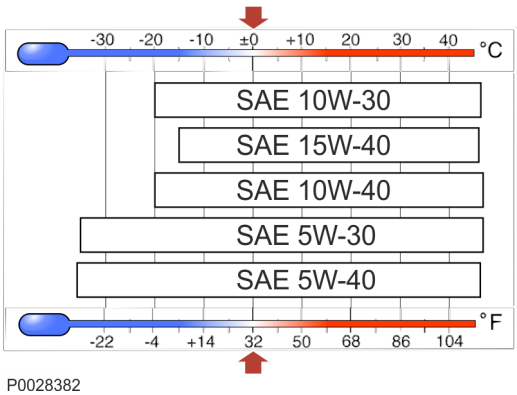
Lubrication System

Oil capacity including oil filters, approx.:	
TAD580–83VE	16 liters (4.23 US gal)
TAD880–84VE	27 liters (7.13 US gal)
TAD880–82GE	27 liters (7.13 US gal)
Oil Sump	
TAD580–83VE Min Max	 10 liters (2.51 US gal) 14 liters (3.57 US gal)
TAD880–82GE, TAD880–84VE Min Max	 19 liters (5.02 US gal) 24 liters (6.36 US gal)
Oil pressure At rated engine rpm	
TAD580–83VE Min Max	 275 kPa (40 psi) 475 kPa (69 psi)
TAD880–84VE Min Max	 275 kPa (40 psi) 475 kPa (69 psi)
TAD880–82GE	385 kPa (56 psi)
Oil filter	
Full flow filter	1
Lube oil pump	
Type	Gear driven

Oil recommendations

Oil quality	**Service interval, reached first in operation**
VDS-4.5	**1000** hours or 12 months

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

TAD580VE, TAD581VE, TAD582VE, TAD583VE

CO_2 emission[1)]	
B7 Fuel, according to EN590	689,2 g/kWh
HVO Fuel, according to EN 15940	660,8 g/kWh
US 1065 (ASTM D975-2D)	722,5 g/kWh

1) This CO2 measurement results from testing over a fixed test cycle under laboratory conditions a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine once installed in a type of non-road mobile machinery or category T vehicle (agricultural and forestry tractors and their trailers).

TAD880VE, TAD881VE, TAD882VE, TAD883VE, TAD884VE

CO_2 emission[1)]	
B7 Fuel, according to EN590	669,4 g/kWh
HVO (EN15940)	644,4 g/kWh
US 1065 (ASTM D975-2D)	678,1 g/kWh

1) This CO2 measurement results from testing over a fixed test cycle under laboratory conditions a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine once installed in a type of non-road mobile machinery or category T vehicle (agricultural and forestry tractors and their trailers).

TAD880GE, TAD881GE, TAD882GE

CO_2 emission[1)]	
B7 Fuel, according to EN590	638 g/kWh
HVO Fuel, according to EN15940	611 g/kWh

1) This CO2 measurement results from testing over a fixed test cycle under laboratory conditions a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine once installed in a type of non-road mobile machinery or category T vehicle (agricultural and forestry tractors and their trailers).

Fuel quality requirements for emission legislation stage 5, diesel engines with exhaust aftertreatment 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 D975-2D and EN15940. Volvo Penta engines will be compliance with emission legislation, if the engine is maintained according to service instructions and used according to intended purpose.

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

98/70/EC is not fully specified in the fuel standard from an engine warranty perspective. Below mentioned fuel parameters must be fulfilled.

- **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.

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 fulfill the standard EN15940.

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

In general, the maximum torque and power output, depends on the density and heat value of the fuel. HVO and GTL fuel may have a power/torque loss of a couple of % compared to EN590 fuel.

Cooling System

Type	Pressurized, sealed
Pressure cap, max opening pressure	75 kPa (10.9 psi)
Coolant Volume (engine)	
TAD580–83VE	13 liters (3.4 US gal)
TAD880–84VE	17 liters (4.5 US gal)
TAD880–82GE	17 liters (4.5 US gal)
Thermostat	
Qty	1 pc
Opening temperature	85 °C (185 °F)
Fully open at	95 °C (203 °F)

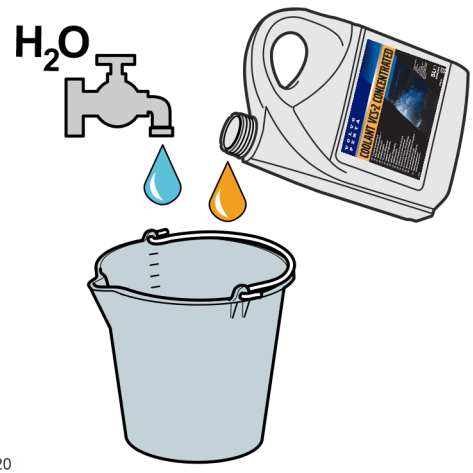
P0038119

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).



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 84*.

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.

P0002094

Water Quality

ASTM D4985:

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

Inlet and Exhaust System

Tank	Small	Medium	Large	X Large
Usable volume (AdBlue®/DEF)	17.4 liters (4.54 US gal)	38.6 liters (10.2 US gal)	68 liters (17.96 US gal)	164.2 liters (43.38 US gal)

Consumption of Urea
The consumption of urea varies depending on how the engine is used. For engines that meet the Nonroad Transient Cycle (NRTC), the standard consumption of urea is 5–9 percent of fuel consumption.

NOTICE! Urea is always filled in a separate tank in the vehicle and must never be mixed with the diesel fuel.

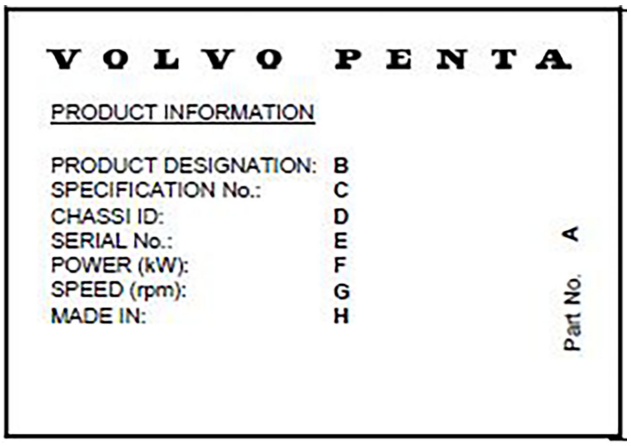
Electrical System

System voltage	24 V			
Batteries	2 pcs. series connected			
Battery voltage	12 V			
Max. Battery capacity	2 x 225 Ah			
Alternator				
ambient temperature 20 °C				
Engine speed	600 rpm	700 rpm	950 rpm	1250 rpm
Alternator, 110 A	80 A	95 A	110 A	115 A
Alternator, 130 A	78 A	95 A	113 A	130 A
ambient temperature 100 °C				
Engine speed	600 rpm	700 rpm	950 rpm	1250 rpm
Alternator, 110 A	65 A	78 A	88 A	93 A
Alternator, 130 A	65 A	80 A	92 A	102 A
Starter motor, output	5.0 kW (6.7 hp)			
	5.5 kW (7.4 hp)	(Start/Stop)		
Battery electrolyte specific gravity at +25 °C:				
Fully charged battery	1.28 g/cm^3 (1.24 g/cm^3)*			
Battery recharged at	1.20 g/cm^3 (1.20 g/cm^3)*			

Note! * Applies to batteries with tropical acid.

Identification Numbers

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



P0038721

Example of general label

A Label part number

B Product designation

C Specification number

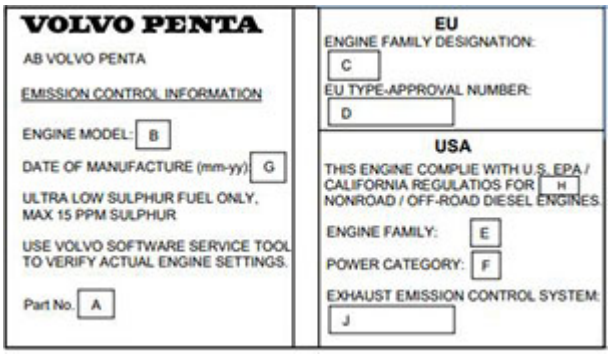
D Chassis ID

E Serial number

F Power (kW)

G Engine speed (rpm)

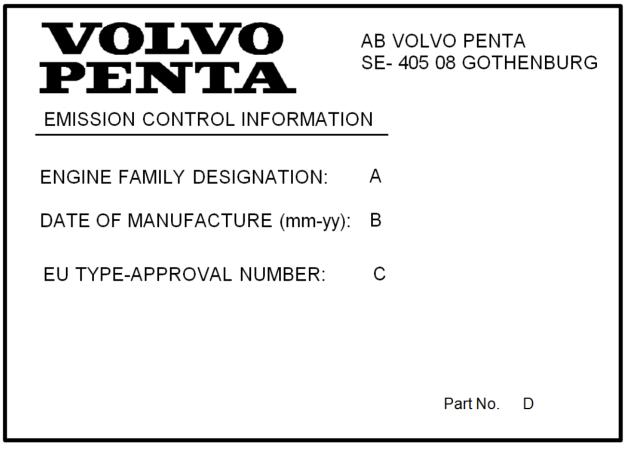
H Country of manufacturing



P0034041

Example of EU/EPA/CARB combined cert label

A. Label part number
B. Engine model
C. Engine family designation
D. EU Type Approval number
E. EPA Engine family
F. Power Category
G. Date of Manufact ure (mm-yy)
H. Model year
J. Exhaust Emission Control System



P0028278

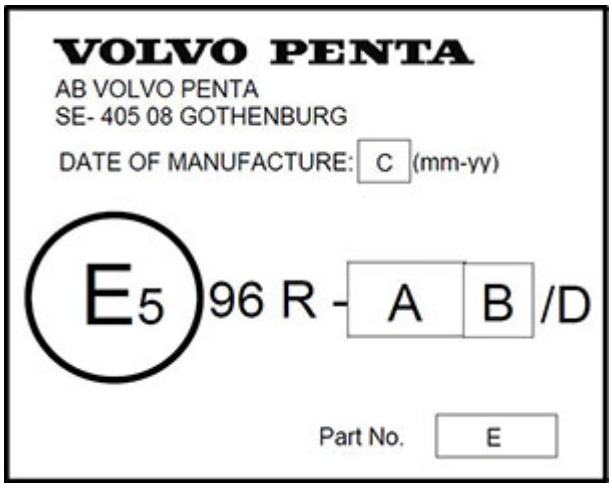
Example of EU certificate label

A Product designation

B Date of Manufacture (mm-yy)

C Type Approval

D Label part number



P0031659

Example of REG 96 certificate label

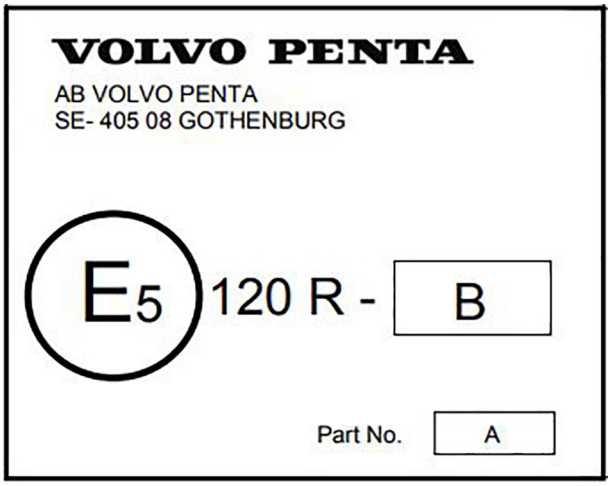
A Type Approval

B Engine Category

C Date of Manufacture (mm-yy)

D –

E Label part number

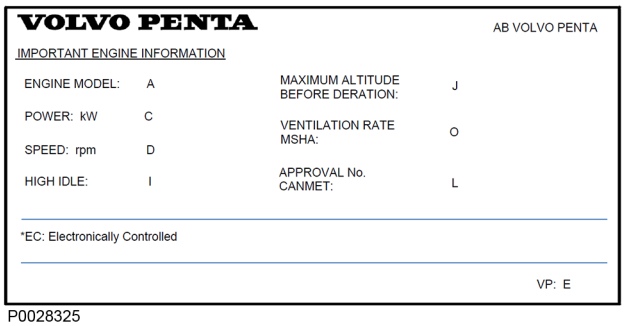


P0034051

Example of REG120 certificate label

A Label part number

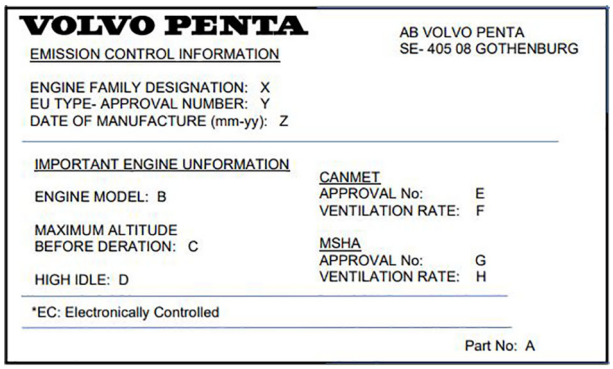
B Approval number



P0028325

Example of MSHA, CANMET certificate label

A. Engine Model Designation
C. Power (kW)
D. Speed (rpm)
E. Label part number
I. High idle
J. Maximum altitude
L. Ventilation rate MSHA
O. Approval No. CANMET



P0034044

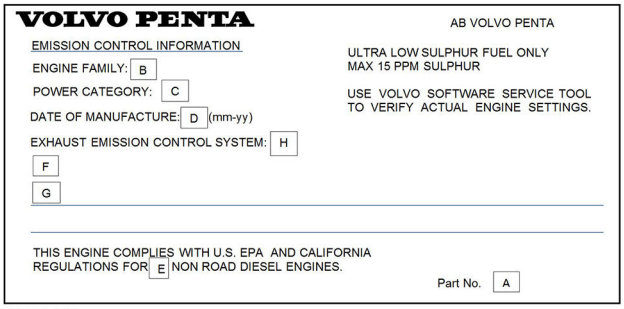
Example of EU, CANMET, MSHA certificate label

A. Label part No
B. Engine model
C. Maximum altitude before deration
D. High Idle (rpm)
E. Approval No. CANMET
F. Ventilation Rate: CANMET (cfm)
G. Approval No. MSHA
H. Ventilation Rate: MSHA (cfm)
X. Engine Family Designation
Y. EU Type-approval number
Z. Date of manufacture (mm-yy)

P0020083

Country of manufacture.

Example of EPA/CARB certificate label



P0028149

A Label part number

B Engine family

C Power category

D Date of manufacture

E Model year

F –

G –

H Exhaust emisssion control system

Example of Korea Approval label

P0030549

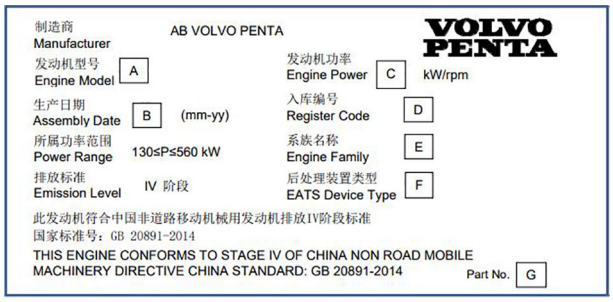
A Approval number

B Engine model

C –

D –

E Label part number



P0034381

Example of China stage IV certificate label

A Engine model

B Assembly date

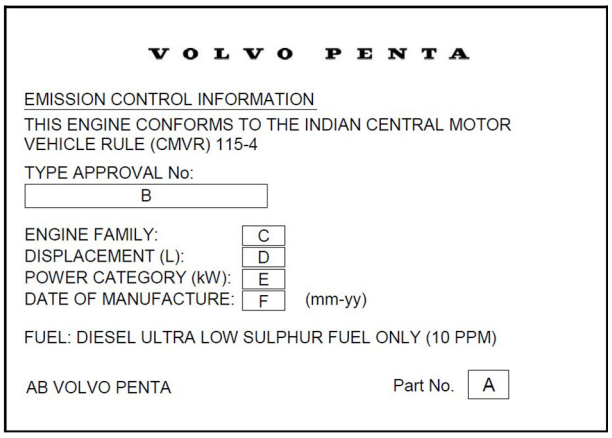
C Engine power kW/rpm

D Register Code

E Engine Family

F EATS Device Type

G Label part No.



P0041452

Example of India, Bharat V certificate label

A Label part No.

B Type Approval number

C Engine family

D Displacement (L)

E Power Category (kW)

F Date of Manufacture (mm-yy)

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 - TAD852VE-B - TAD853VE - TAD870VE - TAD871VE - TAD872VE - TAD873VE - TADH880-84VE - TAD880VE - TAD881VE - TAD882VE - TAD883VE - TAD884VE
8 liter, GE	TAD840GE - TAD840GE-B - TAD841GE - TAD842GE - TAD843GE - TADH880-82GE - 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 - TWD1682GE - 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 - TAD852VE-B - TAD853VE - TAD870VE - TAD871VE - TAD872VE - TAD873VE - TADH880-84VE - TAD880VE - TAD881VE - TAD882VE - TAD883VE - TAD884VE
8 liter, GE	TAD840GE - TAD840GE-B - TAD841GE - TAD842GE - TAD843GE - TADH880-82GE - 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 - TWD1682GE - 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

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 tramiteInternet, 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 encomendad 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 مجانًا عبر الإنترنت لفترة تصل إلى ١٢ شهرًا من بعد التسليم.

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

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

VOLVO PENTA

47714000 English 01-2025