PUB 20057955-B 2021.05 English

VOLVO

Volvo Construction Equipment

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OPERATOR'S MANUAL

ECR25 Electric

English

Volvo Construction Equipment
Building Tomorrow

OPERATOR'S MANUAL

ECR25 Electric

Foreword

OPERATOR'S MANUAL

This operator's manual is intended as a guide for the correct use and maintenance of the machine. Read this manual carefully before you start and move the machine or before you carry out any preventive maintenance.
Keep this manual in the lockable storage compartment so that it is always available for easy reference. Replace it immediately if it is lost.
The operator's manual describes the applications for which the machine was primarily designed. It has been written to be valid on all markets. Therefore, please ignore any sections which do not relate to your machine or to the work that you do with your machine.

NOTE!
If the manual covers more than one machine, the information relates to all machines unless otherwise specified.

When designing this machine, much time has been invested in achieving the best possible efficiency and safety. But accidents do happen, and most of them can be attributed to human error. A safety-conscious person and a well-maintained machine make up a reliable, powerful, and profitable combination. **Therefore, read the safety instructions and follow them.**
We constantly strive to develop and improve the efficiency of our products by making changes to their design. We reserve the right to make design modifications to the products even after they have been delivered. Also, we reserve the right to change data and equipment, as well as the service and maintenance instructions, without prior notice.

PUB 20057955-B
The original language is English. Original instructions.
2021.05

Safety regulations

The machine operator is responsible for being aware of and complying with the relevant, legally prescribed, national and regional safety instructions. The safety instructions in this operator's manual are applicable only in cases where no legislated safety instructions are in force.

⚠ DANGER

The safety symbol combined with this signal word indicates a hazardous situation which, if not avoided, ***will result in death or serious injury.*** Danger is limited to the most extreme situations.

⚠ WARNING

The safety symbol combined with this signal word indicates a hazardous situation which, if not avoided, could result in ***death or serious injury***.

⚠ CAUTION

The safety symbol combined with this signal word indicates a hazardous situation which, if not avoided, could result in ***moderate or minor injury***.

NOTICE

Indicates a potentially hazardous situation which may result in machine damage.

NOTE!
Used in order to refer to installation, operating, or maintenance information which is important but not danger-related.

Get to know the capacity and limits of your machine!

Identification numbers

Enter the identification number of machine and machine parts. This number must be specified when contacting the manufacturer to order spare parts. Positions and explanation of the PIN plates, see page *23*.

Manufacturer:	Volvo Construction Equipment sas rue Pierre Pingon BP 01303 Belley Cedex France
PIN (Product Identification Number) of machine:	

Electrical ratings

Rated traction voltage	48 V DC
Rated traction battery output per module Quantity	48 V DC / 150Ah 3
Total energy storage	19.8 kWh
Rated service voltage	12 V
Service battery	12 V / 42 Ah

Traction battery chargers

Rated on-board charger	100–230 V AC / 8 A (a)
Rated off-board charger	48 V DC / 320A

a)The charging current limit value at the grid charging point is subject to local regulations.

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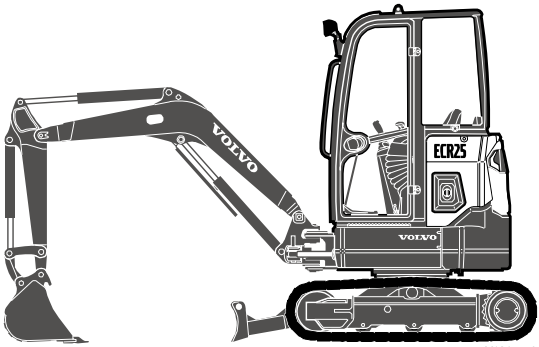
Presentation



Intended use

The machine is intended to be used under normal conditions for the applications described in this manual. If it is used for other purposes or in potentially dangerous environments, for example explosive atmosphere, flammable environment or areas with dust containing asbestos and so on, special safety regulations must be followed and the machine be equipped for such use. Contact the manufacturer/dealer for further information.

The machine is equipped with an electric motor and may behave differently than a diesel engine. The machine operates silently and responsively. Persons within audible reach may need to be aware of the machine in operation.
Make yourself familiar with all controls to safely operate the machine.

Do not apply the battery isolator switch to shut down the machine.
Always follow the machine shutdown procedure.

Environmental requirements

Be aware of the environment when operating and during service and maintenance of the machine. Always follow local and national environmental legislation applicable to all handling of the machine.

Motor

The machine is equipped with an 48 V DC electric motor.

The rated net power is 14.8 kW (peak: 18 kW)

The motor is powered from a rechargeable energy storage system (RESS). It is charged at the left hand side using the enclosed cable with type-2 plug (read instruction on page *178*).

NOTE!
Local regulations may apply to ensure the utilization of approved electrical charging points.

NOTE!
It is recommended to always use Volvo-approved charging harness.

Electrical system

The machine can have up to 11 electronic units:

- K-ECU (Keypad)
- I-ECU (Instrument cluster)
- V-ECU (Vehicle) x 2
- MDS-1 (Motor Drive System ECU)
- BMU (Battery management unit)
- E/H control ECU (Cooling fan)
- OBC (On-Board charger)
- DC/DC converter
- Inverter
- W-ECU2 (Track unit, optional)
- W-ECU3 (TGW, Wireless control unit, optional)

The display unit shows information, e.g machine status, control lamps, gauges, settings and information/warning lights.

To select various functions there are two instrument panels with switches and controls. Activation and control of the excavating functions is mostly done with the buttons on the control levers.

Most of the service relays and fuses are grouped in the electrical box under the cover on the left side of the machine.

Open Source Software

Your construction machine includes various control systems and software programs. Some of those are open source software, which among other things

means that you may have the right to gain access to the source code. This depends on the license terms for the respective software as agreed between the Volvo group and the respective licensors.

For further information about Volvo's use of open source software and about where you can get access to the relevant source code, as well as the applicable copyright notices and developer credits, license terms and legal disclaimers, please visit www.opensource.volvotrucks.com.

Cab

The cab is approved as a protective structure according to the following standards:

- TOPS (Tip-Over Protective Structure), ISO 12117 / EN13531
- ROPS (Roll Over Protective Structure), ISO 3471
- OPG (Operator Protective Guard) Level 1 on top, ISO 10262

The OPG level 2 is an option.

These tests are based on the heaviest machine weight configuration, unless otherwise stated.

If any part of the cab's protective structure is affected by plastic deformation or rupture, the cab shall be immediately replaced.

If the machine is equipped with a cab, i.e. with side windows and side door, it will have heating and ventilation. The rear window can be broken with an emergency hammer and used as an emergency exit.

Never carry out any unauthorised alterations to the cab without first discussing any planned alterations to the cab with a local authorised dealer or distributor. Volvo Construction Equipment will decide whether the alteration may cause the TOPS-, ROPS- and OPG-approval to become void.

Hydraulic system

Closed circuit hydraulic load-sensing system, allowing full independence of the individual movements.

Equipment

The machine can be provided with different types of optional equipment, depending on the requirements of different markets. Examples of such equipment are attachment quick coupler and hydraulic breaker.

Modifications

Modifications of this machine and its components such as the traction voltage system, including the use of unauthorized attachments, accessories, units, or parts, may affect the machine's integrity (condition), the machine's ability to function in the way for which it is designed and voids the EU type-approval of the machine and the traction voltage system. Persons or organizations performing unauthorized modifications assume all responsibility for consequences that arise due to modifications or can be attributed to modifications, including damages to the machine.

No modifications of any kind may be performed on this product unless each specific modification first has been approved in writing by Volvo Construction Equipment. Volvo Construction Equipment reserves the right to reject all warranty claims that have arisen due to or can be traced to unauthorized modifications.

Unauthorised modifications on the upperframe can have an influence on the ROPS protection system which is intended to secure the driver in case of an accident.

Modifications may be considered to be officially approved, if at least one of the following conditions has been met:

1 The attachment, the accessory, the unit, or the part has been manufactured or distributed by Volvo Construction Equipment and has been installed according to the factory-approved method described in a publication available from Volvo Construction Equipment; or

2 The modification has been approved in writing by the Engineering Department for the relevant product line at Volvo Construction Equipment.

Travel system

The travel motion is accomplished by the main chassis via two rubber tracks (steel tracks available as option). The tracks are each driven by a two speed travel motor.

Slewing system

The slewing ring is driven by a hydraulic motor, which is protected against excess pressure by high pressure relief valves.

Anti-theft device

(optional equipment)

An installed anti-theft device makes it more difficult to steal the machine. Volvo CE may supply anti-theft protection as part of the machine control system. If your machine is not yet equipped with one, check the possibilities of having such a device installed by a qualified service technician.

CareTrack

(optional equipment)

The machine may be equipped with CareTrack, a telematics system developed by Volvo Construction Equipment.

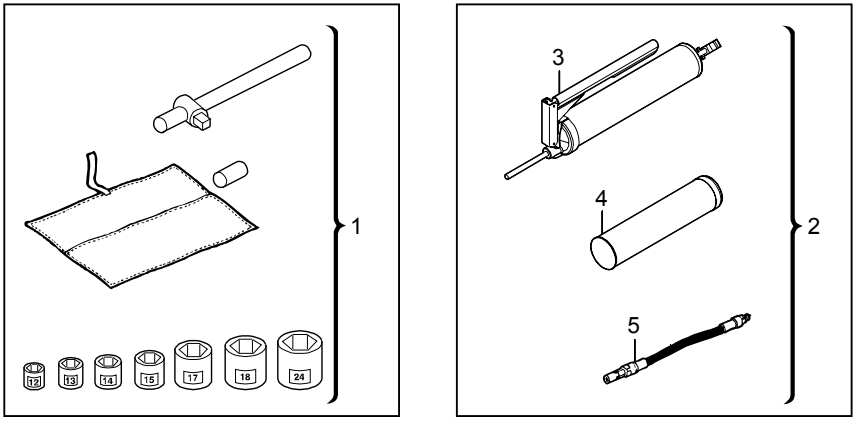
CareTrack makes it easier to plan for service and reduces costly downtime.
It also allows the customer to restrict the operating area of the machine, by using virtual fences. This helps to eliminate unauthorized machine use and theft. CareTrack is available in different versions, depending on the required information level. For further information contact a Volvo Construction Equipment dealer.

The CareTrack system transmits data, in the same way a mobile phone does, with a maximum output rate of 10 W. The transmitter is always on and the operator cannot switch it off.

Tool kit

(optional equipment)

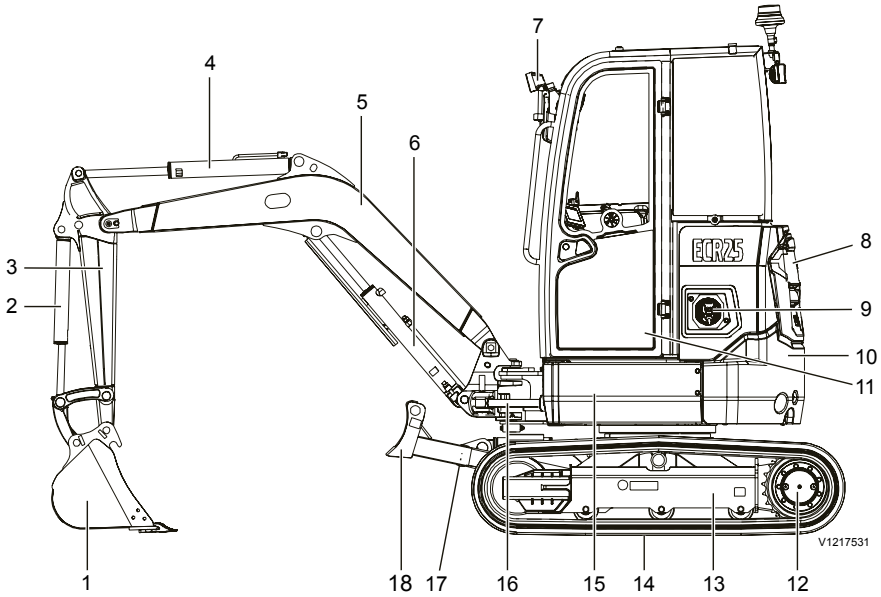
The tool kit is located under the seat and consists of following tools:



Tools of the tool kit

1 Wrench with different sizes of nuts
2 Grease gun (3) with cartridge (4) and extension (5)

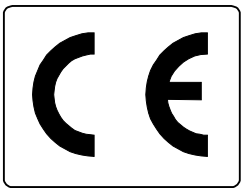
Machine view



Component location

1	Bucket	10	Connector, fast charging
2	Bucket cylinder	11	Battery disconnect switch (in the cab *Service points*)
3	Dipper arm	12	Travel motor
4	Dipper arm cylinder	13	Undercarriage
5	Boom	14	Tracks
6	Boom cylinder	15	Superstructure
7	Working lights	16	Boom offset cylinder
8	Rear hood	17	Dozer blade cylinder
9	Connector charge port	18	Dozer blade

CE-marking, EMC-directive



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CE marking

(Declaration of Conformity : Only applies to machines marketed within the EU/EEA.)

This machine is CE marked. This means that when delivered the machine meets the applicable "Essential Health and Safety Requirements", which are given in the EU Machinery Safety Directive, 2006/42/EC.
Any person carrying out changes that affect the safety of the machine, is also responsible for the same.
As proof that the requirements are met, the machine is supplied with an EU Declaration of Conformity, issued by Volvo CE for each separate machine. This EU declaration also covers attachments manufactured by Volvo CE. The documentation is a valuable document, which should be kept safe and retained for at least ten years. The document should always accompany the machine when it is sold.
If the machine is used for other purposes or with other attachments than described in this manual, safety must at all times and in each separate case be maintained. The person carrying out such action is also responsible for the action which, in some cases, may require a new CE marking and the issue of a new EU Declaration of Conformity.

EU EMC Directive

The electronic equipment of the machine may in some cases cause interference to other electronic equipment, or suffer from external electromagnetic interference, which may constitute safety risks.
The EU EMC directive about "Electromagnetic compatibility", 2014/30/EU, provides a general description of what demands can be made on the machine out of a safety point of view, where permitted limits have been determined and given according to international standards.
A machine or device which meets the requirements should be CE marked. Our machines have been tested particularly for electromagnetic interference.
The CE marking of the machine and the declaration of conformity also cover the EMC directive.
If other electronic equipment is fitted to this machine, the equipment must be CE marked and tested on the machine with regard to electromagnetic interference.

EU conformity certificate

We, the manufacturer

Volvo Construction Equipment sas
Rue Pierre Pingon
BP 01303 Belley Cedex
France

The technical documentation is maintained by:
Volvo Construction Equipment, Belley France

declare that the following equipment

Excavator

Model	Serial Number	Output	Guaranteed Sound Power Level (LWA)	Year of CE-Marking
ECR25		14.8 kW	84 dB(A)	

complies with the following relevant directives:

- EC Directive "Machinery" 2006/42/EC
- EC Directive "Noise Emission" 2000/14/EC
- EC Directive "EMC" 2014/30/EU
- As well as EC Directive "Low Voltage" 2014/35/EU for the on-board charger

Applied harmonized standards especially:

- EN 474-1 and EN 474-5
- The EN and ISO Standards specified under Chapter 2 of EN 474-1 and EN 474-5

The assessment of conformity method used to determine the guaranteed sound power level complies with Article 14 item 3 of Directive 2000/14/EC.

Certified European institute, Cofrac 1-0606,
LNE – France 1, rue Gaston Boissier 75724 Paris Cédex 15

Belley, <dd.mm.yyyy>

<N. N.>
General Manager
Volvo Construction Equipment sas

Communication equipment, installation

NOTICE

All installation of optional electronic communication equipment must be performed by trained professionals and in accordance with the Volvo Construction Equipment instructions.

Protection against electromagnetic interference
This machine has been tested according to EU's directive 2014/30/EC that regulates electromagnetic interference. Therefore, it is very important that all non-approved electronic accessories, such as communication equipment, are tested before they are installed and used, since they may interfere with the machine's electronic system.

Guidelines for installing aerial

The guide lines listed below must be followed during installation:

- The position of the aerial must be selected to provide satisfactory adaptation to the surrounding area.
- The aerial downlead must be of the coaxial cable type. Make sure that the cable is undamaged, that the screen is not split at the ends and that it thoroughly surrounds the contact sheaths and has good galvanic contact with the same.
- The surface between the mounting bracket for the aerial and the point of attachment must be free from dirt and oxide. Apply corrosion protection to the surfaces after installation so that good galvanic contact is maintained.
- Take care to separate cables that may cause interference from those which may suffer interference. Cables that may cause interference are voltage feed cables and the aerial cable to the communication equipment. Cables that may suffer from interference are connecting cables for the electronics of the machine. Install cables as close as possible to plate surfaces which are connected to ground (earthed), as these have a screening effect.

Safety components

Genuine Volvo spare parts guarantee the best service life, reliability, and safety for the machine and operator. If reliable and purpose-built parts are not used, your safety, health, and the machine's function may be compromised. Contact your dealer and state the machine's model designation/serial number (PIN-number) when ordering spare parts. Position of PIN-plate, see section "Product plates".

Your Volvo dealer always has up-to-date spare part information that is updated at regular intervals via the information system PROSIS.

Safety-classified machine and spare parts

Safety-classified machine and spare parts mean that the components are intended to fulfil a safety-related function.

Examples of safety-classified machine parts/ spare parts

- Removable protective devices/guards over rotating parts and hot surfaces
- Protective plates, rails, covers, and steps
- Components included in systems to reduce sound and vibrations
- Complete operator's seat incl. seatbelt
- Decals and plates
- Cab filter

NOTE!
Safety-classified machine and spare parts shall be reinstalled, repaired, or replaced immediately if they have been removed or damaged.

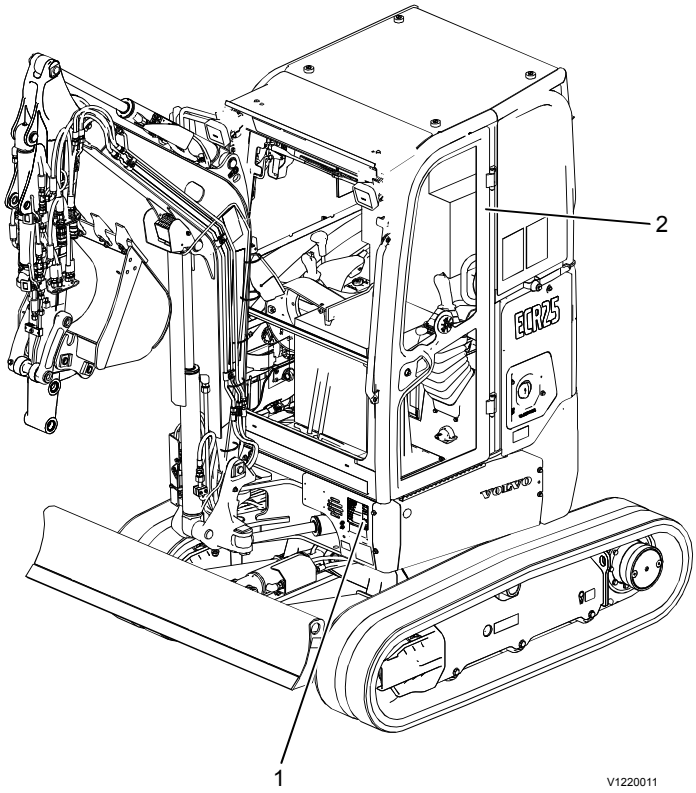
When changing machine operator/owner, malfunctions and defects of safety-classified machine and spare parts shall be reported immediately and an action plan shall be established.

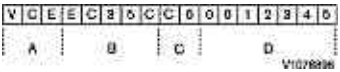
There is more important information in this Operator’s Manual about the components that are considered safety-classified.

Product plates

The following illustrations and descriptions show the product plates on the short swing radius excavator.

When ordering spare parts or for short enquiries by phone and in correspondence you should always specify model designations and product identification number.





Example of 17 digit PIN number on PIN plate

A World Manufacturing Code
B Machine description
C Check letters
D Serial number

1 Product Identification plate (PIN)

The product plate contains name and address of manufacturer, model/type designation and 17 digit PIN number. It also contains information about machine mass in kg, motor rated power in Kw, manufacturing year, machine serial number and a CE-mark.

Machine mass

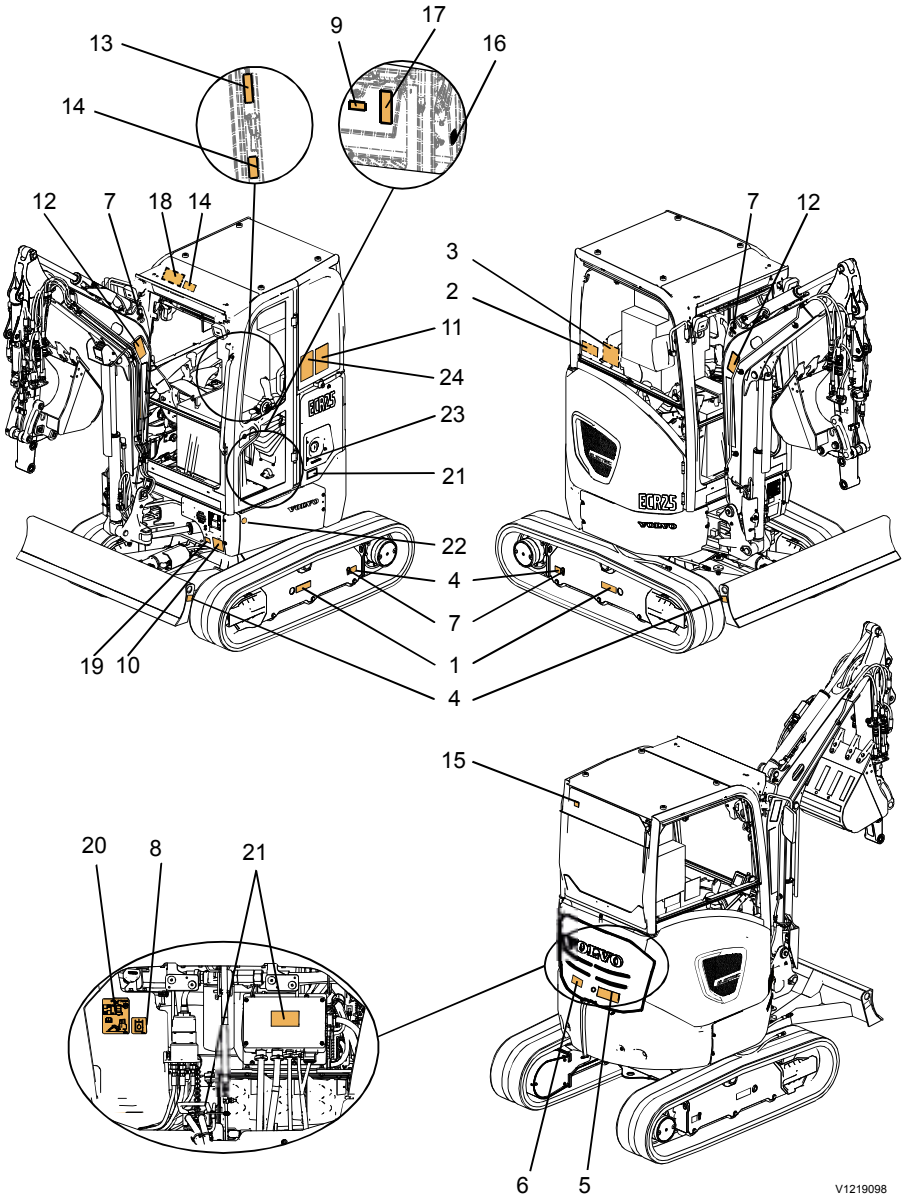
The machine mass in kg on the plate is based on the most usual definition of the machine in accordance with ISO 6016.

2 TOPS/ROPS and OPG plate

The plate is located inside the cab on the left back column (in canopy under the roof). TOPS (Tip-Over-Protection-Structure) and ROPS (Roll-Over-Protection-Structure) provide roll over protection in case the machine should turn over. OPG (Operator Protective Structure) provides protection against falling down objects.

Information and warning decals

The operator should know and pay attention to the information and warning plates/decals which are positioned on the machine. All plates/decals are not installed on all machines, as they are market and machine dependent. The decals/plates must be kept free from dirt, so that they can be read and understood. If they have been lost or no longer are legible, they must be replaced immediately. The part number (order number) is given on the respective plates/decals and in the Parts Catalogue.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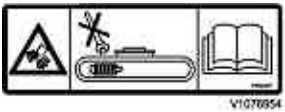
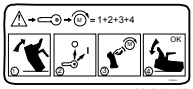
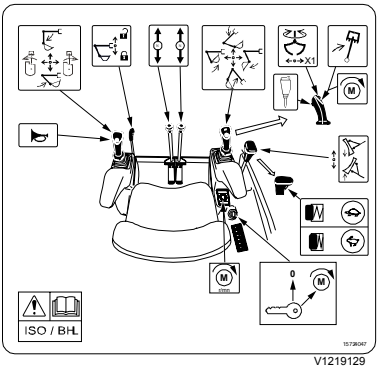


1 WARNING! Track tension, check the tension every 250 hours – read the Operator's Manual.

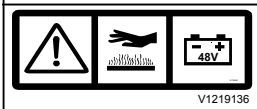


2 Locking console / procedure to start

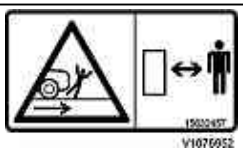


3 Operator's stand control elements

4 Tie down points.
(2 tie down points on blade / 2 tie down points on undercarriage)



5 WARNING! Hot surface, electric risk.



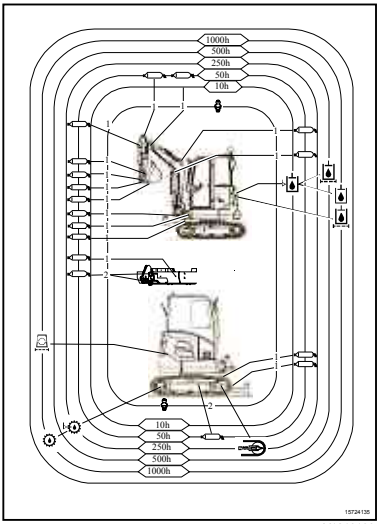
6 WARNING! Do not enter the machine's working area. Risk for crushing.

7 Lifting points.
(2 lifting points undercarriage / 2 lifting points on boom)

8 Hydraulic oil filler point

9 WARNING! First read the Operator's Manual.

10 Sound power level outside the machine

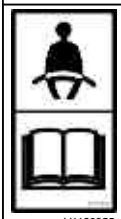


V1219100

11 Lubrication and maintenance chart

V1065351

12 WARNING Do not stand in the vicinity of a raised load.
(decal on both sides of the boom)



V1129955

13 WARNING! Fasten seat belt when operating the machine.

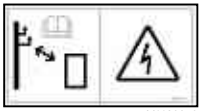
14 WARNING! Operate backhoe from operator's seat only (North America only)

15 Alternative exit path

16 Battery disconnect switch

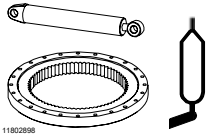
V1129954

17 WARNING! Move the control lockout lever up to lock the system securely when leaving the machine.



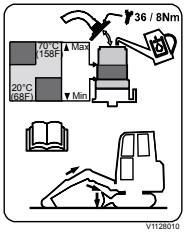
V1129956

18 WARNING! High voltage. Keep sufficient distance from electrical power lines.



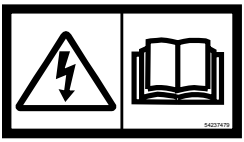
V1089393

19 Slewing ring lubrication



V1128010

20 WARNING! Read and understand the hydraulic oil filling instruction before filling.



V1219137

21. WARNING! Electric risk. First read the Operator's Manual.

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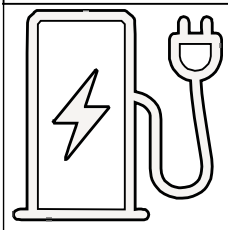
22. Earth ground connection



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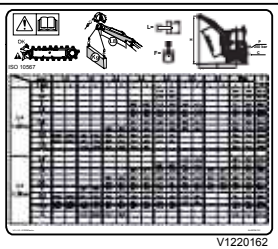
23. Charge symbol



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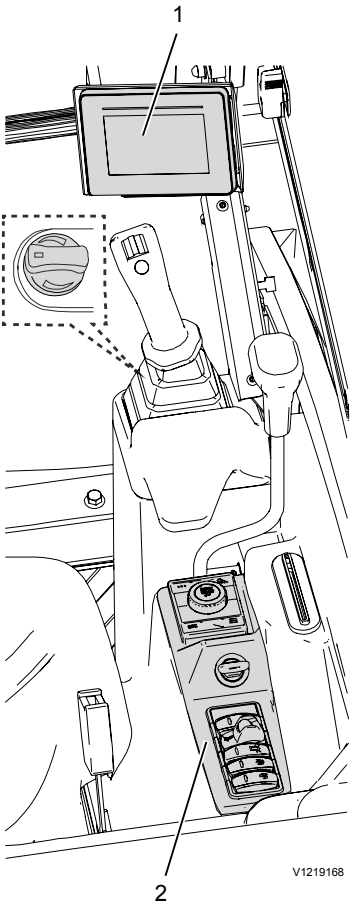
24. Lifting capacities

Instrument panels

NOTE!
Do not operate the machine until you know the function and position of the instruments and operating controls. Carefully read through this Operator's Manual, your safety is involved!

Keep the manual in the cab so that it is always at hand when needed.

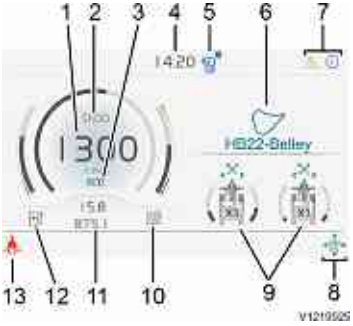


1	Display unit
2	Instrument panel, right

Display unit

The display is used with the keypad to function as a display unit. The display is located in front to the right of the operator. The keypad is located on the right instrument panel.
See *30*.

Home screen



Home screen

The home screen is the first screen that is displayed after the display unit starts. If the machine is equipped with anti-theft, it is displayed after entering the code, see *38*. The home screen is the basic screen that is displayed while operating the machine.
The home screen will change depending on which settings that have been made. The system will return to the home screen after 15 seconds without action, from all sub menus.

1 Electric motor speed — The electric motor speed is displayed.
2 Estimated runtime— This is an estimation of the remaining runtime of the machine, based on the power consumed from the battery recently and based on the State of Charge (SoC) of the traction battery.
3 ECO/BOOST mode indicator — The ECO/BOOST mode indicator will be displayed when the machine is operating in ECO/BOOST mode. See *104*.
4 Clock — This shows the current time of day.
5 Auto electric motor shutdown icon — When the auto electric motor shutdown icon is displayed, the electric motor will shut down automatically after a predefined time.
6 Tool image — This shows which tool is set up. To change the image or the name, see *39*.
7 Message icons — There are three different message icons. See *45*.
   - Warning (red)
   - Caution (yellow)
   - Information (blue)
8 Information icons — Example shows that the ISO/SAE control lever pattern is in use.

   NOTE!
   Not all icons are shown. See also *41*.
9 Hydraulic control pattern — Example shows X3 and X1.

10 Hydraulic oil temperature — There are four different levels for the hydraulic oil temperature:
- Too low temperature (blue)
- Operating temperature (white)
- High temperature (orange)
- Critically high temperature (red)

NOTE!
The hydraulic oil temperature icon changes to red when the temperature is in the hazardous range.

11 Hour meter — The hour meter has two values for how long the electric motor has been operating. The top value is the daily hours and the bottom value is the total operating hours.

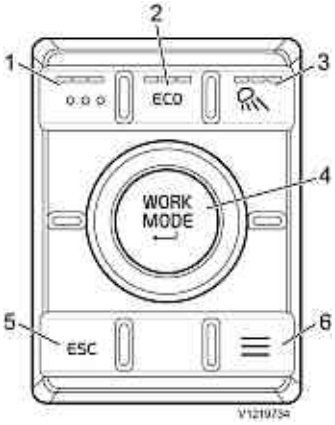
12 State of charge — There are four different levels for the traction battery State of Charge:
- Battery level OK (white)
- Low battery level (constant orange)
- Critically low battery level (blinking orange)
- Machine stop shortly (blinking red)

13 Seat belt icon — When the seat belt icon is displayed it means the operator should fasten the seat belt.

Keypad

The keypad is used to provide operator input to the display unit.

NOTE!
When pressing the **WORK MODE** button, a short press is made by pressing it and releasing it quickly and a long press is made by pressing it for 2 seconds.



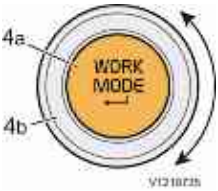
Keypad

1 Configurable button — This is a button that can be customized to activate a function from a list of available functions.
Short press — activate the function.
Long press — select the setup screen to choose the function that this button will activate.

2 **ECO** mode button
Short press — Change between normal and ECO modes. The selected mode is indicated by the number of LEDs that are lighted.
1 LED — ECO mode
2 LEDs — normal mode
3 LEDs — BOOST mode
Long press — Setup screen for the button that can be customized.

Worklights screen

The colour of the line above the function indicates which light is active as follows:
Grey — not active
Green — active



WORK MODE button/wheel
4a. Button — Long or short press
4b. Wheel — Turn

3 Worklights — The worklights button has three LEDs to indicate which lights are turned on.
All — All LEDs
Boom lights (option) — Left LED
Front lights — Middle LED
Rear lights (option) — Right LED
- Short press — Turn ON/OFF the worklights according to how they are set up.
- Long press — Setup worklights.

NOTE!
The setup screen is not available if optional worklights are not installed.
To change the setup, turn the **WORK MODE** wheel to choose which lights, represented by the yellow line below the icon, to turn on or off then press the WORK MODE button.

4 **WORK MODE** button/wheel when the **HOME SCREEN** is displayed:
4a. WORK MODE button — The **WORK MODE** button has two actions:
Short press — select the work mode screen (See *34*).
Long press — select the tool setup screen.
4b. WORK MODE wheel — Turn the wheel left or right to increase or decrease the electric motor speed.
WORK MODE button/wheel when the **MENU SCREEN** is displayed:
4a. WORK MODE button:
Short press — to select the work mode screen (See *34*).
Long press — no action.
4b. WORK MODE wheel — Turn the wheel left or right to step between the functions/menus. As the wheel is turned, the chosen function on the screen changes and is highlighted.

5 **ESC** — The **ESC** button is used to return to the previous menu or home screen.
Short press — back
Long press — back to home screen

Menu screen

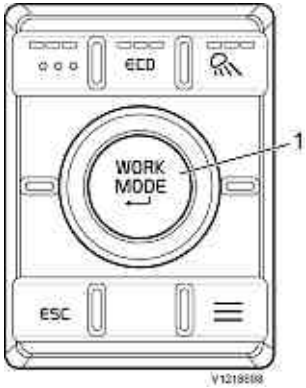
6 Menu button — The menu button is used to display a menu to view and change settings such as worklights and machine setup.
Short press — Menu
Turn the **WORK MODE** wheel to choose a function on the menu and press the button to activate the function.
- Worklight — set up the worklights
- ISO/SAE (optional equipment) — change the operating pattern between ISO/SAE and BHL for working equipment control levers
- Machine — display the machine settings screen to view/change the settings:
  - Electric motor shutdown
  - Energy consumption
  - Travel alarm
  - Flow setup
- Messages — display the system messages (See *45*)
- Settings — view/change the system and display unit settings:
  - Help information
  - System — Which for example includes submenus for:
    Time and date
    Display brightness
    Keypad backlight
    Language
    About (with information about open source software licenses)
    Night mode
  - Machine status
  - Antitheft (optional equipment)

Work mode screen

The work mode screen is used to change the work mode (which tool is being used), edit (customise) a tool and add a tool.

NOTE!
Some tools and the add tool function might not be visible when the work mode screen is displayed. Use the **WORK MODE** wheel to scroll and bring the hidden items into view.

Work mode screen, example



Keypad
1 **WORK MODE** button

To display the work mode screen, press (short press) the **WORK MODE** button.

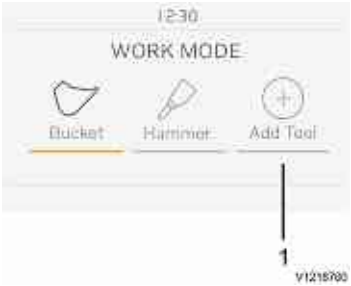
Tool, set up or change settings

To set up or change the setting for a tool, turn the **WORK MODE** button to select the tool and long press the **WORK MODE** button. The tool editor screen will be displayed. See *39*.

Work mode screen, example
1 Tools, previously set up

Tool, add to work mode

NOTE!
Changing tool settings and adding tools should be performed only by persons that are experienced and knowledgeable about the tool settings that are required for the selected tool.



Work mode screen, example
1 Add tool

Add tool screen, example

To add a tool to the work mode, turn the **WORK MODE** button to select the add tool function and press **WORK MODE** button. The add tool screen will be displayed.

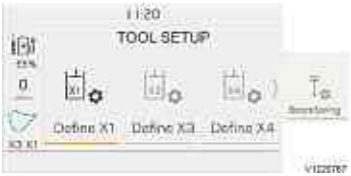
1 Press the **WORK MODE** button and select the add tool function. The add tool screen will be displayed.
2 Turn the **WORK MODE** button and select the tool to be added. The image and name of the tool will be displayed next to the selected tool. The image and name can be changed. See *39*.

NOTE!
The lifting mode will be added automatically when the overload option is installed. It can not be added, duplicated or edited.

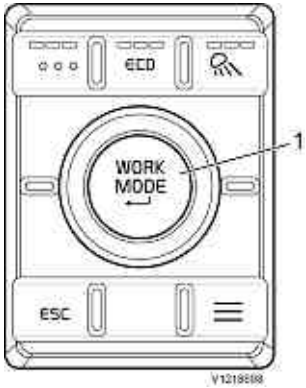
3 Press the **WORK MODE** button to add the tool.

Tool setup screen

The tool setup screen is used to adjust the parameters according to installed options X1, X3, X4, or boom swing hydraulic lines.

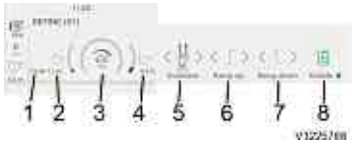


Tool set up screen



Keypad
1 WORK MODE button

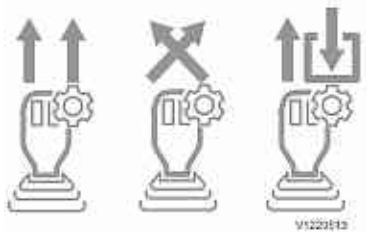
To display the Tool setup screen, press (long press) the **WORK MODE** button from the home screen.



Flow setup screen

To adjust a function parameter, use the WORK MODE wheel to select the appropriate icon function (X1, X3, X4, or boom swing) and short press the WORK MODE button to open the Flow settings screen.

1 ON indicator with radio button — Use the WORK MODE wheel to select ON and short press the WORK MODE button.
— If the radio button is green, the function is ON
— If the radio button is gray, the function is OFF and all settings are grayed out.
2 Left hand (side) hydraulic flow — Set the left side hydraulic flow of the selected function (X1 shown in figure).
3 Motor speed with the active function (X1 shown) — Set the motor speed when the hydraulic function is active.
4 Right hand (side) hydraulic flow — Set the right side hydraulic flow of the selected function (X1 shown in figure).
5 Flow direction (not available for boom swing) — Indicates the direction of hydraulic flow to the arm.
Two parallel arrows — The left side of the proportional roll switch sends flow to the left side of the arm. The right side of the proportional roll switch sends flow to the right side of the arm. (Only for X1) The push button on the front of the joystick sends the maximum flow set to the left side of the arm.



Flow direction

Ramp up
From left to right: Active, Normal, Soft

Two crossed arrows — The left side of the proportional roll switch sends flow to the right side of the arm. The right side of the proportional roll switch sends flow to the left side of the arm. (Only for X1) The push button on the front of the joystick sends the maximum flow set to the right side of the arm.
Two arrows, one back to tank (X1 function only) — The left side of the proportional roll switch sends flow to the left side of the arm. The right side flow adjustment is set as 0%. The right side of the proportional roll switch has no action. (Only for X1) The push button on the front of the joystick sends the maximum flow set to the left side of the arm.

6 Ramp up — Three options of ramp up are available to send the flow in line.
Active — Flow is increased with rapid ramp up.
Normal — Flow is increased with medium ramp up.
Soft — Flow is increased with slow ramp up.
7 Ramp down — Three options of ramp down are available to send the flow in line.
Active — Flow is decreased with rapid ramp down.
Normal — Flow is decreased with medium ramp down.
Soft — Flow is decreased with slow ramp down.
8 Enable (X1 function only) — Detent mode enabled allows for maintaining the maximum flow without using the push button on the front of the joystick. Press the push button on the front of the joystick once to start and once again for maximum set flow stop.

Antitheft screen

(Optional equipment)

The anti-theft screen requires that the operator enter a valid code to start the machine.

Anti-theft screen

How to enter code

The anti-theft screen begins with the code entry for the first digit. Use the **WORK MODE** button to enter the code:

NOTE!
When entering the code, the current digit being entered is highlighted with an orange (yellow if in night mode) line under it.

1 Turn the **WORK MODE** wheel to change the digit (begins with the first digit). The number displayed in the digit will change as the wheel is turned.
2 Press the **WORK MODE** button to enter the digit. The display will accept the input and the next digit will be ready for input.
3 Repeat until all digits are entered.

NOTE!
Use the ESC key to go back.

If all digits are correctly entered, the display will go to the home screen.

Failed attempts

Only two incorrect attempts are permitted. After each incorrect entry of the code, the display will show the operator how many attempts remain. After three incorrect attempts, the machine will be locked down and the display will provide a recovery code that is needed to unlock the machine.

If the machine becomes locked, contact your Volvo Construction Equipment dealer and provide the recovery code to reset the machine.

How to activate or change code:

Go to settings and choose anti-theft.
Choose enable anti-theft to enable or disable anti-theft.
Choose change pin code.
Select which pin code to change:
- Owner
- Operator 1
- Operator 2

Tool editor (shown in night mode)

Tool editor

The tool editor is a function of the display unit to change settings for tools that have been setup. It also can add tools and delete tools. To start the tool editor, select a tool with the **WORK MODE** button/ wheel (See *31*) and long press the **WORK MODE** button.

NOTE!
Changes to tools are saved when the machine is shut down. If the machined is equipped with the antitheft option (see *38*), changes to tool settings are saved with the code that was used to unlock the machine.

The tool editor provides a menu to change the settings of the tools that are displayed in the work mode.

Duplicate tool

Tools that are set up and displayed in the work mode, except for the lifting mode, can be duplicated and added to the work mode. When a tool is duplicated, a screen to change the name will be displayed. The default name will be the same as the duplicated tool with a number in parentheses added at the end of the name.

NOTE!
The lifting mode (tool) can not be duplicated or removed.

Delete tool

A tool can be deleted from the work mode. When deleting a tool, the tool is removed from the work mode only. The tools that can be added to the work mode from the list of tools (See *34*) will remain available.

Tool setup

The settings for the hydraulic lever functions for a tool, such as its actuating speed, can be adjusted.

Change tool image

The image for the tool can be changed by selecting from a list of tool images. After selecting the change tool image function, a list of tools and their images will be displayed when the tool is selected.

Edit name

The tool name can be changed as desired by the operator.

Indicator icons

Various icons may be displayed on the home screen, depending on operating conditions and machine status.
When red icons are displayed and a warning message is also displayed, any instructions provided should be followed immediately.

Warning, caution and information icons will be displayed if there is an active warning, caution or information message. The messages can be dismissed or hidden by a message with higher priority, for more information see *45*.

Warning (red)

- **Warning (red)** — A critical operating condition exists and the operator must take action to resolve the reason for the warning immediately.


Caution (yellow)

- **Caution (yellow)** — Is displayed when operating conditions exist that should be checked the next time the machine is stopped or when service is needed. Some caution messages need a quick action to be resolved immediately.


Information (blue)

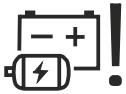
- **Information (blue)** — The information icon indicates that there is an information message in the message center.


Seat belt (red)

Seat belt (red) — The seat belt icon indicates that the seat belt is not fastened while the electric motor is running. Fasten the seat belt before continuing.


Service battery (red)

Service battery (red) — The service battery (12 V) is not charging.


V1220045

Traction battery (red)

Traction battery (red) — The traction battery (48 V) encountered an error.


V1225048

Electric motor failure (red)

Electric motor failure (red) — Is displayed when the electric motor is in error state.

Cluster failure (red)

Cluster failure (red) — Is displayed when the cluster has lost communication with the Vehicle ECU.

Service needed (yellow)

Service needed (yellow) — Service is needed.

Auto shutdown (blue)

Auto shutdown (blue) — The auto shutdown icon is displayed when the auto shutdown mode is activated.
The countdown time left is displayed along with the auto shutdown icon right before shutdown.

Heater (grey)

Heater (grey) — The heater icon is displayed when the heater is activated.

Boom offset (green)

Boom offset (green) — The boom offset icon is displayed along with other icons to identify functions and controls that are associated with swinging the boom (moving the boom to the left or right while keeping the cab stationary).

Detent (green)

Detent (green) — The detent icon is displayed to indicate that a continuous flow has been set for X1.

Electric motor temperature high (yellow/red)

Electric motor temperature high (yellow/red) — Indicates that the electric motor temperature is too high.

High speed (green)

High speed (green) — The high speed icon is displayed when the machine travel speed is in high speed mode.

Low speed (green)

Low speed (green) — The low speed icon is displayed when the machine travel speed is in low speed mode.

ISO/SAE (green)

ISO/SAE (green) — This icon indicates that the pattern for the control levers is in ISO/SAE mode (option).

BHL (green)

BHL (green) — This icon indicates that the pattern for the control levers is in BHL mode (option).

Overload (red)

Overload (red) — The overload icon indicates that the load is more than the maximum allowed for the machine.

NOTE!
Stop lifting immediately and reduce the load.

Standard charger locked (green)

Standard charger locked (green) — This icon is displayed when the AC inlet is locked.

Standard charger unlocked (green)

Standard charger unlocked (green) — This icon is displayed when the AC inlet is unlocked.

Antitheft (green)

Anti-theft (green) — This icon indicates that the anti-theft function is active and the profile is locked. Enter the correct PIN code to use the machine. The machine can be recharged when the anti-theft is locked.

Quick coupler unlocked (red)

Quick coupler unlocked (red) — This icon indicates that the quick coupler attachment bracket (optional equipment) is not locked.

WARNING

Risk of crushing.
Falling attachments could result in severe injury or death.
Make sure the attachment bracket is properly locked before starting work.

Quick coupler initiated/locked (yellow/green)

Quick coupler initiated/locked (yellow/green) — When this icon is yellow it indicates that the quick coupler attachment process is initiated. It changes to green when the quick coupler is confirmed locked by the operator.

Quick coupler confirm locked (yellow/red)

Quick coupler confirm locked (yellow/red) — This icon is displayed in yellow when the system is requesting confirmation that the quick coupler is locked. Press the attachment quick coupler switch to confirm that the quick coupler is locked. See *50*. This icon is displayed in red when the quick coupler is in the disengaged state of the quick coupler sequence.

Quick coupler error (red)

Quick coupler error (red) — This icon indicates that an error has occurred in the quick coupler function and the quick coupler is no longer available.

NOTE!
Do not attempt to unlock and operate the quick coupler switch. Contact a qualified service technician.

V1220041

Fast charger (green)

Fast charger (green) — When charging the battery with a fast charger, this icon is shown.

Work lights (green)

Work lights, front (green) — This icon indicates that one or more work lights are on.

System messages

When the system has messages for the operator, a collapsed view of the message will be displayed at the top of the home screen. There are three different types of messages: warning, caution and information. When a message is first displayed, it will be in collapsed view at the top of the display. If the arrow is present, a full screen view of the message can be displayed by using the **WORK MODE** button/wheel.

Home screen with collapsed warning message, example

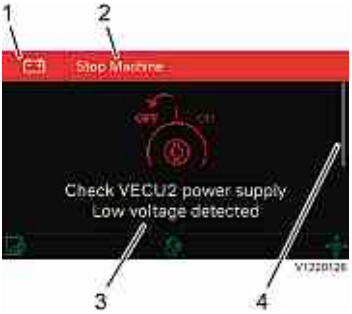
1 Icon to indicate the reason for the warning
2 Action for the operator
3 Arrow, if present, indicates that additional information is available

Warning messages

Warning messages have the highest priority and will be displayed instead of any cautions or information messages that may have been previously displayed.
While warning messages are present, the system will beep repeatedly, continuously.

1 Icon — Warning messages are displayed with a white icon on a red background. The icon will vary depending on the reason for the warning.
2 Message — The displayed message, in collapsed view, is an action for the operator.
3 Arrow — If the arrow is present, there is additional information. Use the **WORK MODE** button/wheel to select and view the message in full screen view.

NOTE!
When a warning message is displayed the operator must take action to resolve the reason for the warning immediately.



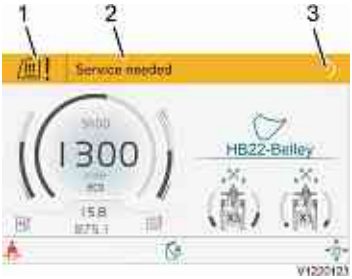
Full screen view, example warning message

1 Icon to indicate the reason for the warning
2 Action for the operator
3 Detailed message
4 Scroll bar. If present, scroll to see more.

Warning messages, full screen view

The full screen view of a warning message gives details about the reason for the warning. If a scroll bar is present on the right, the **WORK MODE** wheel can be used to scroll the message and view additional information such as:

- Error code
- Source of the error
- First event (when the event first occurred)
- Number of times the event has occurred
- Last event (when the event last occurred)



Caution message, collapsed view, example

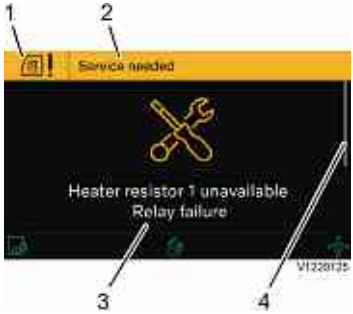
1 Icon to indicate the reason for the caution
2 Action for the operator
3 Arrow, if present, indicates that additional information is available

Caution messages

Caution messages have the second highest priority and will be displayed only if no warning messages are displayed. Caution messages will be displayed instead of any information messages that is currently displayed.
When a caution message is displayed, the system will beep two times only.

1 Icon — Caution messages are displayed with a black icon on an orange background. The icon will vary depending on the reason for the caution.
2 Message — The displayed message, in collapsed view, is an action for the operator.
3 Arrow — If the arrow is present, there is additional information. Use the **WORK MODE** button/wheel to select and view the message in full screen view.

NOTE!
Caution messages can be dismissed by pressing the **ESC** key and if no other caution messages or information messages has been triggered, the display will return to the home screen with only one icon at the top right to indicate that there are messages present.



Full screen view, example caution message

1 Icon to indicate the reason for the caution
2 Action for operator
3 Detailed message
4 Scroll bar. If present, scroll to see more.

Caution messages, full screen view

The full screen view of a caution message gives details about the reason for the caution. If a scroll bar is present on the right, the **WORK MODE** button/wheel can be used to scroll the message and view additional information.

NOTE!
Use the **ESC** button on the keypad to return to the home screen with only a caution icon to indicate that there are caution messages.

Information message, collapsed view, example

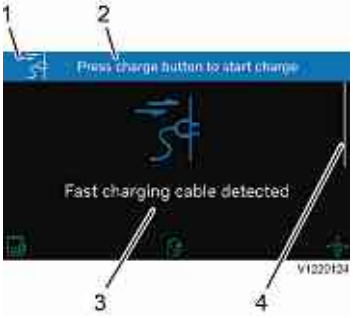
1 Icon to indicate the reason for the information
2 Short version of the message
3 Arrow, if present, indicates that additional information is available

Information messages

Information messages have the third highest (lowest) priority and will be displayed only if no warning or caution messages are displayed. Messages with higher priority will be displayed instead of any information messages that may have been previously displayed.
When an information message is displayed, the system will beep once only.

1 Icon — Information messages are displayed with a white icon on a blue background. The icon will vary depending on the reason for the information.
2 Message — The displayed message, in collapsed view, could be a shortened version to tell the operator how to react.
3 Arrow — If the arrow is present, there is additional information. Use the **WORK MODE** button/wheel to select and view the message in full screen view.

NOTE!
Information messages can be dismissed by pressing the ESC key and if no other information messages or caution messages has been triggered, the display will return to the home screen with only one icon at the top right to indicate that there are messages present.



Full screen view, example information message

Message center, example messages

Home screen, message icons

1 Caution message icon (yellow)
2 Information message icon (blue)

Information messages, full screen view

1 Icon to indicate the reason for the caution
2 Brief message
3 Detailed message
4 Scroll bar. If present, scroll to see more. (scroll bar not shown)

The full screen view of an information message gives details about the reason for the information. If a scroll bar is present on the right, the **WORK MODE** wheel can be used to scroll the message and view additional information.

NOTE!
Use the **ESC** button on the keypad to return to the home screen.

Message center

To view the messages in the message center:
1 Press the menu button on the keypad.
2 Use the **WORK MODE** button/wheel to select the message function and enter the message center.
3 Use the **WORK MODE** button to select and view details about the message, such as:
- First event (when the event first occurred)
- Number of times the event has occurred
- Last event (when the event last occurred)

Dismissed messages

Warning messages that have been dismissed by the operator will be indicated by a stop sign and a red shading banner.
Caution and information messages that have been dismissed by the operator will be indicated with only an icon at the top right of the display.

NOTE!
Dismissed and active messages can be viewed in the message center.

Day mode, example

Day mode

Day mode uses a screen setup with a light coloured background with darker text, icons and images. To change to day mode:

1 Press the menu button on the keypad to display the settings menu.
2 Use the **WORK MODE** button/wheel and select the settings choice.
3 Use the **WORK MODE** button/wheel and select the system choice.
4 Use the **WORK MODE** wheel to scroll down to the night mode choice.
5 Use the **WORK MODE** button to deactivate the night mode.
6 Long press the **ESC** key to return to the home screen.

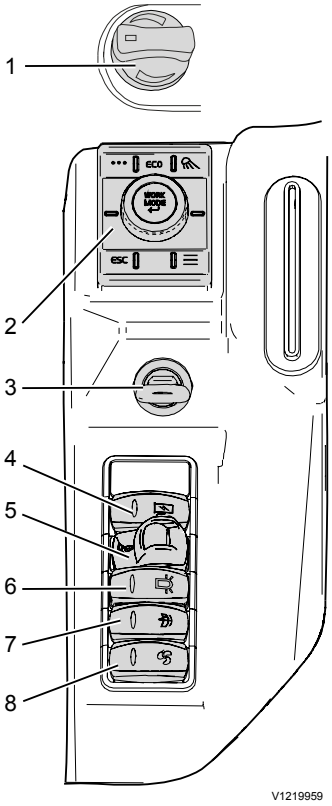
Night mode, example

Night mode

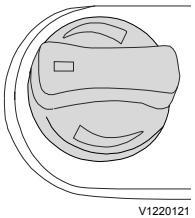
Night mode uses a screen setup with a dark coloured background with lighter text, icons and images. To change to night mode:

1 Press the menu button on the keypad to display the settings menu.
2 Use the **WORK MODE** button/wheel and select the settings choice.
3 Use the **WORK MODE** button/wheel and select the system choice.
4 Use the **WORK MODE** wheel to scroll down to the night mode choice.
5 Use the **WORK MODE** button to activate the night mode.
6 Long press the **ESC** key to return to the home screen.

Instrument panel, right

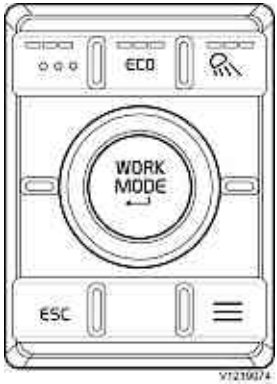


1	Temperature control
2	Keypad
3	Ignition switch/Ignition key
4	Charging switch
5	Attachment quick coupler switch
6	Rotating warning beacon switch
7	Windscreen wiper and washer switch
8	Fan switch



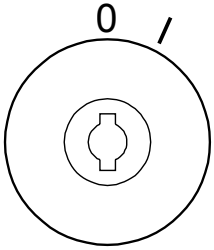
1. Temperature control

When the fan is activated, turn the control to adjust the temperature in the cab.



2. Keypad

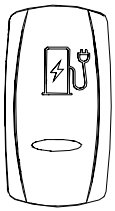
The keypad is used to control the display unit and other functions of the machine. For more information, see *32*.



3. Ignition switch

The ignition switch is used for starting. The ignition switch has two positions:

0: Electric motor off
I: Running position

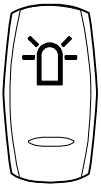


4. Charging switch

Press the charging switch to start and stop the charging of the traction battery, see *75*.

5. Attachment quick coupler switch

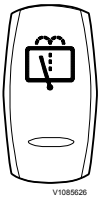
The attachment quick coupler switch opens, closes and locks the attachment bracket, see *122*.



6. Rotating warning beacon switch

- Press upper end of switch = the rotating warning beacon is on
- Press lower end of switch = the rotating warning beacon is off

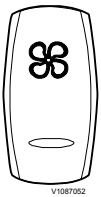
NOTE!
When turning off the electric motor while the rotating warning beacon is on, the rotating warning beacon will stay on.



7. Windscreen wiper and washer switch

- Press lower end of switch = windscreen washer and wiper are off
- Switch in middle position = windscreen wiper is on
- Press upper end of switch = windscreen wiper and windscreen washer is on

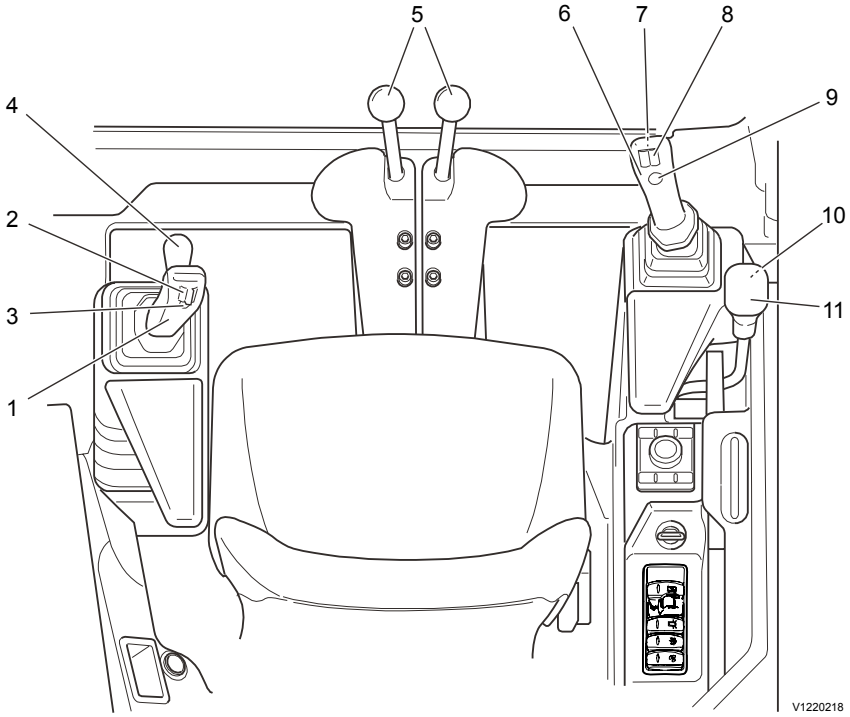
NOTE!
To activate the windscreen wiper and windscreen washer the upper windscreen needs to be closed.



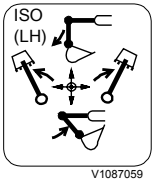
8. Fan switch

- Press lower end of switch = fan is off
- Switch in middle position = fan is in low speed
- Press upper end of switch = fan is in high speed

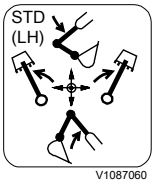
Other controls
Controls



1	Left hand control lever for attachments
2	Proportional roll switch to control X3 hydraulic flow (optional equipment)
3	Horn
4	Control lockout lever for hydraulics
5	Control levers for travel motion
6	Right hand control lever for attachments
7	Push button for X1 max flow
8	Proportional roll switch to control X1 or boom offset hydraulic flow
9	Offset boom or X1 selection Start button for the electric motor
10	Button to activate fast travel speed gear
11	Dozer blade control lever



Decal ISO/SAE control pattern



Decal BHL control pattern

1. Left control lever for attachments (ISO/SAE control pattern)

- Lever forward: Extending the dipper arm.
- Lever backward: Retracting the dipper arm.
- Lever to the right: Slewing movement to the right.
- Lever to the left: Slewing movement to the left.

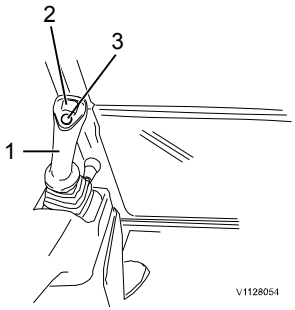
Left control lever for attachments (BHL control pattern)

- Lever forward: Boom down.
- Lever backward: Boom up.
- Lever to the right: Slewing movement to the right.
- Lever to the left: Slewing movement to the left.

NOTE!
Optional equipment. See Pattern change in this chapter.

WARNING

Risk of serious accidents.
Unfamiliar control patterns could cause confusion and accidents resulting in serious injury.
Use extreme caution when using the control levers after changing the control pattern and until you become familiar with the new pattern.



Left control lever

2. Proportional Roll switch to control X3 hydraulic flow (optional equipment)

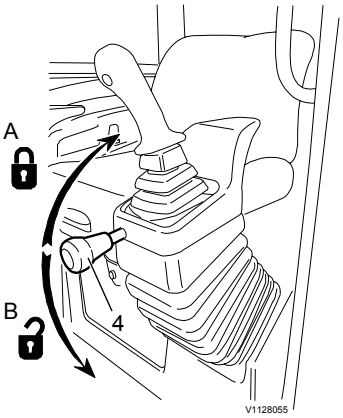
- Proportional roller to operate optional equipment (X3, for example rototilt bucket).

Hydraulic oil flow, changing maximum setting for X3
There is a possibility to set the maximum hydraulic oil flow used for X3, see “Hydraulic oil flow, changing maximum setting for X1 and X3” under the explanation of position 8.

NOTE!
While turning ON the ignition switch or lowering the arm rest, a neutral detection is performed for the roller switch on the left control lever. If the roller is not in its neutral position the proportional function (X3)) is disabled.
The function becomes active (operational) once the roller comes back to its neutral position.

3. Horn

■ Button depressed: Horn signal.



4. Control lockout lever for working and travel

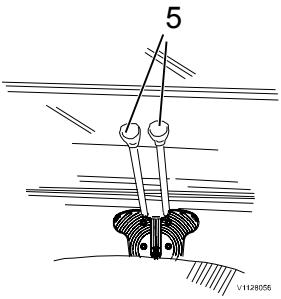
■ Shift the lever to position (A). The operating levers for working and travel hydraulics are locked (no movement possible).

NOTE!
The control lockout lever must be fully in the upper end position to secure that the hydraulic is locked.

■ Shift the lever forward to position (B). The operating levers for working and travel hydraulics are unlocked (working position).

⚠ WARNING

Risk of crushing.
A raised attachment could fall and cause crushing injury.
Before leaving the cab, always lower all attachments to the ground and lock the control functions.



5. Control levers for travel motion

When the dozer plate is in the rear position (180° rotation), the travel system operation is reversed.

⚠ WARNING

Risk of fatal accidents.
Unexpected driving direction could lead to accidents resulting in serious injury or death.
Always check the driving direction before moving the machine.

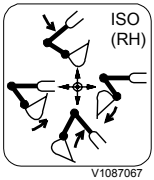
■ Push both levers forward: Forward travel.

■ Pull both levers backward: Reverse travel.

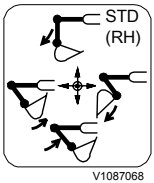
■ Push right lever forward: Turn left.

■ Push left lever forward: Turn right.

NOTE!
When operating the travel levers the travel alarm (optional equipment) emits a warning signal.



Decal ISO/SAE control pattern



Decal BHL control pattern

6. Right control lever for attachments (ISOSAE control pattern)

- Lever forward: Boom down.
- Lever backward: Boom up.
- Lever to the right: Empty the bucket (opening).
- Lever to the left: Fill the bucket (closing).

Right control lever for attachments (BHL control pattern)

- Lever forward: Extending the dipper arm.
- Lever backward: Retracting the dipper arm.
- Lever to the right: Empty the bucket (opening).
- Lever to the left: Fill the bucket (closing).

NOTE!
Optional equipment. Control pattern change, see below.

Pattern change (optional equipment)

WARNING

Risk of serious accidents.
Unfamiliar control patterns could cause confusion and accidents resulting in serious injury.
Use extreme caution when using the control levers after changing the control pattern and until you become familiar with the new pattern.

NOTE!
It is possible to change the control pattern for the control levers through the machine display. The default setting is ISO/SAE.

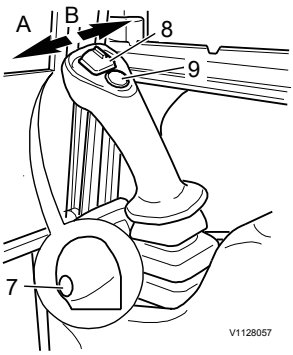
To change control pattern:

1 In the main menu, select ISO/SAE.

Main menu

Operating pattern menu

2 In the Operating pattern menu, select the desired control pattern.
The active control pattern symbol will be displayed in the lower right corner of the display screen.



Right control lever

7. Push button for X1 max flow

■ Actuation of the switch executes the function of the first auxiliary with maximum hydraulic flow.

8. Proportional roll switch or two buttons to control X1 or boom offset hydraulic flow

■ Roller in central position (neutral)/no button pressed: No oil flow

■ Roller to the left (A)/left button pressed: Increases/turns on the oil flow for the function of optional equipment or boom offset to the desired direction. For example thumb opens or offset boom to the left.

■ Roller to the right (B)/right button pressed: Increases/turns on the oil flow for the function of optional equipment or boom offset to the desired direction. For example thumb closes or offset boom to the right.

■ Roller to the left (A) in X1 mode: accessory flow through pipe on left side of boom

■ Roller to the right (B) in X1 mode: accessory flow through pipe on right side of boom

NOTE!
While turning ON the ignition switch or lowering the arm rest, a neutral detection is performed for the roller switch on the right control lever. If the roller is not in its neutral position the proportional function (X1 or boom offset) is disabled.
The function becomes active (operational) once the roller comes back to its neutral position.

Flow adjust for X1 and X3 with WORK MODE wheel

There is a possibility to set the maximum hydraulic oil flow used for the first auxiliary (X1) and for X3.

9. Offset boom or X1 selection

- When actuating this switch (9), function of the proportional roller on the right hand lever changes between offset boom and attachment movement.

The switching mode can operate only if the roller is in neutral position.

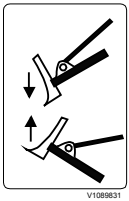
NOTE!
The control lamp in the instrument panel lights up when operation with the offset boom is activated.

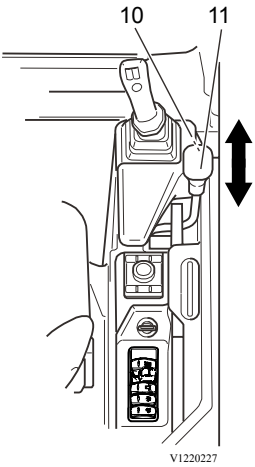
10. Button to activate fast travel speed gear

■ Hold button depressed: Fast speed is activated.

■ Button released: Fast speed is deactivated.

NOTE!
Fast speed is automatically disabled when the button is released.





11. Dozer blade control lever

The control lever controls the position of the dozer blade.

- Lever forward: Dozer blade down.
- Lever backward: Dozer blade up.

ROPS

ROPS Cab (Roll Over Protective Structure)

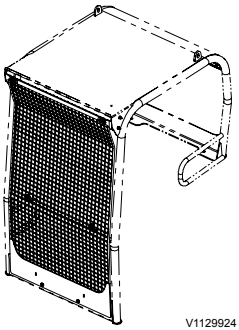
The cab is designed to ensure minimum crash protection space according to the standard currently being developed by the International Standard Organization.

NOTE!
Do not jump out of cab if the machine should roll over. Stay in seat wearing seat belt.

Protection from falling or scattering materials (optional equipment)

OPG Level 1

The cab is made from toughened glass. Toughened glass will protect the operator from debris projection for example during breaker operations.
The top of the canopy is approved as a protective structure according to the OPG (Operator Protective Guard) Level 1. OPG 1 front is available as option on canopy.

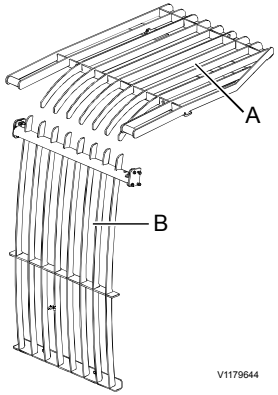


OPG 1 front for canopy

OPG Level 2

To comply with OPG (Operator Protective Guards) Level 2, machines must be equipped with:

- An additional top protective structure made of solid steel plates. This guard will protect the operator from an object of 227Kg (500lb) falling from 5.2 meter (17 ft) above the cab.
- An additional front protective structure made of solid steel plates. This guard must absorb 5800 J energy to protect the operator from large objects approaching from the front.



A OPG 2 top
B OPG 2 front

By installing OPG 2 top (A) and front (B), cab and canopy are approved according to OPG Level 2. These additional guards are recommended for demolition and logging operations.

Install the necessary protection guards in accordance with work site conditions and local government recommendations. Consult your local Volvo Construction Equipment dealer.

In working conditions where falling or scattering materials are capable of entering the cab, for example in mining applications and when operating with a hammer (hydraulic breaker), protective roof and window guards should be installed.

If you have a canopy version of the machine, a hammer (hydraulic breaker) protection kit is also available. Consult your local Volvo Construction Equipment dealer for information about when the different options can be used.

NOTE!
Always, check clearance between bucket and Cab/OPG guard. Slowly cycle bucket to check for interference with the Cab/OPG guard. Pay close attention when quick couplers are used.

Operator comfort

Operator seat

A correctly adjusted operator’s seat is an essential contribution to operator comfort and safety!

NOTICE

To obtain maximum comfort and eliminate the risk of accidents, you must make sure that all seat adjustments have been carried out correctly before starting the machine.

NOTE!
The seat is intended for use by one seated occupant only.

Operator's seat, adjusting

WARNING

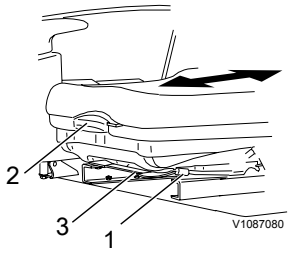
Risk of serious accidents.
Sudden movement of operator's seat could cause loss of machine control. This could result in accidents with serious injuries.
Always stop the machine before adjusting the operator´s seat.

WARNING

Risk of serious injury.
Uncontrolled touch of control levers could cause unexpected movement of machine or parts. This could result in serious injury.
Always lock the control lock out lever before adjusting the seat.

NOTICE

Installation and maintenance of the operator seat may only be carried out by authorised and competent personnel.



Operator's seat, option variant A

Horizontal adjustment

1 Pull lever (1) slightly up.

2 Adjust the seat to the desired position.

3 Check that the seat has properly engaged.

Backrest adjustment

1 Pull lever (2) slightly up.

2 Adjust the inclination of the backrest.

NOTE!
Adjusting the backrest automatically changes the horizontal adjustment of the seat!

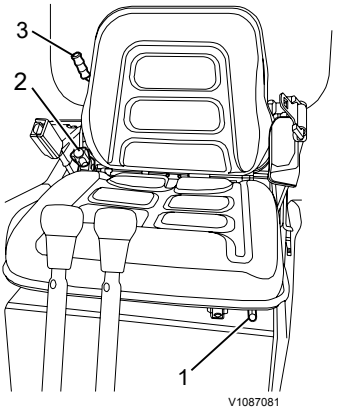
Weight adjustment

Resetting to zero:

Pull lever (3) fully back to reset the weight adjustment to the minimum weight.

Adjustment depending on the weight of the operator:

Pull lever (3), until the desired weight is displayed.



Operator's seat, option variant B

Horizontal adjustment

1 Pull lever (1) slightly up.

2 Adjust the seat to the desired position.

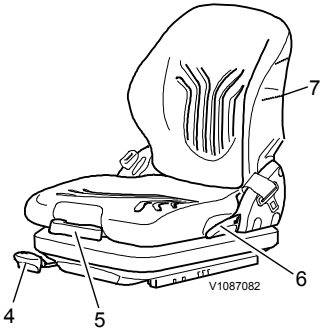
3 Check that the seat has properly engaged.

Backrest adjustment

Turn the knob (2) to the desired setting.

Weight adjustment

Pull lever (3) upwards or downwards until the desired weight adjustment is reached.



Operator's seat, option variant C

Horizontal adjustment

1 Pull lever (4) slightly up.

2 Adjust the seat to the desired position.

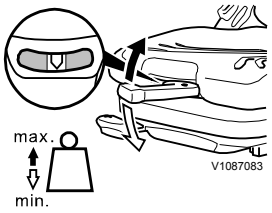
3 Check that the seat has properly engaged.

Backrest adjustment

1 Pull up lever (6).

2 Adjust the inclination of the backrest. Release the lever to lock the backrest.

3 Check that the backrest has properly engaged.



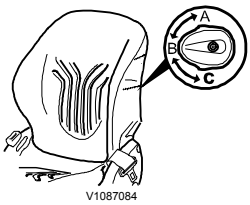
Weight adjustment

The weight is adjusted with the operator sitting in the seat.

1 Pull lever (5) fully out, stay in this position and move lever upwards or downwards until the desired weight adjustment is reached.
When the minimum/maximum has been reached you can notice an empty movement in the lever.

2 The weight has been set correctly when the arrow is in the middle of the viewing window.

3 Lock the lever again.



Lumbar support

By turning the adjustment knob (7) the curvature in the upper and lower part of the backrest is adjusted.

A Maximum curvature on the upper part of the backrest

B No curvature

C Maximum curvature on the lower part of the backrest

Seat belt

NOTE!
A seat belt that is damaged or has been stretched in an accident must be replaced immediately.

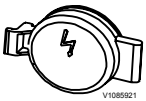
NOTICE

Due to soiling by water and dirt the seat belt must be replaced every 3 years!

- Modifications to the belt or its mountings are not permitted.
- The belt is intended for one adult person only.
- Change the belt every three year regardless of its condition.

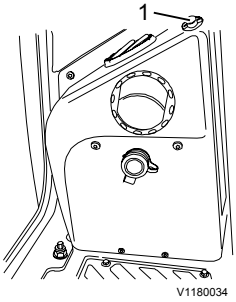
When the seat belt needs to be washed:

- Use a mild soap solution.
- Allow the belt to dry while it is fully pulled out, before retracting it.
- Make sure the belt is fitted in a correct way.



Power socket

The power socket is used for electrical devices such as a mobile phone charger or to supply electricity to a lamp. (Voltage: 12 V, Amperage: 5 A, Power: 60 W).
The power socket is placed on the left hand side of the operator’s seat.



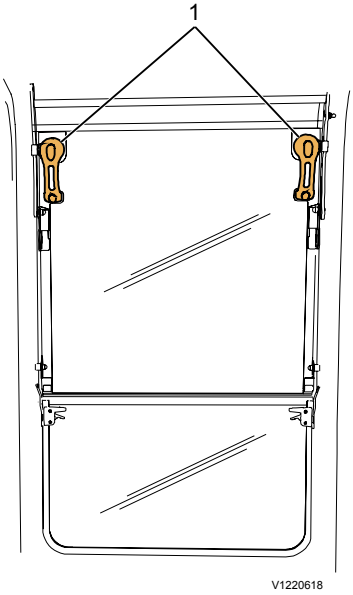
1 Heater

Heater

The heater (1) is located inside the cab on the right side.

Windows

Upper windscreen

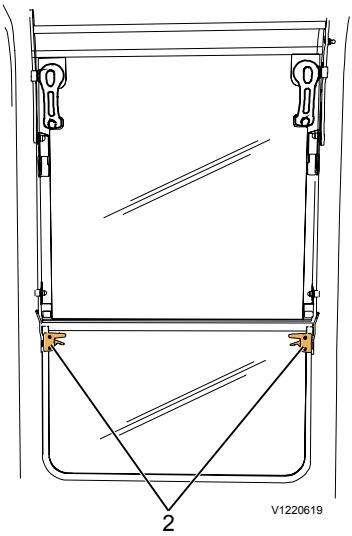


Upper windscreen

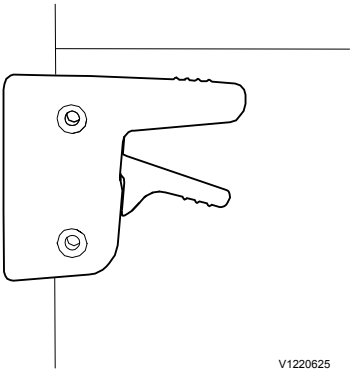
- The upper windscreen can be loosened by pushing the buttons (1) on both sides and then slide the windscreen upwards under the cab roof.

NOTE!
The windscreen is fastened when you hear a click on both sides.

- To close the windscreen push the buttons again and slide the window down into closed position.
- To loosen the upper windscreen, push the buttons (1) on both sides.



Lower windscreen



Locked position

Lower windscreen

■ The lower windscreen can be removed and placed on the back of the upper windscreen.

1 Make sure that the upper windscreen is in closed position (not under the roof).

2 Loosen the upper windscreen by pushing the button (1) and push it slightly upwards to disengage the lower windscreen.

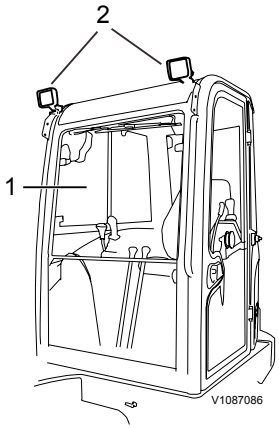
3 Push the handle of the latch (2) on both sides of the lower windscreen to remove it.

4 Loosen the upper windscreen by pushing the buttons (1) and pull it down.

5 Align the bottom of the lower windscreen to the bottom of the upper windscreen. Push the handle of the latch (2) on both sides of the lower windscreen and fasten the lower windscreen to the upper windscreen.

6 The lower windscreen is secured when you hear a click at both sides. Make sure that the handle of the latch is back in its locked position.

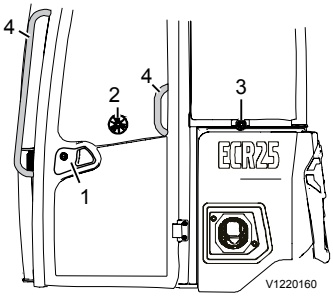
7 Push both of the windscreens up under the cab roof. Make sure you hear a click, then the windscreens are fastened.

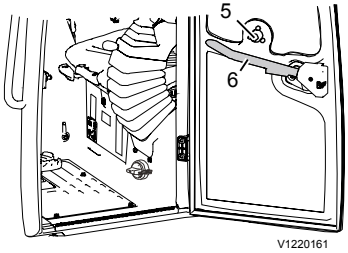


Working lights

Working lights (2) are used to illuminate the working area under insufficient light conditions. The working lights are mounted at the front (standard) and rear (optional equipment) of the cab.

Door





⚠ WARNING

Risk of falling.
Careless mounting and dismounting of the machine could result in falling and injury.
Always use the three-point approach to access or leave the machine by using two hands and one foot or one hand and both feet. Use stepping surfaces and handholds. Always face the machine when entering or stepping down from the machine. Do not jump off!

- The cab door is fitted with an external door handle with a lock (1) and an internal door handle (6).
- The door can be locked in open position by application of manual force (a fixed locking bolt (3) on the cab engages in the round bolt receptacle (2) in the door).
- By pressing the unlocking button (5) the cab door can be unlocked and closed.
- Make sure that the cab is parallel to tracks when entering the machine. That allows best possible access situation.

Operator's manual, storage

The operator's manual is stored in the lockable storage box under the operator seat. Keep the

manual in the storage box so that it is always at hand.

Fire extinguisher, location

Possible location for a fire extinguisher is, if you have a canopy, behind the seat against the rear plate and, if you have a cab, along the right hand rear pillar.

Emergency exit

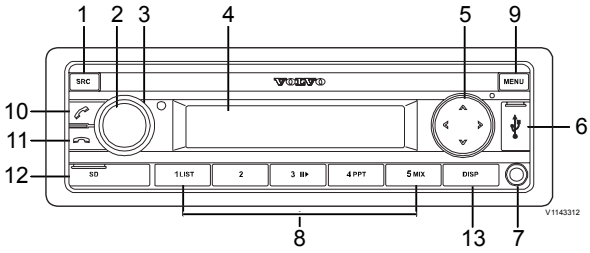
The alternative exit path is through the rear window (its location is marked with the information decal shown to the left). In case of a turnover or accident, if the door is blocked, use the emergency hammer, located on the rear pillar on the left hand side of the machine, to brake the window and leave the cab.

Audio system

(optional equipment)

The audio system (optional equipment) is located below the cab roof on the right hand side of the machine.

Radio with USB, SD and Bluetooth



1	SCR button	8	Preset 1–5
2	ON/OFF button	9	MENU button
3	Volume control	10	Green phone button
4	Display	11	Red phone button
5	SEARCH/ CHANGE/SELECT button	12	SD card slot

6	USB socket	13	DISP button
7	Front AUX-IN socket		

1 **SCR button**
Select memory bank or audio source.
Short press: Select RADIO, BT STREAM, USB FRONT, USB REAR, SD, AUX FRONT or AUX REAR source.
Long press: Activate Travel-Store function in radio mode.
2 **ON/OFF button**
Short press: Switch on sound system.
In operation: Mute sound system.
Long press: Switch off sound system.
3 **Volume control**
Adjust the volume
In the menu: Change the settings.
Fast-Browse mode: Select folder and track.
4 **Display**
5 **SEARCH/CHANGE/SELECT button**
UP/DOWN
In the menu: Select menu item.
Radio mode: Start seek tuning.
MP3/WMA/iPod mode: Change to next or previous folder.
LEFT/RIGHT
In the menu: Change menu level.
Radio mode: Adjust the stations.
Other operating modes: Select a track.
6 **USB socket**
7 **Front AUX-IN socket**
8 **Preset 1–5**
Short press: Call up the stored station in radio mode.
Long press: Store station in the current memory bank in radio mode.
9 **MENU button**
Short press: Open and close the menu.
Long press: Start the scan function.
10 **Green phone button**
Short press: Answering a call, special dial
Long press: Activate voice dialing
11 **Red phone button**
Ending, rejecting a phone call
12 **SD card slot**
13 **DISP button**
Switch display

Operating instructions

This chapter contains rules which must be followed in order to operate the machine safely. However, these rules are to be followed in conjunction with laws or other national regulations applicable to road safety and labour welfare.

Alertness, judgement and respect for applicable safety regulations are conditions for avoiding risk of accidents.

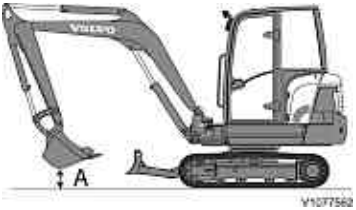
Running-in instructions

During the first 100 hours, the machine should be operated with a certain care. It is important to check oil and fluid levels often during the running-in period.

Visibility

WARNING

Risk of serious accidents.
Machine parts, equipment or load could obstruct the operator‘s view. Operating or driving with obstructed operator‘s view could cause serious accidents.
Use a signal man if operator‘s view is obstructed.



The distance between bucket and ground (A) should be 400 mm for best visibility when travelling.

In order for you to have the best possible visibility when travelling with the machine, sit in the seat and place the boom as in the picture. The distance between bucket and ground (A) should be 400 mm (15.7 in).
It may not be possible to provide direct visibility to all areas around the machine. To achieve acceptable visibility, additional devices such as warning systems, mirrors, and closed-circuit television cameras (CCTV) may be used.

In order to minimize hazards that may be caused by restricted visibility, rules or procedures shall be

established by the job site management. For example:

NOTE!
Some parts of the basic machine may restrict visibility, for example, the cab's pillars, frames, rear hood, as well as optional equipment such as buckets, pallet forks, grapples, and so on. The load that is handled with these attachments may also restrict visibility.

- Ensure that operators and job site workers have received thorough safety instructions.
- Control the traffic patterns for the machine and other vehicles. Avoid travelling in reverse if possible.
- Restrict the machine’s operating area.
- Use a signalman to help the operator. Use signals according to the signal diagram, see page *141*.
- Provide two-way communication equipment if necessary.
- Ensure that job site workers communicate with the operator before approaching the machine.
- Use warning signs.

Standard ISO 5006 "Earthmoving machinery-Operator's field of view" deals with the operator's visibility around the machine and is meant to be used for measuring and evaluating the visibility.

The machine is tested by methods and performance criteria according to this standard. The visibility method used may not include all aspects of the operator's visibility, but provides information for determining if additional devices for indirect visibility, such as warning systems, are necessary.

The test was performed on machines with standard equipment and attachment. If the machine is modified or fitted with other equipment or attachment, which results in impaired visibility, it should be re-tested according to ISO 5006.

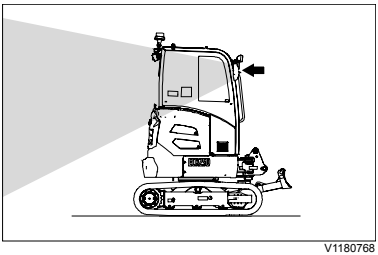
If other equipment or attachments are used and the visibility has been impaired, the operator should be informed.

Conforming to the standard is a requirement in EU-countries and provides for improved visibility around the machine.

Mirror setting

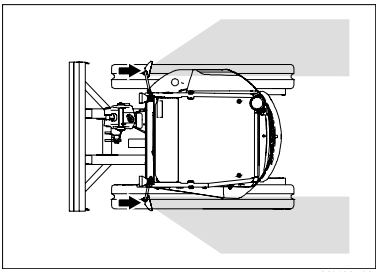
Mirrors (optional), adjusting

Rear-view mirrors (optional)



V1180768

Machine`s right view (mirrors optional)



V1180769

Machine’s top view (mirrors optional)

Using rear-view mirrors helps to get more comfortable visibility without torso rotation. Adjust it as good surrounding visibility is obtained while operating.

Measures before and during operation

- Walk around the machine and check that there are no obstacles next to the machine.
- Check that mirrors and other visibility-enhancing devices are in good condition, clean, and correctly adjusted.
- Check that the horn, back-up/travel alarm and rotating beacon (optional equipment) are working correctly.
- Check if the management has established rules or procedures for the work site.
- Always pay attention around the machine to identify any obstacles.
- Prevent persons from entering or remaining in the work area, i.e., the area around the machine and at least 7 m (23 ft) beyond the maximum reach of the attachment. However, depending on the job site's organization, the operator may allow a person to remain in the work area, but must then observe caution and operate the machine only when the person can be seen or has given clear indications of where he or she is.

Never allow any person to walk or stand under raised equipment or suspended loads.

Safety rules when operating

Follow the safety rules in the Operator's Manual before performing any operation.

Traction battery, charging

NOTE!
Before operating and recharging the rechargeable energy storage system (RESS) make sure to read all instructions carefully.

NOTE!
During the charging of the rechargeable energy storage system (RESS), always make sure that the close environment of the battery and service compartment is dry and free of flammable agents.

NOTE!
Local regulations may apply to ensure the utilization of approved electrical charging points.
It is recommended to always use a Volvo-approved charging harness.

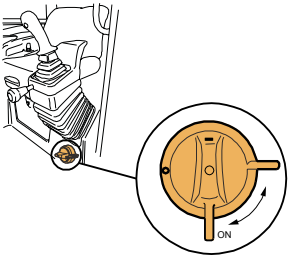
NOTE!
The machine must be placed in parking position before charging, with the battery disconnect switch set to position ON.
Make sure to rest the working attachment on the ground at all time during charging.

NOTE!
Carefully check for corrosion or foreign material in the contacts on plug and socket.
Replace the charging harness when needed.
Do not abuse, damage, remove, or modify electrical parts of the machine or the charging equipment.
Do not use equipment that is suspected to be damaged. Contact a qualified service technician if there are any questions.

There are two ways to charge the traction batteries, standard charging and fast charging (optional equipment). The charging procedures are similar. It is recommended to use the standard charging procedure when possible.

Standard charging of the traction batteries

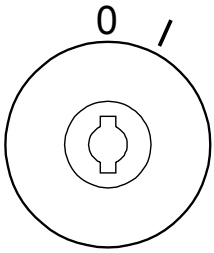
NOTE!
Make sure that the rear hood is closed before and during charging. If the rear hood is opened it will not be possible to charge the battery, and any ongoing charging will be interrupted.



V1220095

Battery disconnect switch

1 Turn the battery disconnect switch to position ON (I) .



V1219840

Ignition switch

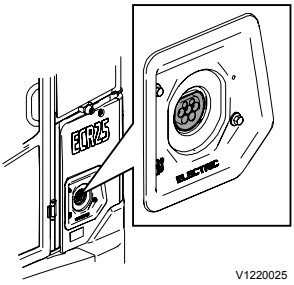
2 The ignition switch can be in position 0 or position 1.

NOTE!
If the ignition switch is in position 1 the electric motor must first be stopped and the control lockout lever must be raised before charging.

3 Connect the charging harness to the power source.

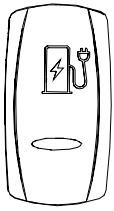
NOTE!
Local regulations may apply to ensure the utilization of approved electrical charging points. It is recommended to always use a Volvo-approved charging harness.

4 Remove the lid from the charging socket in the machine and connect the charging harness.



V1220025

Charging socket


V1220117

Charging switch

5 **If the ignition switch is in position 1:**
Press the charging switch on the right hand side panel in the cab when the display shows the battery charge screen. This will lock the charging harness connection and the charging will be started.
If the ignition switch is in position 0:
Press the charging switch on the right hand side panel in the cab to initiate the charging process. This will turn on the display, lock the charging harness connection and the charging will be started.

6 The display will show the state of charge (SoC) and the time remaining until fully charged.
The ignition switch can now be set to position 0 if needed.

NOTE!
When leaving the machine unattended while charging, it is advised to set the ignition switch to position 0.

7 To interrupt the charging, make sure that the ignition switch is in position 1 and press the charging switch again. This will unlock the charging harness connection.
When the charging harness is removed the charging information on the display will be replaced by the home screen.

NOTE!
The ignition switch must be in position 1 to unlock the charging harness connection.

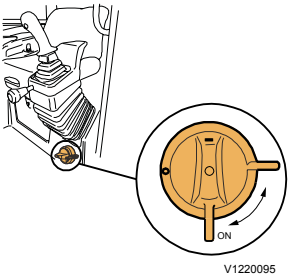
NOTE!
If the charging is interrupted with the ignition switch in position 0 (e.g. by opening the rear hood or pressing the charging switch during charge) the machine will shut down with the charging harness connection still locked. Setting the ignition switch to 1 will allow unlocking and operation of the machine.

8 Put the lid back over the charging socket .

Fast charging (DC) of the traction batteries

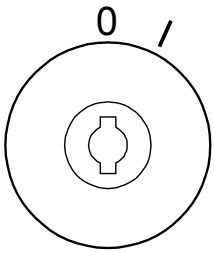
NOTE!
The distance between the machine and the off-board charger should be three meters where possible.

NOTE!
Read the manual for the off board charger before charging the traction batteries.



Battery disconnect switch

1 Turn the battery disconnect switch to position ON (I) .



Ignition switch

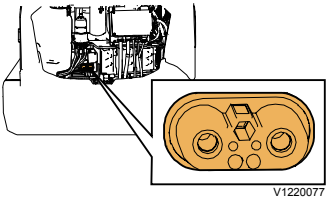
2 The ignition switch can be in position 0 or position 1.

NOTE!
If the ignition switch is in position 1 the electric motor must first be stopped and the control lockout lever must be raised before charging.

3 Connect the plug of the off board fast charger cable harness to the power source.

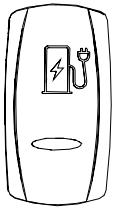
NOTE!
It is recommended to always use a Volvo-approved off board charger.

4 Open the rear hood.
5 Remove the lid from the charging socket.
6 Plug the fast charger cable harness into the charging socket of the machine.
7 Close the rear hood.



Charging socket

NOTE!
Make sure that the rear hood is closed during charging. If the rear hood is open it will not be possible to charge the battery.


V1220117

Charging switch

8 **If the ignition switch is in position 1:**
Press the charging switch on the right hand side panel in the cab when the display shows the battery charge screen to start charging.
If the ignition switch is in position 0::
Press the charging switch on the right hand side panel in the cab to initiate the charging process. This will turn on the display and start the charging.

9 The display will show the state of charge (SoC) and the time remaining until fully charged.
The ignition switch can now be set to position 0 if needed.

NOTE!
When leaving the machine unattended while charging, it is advised to set the ignition switch to position 0.

10 To interrupt the charging, make sure that the ignition switch is in position 1 and press the charging switch again or press the stop button on the off-board charger.
This will interrupt the charging within a few seconds.
When the charging harness is removed the charging information on the display will be replaced by the home screen.

NOTE!
Never disconnect the off-board charging harness before stopping the charging first (either from the machine or from the off board charger control panel).

NOTE!
If the charging is interrupted while the ignition switch in still in position 0, (e.g. by opening the rear hood or pressing the charging switch during charge) the machine will shut down.

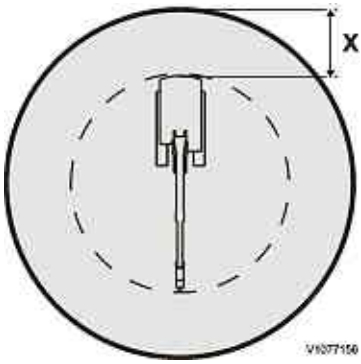
11 Put the lid back and close the rear hood.

Operator obligations

WARNING

Risk of fatal accidents.
Unauthorised persons within the work area around the machine could lead to serious crushing injury.
• Clear all unauthorised personnel from the working area.
• Keep a lookout in all directions.
• Do not touch control levers or switches during start.
• Sound the horn before beginning operation.

- The operator should operate the machine in such a way that the risk of accidents is minimized for both operator and persons present at the work site.
- The operator must be thoroughly familiar with how to operate and maintain the machine and should undergo adequate training on the machine.
- The operator must follow the Operator's Manual rules and recommendations, but also pay attention to any statutory and national regulations or specific requirements or risks which apply at the work site.
- The operator must be thoroughly rested and must never operate the machine when under the influence of alcohol, medicine or other drugs.
- The operator is responsible for any load while working with the machine.
  - There must be no risk of the load falling off while operating.
  - Refuse to take a load which is an obvious safety risk.
  - Respect the stated maximum load for the machine. Pay attention to the effect of different distances to the centre of gravity and the influence of different attachments.



- The operator must be in control of the working area of the machine.
  - Prevent persons from walking or standing under raised excavating equipment, unless it has been made safe or supported.
  - Prevent persons from entering or remaining in the danger area, that is a distance of at least 7 m (23 ft) in all directions from operating machines. The operator may allow a person to remain in the danger area, but should then observe caution and operate the machine only when the person is visible or has given clear indications of where he or she is.
  - Prevent persons from being in the cab of a vehicle which is placed so that there is a risk that the cab may be hit by other machines or falling objects, for example stones or logs. This does not apply if the cab is sufficiently strong or protected to withstand the impact of such external forces.
  - Make sure you know the weight limitation of working ground.

Only the operator, seated in the operator's seat, may be in the cab when operating. All other personnel must keep at a safe distance from the machine.

⚠ WARNING

Risk of fatal accidents.
Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.
Never use attachments for lifting or transporting persons.

Accidents

- Accidents and also incidents should be reported to the site management immediately.
- If possible leave the machine in position.
- Only take necessary action so as to reduce the effect of damage, especially personal injuries. Avoid action which may make an investigation more difficult.
- Wait for further instructions from the site management.

Operator safety

WARNING

Risk of fatal accidents.
Unauthorised persons within the work area around the machine could lead to serious crushing injury.
• Clear all unauthorised personnel from the working area.
• Keep a lookout in all directions.
• Do not touch control levers or switches during start.
• Sound the horn before beginning operation.

- Never leave the working station to egress even partially from the cabin or canopy by the front or side during operation. The left armrest shall always be in upright position before unfasten the seat belt and moving within the operator station. It is recommended to always bring the equipment to ground and stop the electric motor before entering or leaving the machine for short term job purposes.
- Check that the seat belt is not worn, see page *65*.
- The machine must be operational, i.e. faults which can cause accidents must be rectified.
- Suitable clothing for safe handling and a hard hat should be worn.
- Keep your hands away from areas where there is a risk of crushing, e.g. covers, door and window.
- Use steps and handholds when entering or leaving the machine. Use the three-point grip, i.e. two hands and one foot or two feet and one hand. Always face the machine – do not jump!
- Check that the attachment is properly attached and locked.
- The vibration (shaking) which arises when operating may be harmful to the operator. Reduce this by:
  - adjusting the seat and tightening the seat belt.
  - picking the smoothest operating surface for the machine (levelling the surface when necessary).
  - adapting your speed.

- The cab is designed to meet the requirements for falling objects, the weight of which agrees with testing methods according to ROPS-standard (Roll Over Protective Structure), OPGstandard (Operator Protective Structure) and TOPS (Tip-Over Protective Structure), see page *13*.
- During electrical storms, do not enter or exit the machine.
  - If you are off the machine, stay well away from the machine until the electrical storm passes.
  - If you are in the cab, remain seated with the machine stationary until the electrical storm passes. Do not touch controls or anything metal.
- Always wear approved respirator for the materials being used.
- When travelling on, for example, very rough and uneven ground, the operator may be thrown about and contact with the windshield is possible. Reduce this potential hazard by travelling at low speed and be extra careful under these conditions. Also wear a hard hat.

Stability when working

The stability of the machine is subjected to considerable changes. The operator himself must observe all special regulations applicable to every operation in order to obtain full working safety.

NOTICE

Risk of machine damage!
Improper use could cause serious machine damage.
Never anchor or fix the undercarriage to the ground or any object when digging or lifting.

NOTE!
A pre requisite for good stability is that the machine is parked on level ground of sufficient load bearing capacity. Care should be taken if the ground is soft and uneven, sloped, in danger of collapsing, side stress and other dangerous situations.

Operating on public roads

- Road signs, traffic restricting arrangements and other safety devices, which may be required

when considering traffic speed and intensity or other local conditions, must be used.

- When moving the machine with a suspended load, special attention must be observed. When required, request the help of a signal man.
- Use lights, hazard flashers and rotating warning beacon according to national traffic regulations.

Periodic replacement of critical parts for safety

To ensure safety at all times when operating or driving the machine, periodic maintenance must always be carried out. To further improve safety, it is also recommended that periodic check or replacement of the parts given in the table below, is carried out.
These parts are closely connected to safety and fire prevention. The material changes as time passes, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. It is necessary to ensure that they always maintain their function completely.
However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately. If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses. When replacing the hoses, always replace the O-rings, gaskets, and other related parts at the same time. The replacements should be carried out by trained personnel at a workshop.

Inspection interval	Item
Daily	Hydraulic hose - leakage of connections and end fittings
Monthly	Hydraulic hose - leakage, damage of connections and end fittings
Yearly	Hydraulic hose - leakage, damage, deformity and aging of connections and end fittings

Safety critical parts for periodic replacement		Recommended replacement interval
Cab / Canopy	Seat belt	Every 3 years

Measures before operating


V1065709

For safety, observe the following rules.

1 Read the Operator's manual.

2 Carry out daily service, see page *162*.

3 Clean / scrape ice off the windows.

4 Check the level of hydraulic fluid, refill if required.

5 Check that there are no faulty, loose parts or leaks, which can cause damage.

6 Check that the battery disconnect switch is switched on.

7 Check for cracks on frame and tracks.

8 Check that hoods and covers are closed.

9 Make sure fire extinguisher if equipped is fully charged.

10 Inspect steps and handholds for damage or loose parts. Make necessary repairs if needed.

11 Check that there are no persons in the vicinity of the machine.

12 Adjust the operator seat and fasten the seat belt.

13 Adjust and clean the mirrors.

14 Inspect working and other lights for proper operation.

15 Travel alarm should be on before operating the machine.

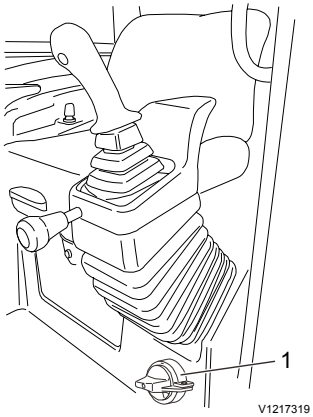
16 Inspect the failure of gauges in the instrument panels.

17 Check the function of the attachment quick coupler (optional equipment).

Starting machine

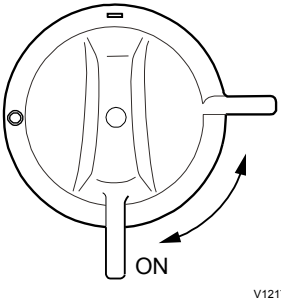
Starting the Electric System

NOTE!
Electricity should always be switched off when the machine is not in use and parked. The battery disconnect switch is located on the lower right hand side at the entrance of the cab.



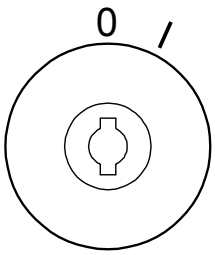
1 Battery disconnect switch

NOTE!
The ignition key switch shall always be used to shut down the systems before applying the battery disconnect switch.



Battery disconnect switch

1 Turn the battery disconnect switch (1) to position ON (I) .

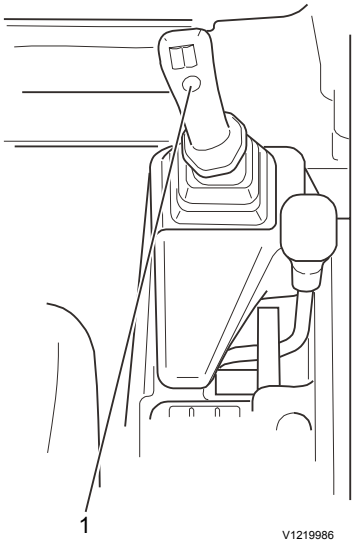


Ignition switch

2 Turn the key in the ignition switch to operating position (I).
→ The display turns on.

NOTE!
If the display doesn't turn on, check the service battery. See *177*.

3 Wait until the display shows that you can start the motor.



1 Start button

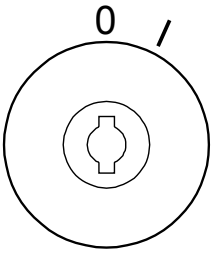
4 Press the button on the lever to start the motor.

Stopping

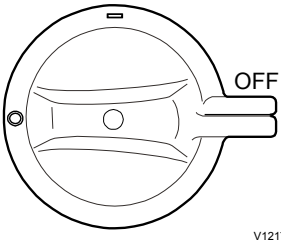
WARNING

Risk of crushing.
A raised attachment could fall and cause crushing injury.
Before leaving the cab, always lower all attachments to the ground and lock the control functions.

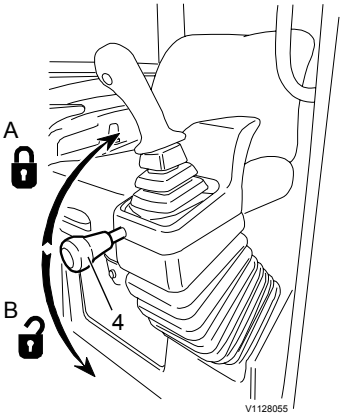
NOTE!
Do not turn off the battery disconnect switch when the electric motor is running. The electrical system may be damaged.



Ignition switch



Battery disconnect switch

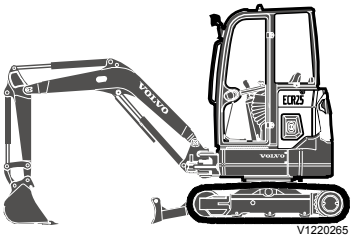


1 Reduce machine speed.
2 Brake the machine to a stop.
3 If possible park the machine on solid and level ground and lower the attachment and dozer blade to the ground.
4 Make sure that the cab is parallel to tracks, that allows best possible leaving situation.
5 Turn the ignition key to the off position (0). The control levers for working and travel hydraulics are locked (no movement possible).
6 All control lamps go out.
7 Check whether all switches and controls are switched off or deactivated.
8 Remove the ignition key to prevent unauthorised use of machine.
9 If the machine is to be parked: interrupt the electric supply with the battery disconnect switch.

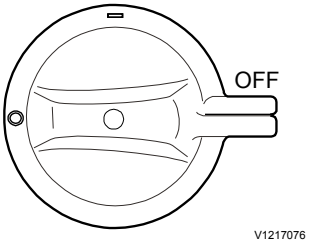
NOTE!
If you want to stop all movements of the machine quickly, without turning the ignition key, shift the control lockout lever to position (A).

NOTE!
Applying the armrest in upright position is an emergency mean to interlock all machine movements.

Parking



Parking position



Battery disconnect switch

WARNING

Risk of crushing.
A raised attachment could fall and cause crushing injury.
Before leaving the cab, always lower all attachments to the ground and lock the control functions.

1 Park the machine on firm, flat ground.

2 Park the machine in the parking position as shown on the picture: open the bucket and lower it to the ground and lower the dozer blade to the ground. If this is not possible, use the bucket and dozer blade to secure the machine to a fixed object.

3 Check that all switches and controls are in off position or in neutral.

4 Pull out the ignition key.

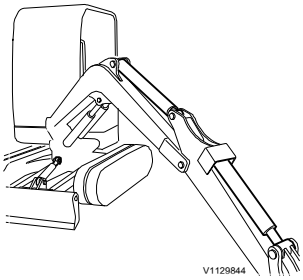
5 Close and lock windows, door and covers.

6 Disconnect the battery by turning the battery disconnect switch to position OFF.
If the machine is to be parked for more than one day it is recommended that the traction batteries are charged to between 50 and 70 percent.

Keep in mind that the theft and burglary risk can be minimised by:

- removing the ignition key when the machine is left unattended
- locking doors and covers after working hours
- turning off the current with the battery disconnect switch, locking the switch with a padlock, and locking the rear hood
- parking the machine where the risk of theft, burglary and damage is minimised
- removing all valuables from the cab such as cellular phone, computer, radio and bags
- chaining the machine.

By etching in the PIN-number or the national licence plate number of the machine on its windows, it is easier to identify stolen machines.



Long-term parking position

Long-term parking

NOTE!
If the machine is not going to be used for a longer period, all cylinder rods must be protected against corrosion.

1 Carry out the measures as described on previous page. Remember that the ground on which the machine is to stand may shift depending on the weather. Therefore take suitable action.

2 The temperature must not fall below -20 °C (-4 °F) or exceed +45 °C (113 °F).

3 Check that the service battery is fully charged. The traction batteries should be charged to between 50 and 70 percent.
Check the batteries state of charge regularly. The traction batteries should not be allowed to have 0% charge for more than 20 days.
The traction batteries should not be stored for more than 250 days.

4 Wash the machine and touch up any damaged paint finish to avoid rusting.

5 Rust-proof exposed components, lubricate the machine thoroughly and grease all unpainted surfaces like cylinder rods etc.

6 Fill the hydraulic oil tank to the max. marks.

NOTE!
A machine parked in locations showing environmental temperatures outside the limits above may not operate on demand. Ensure the machine temperature be brought back within limits enough time before attempting to restart.

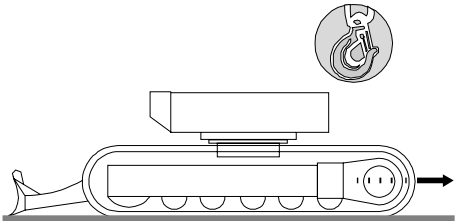
Check after long-term parking

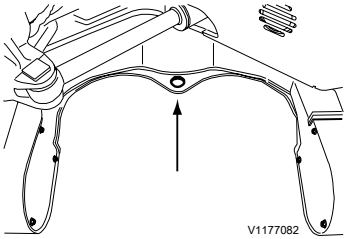
- Hydraulic oil level
- Track tension

NOTE!
If a preservative has been used on the machine to prepare it for long term storage, follow the manufacturer’s instructions for any necessary safety precautions and the method of removal.

Retrieving and towing

Towing





The towing eye is located on the lower frame

In case the machine needs to be retrieved, either for safety reasons, or under certain operational conditions, the machine can be towed by using the towing eye located on the lower frame. Before towing ensure that the towing linkage is properly connected, adequate for the purposes.

NOTE!
Use a steel chain of suitable strength to tow the machine. The machine should be towed at low speed and keep the towing distance as short as possible (the crawler tracks do not move).

The angle for pulling should not exceed 20° from the horizontal line of tow lope and longitudinal axis of the machine. Be careful there should not be also interference with parts of the machine.

Towing force: 2350 daN MAX

Attachments, alternative lowering

WARNING

Risk of crushing.
Incorrect function of the line rupture valves may cause uncontrolled lowering of the attachment.
Do not enter under the attachment when working with the alternative lowering function.

WARNING

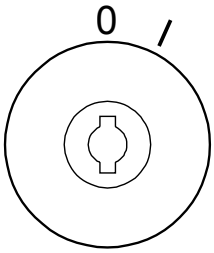
Risk of crushing.
A raised lift arm can drop down. This can result in serious injuries. Lower the lift arm to the ground before performing any service or adjustment.

Even in technical incidents the attachment can be lowered to the ground.

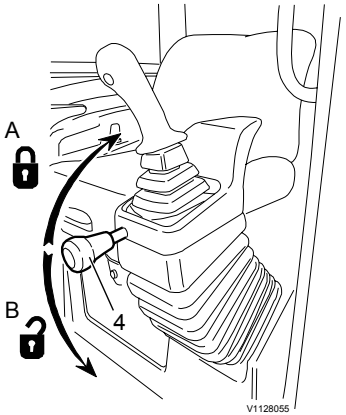
Lowering attachment using accumulator pressure

In case of standstill.
If the electric power circuit is available and the accumulator is pressurised, it is possible to lower the attachment with the control levers.

1 Insert the ignition key into the ignition switch and turn it to operating position (I).



Ignition switch



2 Shift control lockout lever (4) to position (B). The control levers for working and travel hydraulics are unlocked (movement possible).

3 The control levers (1) and (6) (see page *53*) can be used to lower the attachment.

NOTE!
If lowering of the attachment is not possible because the accumulator is depressurized, restart the electric motor to pressurize the accumulator.

Relieving residual pressure from the accumulator

1 Turn the ignition key to operating position (I).

2 Move the control lockout lever down to unlock the system.

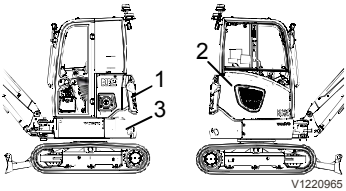
3 Shift the rollers on the joysticks to the right and to the left.

4 Then move the joysticks in all directions a couple of times to release all residual pressure.

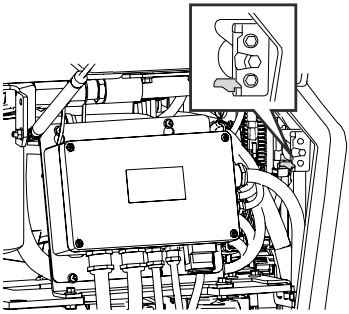
Lowering attachment in case of problems with the electric circuit

In case of standstill or motor defect and power failure.

1 Open the rear hood (1) and the side hatch (2).



■ To open the side hatch, release the latch.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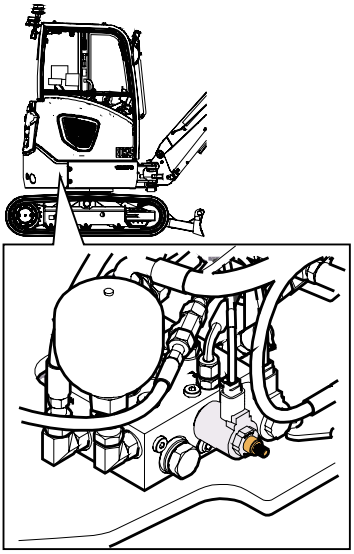
Latch for side hatch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2 Loosen screw (C) (end of the pin) on the left solenoid valve.
3 Use the control levers to lower the attachment.
4 Re-tighten the screw (C).
5 Close the side hatch and the rear hood.

NOTE!
If you do not re-tighten the screw, the function of the control lockout lever will not work.

NOTE!
Before lifting the control lockout lever to position A, lower the attachment to the ground.

Transporting machine

Measurements before transporting machine

NOTICE

The person in charge of the transport must see to that loading, positioning, lashing and transporting the machine on a trailer or other vehicle is done according to applicable laws and regulations for the country or state in question. For further information, contact your dealer.

Weight and dimension

Weight and dimension are very useful to estimate the method how the machine is supposed to be transported. To comply with the laws and regulations in certain region, use the specifications of total weight and dimension. See page *201* and *203*.

Tying down machine

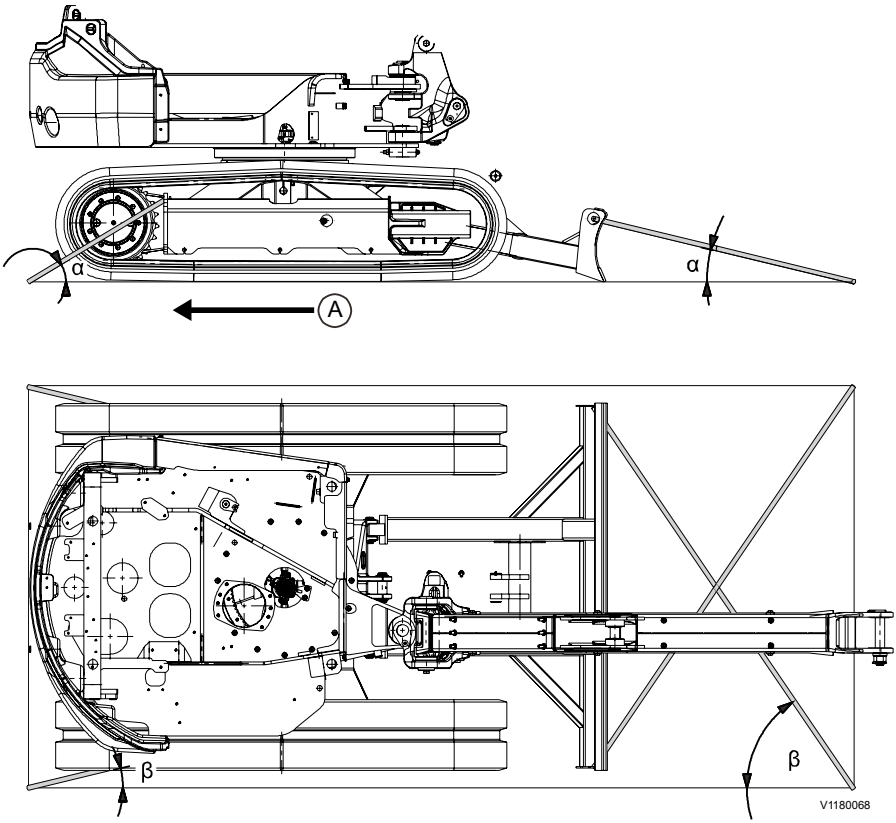
Cross tie down procedure

Move the machine onto an appropriate truck or trailer. See *99*, or *100*.

1 Fix the chains and belts to the tie down points of machine and truck/trailer as shown in illustrations.
2 Tight the chains and belts in a loose way first.
3 Then tight the chains and belts solidly one after the other obliquely opposite.

NOTE!
During transportation the fixture has to be re-checked and probably tight again.

Tying down on small trailer (3.5 t)

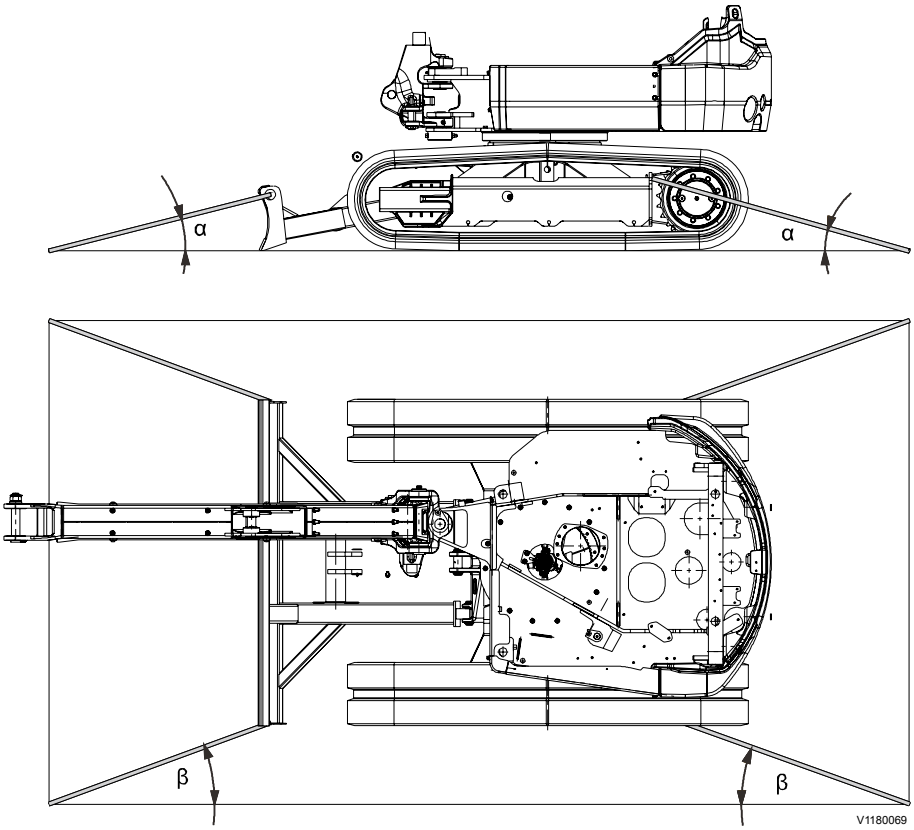


Tying down on trailer

A: Driving direction of trailer

Tying-down on small trailer (3.5t)			
		steel tracks	rubber tracks
Tie-down angles	α	0°–70°	5°–90°
	β	0°–45°	20°–70°
Anti-slide mat		mandatory (μ= 0.6)	optional
Mechanical stops (blocks and chocks)		optional	mandatory
Tie-down forces	Refer to max. tie-down forces of fixing points of trailer.		

Tying down on truck



Tying down on truck

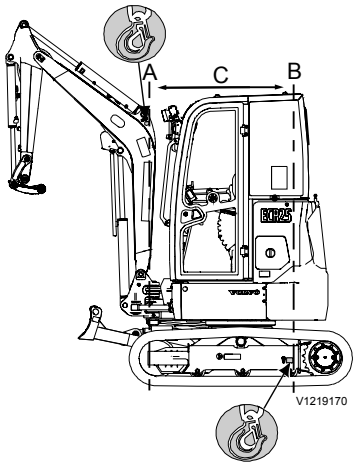
Tying-down on truck			
		steel tracks	rubber tracks
Tie-down angles	α	0°–80°	10°–90°
	β	15°–75°	5°–85°
Mechanical stops (blocks and chocks)		mandatory	
Tie-down forces		Refer to max. tie-down forces of fixing points of truck.	

Lifting machine

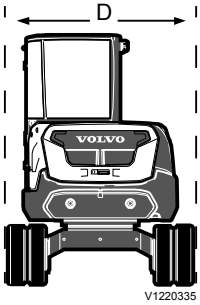
WARNING

Risk of personal injury.
Faulty or improper lifting equipment could cause the machine to break away from the lifting vehicle, causing accidents, serious injury or death.
Use certified cables, lifting straps, slings, shackles and hooks with adequate load capacity and never lift the machine with a person in or on the machine.

NOTE!
Incorrect or faulty equipment or improper towing methods may cause accidents. Therefore, carefully follow the instructions given below.



The distance (C) between axis (A) and (B) at the lifting points on the boom/ undercarriage and distance (D) must be observed when lifting.
C. 1295 mm (50.98 in)



D. 1550 mm (61.02 in)

1 Park the machine on flat, even and level ground.
2 Position dipper arm, boom and blade as shown in the illustration.
3 Move the control lockout lever up to lock the system securely.
4 Stop the machine, check the safety around the machine.
5 Close and lock the windshield, cab door and rear hood securely.
6 As shown in the illustration for lifting, connect lifting cables or slings with sufficient strength of bar for the machine weight at the lifting points correctly. For machine weight, see *201*.

   NOTE!
   Use suitable lifting equipment to lift the machine. Make sure that the lifting chains are strong enough for the weight of the machine.
7 After installation of all hoisting equipment, lift the machine a little to check its balance, if satisfactory, lift it slowly and evenly.
8 Maintain good visibility of the machine at all times during the lift. And continuously check that the machine is level.

NOTICE

The lifting equipment attached to the lower frame must be vertical when lifting to prevent any damage to the machine.

Loading machine on truck or trailer

WARNING

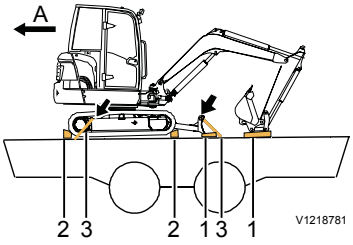
Risk of fatal accidents.
Unexpected driving direction could lead to accidents resulting in serious injury or death.
Always check the driving direction before moving the machine.

NOTE!
Make sure that loading ramps and platforms are free from oil, mud, ice and similar so that the machine does not begin to slip.

If the machine is too high to fit in the transporting vehicle it is possible to tilt the rotating warning

beacon (optional equipment). This will reduce the total height of the machine.

NOTE!
Use anti-slide mat for *steel* tracks. No blocks or wheel chocks need to be used then.



Loading on to small trailer

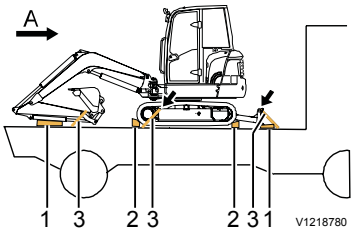
A Driving direction of trailer

1 Wooden block
2 Wheel chock
3 Chains or belts

1 Drive the machine onto the truck or small trailer (3.5 t).
On a trailer, the dozer blade must be facing the back of the trailer.

NOTE!
To avoid tilting, the boom must be in direction towards the ramp.

NOTE!
Never operate any lever other than the travel levers (pedals) while the machine is on the loading ramp.



Loading on truck

A Driving direction of truck

1 Wooden block
2 Wheel chock
3 Chains or belts

2 Align the machine's tracks to the ramp.

3 Park the machine on the truck or trailer.

4 According on situation (tie-down points etc.) you can rotate the swinging superstructure by 180°. On a small trailer the direction as shown is mandatory.

5 Put a suitable wooden block under the attachment and the dozer blade.

NOTE!
When machine shall be loaded on a small trailer and is equipped with steel tracks, an anti-slide mat with the indicated friction coefficient has to be used. No wooden blocks or wheel chocks need to be used then.

6 Place the attachment and the dozer blade on the wooden blocks.

7 Stop the machine and remove the ignition key.

8 Switch off the battery disconnect switch.

9 Lock the cab door and all lockable covers.

10 Secure both tracks with wheel chocks.

11 Tie down the machine with chains and belts, see *96*.

Unloading machine

1 Remove the chains, belts and wheel chocks.

2 Raise excavating equipment and dozer blade.

3 Remove the wooden blocks below the attachment and the dozer blade.

4 Slowly drive to the beginning of the ramp, lift the excavating equipment position and drive forwards until the machine tips on to the ramp.

5 Drive down slowly until the machine reaches level ground.

Operating techniques

The excavator is a multi-task machine capable of being fitted with multitude special attachments to perform many types of work. This chapter contains information and instructions regarding the best operating practices to improve efficiency, including examples on how the most common attachments are used. It is important that the correct technique is used to obtain safe and efficient use of the machine.

Eco driving

Operating in an environmental friendly way will prolong traction battery life and can also lower wear on the machine.

Always try to:

- **Use the ECO mode if possible**
  Use the ECO mode in your machine to reduce rpm's in order to stay in the most economical area.
- **Use the electric motor auto shut down function if possible**
  Use the electric motor auto shut down function in your machine.
  Do not idle unnecessarily, a machine turned off does not consume the traction battery.
- **Plan your work site**
  Take stock of your work area and plan its layout with regard to the machines that will work there. Your work will be much more productive and organized. Keep the ground even and free from larger stones or other objects that form obstacles.
- **Cooperate**
  Consult with other operators so that machines and trucks work together in the most effective way.
- **Use the right equipment**
  The right equipped machine saves on maintenance and reduces the need to charge the traction battery. See the operating techniques chapter for further information about equipment.

Contact your local Volvo Construction Equipment dealer for further information and the possibility to attend a Volvo training for efficient machine operating.

Whole-body vibrations

Whole-body vibration emission on construction machinery are affected by a number of factors, such as working mode, ground conditions, speed, and so on.

To a large extent the operator can influence the actual vibration levels, because the operator controls the speed of the machine, its working mode, the travel path, and so on.

Therefore, the result can be a range of different vibration levels for the same type of machine. For cab specifications, see page *197*.

Guidelines for reducing vibration levels on earthmoving machines

- Use the proper type and size of machine, with optional equipment and attachments for the application.
- Keep the terrain and haul roads in good condition.
  - Remove any large rocks or obstacles.
  - Fill any ditches and holes.
  - Provide equipment and schedule time to maintain terrain conditions.
- Adjust the speed and travel path to minimize the vibration level.
  - Drive around obstacles and rough terrain conditions.
  - Reduce the speed when it is necessary to go over rough terrain.
- Maintain machines according to the manufacturer's recommendations.
  - Track tension.
  - Brake and steering systems.
  - Controls, hydraulic system and linkages.
- Keep the seat maintained and adjusted.
  - Adjust the seat and its suspension according to the weight and size of the operator.
  - Inspect and maintain the seat suspension and adjustment mechanisms.
  - Use the seat belt and adjust it correctly.
- Steer, brake, accelerate, shift gears, and move the attachments smoothly.
- Minimize vibrations for long work cycle or long distance travelling.
  - Use suspension systems if available.
  - If no suspension system is available, reduce speed to prevent bouncing.

- Transport machines when there are long distances between worksites.

Back pain associated with whole-body vibrations may be caused by other risk factors.

The following guidelines can be effective to minimize risks of back pains:
- Adjust the seat and controls to achieve good posture.
- Adjust the mirrors to minimize twisted posture.
- Provide breaks to reduce long periods of sitting.
- Avoid jumping down from the machine.
- Minimize repeated handling and lifting of loads.
- Maintain reasonable weight and physical condition.

Rules for digging

WARNING

Risk of serious injury.
More than one person in the cab while operating could cause accidents and serious injury.
Only the operator, seated in the operator's seat, may be in the cab when operating. All other persons must keep at a safe distance from the machine.

First read the safety rules, see page *81*.

- Always prepare work by carefully studying drawings and regulations that apply to the site. Also study the ground conditions and what the risk areas on the site look like. Turn off gas, electricity and water supplies, if this is necessary. Mark the position of cables and pipes.
- Fence off the area around the machine, if there is a risk that people may get too close.
- Look after your workmates! Make sure that they take care. No persons, apart from the operator, may, unnecessarily, be present within the working area of the machine. Teach them to be on their guard against collapsing banks and rolling stones and to be prepared to dash for safety. Changes in stress in a bank immediately prior to a landslip are indicated by small streams of loose material just where the cracks are forming.
- If the machine is provided with optional equipment, which is operated with the control levers, the operator must assure him or her self of that the anticipated movements are obtained when actuating control levers. An unexpected movement may entail risk of an accident.

NOTICE

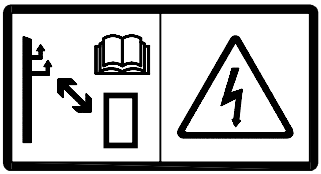
With certain attachment combinations there is a risk that the attachment may strike the cab. Avoid damage by being careful when working close to the machine.

- Never swing the bucket or load above people.

Working within dangerous areas

- Observe great care at marked danger areas.
- Do not operate too close to the edge of a quay, ramp, ditch and so on.
- Move slowly when working in confined spaces and check that there is sufficient room for machine and load.
- When working under ground, special equipment, for example fire extinguisher is required within the EU and in EES countries. Talk to your dealer.
- When working in low light conditions, for example buildings and tunnels, use head light.
- Do not operate the machine when visibility is poor such as a heavy fog, snow or rain.
- When working in an area which is contaminated or dangerous to one's health, the machine must be especially equipped for this purpose. Talk to your dealer. Check also local regulations before entering the area.

High voltage overhead power line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DANGER

Risk of electrocution
Working near or making contact with overhead power lines may lead to electrical flashover and electrocution.
Always keep the minimum clearance from overhead power lines.

High voltage is lethal and the current sufficiently strong to destroy both machine and attachments. Your life is in danger if you come into contact with or close to high voltage power lines. Always contact the power company responsible before beginning any work near high voltage power lines. Go through the special instructions issued by the power company for work/presence near the power lines.

Regard all power lines as if they were live even if they are supposed to be without current. Working when the machine or its load at any time is closer than the minimum safety distance to a power line, is taking a very serious risk.

- Remember that the voltage of the power line determines the safety distance. Electrical flash-over may occur and damage machine and

operator at fairly great distances from the power line.

Voltage	Minimum distance to power line
0 ~ 50 kV	3 m (10 ft)
50 ~ 69 kV	4.6 m (15 ft)
69 ~ 138 kV	5 m (16.4 ft)
138 ~ 250 kV	6 m (20 ft)
250 ~ 500 kV	8 m (26 ft)
500 ~ 550 kV	11 m (35 ft)
550 ~ 750 kV	13 m (43 ft)
750 kV~	14 m (46 ft)

NOTICE

The operator should have secure visibility when working around the power lines.

NOTICE

When transporting the machine also take overhead power lines into consideration.

NOTICE

Remember that the roof window may distort how distance is perceived.

- Keep the following in mind to ensure safety when operating.
  - Operate the machine slower than normal operation in the vicinity of power lines.
  - Consider the long-span power line, which can sway and reduce the clearance.
  - Pay attention when travelling over uneven ground that could cause the machine to lose balance.
  - Keep all persons away from the machine whenever it is close to power lines.
  - Prohibit persons from touching the machine or its load before it is confirmed to be safe.
- Find out what action to take if a person has been exposed to an electric shock.
- Procedure if a machine touches the power line.
  - The operator should stay inside the cab.

- All other persons should keep away from the machine, ropes, and load.
- The operator should try to remove the machine from contact by moving it in the reverse direction from that which caused the contact.
- If the machine cannot be moved away from contact, the operator should remain inside cab until the lines have been de-energized.

Overhead railway power lines

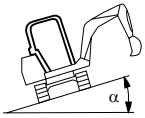
Loading and unloading is only permissible between the boundary signs. The signs may be mounted directly on the power line or on special posts.

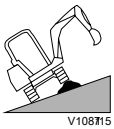
- Contact authorised railway personnel to obtain permission to load or unload.
- After any breaks in the work, always contact the railway personnel again.

Underground cables and pipes

Make sure that authorities or companies responsible for cables and pipes have been contacted and that their instructions are followed. Also check which rules apply to ground personnel regarding exposing cables and pipes. Normally only the service companies' own personnel may expose and arrange provisional suspension of cables. Make use of a signal man when you cannot see the actual point where you are working or when the position of the pipe or cable is critical, see page *141*. The position of the pipe or cable may deviate from the drawing or distances may be incorrectly determined. Regard all electrical cables as live.

Working on slopes





WARNING

Risk of tipping over.
When working on uneven slopes and ground the machine can tip over.
Make sure the maximum machine inclination is not exceeded and that the inclination angle is not increased by an obstacle.

In any machine position the maximum machine inclination should not be more than[a]	Manageable gradients[b] (hydraulic tank)	Manageable gradients[c] (hydraulic tank)
α = 16.5° (30 %)	α = 20° (36 %)	α = 30° (58 %)

a) (α= 50% of tipping limit)

b) manageable gradient continually

c) manageable gradient for maximum 10 minutes

Caution on slopes

- Be careful when opening or closing the doors on a slope, operational force may be changed rapidly. Make sure to keep the doors closed.
- Do not descend backward on a slope.
- Operate the travel function slowly when approaching or descending a slope.
- Do not change direction or travel a cross on a slope. Change direction on level ground, if necessary first come down to level ground and make a detour.
- If the machine slides, immediately lower the bucket to the ground. The machine can turn over due to unbalance. Especially, do not swing with loaded bucket. In unavoidable case, pile up earth on the slope, and then make the machine level and stable.
- While travelling on a slope, keep the angle between boom and arm at 90 - 110°, raise the bucket 20 - 30 cm (7.9–11.8 in) from the ground

- If the electric motor shuts down on a slope, lower the attachment to the ground. Do not operate the swing function since the superstructure may swing under its own weight and cause tipping or side slipping.
- Do not park the machine on a slope and leave it unattended.

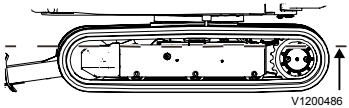
Working in water and on boggy ground

When wading with the machine across a water course, use the bucket as a "feeler" if the water is muddy. The water course may have hidden obstacles under the surface or the depth may change suddenly, endangering the operator and the machine. While wading, stop the machine now and then and swing the bucket sideways just above the bottom. This operation reveals stones or other obstacles. Prod the bottom with the bucket to measure the depth in order to discover any dangerous hollows.

- After working in water, the lubrication points on the undercarriage, which have been under water, must be lubricated, so that the water is driven out. Check also that no water has entered the travel gearbox.

NOTICE

Risk of machine damage.
When operating the machine in water, the water can damage the machine parts.
When operating in water, do not exceed the maximum permissible water depth.


V1200486

NOTE!
The water must not reach higher than the middle of the upper roller.
Proceed slowly when crossing a water bank, in order to avoid water waving above the crawler height.
Excessive water waving may reach and damage electric components within the upper structure.

Heavy timber mats can be used to support the machine when working on boggy ground. The mats should be kept as flat and clean as possible.

Working where there is risk of landslip

Always check ground conditions before beginning to work. If the ground is soft, great care must be taken when positioning the machine. Thawing of frozen ground, rain, traffic, piling and blasting are factors which increase the risk of landslip. The risk also increases on sloping ground. If it is not possible to dig with sufficiently slanting trench sides, they must be shored up.

- Do not place excavated material too close to the edge as its weight may cause a landslip. Loose clay should be placed at least 5 m (16 ft) away from the edge.
- Do not dig under the machine.
- Do not operate too close to the edge of a steep slope or road bank. Take care when working in a place where the machine may tip.
- Take care when working on river banks or in other similar places where the ground is soft. There is a risk that the machine, because of its own weight and own vibrations, may sink and this could lead to accidents.
- Keep in mind that the ground conditions may have changed after heavy rain. Therefore, be careful when restarting work. This is particularly important when working near the edge of ditches, road verges or similar, as the ground may easily give way after it has been raining.

Working in cold weather

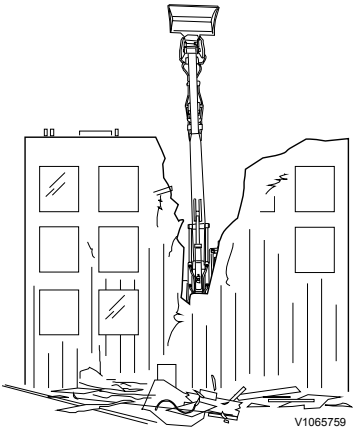
WARNING

Risk of frostbite.
Bare skin can freeze stuck to cold metal which could cause injury.
Use personal protective equipment when handling cold objects.

NOTE!
The hydraulic system could respond slowly at low temperatures.
Operate carefully until the hydraulic system has reached operating temperature.

Read the advice for starting, see page *87* .
Use appropriate fluids for the ambient working temperatures. (see recommended fluids in specification section.)
The windows must be free from ice and snow before putting the machine to work.

- Watch out for ice on the machine causing slippery conditions. Step only onto anti-slip surfaces.
- Use an ice scraper on a long handle or a ladder when removing ice from the windows.

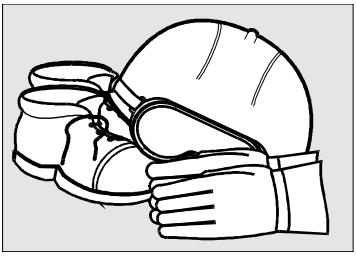

V1065759

Demolition work

Before the machine is used for demolition work, additional front and top protective guards needs to be installed. For further information contact a Volvo Construction Equipment dealer. Be extremely careful and study the work site thoroughly. Use fall protection over the cab against falling objects.

- Make sure that the material, on which the machine is standing, cannot collapse or slide.
- Operate the machine on firm level ground, if necessary prepare the area with another machine first.
- Do not work close to free-standing walls, which may fall over the machine.
- At all times be aware of where your workmates are. Do not work if anyone is dangerously close to the demolition object.
- Leave sufficient space in front of the machine for debris to fall to the ground and not hit the cab.
- Fence off the dangerous part of the work site.
- Spray water over the demolition site to prevent harmful dust from spreading.

Boots with steel reinforcements in the soles and toe caps, protective goggles and a hard hat are obvious protective items to be worn on a demolition site.


V1067189

If the machine is equipped with special demolition equipment, read the supplied instruction booklet about the safety risks that might occur and how the demolition equipment is used.

Attachments

WARNING

Risk of fatal accidents.
Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.
Never use attachments for lifting or transporting persons.

NOTE!
For hydraulically controlled attachments:
Release the hydraulic pressure in the system before removing or connecting hydraulic hoses for hydraulically controlled attachments. See page *126* for the procedure to release the hydraulic system pressure.

WARNING

Risk of high pressure injection.
Residual pressure in the hydraulic system could lead to oil under high pressure jetting out and cause serious injury, even if the electric motor has not been running for some time.
Always release the pressure before any kind of service of the hydraulic system is carried out.

NOTE!
Any persons involved in the process of changing attachments must be familiar with the operation of the machine and should know the signalling pattern.

Using the correct attachment for a particular job is a deciding factor when it comes to the capacity of the machine. The machine has either direct-mounted attachments or attachments mounted in a hydraulically controlled bracket which allows rapid changes of attachments.

Always follow Volvo Construction Equipment recommendations when choosing attachments. If other attachments are used, follow the operator's manuals from the respective supplier.

EU Machine Safety Directive is stated on the product plate of the machine by the way of a CE marking. Therefore, this marking also covers attachments which are designed and marked by

Volvo Construction Equipment, as they are an integrated part of the machine and adapted to the machine. Volvo Construction Equipment is not responsible for attachments manufactured by other companies. Such attachments must be CE marked and accompanied by a Declaration of Conformity and user instructions.

It is the responsibility of the machine owner to make sure that the attachments are approved for mounting on the machine. The machine owner is responsible for the safety of the combination machine – attachment.

For more detailed information regarding the choice of attachments, contact a Volvo Construction Equipment dealer.

The machine is prepared for various different attachments, e.g. hammer (hydraulic breaker). In order to be able to connect these hydraulically to the machine, the pressure in the hydraulics must be released by moving the control levers in all directions.

NOTE!
Depending on the attachments the stability of the machine may vary.

The certification of each attachment and separate Operator's manual should be provided to the customers by the manufacturer of the attachment.

Attachments, connecting and disconnecting

WARNING

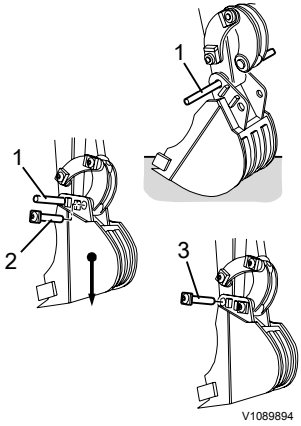
Risk of crushing.
Falling attachments could result in severe injury or death.
Make sure the attachment bracket is properly locked before starting work.

WARNING

Risk of crushing.
An unsecured attachment could fall and cause serious injury or death.
Always ensure the attachment is properly secured by pressing the front part of the attachment to the ground until the machine is slightly lifted.

WARNING

Risk of serious injury or death.
Worn or damaged machine parts can cause malfunction resulting in serious injury or death.
Check relevant machine parts regularly. If wear or damage occurs stop operating immediately and call for immediate corrective maintenance.



Installing a bucket with manual fastening

1 Position the excavating equipment to the bucket to be installed.

2 Align bores in dipper arm and bucket.

3 Insert a Ø 20 mm (0.787 in) assembly rod into the bore.

4 Raise the excavating equipment and operate the bucket cylinder until the bores in bucket and toggle link are in line.

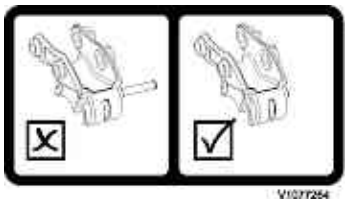
5 Insert locking bolt (2) and secure it with the split pin.

6 Remove assembly rod (1), insert locking bolt (3) and secure it with the split pin.

NOTE!
Disassembly of the bucket takes place in reverse order.

Attachment brackets

1 Front hook
2 Rotating hook
3 Locking pin
4 Linch pin



Working with extracted locking pin is hazardous and not allowed. Always make sure that the locking pin is securely fastened.

Volvo Attachment bracket

NOTE!
For other types of attachment brackets please refer to the separate attachment bracket Operator Manuals.

WARNING

Risk of crushing.
Raised equipment may drop if the hydraulic system fails or if the control is operated. Falling equipment may cause serious injury or death.
Always make sure that raised equipment is supported by a mechanical device before walking or working under it.

NOTICE

There is a risk of loss of stability and tip-over when the attachment bracket is in shovel position. The load is moved forward and may exceed the machine's lifting capacity.

NOTICE

The attachment bracket increases the total length of the dipper arm. Be careful when moving the bucket and dipper arm towards the machine, there is a risk of damaging the machine.

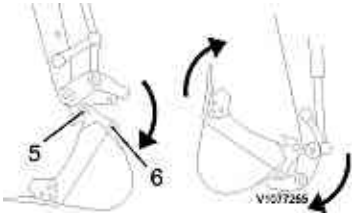
The attachment bracket is not designed as a lifting device. Do not use the front hook or the rotating hook for lifting. Only specially designed pin-on attachments may be hooked to the attachment bracket.

Mechanical attachment bracket, bucket installation

WARNING

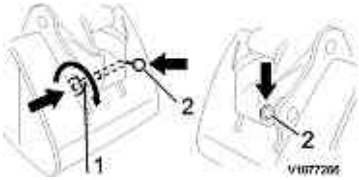
Risk of crushing.
An unsecured attachment could fall and cause serious injury or death.
Always ensure the attachment is properly secured by pressing the front part of the attachment to the ground until the machine is slightly lifted.

Connecting bucket



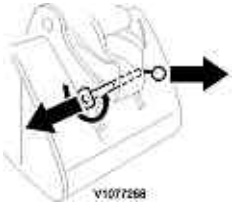
Lower the attachment bracket towards the rear bucket pin and tilt the bucket rearwards.

5 Front bucket pin
6 Rear bucket pin



Rotate the locking pin back 90°. Insert the locking pin. Insert the linch pin through the locking pin.

1 Locking pin
2 Linch pin



Extract the linch pin and the locking pin. Rotate the locking pin 90° to lock it in extracted position.

1 Remove the linch pin and extract the locking pin.
2 Rotate the locking pin 90° to lock it in extracted position.
3 Lower the dipper arm into a position where the attachment bracket connects with the front bucket pin.
4 Lower the attachment bracket towards the rear bucket pin. Tilt the bucket rearwards (bucket in) until the hook on the attachment bracket is in contact with the rear bucket pin.
5 Position the bucket 20 cm (8 in)above the ground.
6 Engage the bar in the bucket in the rotating hook and press it down to fully engage the rear bucket pin.
7 Lower the bucket to the ground.
8 Rotate the locking pin back 90°.
9 Insert the locking pin.
10 Insert the linch pin through the end of the locking pin.
11 Check that the bucket is securely fastened by simultaneously pressing the bucket to the ground and forward.

Disconnecting bucket

1 Lower the bucket to the ground.
2 Extract the linch pin and the locking pin.
3 Rotate the locking pin 90° to lock it in extracted position.
4 Position the bucket 10 cm (4 in) above the ground.

To release the attachment bracket, insert the release bar and pull.

5 Insert the release bar into the hole at the back of the attachment bracket.

Release the attachment bracket from the bucket.

6 Pull the release bar to release the attachment bracket from the rear bucket pin.

WARNING

Risk of crushing.
The bucket is only attached in the front bucket pin. The bucket could fall and cause crushing injury.
Keep a safe distance.

7 Place the bucket on the ground.

8 Lift the attachment bracket in direction from the bucket to release the front bucket pin.

Hydraulic attachment bracket

Attachment quick coupler

Disconnecting & connecting a bucket

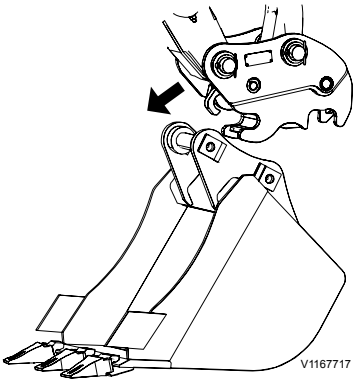
WARNING

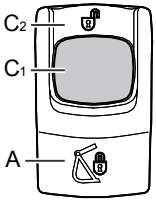
Risk of crushing!
Attachments that move unexpectedly can cause injuries.
Make sure people stay out of the working area when connecting or disconnecting attachments.

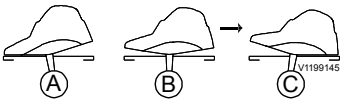
1 Place the machine on firm and level ground.

2 Lower the dozer blade and the boom to the ground.

3 Curl in the bucket completely towards the dipper arm (to release the locking mechanism).







Attachment Quick Coupler Switch, Positions

4 **To start** the process of opening the Attachment Quick Coupler:
Press down the lower end of the switch (A) and release.
→ The switch moves back to position *Neutral* (B).
Now and during the whole process:
→ The symbol of lower end of switch (A) illuminates.

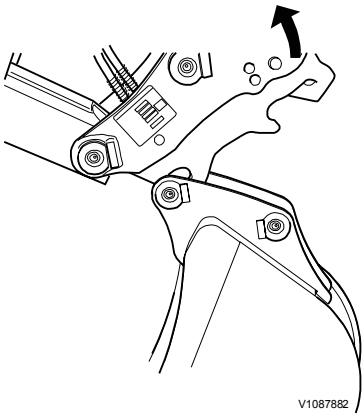
→ a beep sound arises.

NOTE!
If undesired action, the process can be cancelled at this point by pressing the lower end of the switch (A) again.

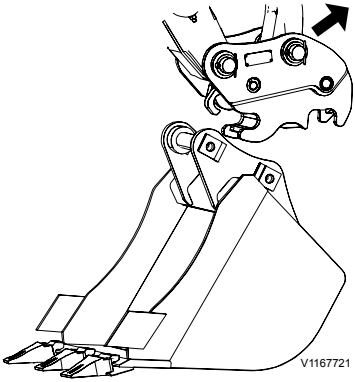
NOTE!
The following screen shots apply as a result when the operator has completed the required action.

5 **To open** the Attachment Quick Coupler:
Unlock and press down the red button (C1) and the upper end of the switch (C2):
→ The Attachment Quick Coupler opens and the switch remains in position C.

6 Lower the bucket and curl out to lift up the attachment quick coupler from the bucket.



Attachment quick coupler, hook off

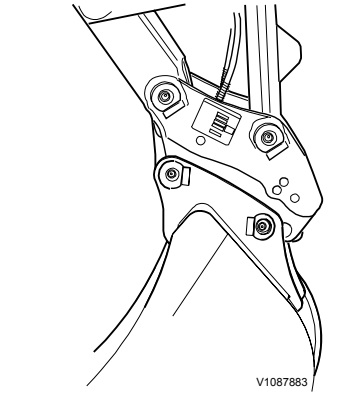


7 Place the bucket flat on the ground and unhook it.

To connect another bucket: Go on with item 11.

To finish without connecting: Finish following items 8, 9 & 10.

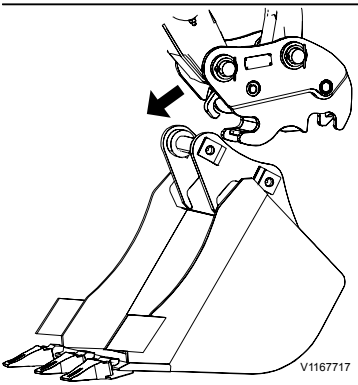
8 **To close** the Attachment Quick Coupler, return the switch to position *Neutral* (B).



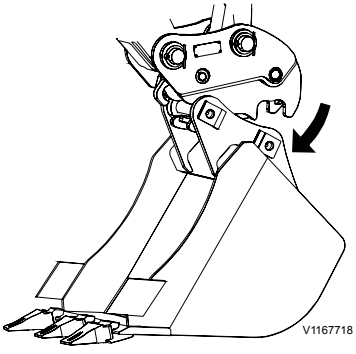
Bucket in locked position

9 Press the bucket against the ground. In this position, curl the bucket in and out to check that it is locked in the correct position. If not properly engaged and firmly locked in working position, press the switch back to position C to re-open the attachment quick coupler.

10 **To confirm** the correct lock and to finish the process:
Press down the lower end of the switch (A) and release.
→ A locking status information applies for a few seconds. The process is finished, when the illuminations and the beep end.



11 Curl out the attachment quick coupler and hook it onto the bucket pin.



12 Slowly curl in the attachment quick coupler fully towards the bucket.

13 **To close** the Attachment Quick Coupler, return the switch to position *Neutral* (B).

NOTE!
Before ending the process, always check the locking indicator whenever available at the quick attachment coupler, and by mechanical check to ground to ensure the safe coupling of the attachment

14 **To confirm** the correct lock and to finish the process:
Press down the lower end of the switch (A) and release.
→ A locking status information applies for a few seconds. The process is finished, when the illuminations and the beep end.

NOTICE

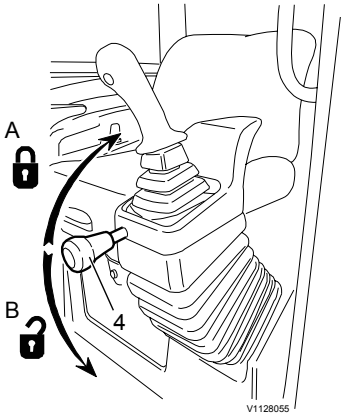
Do not use the machine, if the attachment bracket is not working correctly.

Pressure release

Before removing or connecting hydraulic hoses the pressure in the hydraulic system must be released.

WARNING

Risk of high pressure injection.
Residual pressure in the hydraulic system could lead to oil under high pressure jetting out and cause serious injury, even if the electric motor has not been running for some time.
Always release the pressure before any kind of service of the hydraulic system is carried out.



Control lockout lever

1 Place the machine on firm and level ground.
2 Lower the attachment and the blade to the ground.
3 Shut down the electric motor and turn the ignition key to running position/ignition (I).
4 Move the control lockout lever (4) down to unlock the system.
5 Shift the rollers on the joysticks a couple of times to the right and to the left.
6 Then move the joysticks and the driving levers in all directions a couple of times to release all residual pressure.
7 To release the pressure in the accessory line (X1) and boom offset:
Select function and shift the rollers on the joysticks to the right and to the left in accessory line (X1) position and in boom offset position.

NOTE!
It must be strictly assured that the electric motor cannot be started after hydraulic couplings have been opened.

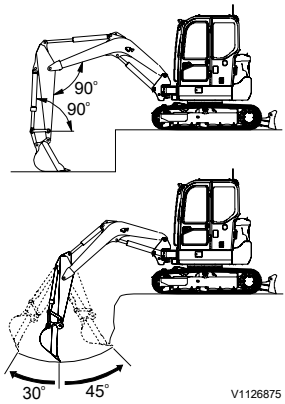
Buckets

Working with buckets

NOTICE

Select a suitable attachment that fits the machine on which it is to be installed. The types of attachments that can be installed vary with the machine type. Contact a workshop authorised by Volvo.

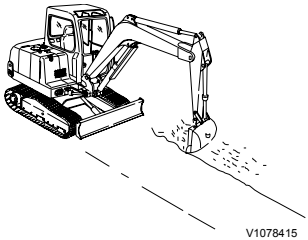
The machine is prepared for several different type of optional equipment to perform many types of work. Only the simplest operations are described below.



Backhoe work

Backhoe work is digging the material at a lower level than the machine is located.

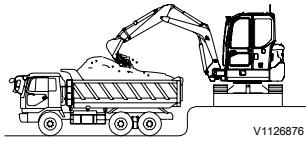
When the angle between bucket cylinder and links, dipper arm cylinder and dipper arm is set to 90° respectively, the working efficiency of each cylinder will be at its maximum. Take advantage of this angle to improve the work efficiency. The range for effective digging is when the dipper arm is between 30° forward and 45° rearward. There may be a little difference according to digging depth. Do not use the cylinder up to its stroke end, but only within this range.



Ditching work

Install a proper bucket for ditching. Place the machine where the ditching is performed effectively.

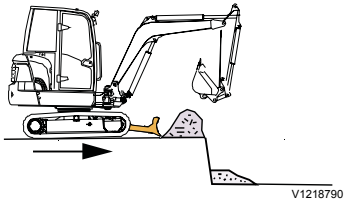
In case of a wide ditch, dig both sides in first, and then dig the center area.



Loading work

Position the hauler or truck so as to achieve a small slewing movement and good visibility for the operator to work effectively.

Also load over the rear side of the dump truck rather than over the side, as this makes the operator work easier and increases efficiency.



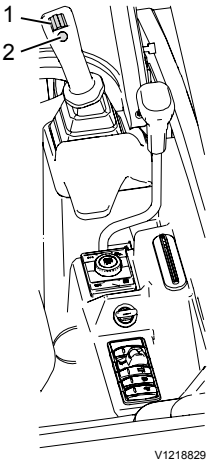
Backfilling or grading

In order to backfill a trench, position the machine perpendicularly to the trench and press the dozer blade against the ground.
Once the machine starts to push correctly do not leave the dozer blade control lever in maximum position, but release it.

NOTE!
Do not use the bottom of the bucket to level the ground by swinging it back and forth. This is the purpose of the dozer blade.

Offset boom

When it comes to digging a trench along a wall, you can use the lateral offsetting function.



1 If the function for offset boom is not activated, push button (2) to activate it. You know that the function is activated when the control lamp is on.

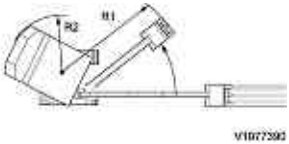
2 Use the proportional roller (1) on the right hand lever to operate the offset boom.

- Proportional roller to the left: Offset boom to the left.
- Proportional roller to the right: Offset boom to the right.

This work can be accomplished under confined spatial conditions. The minimum radius R1 of the equipment is as follows:

Offset in degree (°)	to left	to right
	72°	56°

Offset boom symbol



Min. offset boom radius
R1: min. radius front
R2: min. radius rear

Dipper arm, minimum radius, mm (in)		
Type		ECR25 Electric
R1	to left	1555 mm (61.2 in)
	to right	1902 mm (74.9 in)
R2		750 mm (29.5 in)
		823 mm (32.4 in)[a]

a) with additional counterweight

Boom offset function, settings

The settings for the boom offset function can be changed in the display, see page *39*.

Special hydraulics

Release the hydraulic pressure in the system before removing or connecting hydraulic hoses for hydraulically controlled attachments. See page *126* for the procedure to release the hydraulic system pressure.

⚠ WARNING

Risk of high pressure injection.
Residual pressure in the hydraulic system could lead to oil under high pressure jetting out and cause serious injury, even if the electric motor has not been running for some time.
Always release the pressure before any kind of service of the hydraulic system is carried out.

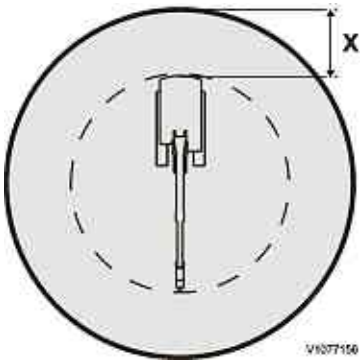
NOTE!
Any persons involved in the process of changing attachments must be familiar with the operation of the machine and should know the signalling pattern.

Volvo supplies a wide range of hydraulic tools. All tools and optional equipment are described in the Attachment Catalogue. Contact a Volvo dealer for further advice.

Hammer

Working with hammer

(hydraulic breaker)



Risk zone when operating the hammer.
X = Must be determined by the operator.

WARNING

Risk of severe personal injury.
While working with the hammer flying chips of rock could cause severe injury.
Provide protective nets for the windscreens. Keep windows and door closed and prevent persons from entering the risk zone when operating the hydraulic breaker.

NOTICE

The standard version of the hammer must not be used under water. If water fills the space where the piston strikes the tool, a strong pressure wave is generated and the hammer may be damaged.

NOTICE

If the hammer is connected to an attachment bracket, the attachment bracket should be checked regularly for damage.

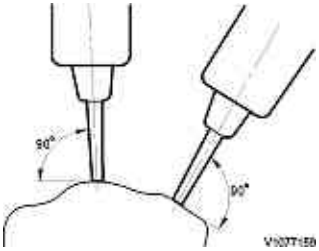
1 Select the hammer function in the Work mode menu in the display, see *34*.

2 Prepare the machine for normal excavation work. Move the machine to the required position. Lower the dozer blade to the ground.

3 Set the electric motor speed to the recommended electric motor RPM for correct amount of oil supply.

4 Place the boom and hammer in the breaking position. Quick and careless boom movements could result in damage to the hammer.

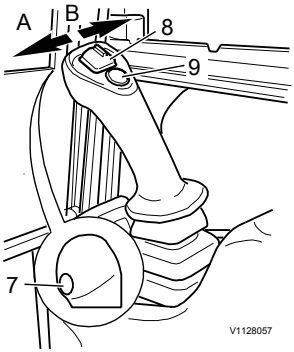
Position for hammer use



5 Place the tool perpendicular to the surface of the object. Keep the feed force aligned with the tool. Avoid small irregularities on the object which will break easily and cause either idle strokes or an incorrect working angle. When demolishing vertical structures (e.g. brick walls), place the tool perpendicular to the wall.

6 Press the hammer firmly against the object. Do not pry the hammer with the boom. Do not press too hard or too gently with the boom.

7 Start the hammer.



- Press button (7) or move the roller switch to the right (B) to activate the hammer function.
- Release the button or roller switch to deactivate the hammer function.

NOTE!
Listen to the sound of the hammer when you are using it. If the sound becomes weaker and the impact less efficient, the tool is misaligned with the material and/or there is not enough feed force on the tool. Realign the tool and press the tool firmly against the material.

Connecting with pivot pins

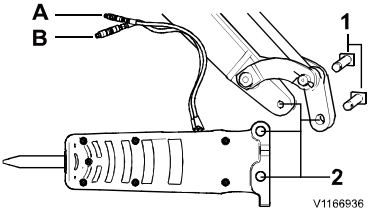
Before removing or connecting hydraulic hoses the pressure in the hydraulic system must be released, see page *126* for the procedure to release the hydraulic pressure.

WARNING

Risk of high pressure injection.
Residual pressure in the hydraulic system could lead to oil under high pressure jetting out and cause serious injury, even if the electric motor has not been running for some time.
Always release the pressure before any kind of service of the hydraulic system is carried out.

CAUTION

Risk of cutting and crushing.
Loose parts could cause crushing and cutting injury.
Never use your fingers for checking alignment between loose parts. Always use a tool.



Connecting with pivot pins
A Pressure line
B Return line
1 Pivot pins
2 Fastening bores

NOTE!
The linkage could change position during changing attachment, pay attention on moving parts.

1 Place the machine on firm and level ground.
2 Slowly lower and align the boom, until fastening bores (2) of the hammer are flush with the holes in the boom.
3 Insert pivot pins (1) into fastening bores (2).
4 Clean the hydraulic connections on hammer and dipper arm.

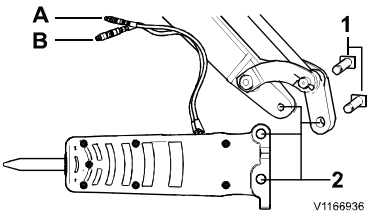
NOTICE

Protect the hydraulic connections against dirt, because only this will ensure the correct function of hydraulic connections and hydraulic system.

5 Release the pressure from the hydraulic system according to the procedure on page *126*.
6 Connect the hydraulic hoses (pressure line (A) and return line (B)) of the hammer to the hydraulic connections on the boom.
7 Lock the hydraulic couplings.

NOTICE

The machine hydraulic oil level must be checked after the hammer has been operated for 2–3 minutes.



Connecting / disconnecting with pivot pins

A Pressure line
B Return line

1 Pivot pins
2 Fastening bores

Disconnecting with pivot pins

1 Place the machine on firm and level ground.
2 Lower the boom and place the hammer flat on the ground.
3 Release the pressure from the hydraulic system according to the procedure on page *126*.
4 Remove the ignition key to make sure the electric motor cannot be started.
5 Unlock the hydraulic couplings.
6 Disconnect the hydraulic hoses (pressure line (A) and return line (B)) of the hammer from the hydraulic connections on the boom.
7 Drive pivot pins (1) out of fastening bores (2) on the boom to loosen the hammer.

Connecting to an attachment bracket

For connecting and disconnecting a hydraulic breaker from an attachment bracket, refer to the attachment bracket Operator´s Manual.

NOTE!
Take care during disconnection, hydraulic breakers have a high inertia due to the weight and could fall out of the attachment bracket coupler during disconnection. Always connect and disconnect as close as possible to the ground.
Release the pressure from the hydraulic system before opening any hydraulic connectors according to the procedure on page *126*.

Hose rupture valves

(optional equipment)

WARNING

Risk of crushing by falling attachments.
Hydraulic or mechanical failure could cause the attachments to fall, resulting in severe personal injury or death.
Ensure no persons can enter the danger zone until the failure is resolved.

If the machine is equipped with a hose rupture valves, it will reduce the falling speed of the boom if a hose bursts.

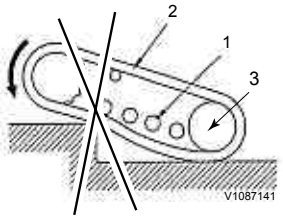
Lowering the boom with hose rupture protection

In case of standstill or motor defect and power failure during loading operation, the accumulator pressure is sufficient to lower the attachment to the ground with the control levers.

NOTE!
Too low pressure in the accumulator may make it impossible to lower the attachment.

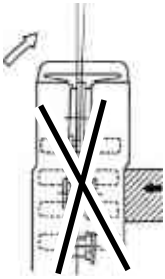
Tracks

When using rubber tracks



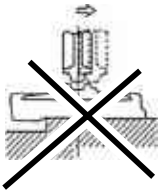
WARNING

Risk of crushing.
Moving tracks could cause serious crushing injury.
Always ensure that no persons are near the tracks while the machine is in motion.

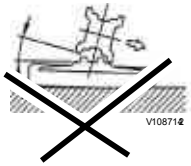


Moving over obstacles

- When reversing over an obstacle, a gap is formed between the rollers (1) and track (2). There is a risk of the rubber tracks coming off.
- If the machine continues to reverse, a gap is formed between the rollers, idler (3) and the track. The track may then come off when turning in a condition where the track can not move to the side because of the obstacle it is passing over or because of some other object.



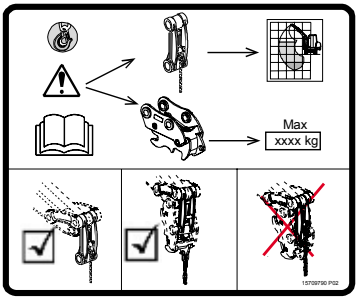
NOTE!
Ensure the tracks are always aligned with rollers and idler. Avoid turning and reversing movements when going over obstacles. Avoid obstacles that load the tracks unilaterally.



Lifting objects

The machine can be optionally equipped with independent or combined systems, allowing the lifting of various loads as from the excavator working equipment.

- A connecting rod featuring a lifting device across its structure, in order to proceed the lashing with appropriate lifting accessories.
- A quick coupler featuring a lifting device, in a form of one or two related eyes, or a lifting hook add-on either removable or welded.



V1198553

Decal on front window right

Always refer to the corresponding manufacturer user manual delivered with the quick coupler, to foresee what kind of lifting means are fit for use. This hardware implies a limitation of the payload that can be safely lifted by the machine featuring quick coupler systems, as shown in the decal 15709790.

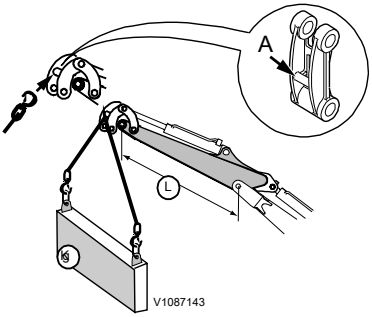
When using the connecting rod without a quick coupler, the lifting chart provided at the operator station shall be used as reference in relation to the lifting point coordinates, in order to determine the permissible lifted load.

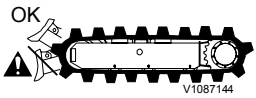
When using a quick coupler providing a lifting device, the permissible load of the ensemble is limited to the lower value of the load chart related lifting coordinates and the limit value usually engraved next to the lifting point of the attachment quick coupler.

The lifted load shall be preferably lashed from the quick coupler lifting device if available, with lashing precaution as shown. In this case, it is advisable to bring up this Safe Working Load information (SWL) at the operator station as well.

NOTE!

In the European Community countries, it is forbidden to proceed load lifting operation, if the machine is not equipped with lifting safety devices on the working equipment and the blade (optional devices). Always refer to the national safety-at-work regulation of the machine work site, to apply additional safety requirements where necessary.





The blade must be in upper position during lifting operation if no hydraulic safety valve is installed.
The hydraulic safety valve on the blade is an optional equipment, but mandatory in EU market if blade on floor is used.

Always use appropriate lifting hook.

Only lift objects using the approved lifting point on the machine (A). Contact your Volvo dealer if any doubt.

WARNING

Risk of crushing.
Falling load could cause serious injury.
Do not stand under a suspended load. Use appropriate loading and lifting equipment.

NOTICE

Do not use damaged, broken or uncertified lifting devices.

WARNING

Risk of crushing.
Swinging objects could cause serious injury.
Always ensure no persons are in the danger zone before lifting or moving objects.

Read the below recommended steps before starting any lifting.

- It is the operator whole responsibility to ensure the machine's safe and adequate configuration with regards to the work site environment before proceeding lifting operations.
- Use qualified and properly trained operators who have:
  - Specific machine knowledge and training.
  - Read and understand the operator's manual and its load charts.
  - Specific machine knowledge and training how to properly rig the load.
  - Full responsibility for all aspects of the lift.
- Interrupt the lift if not fully confident of a safe lift.
- Select machine with sufficient capacity for the total expected load, reach and swing. Ideally, load should be less than the load listed on the load chart at maximum reach across the undercarriage.
  - Know the mass (weight) of the item to be lifted.

- Know the start and finish positions, load lifting position and setting position.
- Know the machine configuration, especially the dipper arm and boom lengths and track size.
- Choose the correct lifting chart taking into account all attachments and rigging materials that will be used during the lift. The weight of the rigging materials and attachments, should be deducted from the load capacity.

■ Warm up the hydraulic oil to normal working temperature.

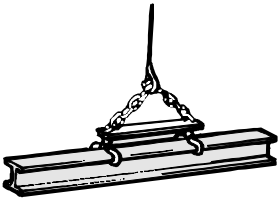
■ Position the machine on firm level ground.

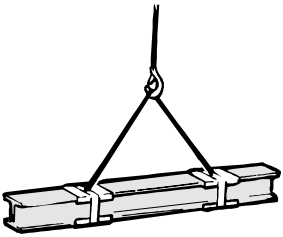
■ Properly set outriggers and blade when applicable.

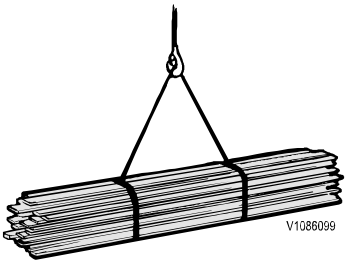
■ Once the load is properly rigged, ensure all ground workers are clear of the load and the machine. If guiding of the load is necessary, use ropes or other type of slings tied to the load to keep ground workers at a safe distance.

■ Use a trained signalman to direct all aspects of the move.

■ Do not use the swing or arm-in operation to drag a load.







Stability

The stability of working machines is highly changeable and exposed to great variations

In order to carry out the work safely, the operator must himself or herself think about and take into consideration the particular conditions that apply at a specific moment.

- Operate on solid, flat, level ground.

NOTE!
The machine must not be tilted by more than the values specified in these operating instructions. The machine may become unstable and unbalanced, depending on the load.

NOTICE

Risk of machine damage!
Improper use could cause serious machine damage.
Never anchor or fix the undercarriage to the ground or any object when digging or lifting.

- Make sure that the ground is firm and safe. Unstable ground, for example loose sand or soft earth, may make the work unsafe, if loads, close to the maximum values in the loading table, are taken.
- Do not make fast slewing movements with a suspended load. Bear the centrifugal force in mind.

Fastening long lifting slings

- Boards, planks, steel reinforcement or similar should have the sling arranged so that they cannot fall out of the loops.
- Girders should generally be lifted with a clamping device.
- Padding made from, for example, cut up compressed-air hoses, may be used in order to protect the slings.
- The slings should be well tightened.

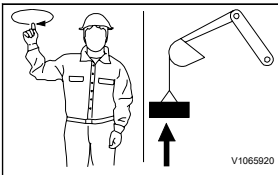
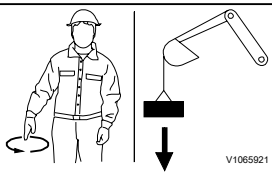
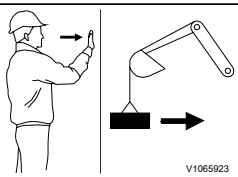
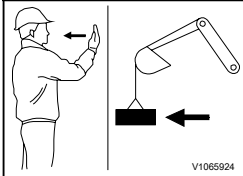
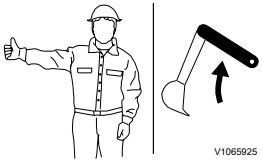
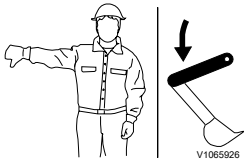
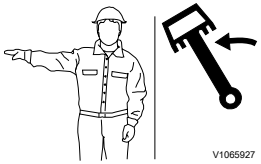
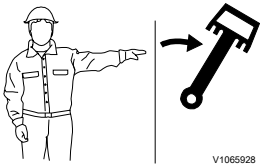
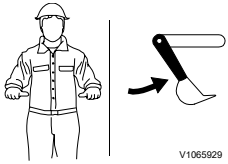
Lifting capacities

For lifting capacities specifications, see page *209*.

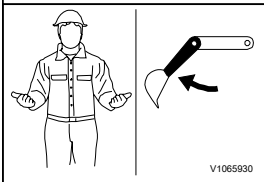
Signalling diagram

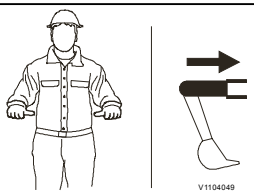
Manual signalling to an operator of a mobile excavator as per SAE J1307.

The primary use of hand signals is for a signalman to direct the lifting, handling, and placement of loads attached to working equipment. Hand signal usage may also be applicable to earth moving operations and/or machine travel when the operator's visibility is obstructed.
If a rapid lifting, lowering or moving movement is required, the dipper arm movements should be carried out more lively. If two different machines are used for lifting the same load, there should be an agreement beforehand how the lift should be carried out and what signals should be given to the respective operators.

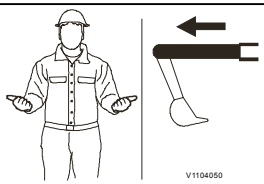
 V1065920	 V1065921	 V1065923
RAISE LOAD VERTICALLY With either forearm vertical, forefinger pointing up, move hand in small horizontal circles.	**LOWER LOAD VERTICALLY** With either arm extended downward, forefinger pointing down, move hand in small horizontal circles.	**MOVE LOAD IN HORIZONTALLY** With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.
 V1065924	 V1065925	 V1065926
MOVE LOAD OUT HORIZONTALLY With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.	**RAISE BOOM** With either arm extended horizontally, fingers closed, point thumb upward.	**LOWER BOOM** With either arm extended horizontally, fingers closed, point thumb downward.
 V1065927	 V1065928	 V1065929

SLEW
With either arm extended horizontally, point with forefinger to direction of slew rotation.

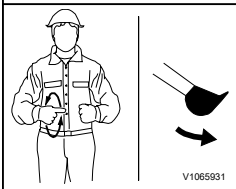




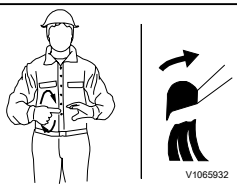
DIPPER ARM INWARD
With both hands clenched, point thumbs inward.



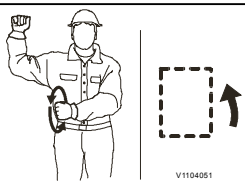
DIPPER ARM OUTWARD
With both hands clenched, point thumbs outward.



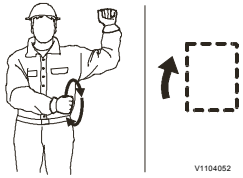
RETRACT TELESCOPIC BOOM
With both hands clenched, point thumbs inward.



EXTEND TELESCOPIC BOOM
With both hands clenched, point thumbs outward.

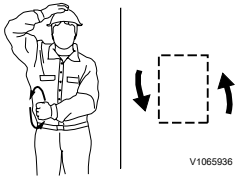


CLOSE BUCKET
Hold one hand closed and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at closed hand.

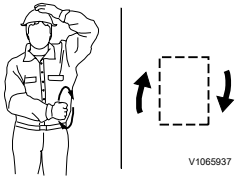


V

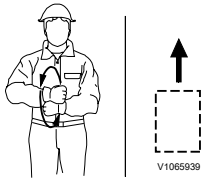
OPEN BUCKET
Hold one hand open and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at open hand.



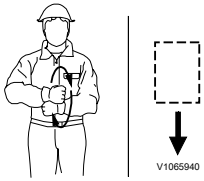
TURN
Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.

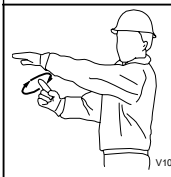
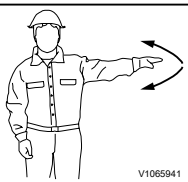
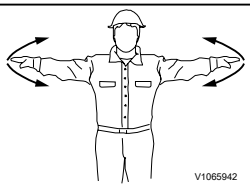
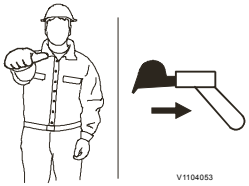
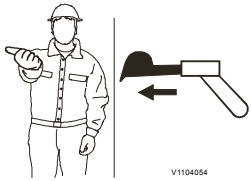


TURN
Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.



COUNTER ROTATE
Place hand on head indicating side or reverse track or wheel rotation. Move other hand in vertical circle indicating forward rotation of other track or wheel.



<table>
<tr><td colspan="2">TRAVEL
Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.</td><td>THIS FAR TO GO
With hands raised and open inward, move hands laterally, indicating distance to go.</td></tr>
<tr><td> 
V1065938</td><td> 
V1065941</td><td> 
V1065942</td></tr>
<tr><td>MOVE SLOWLY
Place one hand motionless in front of hand giving motion signal. Raise load slowly is shown.</td><td>STOP
With either arm extended laterally, hand open downward, move arm back and forth.</td><td>EMERGENCY STOP
With both arms extended laterally, hands open downward, wave arms back and forth.</td></tr>
<tr><td> 
V1065922</td><td> 
V1104053</td><td> 
V1104054</td></tr>
<tr><td>STOP ENGINE
Draw thumb or forefinger across throat.</td><td>RETRACT TELESCOPIC DIPPER ARM
With either arm outstretched horizontally in front of body, close fingers and point thumb in direction of required movement.</td><td>EXTEND TELESCOPIC DIPPER ARM
With either arm outstretched horizontally in front of body, close fingers and point thumb in direction of required movement.</td></tr>
</table>

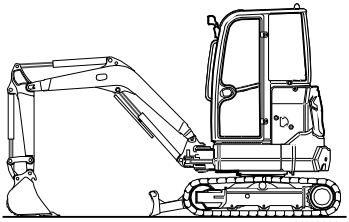
Safety when servicing

This section deals with the safety rules which should be followed when checking and servicing the machine. It also describes the risks when working with unhealthy material and ways to avoid personal injuries.
Further safety rules and warnings texts are given within the respective sections.

⚠ WARNING

Risk of burns!
Hot machine parts could cause burns.
Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.

Service position


V1126885

Thorough maintenance and care (as well as the immediate rectification of possibly occurring faults) are the best prerequisites for a permanent availability of the machine and low repair requirements.

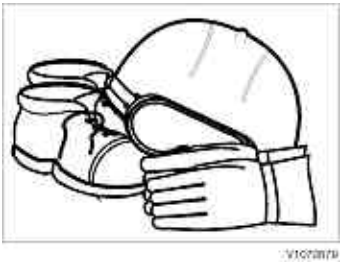
Before starting maintenance or repair work:

- Park the machine on level ground.
- Lower the working attachments and the dozer blade to the ground.
- Depressurize the hydraulic system according to procedure on page *126*.

⚠ WARNING

Risk of burns!
Hot machine parts could cause burns.
Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.

- Pull the ignition key off and move the control lockout lever to the upper position in order to eliminate the risk of unintended starting of the electric motors.
- Turn the battery disconnect switch off when servicing the machine.
- The stability of the machine is a prerequisite for safe assembly, maintenance and repair work.
- When replacing spare parts make sure to use genuine Volvo spare parts. Do not use any spare parts of lower quality.
- Cleanliness is decisive for the operating safety of the complete machine. Always keep the maintenance location clean and tidy.



Before service, read

Prevent personal injuries

- Read the Operator's Manual before the service work is started. It is also important to read and follow information and instructions on plates and decals.
- Do not wear loose-fitting clothing or jewelry, which can get caught and cause injury.
- Always use a hard hat, safety glasses, gloves, and protective footwear when required by the job.
- Do not stand in front of or behind the machine when the machine is running.
- Turn off the machine and turn off the battery disconnect switch before removing any protective covers or opening the rear hood.
- When the machine is turned off, there is a remaining accumulated pressure in the pressurized systems. If a system is opened without having first released the pressure, liquid under high pressure will jet out.
- Use a piece of paper or cardboard to check for leaks, never use your hand.
- Make sure that steps, handles, and slip-protected surfaces are free from oil, dirt, and ice.
- Only step on parts of the machine provided with slip-protection.
- It is important to use correct tools and equipment. Broken tools or equipment should be repaired or replaced.
- If service work has to be done under a raised attachment, first secure the attachment. Lock the control lever lockout in the upper position.

Prevent machine damage

- When lifting or supporting the machine or parts of the machine, use equipment with a sufficient lifting capacity.
- Lifting devices, tools, working methods, lubricants and parts prescribed in the Operator's Manual should be used. Volvo CE will not accept any responsibility otherwise.
- Make sure that no tools or other objects, which may cause damage, have been forgotten in or on the machine.
- Release the pressure in the hydraulic system before starting the service work.
- Never set a relief valve to a higher pressure than that recommended by the manufacturer.

- Machines, which are used within a polluted or in another way insanitary area should be equipped for this kind of work. Special safety regulations apply when servicing such a machine.
- When installing two-way radio, mobile telephone, or similar equipment, the installation should be performed according to the manufacturer's instructions in order to eliminate interference with the electronic system and components intended for the machine's function, refer to page *21*.
- Actions to be taken in connection with electric welding, refer to page *182*.
- Make sure that all protective covers, and the rear hood are in place before the battery disconnect switch is turned on and the machine is used.
- Use the three-point method (two feet and one hand) when cleaning or scraping the windows, mirrors and cameras.

Prevent environmental impact

Be aware of the environment when performing service and maintenance. Oil and other liquids harmful to the environment and released into the environment will cause damage. Oil degrades very slowly in water and sediment. The machine shall be cleaned in a facility with an oil separator or equivalent equipment.

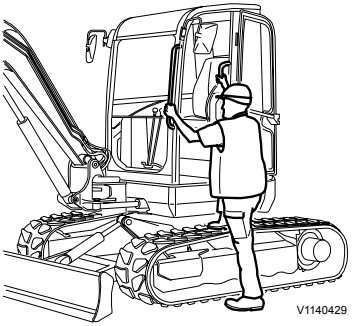
NOTE!
In common for all points below is that all waste is to be handed over to a treatment and disposal company approved by the authorities.

- When draining, oils and liquids must be collected in suitable containers and actions must be taken to avoid spills.
- Used filters must be drained of all liquid before they are handled as waste. When changing asbestos filter, the used asbestos filter shall be placed in the tight-sealing plastic bag that is supplied with each asbestos filter package. Do not shake out the asbestos filter, just place it carefully in the supplied plastic bag. Seal the plastic bag and make sure that it is deposited in a suitable location for asbestos waste.
- Batteries contain substances dangerous to the environment and health. Therefore used batteries must be handled as environmentally hazardous waste.

- Consumables, e.g. used rags, gloves, and bottles may also be contaminated with oils and liquids that are hazardous to the environment. In such cases they must be treated as environmentally hazardous waste.

Entering, leaving and climbing the machine

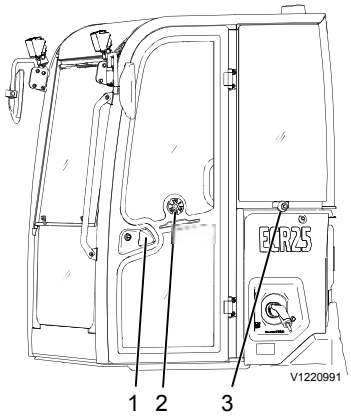
Entering, leaving and climbing the machine



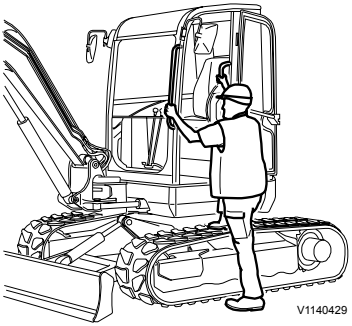
NOTE!
For safety, observe the following rules.

- Do not jump on/off a machine, especially never get on / off when the machine moves.
- Never grasp the control lever to get on / off.
- Use handholds and steps when entering, leaving or climbing the machine.
- Use the three-point grip, that is two hands and one foot or two feet and one hand.
- Always face the machine.
- Always wipe mud and oil off all footboards, handrails and your footwear, especially clean the windows, rear view mirrors and lights.
- Clean your boots and wipe your hands before getting on the machine.
- Do not use hand grip (A) of the cab door as a support when entering, leaving and climbing the machine. it is not strong enough to be used as a support. it should only be used for closing the door.

Access to cab



- The cab door is fitted with an external door handle with a lock (1) and an internal door handle.
- The door can be locked in open position by application of manual force (a fixed locking bolt (3) on the cab engages in the round bolt receptacle (2) in the door).
- By pressing the unlocking button the cab door can be unlocked and closed.
- Always use the three-point approach to access the cab by using two hands and one foot or one hand and both feet. Use stepping surfaces and handholds. Always face the machine when entering the cab.



Leaving cab

- Make sure that the cab is parallel to tracks, that allows best possible leaving situation.
- Stop the electric motor and remove key before leaving the cab to prevent unauthorised use of machine.
- Use the three-point approach to leave the cab by using two hands and one foot or one hand and both feet. Use stepping surfaces and handholds. Always face the machine when leaving the cab. Do not jump off!

Alternative exit path

The alternative exit path is the rear window (its location is marked with an information decal). In case of a turnover or accident and when the door is blocked, break the glass with the hammer attached to the rear wall inside the cab.
Never egress even partially from the cabin or canopy by the front or side during operation. It is recommended to always bring the equipment to ground and stop the electric motor before entering or leaving the machine for short term job purposes.

Fire prevention

Using the machine in environments with high risk of fire or explosion requires special training and equipment.

There is always a risk of fire. Find out what kind of fire extinguisher is used on your working site and how to use it. If the machine is equipped with a fire extinguisher, it should be kept inside the cab on the left side of the operator.

If the machine is to be provided with a hand-held fire extinguisher, it should be of the ABE type (ABC in North America). The designation ABE means that it is possible to extinguish fires in both solid organic material and liquids, and that the fire extinguishing compound does not conduct electricity. Efficiency class I means that the effective operating time of the extinguisher must not be less than 8 seconds, class II at least 11 seconds and grade III at least 15 seconds.
A hand-held fire extinguisher ABE I normally corresponds to a powder content of 4 kg (8.8 lb) (EN-grade 13A89BC), standard EN 3-1995, parts 1, 2, 4 and 5.

Fire prevention measures

- Use conventional car care products meant for cleaning or degreasing. Also bear in mind that certain solvents can cause skin rashes, damage to the paint finish and constitute fire hazard.
- Keep the place clean where the service is to be carried out. Oil and water can make the floor slippery and is also dangerous in connection with electrical equipment or electrically powered tools. Oily and greasy clothes are a serious fire hazard.
- Check daily that the machine and the equipment are free from dust and oil. Besides reducing the risk of fire, it is also easier to detect faulty or loose components.

NOTE!
Be careful if using a high-pressure wash cleaning. Electrical components and electrical leads can be damaged even at a moderately high pressure and temperature. Protect electrical leads in an appropriate way.

- Be extra careful when cleaning a machine working in a fire-sensitive environment, for example saw-mill and refuse dumps.
- It is important that the fire extinguisher is maintained in order to work when it is needed.
- Check that hydraulic and brake hoses and electrical cables have not been damaged by chafing or are not in danger of being damaged in that way because of incorrect installation or clamping. Electrical cables must not have direct contact with oil lines.
- Do not weld or grind on components which are filled with flammable liquids, for example tanks and hydraulic pipes. Exercise care with such work also in the proximity of such places. A fire extinguisher should be kept near to hand.

Actions in case of fire

If the circumstances permit and your own safety is not jeopardized, take the following steps at the slightest sign of fire:

1. Stop the machine, if it is moving.
2. Lower attachments to the ground.
3. Move the control lockout lever to locked position.
4. Turn the ignition key to stop position.
5. If possible to access safely, turn off the battery disconnect switch.
6. Exit the cab.
7. Call the fire brigade.
8. Try to put out the fire, if possible. Otherwise, move away from the machine and out of the danger zone.

Actions after fire

When handling a machine which has been damaged by fire or been exposed to intense heat, the following protective measures must be followed:

- Use thick, protective gloves made of rubber and wear goggles.
- Never touch burnt components with your bare hands in order to avoid contact with melted polymer materials. First wash thoroughly with lime water (a solution of calcium hydroxide, that is slaked lime in water).
- Handling heated fluoro-carbon rubber, refer to page *154*.
- Cool down the traction battery and the surroundings with extensive amounts of sprayed water to prevent the propagation of the fire.

Once the traction battery has been on fire it may reignite even several hours after the first event has stopped. The complete burning of a traction battery may take approximately 2 hours.

Handling hazardous materials

Heated paint

WARNING

Risk of toxin inhalation.
Burning of painted, plastic or rubber parts produces gases that could damage respiratory tracts.
Never burn painted or rubber parts or any plastics.

Heated paint gives off poisonous gases. Therefore, paint must be removed from an area with a radius of at least 10 cm (4 in) before carrying out welding, grinding or gas cutting. In addition to the health hazard, the weld will be of inferior quality and strength, which, in the future, may cause the weld to break.

Methods and precautionary measures when removing paint

- Blasting
  - use respiratory protective equipment and protective goggles
- Paint remover or other chemicals
  - use a portable air extractor, respiratory protective equipment and protective gloves
- Grinding machine
  - use a portable air extractor, respiratory protective equipment and protective gloves and goggles

Never burn painted parts after they have been discarded. They should be disposed of by a licensed disposal plant.

Heated rubber and plastics

Polymer materials can, when heated, form compounds which are dangerous to health and environment and must therefore never be burned when scrapped.

If gas cutting or welding is to be carried out near such materials, the following safety instructions must be followed:

- Protect the material from heat.
- Use protective gloves, protective goggles and respiratory protective equipment.

Heated fluoro-carbon rubber

WARNING

Risk of serious injury.
At very high temperatures fluoro-carbon rubber forms substances which are very corrosive to skin and lungs.
Always wear personal protective equipment.

When handling a machine which has been damaged by fire or been exposed to intense heat, the following measures should be taken:

- Use thick, rubber gloves and wear protective goggles.
- Discard gloves, rags and other items that have been in contact with heated fluoro-carbon rubber after first having washed these items in lime water (a solution of calcium hydroxide, that is slaked lime in water).
- The area around a part which has been very hot and which may be made of fluoro-carbon rubber should be decontaminated by thorough and ample washing with lime water.
- As a precaution, all seals (O-rings and other oil seals) should be handled as if they were made of fluoro-carbon rubber.
- The hydrofluoric acid may remain on the machine parts for several years after a fire.
- If swelling, redness or a stinging feeling appears and one suspects that the cause may be contact with heated fluoro-carbon rubber, contact a medical doctor immediately. Several hours may pass, however, before any symptoms appear and there is no immediate warning.
- The acid cannot be rinsed or washed off from the skin. Treat instead with Hydrofluoric Acid Burn Jelly or similar before contacting a medical doctor.

Service battery

WARNING

Risk of chemical burns.
The battery electrolyte contains corrosive sulphuric acid which could cause severe chemical burns.
If electrolyte spilled on your bare skin, remove it immediately and wash the affected area with soap and plenty of water. If it gets into your eyes or any other sensitive body part, rinse with plenty of water and seek immediate medical attention.

- Do not smoke near batteries as these give off explosive gases.
- Make sure that metal objects, e.g. tools, rings and watch straps, do not come into contact with the battery pole studs.
- Make sure the protections are always installed over the battery pole studs.
- Do not connect a discharged battery in series with a fully charged battery. Risk for explosion.
- Discarded batteries must be taken care of according to national environmental requirements.

Traction battery

The traction battery has a guarded cooling fan along with extracting holes to help circulate air within the housing (for Li-Ion cells and internal electronics) therefore any gases or smoke generated after an electrical defect will be exhausted to the battery and service compartment. Li-Ion cells may exhaust hazardous substances if subject to external overheating, as well as internal thermal runaway.

If any visible smoke or suspicious smell appears from the traction battery environment:

- Shut down the machine and turn off the battery disconnect switch.
- Call a qualified service technician and let the machine cool down.

Should the traction battery be exposed to either hot stream or incipient fire, use large amount of cooling means in order to maintain its temperature low enough

Do not try to extinguish a propagating fire. Call the fire brigade. Also refer to *151*.

Crystalline silica (quartz) dust

WARNING

Risk of hazardous inhalation.
Working in environments containing dangerous dust can lead to serious health problems.
Wear personal protective equipment when working in dusty environments.

Crystalline silica is a basis component of sand and granite. Therefore, many activities at construction and mining sites, such as trenching, sawing and boring, produce crystalline silica dust. This dust can cause silicosis.
The employer or working site management should provide the operator with information about the presence of crystalline silica in the work site along with specific work instructions and precautions and also necessary personal protective equipment.
Also check the local / national regulations regarding silica / silicosis.

Handling line, tubes and hoses

WARNING

Risk of high pressure injection.
Leaks from high pressure hoses could cause serious injury to skin and eyes.
If high pressure hoses are loose or leaking, contact a qualified service technician.
Keep away from fluid that is spraying out.
Use a stiff piece of cardboard to check for leaks.
Never use your hands to check for leaks.

- Do not bend high pressure lines.
- Do not strike high pressure lines.
- Do not install any lines that are bent or damaged.
- Check lines, tubes and hoses carefully.
- Do not reuse hose, tube and fittings.
- Do not use your bare hand to check for leaks.
- Tighten all connections. Consult your Volvo dealer for the recommended tightening torque.

If any of the following conditions are found, replace the parts. Consult your Volvo dealer.

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Strengthening wires are exposed.
- Outer coverings are ballooning.
- Flexible part of the hoses are kinked.
- End fittings are displaced.
- Foreign material is embedded in the coverings.

NOTICE

Make sure that all clamps, guards and heat shields are correctly installed. This contributes to preventing vibrations, chafing against other parts and excessively strong generation of heat.

Maintenance

If the machine is to function satisfactorily and at lowest possible cost, it requires careful maintenance.

This section describes maintenance and service jobs that the operator can do. Other maintenance and service jobs require trained workshop personnel, special equipment or spare parts and should be done by a qualified service technician.

The chapter “Lubrication and service chart” (see page *162*) presents all the jobs and actions that are included in the machine's service program.

Service history

After each completed service by a qualified service technician, the service history should be filled in, see page *213*. Service history is a valuable document, which is referred to when selling the machine.

Arrival Inspection

Before the machine leaves the factory, it is tested and adjusted. The dealer or distributor must also carry out arrival inspections according to the applicable form.

Delivery Inspection

Before the machine leaves the factory, it is tested and adjusted. The dealer or distributor must also carry out delivery inspections according to the applicable form.

Delivery Instructions

When handing the machine over, the dealer must give the buyer "Delivery instructions" according to applicable form, which must be signed, if the warranty is to apply.

Service Programme

For any factory warranty to be valid, the machine shall be maintained according to the service program established by Volvo. The service program

is continuous with fixed intervals. The operating time between intervals only applies if the machine is used in normal environment and operating conditions. Ask your Volvo dealer what is right for your specific machine.

Lubrication and service chart

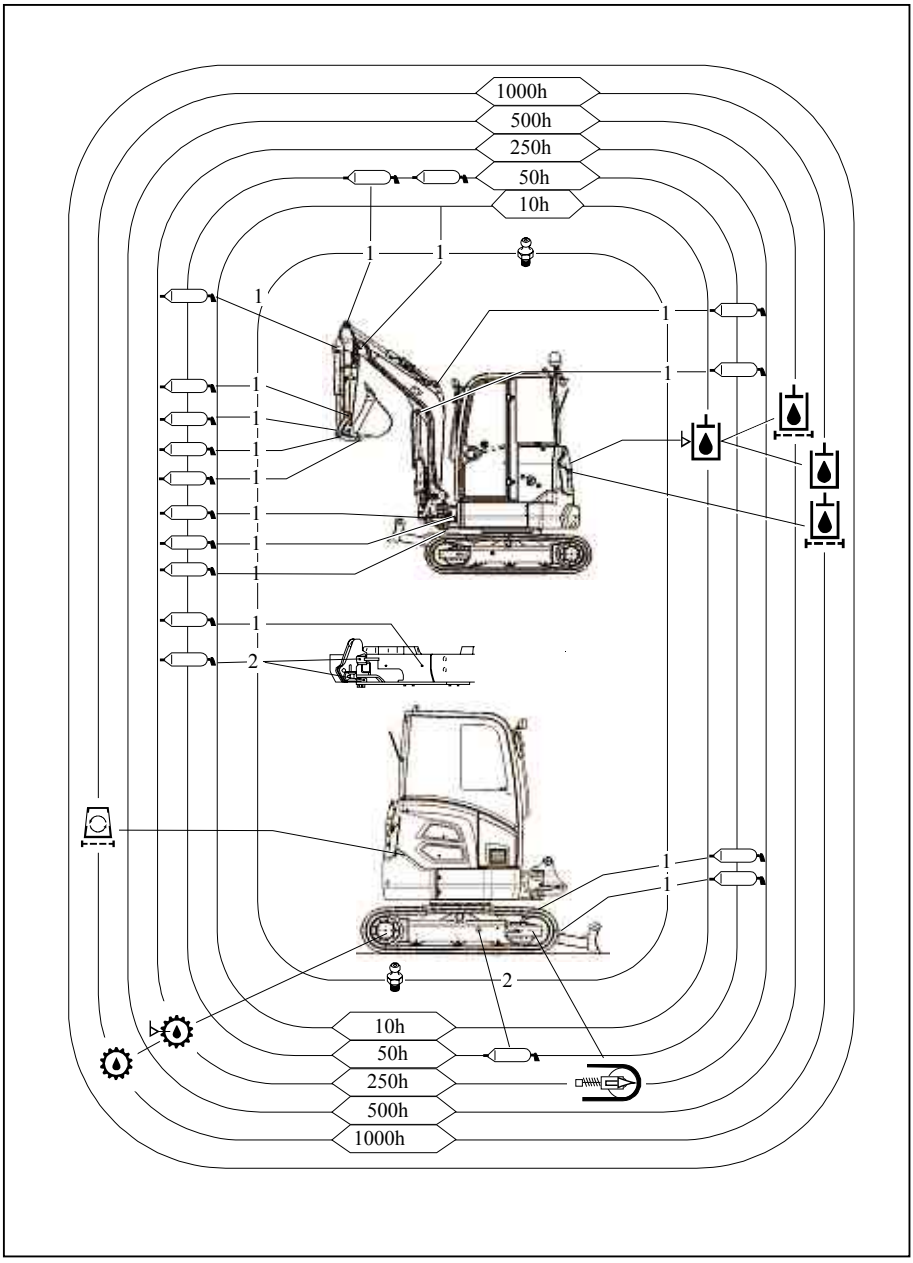
Symbol key

The following standard symbols are used in the lubrication and service chart.

	Lubrication		Grease nipple
	Check travel gear oil		Check the hydraulic oil level
	Change travel gear oil		Change the hydraulic oil
	Check track tension		Replace the hydraulic oil filter
 V1087233	Replace cab ventilation filter		

Lubrication and service chart

Every: 10, 50, 250, 500 and 1000 operating hours
(according to Service Programme of the machine).



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When required	Page
Cleaning machine	*182*
Battery and service compartment, cleaning	*185*
Washer reservoir	*185*
Front windscreen rail, lubricate	*186*
Touch-up painting	*184*
Service battery, charging	*177*
Traction battery, charging	*178*
Paint finish maintenance	*184*
Bucket teeth, replacing	*186*

DAILY (every 10 hours)	Page
Machine, visual check (for leakages, loose connections, external damages, cracks and wear damages)	—
Loose and loss of bolts, checking	—
Test run and check	*166*
Hydraulic oil level, checking	*167*

First 50 hours After carrying out daily service	Page
Hydraulic oil filter, replacing	Contact a qualified service technician.

EVERY 50 hours After carrying out daily service	Page
Lubrication according to Lubrication chart	refer to Lubrication chart and page *168*
High voltage components condition, visual checking	*168*

EVERY 250 hours After carrying out daily and 50 hours services	Page
Service battery, checking	*173*
Track tension and condition, checking	*172*

EVERY 250 hours After carrying out daily and 50 hours services	Page
Track gearbox oil level, checking	Contact a qualified service technician.
Electrical system, checking	Contact a qualified service technician.

EVERY 500 hours After carrying out daily, 50 and 250 hours services	Page
Coolers, cleaning More often if working in dusty environment.	*175*
Hydraulic oil filter, replacing (first after 50 hours)	Contact a qualified service technician.
Hydraulic pump, suction hose and pressure hose, check and replace if necessary	Contact a qualified service technician.
Hoses for boom-, dipper-, and bucket-cylinder, check and replace if necessary	Contact a qualified service technician.
Hose on boom for X1 and X3, check and replace if necessary	Contact a qualified service technician.
Quick coupler lock mechanism, check and replace if necessary	Contact a qualified service technician.

EVERY 1000 hours After carrying out daily, 50, 250 and 500 hour services	Page
Cab main filter, replacing	Contact a qualified service technician.
Leakage oil filter element, replacing (if using bio oil, every 750 hours)	Contact a qualified service technician.

EVERY 1000 hours After carrying out daily, 50, 250 and 500 hour services	Page
Hydraulic oil, changing (if using bio oil, every 750 hours)	Contact a qualified service technician.
Hydraulic pressure, checking (same time as oil changing) or (if using bio oil, every 750 hours)	Contact a qualified service technician.
Track gearbox oil, changing	Contact a qualified service technician.

Maintenance service, every 10 hours

Test-run and check

Performed daily.

Warning decals

1 Check that all warning, information decals/plates and reflectors are in place, are legible, and are not damaged, refer to page *25*.

External check

1 Check that the machine does not have any external damage or defective/loose parts. Especially tires, hoses, and pipes.

2 Check that there are no visible leaks.

3 Check that all protective covers, and the hood is closed.

4 Clean/scrape windows and rear-view mirrors.

5 Check that the work lights and headlights are clean and intact.

6 Check that the wheels are not blocked.

7 Check the service battery. The cable terminals and pole studs must be clean, well tightened and coated with vaseline or similar.

8 Check that all access paths for maintenance is clear.

Lights, instruments, and controls

1 Turn the ignition to position 1 (operating position) and check that all control lights turn on.

2 Check the function of the work lights and headlights.

3 Check the function of the wiper and washer system.

4 Check that the lap-type seatbelt can be buckled up and is not damaged. Fasten the lap-type seatbelt.

5 Check that there are no persons near the machine, refer to page *79*.

6 Start the machine. refer to page *87*

7 Check that all control and warning lights are off.

8 Check the function of the fan and regulator, including heater

9 Check the end-position damping, cylinder at boom

10 Check that the horn works.

NOTE!
Contact a qualified service technician if there is a problem with any of the items above.

Hydraulic oil level, checking

When you check the oil, the temperature of the oil must be between 20 °C (68 °F) and 50 °C (122 °F) [±5 °C (±9 °F)].

1 Park the machine on horizontal ground.

2 Operate all cylinders to both directions while the electric motor is running.

3 Arrange the machine as shown on the decal:
- dozer blade on the ground
- equipment parallel to the axis of the machine
- bucket cylinder out and dipper arm cylinder in
- equipment lowered to the ground

4 Open the rear hood.

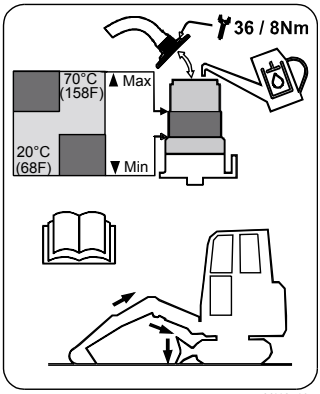
5 Check the hydraulic oil level in the sight glass.

- At 20 °C (cold machine), the hydraulic oil level must be above the minimum level and well below the maximum level (A).
- At 50 °C (hot machine), the hydraulic oil level must be below the maximum level and well above the minimum level (B). Fill hydraulic oil through filler neck on the hydraulic oil level sight glass.

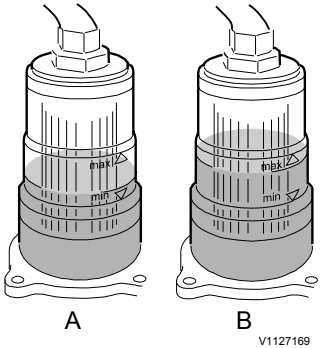
For quality of hydraulic oil please refer to the table of fuels and lubricants on page *191*.

NOTE!
If the hydraulic system is filled with biodegradable hydraulic oil from the factory (see sticker on filler neck), only the oil quality specified on the sticker must be used to fill up or when changing the oil.

Take care of filters/oils/liquids in an environmentally safe way, refer to page *146*.



Decal on hydraulic oil tank



A Correct hydraulic oil level (cold machine)
B Correct hydraulic oil level (hot machine)

Maintenance service, every 50 hours

Bearings, greasing

The service life of bushings and pivot pins can be extended considerably, if the machine is greased regularly and in the correct way.

Before greasing, place the machine on horizontal ground and extend the equipment in the front, so that all cylinder grease points are accessible.

The greasing of bearings has two main purposes:
- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease which may contain dirt. The grease in the space inside the outer seal collects dirt and prevents dirt and also water from penetrating into the bearing.

Therefore, grease the bearing until new, clean grease is forced out through the outer seal. For recommended grease, see page *191*.

Wipe off grease nipples and grease gun before greasing, so that dirt and sand is not introduced through the grease nipples.

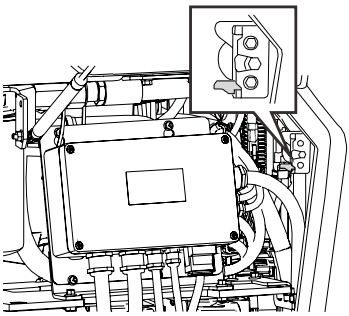
High voltage components condition, visual checking

DANGER

Risk of electrocution.
Contact with live parts will cause death or serious injury.
Never touch live electrical parts.

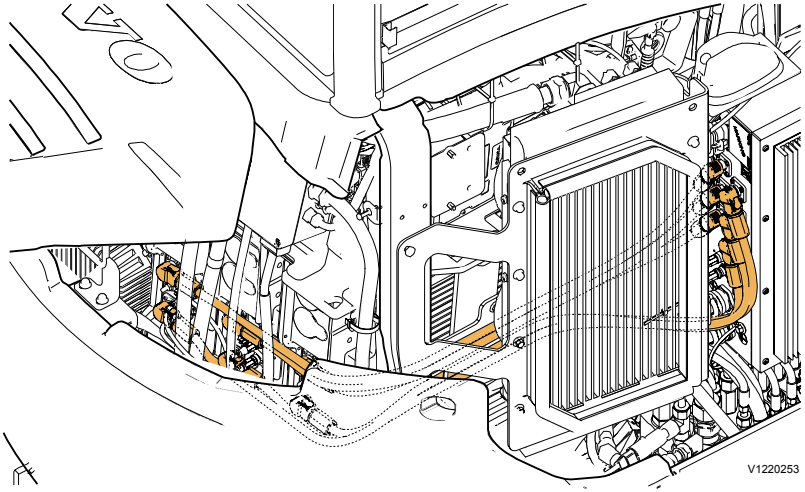
1 Turn the battery disconnect switch off.

NOTE!
The battery disconnect switch must always be in position off during longer resting periods of the machine and during repair work in the electric system.



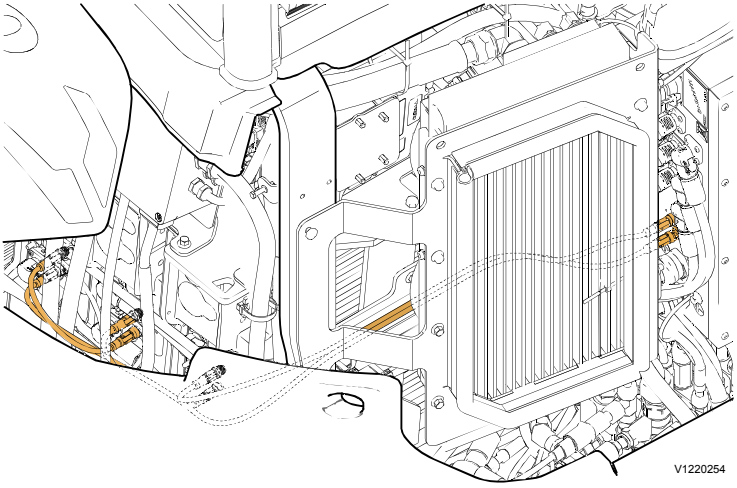
Open mechanism

2 Open the rear hood and the hatch on the right side of the machine.
3 Visually inspect the HV wiring and connectors for damage like isolation cracks, abrasion, excessive bending or stretching



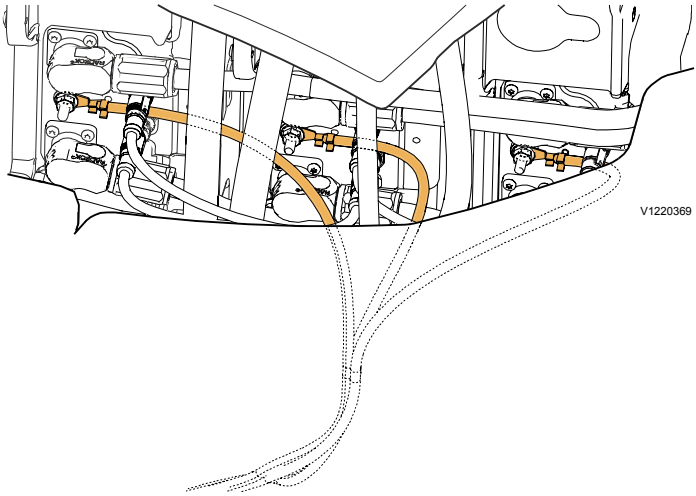
HV wiring and connectors

4 Visually inspect the LV wiring (data cables) and connectors for damage like isolation cracks, abrasion, excessive bending or stretching

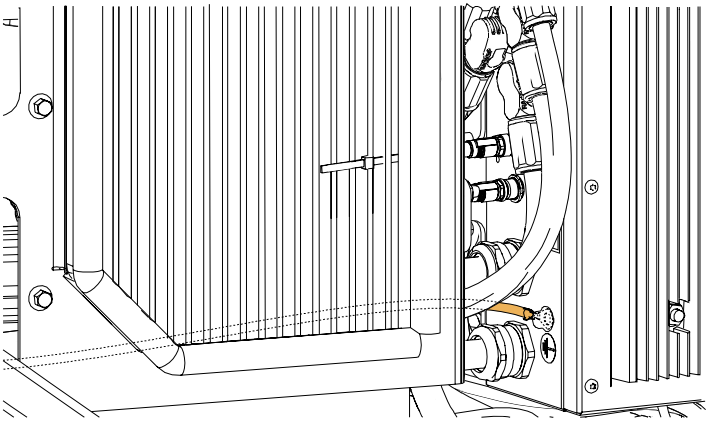


LV wiring (data cables) and connectors

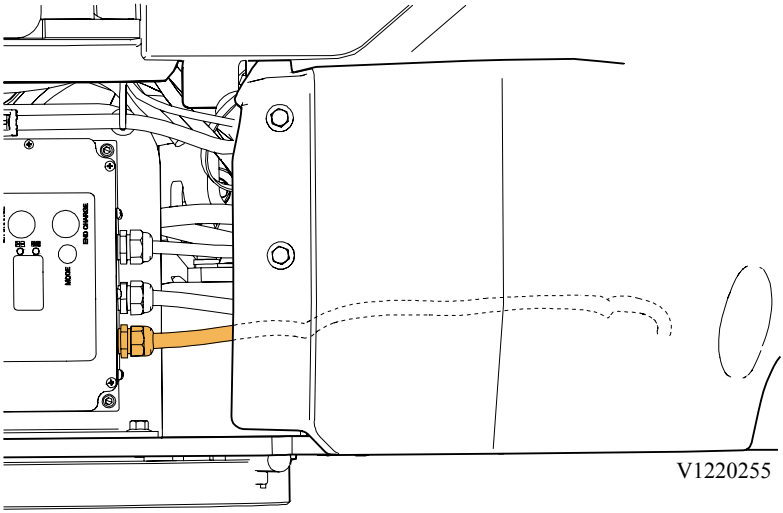
5 Inspect the ground wiring and connectors for damage like isolation cracks, abrasion, excessive bending or stretching.
From the traction battery to ground point. As much as possible.



6 Inspect the ground wiring and connectors for damage like isolation cracks, abrasion, excessive bending or stretching.
From battery management unit to ground point. As much as possible.



7 Remove the cover on the left side
Inspect the ground wiring and connectors for damage like isolation cracks, abrasion, excessive bending or stretching.
From the on board charger to ground point.

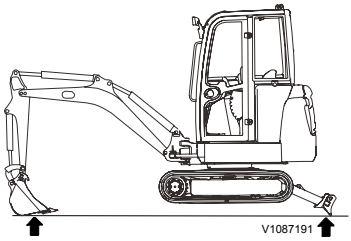


8 Restore the machine.

Maintenance service, every 250 hours

Track unit, checking tension

NOTE!
Incorrect tension reduces the lifetime of the tracks. A too low track tension increases the risk of detracking.

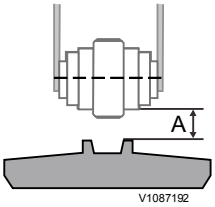


1 Park the machine on horizontal ground.

2 Lower the dozer blade in the back to the ground until the tracks are slightly raised (see picture).

3 Lower the bucket to the ground, operate the boom until the machine is raised (see picture).

4 Run the tracks several times in forward and reverse.

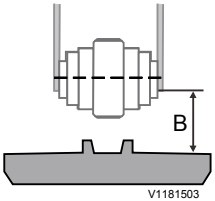


Sag A for rubber tracks

The correct distance (A) is between 15 and 25 mm (0.59 and 0.98 in), target: 20 mm (0.79 in).

5 For rubber tracks, measure (on both tracks) sag (A) under the roller which is the closest to the center of the undercarriage, between the track pad and the track roller.

6 The rubber track is correctly tensioned when a sag (A) of 15 to 25 mm (0.59 to 0.98 in), target: 20 mm (0.79 in) is reached.

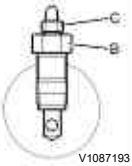


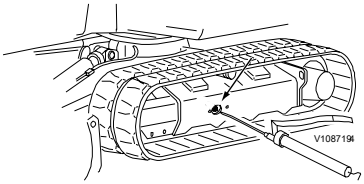
Sag B for steel tracks

The correct distance (B) is between 140 and 150 mm (5.51 and 5.91 in), target: 145 mm (5.71 in).

7 For steel tracks, measure (on both tracks) sag (B) from the frame of undercarriage under a roller until the surface of steel tracks.

8 The steel track is correctly tensioned when a sag (B) of 140 to 150 mm (5.51 to 5.918 in), target: 145 mm (5.71 in) is reached.





Inject grease

NOTICE

Risk of environmental pollution!
The grease in the track adjustment cylinder is under high pressure and large quantities of grease will be quickly released if the valve is loosened too much. Never loosen the valve by more than two turns when draining the grease.

9 In order to reduce sagging of the track, press grease through grease nipple (C) into the adjustment cylinder.

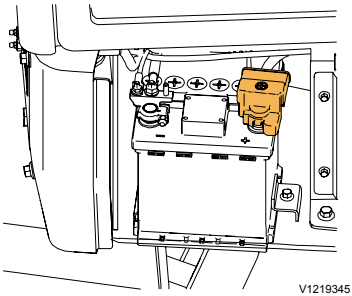
10 In order to increase sagging of the track loosen valve unit (B) by one revolution, so that the grease can be drained off. Tighten the valve unit when the sag of the track is correct.

11 Run the track several times in forward and reverse and verify that the sag is still correct.

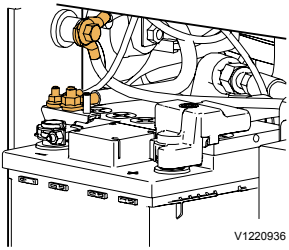
NOTE!
For quality of grease please refer to the table of fuels and lubricants on page *191*.

Service battery, checking

1 Turn the battery disconnect switch to position OFF.



2 Remove the terminal cover from the positive (+) pole.



3 Check that the cable terminals and the pole studs are clean, well tightened and coated with acid free dielectric grease.

NOTE!
The stud next to the service battery is the protective earth (PE) terminal for protective bonding during AC charging.

4 Inspect the ground wiring and connectors for damage like isolation cracks, abrasion, excessive bending or stretching.
5 Install the terminal cover on the positive (+) pole.

NOTE!
Dispose old service battery environmentally. For safety regulations, refer to page *154*.

Maintenance service, every 500 hours

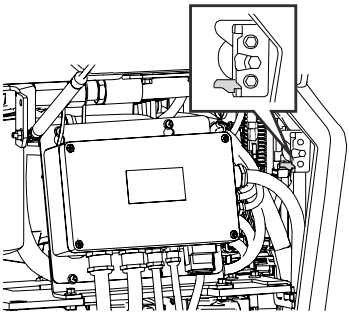
Coolers, cleaning

WARNING

Risk of burns!
Hot machine parts could cause burns.
Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.

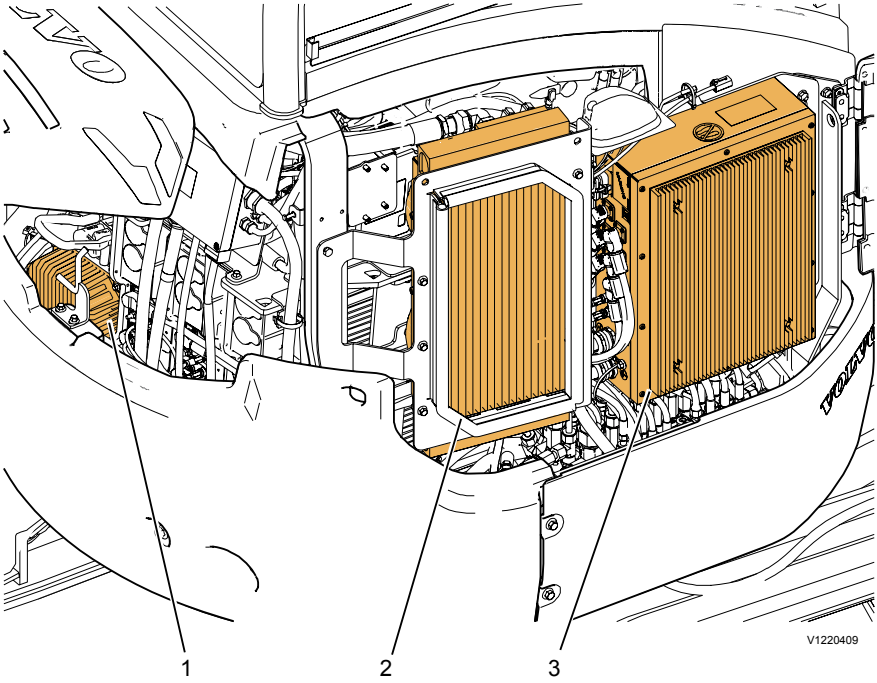
WARNING

Risk of hazardous inhalation.
Working in environments containing dangerous dust can lead to serious health problems.
Wear personal protective equipment when working in dusty environments.


V1220114

1 Open the rear hood. Open the hatch on the right hand side of the machine,

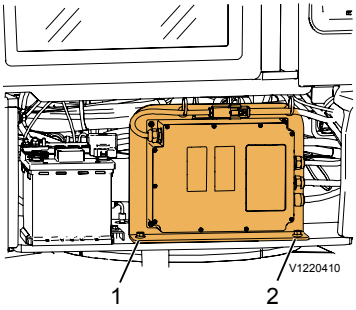
2 Clean the DDC/DC converter, the hydraulic oil cooler and the battery management unit with compressed air.



1 DC/DC converter
2 Hydraulic oil cooler
3 Battery management unit

3 Remove the cover on the left side.

4 Remove the first bolt and loosen the second one. Turn the on board charger out. Clean the fins on the inside with compressed air.
Install the on board charger.



1 First bolt
2 Second bolt

5 Install the cover. Close the hatch and the rear hood.

Maintenance service, when required

Service battery, charging

WARNING

Risk of serious injury.
Short-circuit, open flames or sparks near a charging battery could lead to an explosion.
Switch off charge current before connecting and disconnecting charging cable clamps. Never charge a battery near open flames or sparks. Always charge a battery in well-ventilated areas.

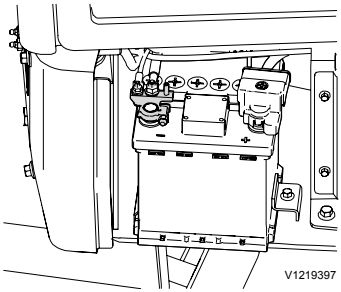
The original service battery installed in the machine is completely impermeable and maintenance free. The service battery may only be replaced by a battery with identical technological characteristics. This rules out the danger of service personnel being affected by acid or acid vapor should the machine tip over.

NOTE!
Dispose the old service battery environmentally.
For safety regulations, refer to page *154*.

Battery disconnect switch in off position

1 The battery disconnect switch must be in position off.

   NOTE!
   The battery disconnect switch must always be in position off during longer resting periods of the machine, repair work in the electric system and when charging the service battery.
2 The service battery is located under the cab on the left hand side of the machine
   Loosen the two screws and remove the cover.



Service battery, negative terminal (-)

3 Disconnect the negative terminal (-) first. Disconnect the positive terminal (+) and remove the service battery.

NOTE!
Any contact between a tool and the cable connecting the positive terminal and the frame may cause sparks.

4 Charge the service battery.
5 Place the service battery in position and connect the positive terminal (+) first. Connect the negative terminal (-).
6 Check that the cable terminals and pole studs are clean, well tightened and coated with vaseline or similar.
7 Install the cover.

Traction battery, charging

NOTE!
Before operating and recharging the rechargeable energy storage system (RESS) make sure to read all instructions carefully.

NOTE!
During the charging of the rechargeable energy storage system (RESS), always make sure that the close environment of the battery and service compartment is dry and free of flammable agents.

NOTE!
Local regulations may apply to ensure the utilization of approved electrical charging points.
It is recommended to always use a Volvo-approved charging harness.

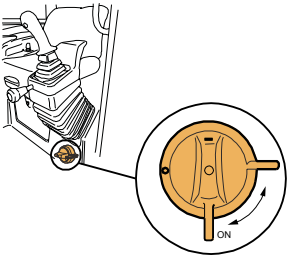
NOTE!
The machine must be placed in parking position before charging, with the battery disconnect switch set to position ON.
Make sure to rest the working attachment on the ground at all time during charging.

NOTE!
Carefully check for corrosion or foreign material in the contacts on plug and socket.
Replace the charging harness when needed.
Do not abuse, damage, remove, or modify electrical parts of the machine or the charging equipment.
Do not use equipment that is suspected to be damaged. Contact a qualified service technician if there are any questions.

There are two ways to charge the traction batteries, standard charging and fast charging (optional equipment). The charging procedures are similar. It is recommended to use the standard charging procedure when possible.

Standard charging of the traction batteries

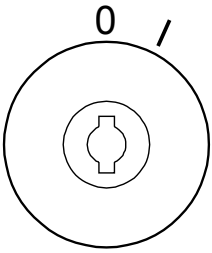
NOTE!
Make sure that the rear hood is closed before and during charging. If the rear hood is opened it will not be possible to charge the battery, and any ongoing charging will be interrupted.



V1220095

Battery disconnect switch

1 Turn the battery disconnect switch to position ON (I) .



V1219840

Ignition switch

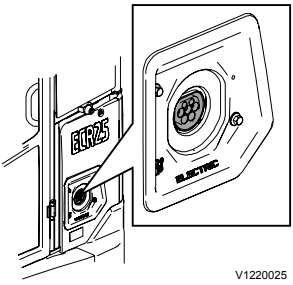
2 The ignition switch can be in position 0 or position 1.

NOTE!
If the ignition switch is in position 1 the electric motor must first be stopped and the control lockout lever must be raised before charging.

3 Connect the charging harness to the power source.

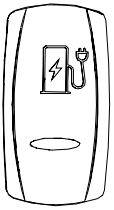
NOTE!
Local regulations may apply to ensure the utilization of approved electrical charging points. It is recommended to always use a Volvo-approved charging harness.

4 Remove the lid from the charging socket in the machine and connect the charging harness.



V1220025

Charging socket


V1220117
Charging switch

5 **If the ignition switch is in position 1:**
Press the charging switch on the right hand side panel in the cab when the display shows the battery charge screen. This will lock the charging harness connection and the charging will be started.
If the ignition switch is in position 0:
Press the charging switch on the right hand side panel in the cab to initiate the charging process. This will turn on the display, lock the charging harness connection and the charging will be started.
6 The display will show the state of charge (SoC) and the time remaining until fully charged.
The ignition switch can now be set to position 0 if needed.

NOTE!
When leaving the machine unattended while charging, it is advised to set the ignition switch to position 0.

7 To interrupt the charging, make sure that the ignition switch is in position 1 and press the charging switch again. This will unlock the charging harness connection.
When the charging harness is removed the charging information on the display will be replaced by the home screen.

NOTE!
The ignition switch must be in position 1 to unlock the charging harness connection.

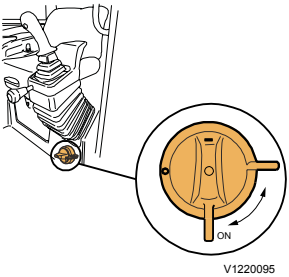
NOTE!
If the charging is interrupted with the ignition switch in position 0 (e.g. by opening the rear hood or pressing the charging switch during charge) the machine will shut down with the charging harness connection still locked. Setting the ignition switch to 1 will allow unlocking and operation of the machine.

8 Put the lid back over the charging socket .

Fast charging (DC) of the traction batteries

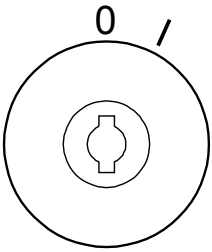
NOTE!
The distance between the machine and the off-board charger should be three meters where possible.

NOTE!
Read the manual for the off board charger before charging the traction batteries.



Battery disconnect switch

1 Turn the battery disconnect switch to position ON (I) .



Ignition switch

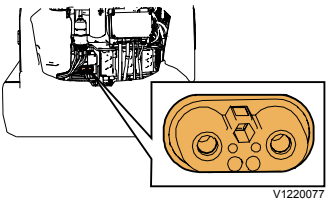
2 The ignition switch can be in position 0 or position 1.

NOTE!
If the ignition switch is in position 1 the electric motor must first be stopped and the control lockout lever must be raised before charging.

3 Connect the plug of the off board fast charger cable harness to the power source.

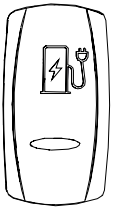
NOTE!
It is recommended to always use a Volvo-approved off board charger.

4 Open the rear hood.
5 Remove the lid from the charging socket.
6 Plug the fast charger cable harness into the charging socket of the machine.
7 Close the rear hood.



Charging socket

NOTE!
Make sure that the rear hood is closed during charging. If the rear hood is open it will not be possible to charge the battery.


V1220117

Charging switch

8 **If the ignition switch is in position 1:**
Press the charging switch on the right hand side panel in the cab when the display shows the battery charge screen to start charging.
If the ignition switch is in position 0::
Press the charging switch on the right hand side panel in the cab to initiate the charging process. This will turn on the display and start the charging.

9 The display will show the state of charge (SoC) and the time remaining until fully charged.
The ignition switch can now be set to position 0 if needed.

NOTE!
When leaving the machine unattended while charging, it is advised to set the ignition switch to position 0.

10 To interrupt the charging, make sure that the ignition switch is in position 1 and press the charging switch again or press the stop button on the off-board charger.
This will interrupt the charging within a few seconds.
When the charging harness is removed the charging information on the display will be replaced by the home screen.

NOTE!
Never disconnect the off-board charging harness before stopping the charging first (either from the machine or from the off board charger control panel).

NOTE!
If the charging is interrupted while the ignition switch in still in position 0, (e.g. by opening the rear hood or pressing the charging switch during charge) the machine will shut down.

11 Put the lid back and close the rear hood.

Welding

NOTE!
Welding on the machine is not allowed. If welding on the machine is needed, it has to be approved by Volvo Construction Equipment. Otherwise all additional welding is under customer responsibilities. Any unauthorized welding could lead to a loss of warranty.

Cleaning machine

The machine should be cleaned regularly with conventional car care products in order to eliminate the risk of damage to the paint finish and other surfaces on the machine.

NOTICE

Avoid using strong cleaning agents or chemicals in order to minimise the risk of damage to the paint finish.

NOTICE

Soil and clay may damage or cause wear to moving parts of the undercarriage. Therefore, all parts must be cleaned regularly from of soil and clay.

NOTE!
Daily clean the areas on the machine where dust, chips and similar may collect in order to minimise the risk of fire, see page *151*.

- Place the machine in a place intended for cleaning.
- Follow the instructions supplied with the car care product.
- The water temperature must not exceed 80 °C (176 °F).
- If high-pressure wash is used, keep a distance of at least 40 cm (16 in) between the seals and the nozzle. Keep a distance of 30 cm (12 in) between nozzle and other machine surface. Too high pressure and too short distance may cause damage.

NOTE!
Protect electrical leads in an appropriate way and be careful not to damage the cab prefilter when cleaning the machine.

NOTICE

Do not spray with high pressure into the sealing of the slewing ring, the water may penetrate and affect the characteristics of the grease.

- Use a soft sponge.
- Finish by rinsing the whole machine with only water.
- Always lubricate the machine after washing.
- Touch-up the paint finish when required.

Paint finish maintenance

Machines which are used in corrosive environment suffer more from rust than others. As a preventive measure it is recommended that the paint finish should be maintained every sixth months.

- At first clean the machine.
- Apply a transparent waxy anti-rust agent.
- A protective layer of underseal may be applied under the mudguards where mechanical wear is expected.

Touch-up painting

- Check if there are any damaged areas of the paint finish.
- At first clean the machine.
- Rectify any damage to paint finish in a professional way.

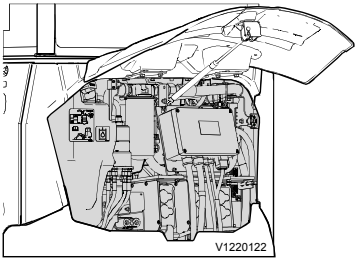
Battery and service compartment, cleaning

WARNING

Risk of burns!
Hot machine parts could cause burns.
Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.

WARNING

Risk of hazardous inhalation.
Working in environments containing dangerous dust can lead to serious health problems.
Wear personal protective equipment when working in dusty environments.



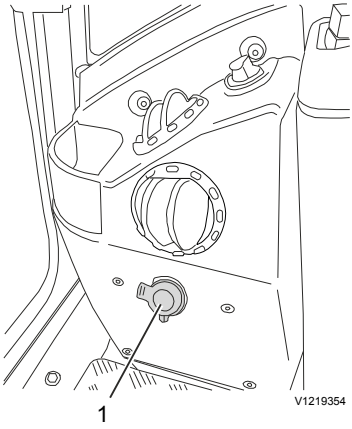
Cleaning should preferably be carried out at the end of the working shift before the machine is parked. Use personal protective equipment such as protective goggles, gloves and respirator.

Machines operating in dusty environment or environment exposed to fire hazards for example, wood-processing, wood chip handling or grain handling and animal feed industries require daily attention and cleaning of the battery and service compartment and surrounding areas. When operating in other environments, inspection and cleaning is required at least once a week.

Loose material is removed with for example compressed air. Clean the traction battery fans and power electrics from dust.

NOTE!
Protect electrical leads in an appropriate way and do not clean electric components with water.

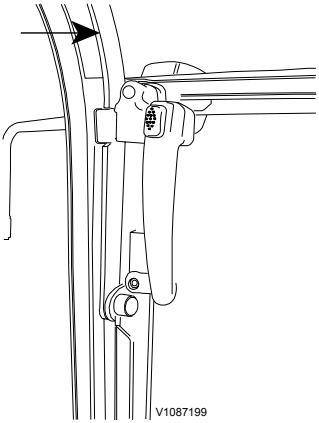
After cleaning, check and rectify any leaks.



1 Washer reservoir

Washer reservoir

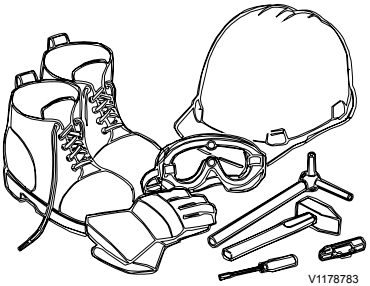
Fill up with washing fluid in the washer reservoir. It is located inside the cab on the right side.



Front windscreen rails

The front windscreen rails must be kept lubricated.

Start at one end of the rail and lubricate with grease all the way to the other end.



Needed tools incl. Special tool

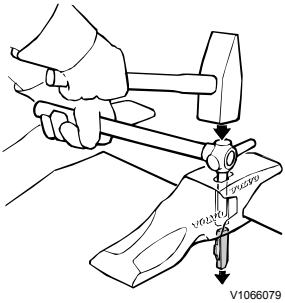
Bucket and ripper teeth, replacing

WARNING

Risk of splinter injury.
When striking metal objects with a hammer, flying metal chips could cause serious splinter injury to eyes and other body parts.
Always wear personal protective equipment and eye protection when replacing bucket teeth.

A special tool may be ordered to facilitate replacement of teeth. The tool are available in

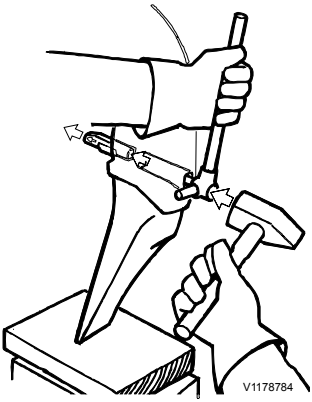
different sizes depending on tooth size. Contact your dealer for further information.



Removing bucket tooth

Removing bucket tooth

1 Lower the bucket to the ground and angle it slightly upward.
2 Clean the opening for tooth adapter locking device.
3 Knock out the locking device with a hammer and the special tool or other suitable drift.
4 Remove tooth.



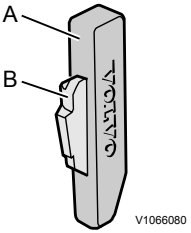
Removing ripper tooth

Removing ripper tooth

1 Lower the tooth onto stable ground as shown.
2 Clean the opening for tooth adapter locking device.
3 Knock out the locking device with a hammer and the special tool or other suitable drift.
4 Remove tooth.

Installing tooth

1 Clean the front part of the tooth adapter and the hole for the locking device.
2 Install the tooth so that the guide lugs fit in the tooth adapter recesses.

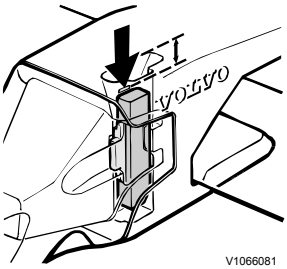


Locking device
A Steel pin
B Lock retainer

3 Replace lock retainer (B) with a new part.

4 Install the locking device so that the chamfered part points downward and the lock retainer points forward.

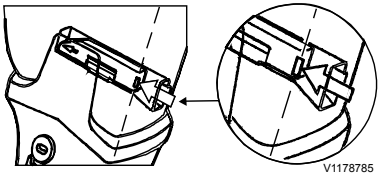
5 Knock down the locking device with a hammer until it is level with the upper part of the tooth adapter.



Locking device in bucket tooth

The locking device should be just below the scored line.

6 Bucket tooth: Knock down the locking device further with a hammer and the tool or other suitable drift until the upper part is just below the scored line in the hole.



Locking device in ripper tooth

7 Ripper tooth: Knock down the locking device further with a hammer and the tool or other suitable drift until the upper part is just below the shown line in the hole and is engaged.

NOTE!
Replace the steel pin in connection with replacement of tooth adapter.

Recommended intervals for critical parts

To ensure safety at all times when operating or driving the machine, periodic maintenance must always be carried out. To maintain safety over time, it is also recommended that periodic check or replacement of the parts given in the table below, is carried out. These parts are closely connected to safety and fire prevention. The material ages or materials are wearing with foreseeable deterioration. If these parts show any abnormality before the recommended interval has passed, they should be repaired or replaced immediately. If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses. When replacing the hoses, always replace the O-rings, gaskets, and other related parts at the same time. The replacements should be carried out by a qualified service technician.

Inspection interval	Item
Daily	Hydraulic hoses - leakage of connections and end fittings
Monthly	Hydraulic hoses - leakage, damage of connections and end fittings
Yearly	Hydraulic hoses - leakage, damage, deformity and aging of connections and end fittings

Critical parts list for periodic replacement	Recommended interval
Hydraulic hoses	Every 6 years or 6000 hours, which occurs first
Seat belt	Every 3 years

Maintenance under special environmental conditions

Conditions	Maintenance	Related page
Water or near the ocean	Before operating, check the tightness of plugs and all drain hoses and stopcocks.	-
	After working near the ocean, clean the machine thoroughly with fresh water and dry out the electrical parts to prevent from corrosion. It is highly recommended to use dielectric grease in all harness connecting points for better sealing and to prevent corrosion.	-
	After working, grease the attachment pins or the areas affected by the water.	*112*
Freezing weather	Use the recommended lubricants.	*191*
	Fully charge the service battery regularly.	*177*
	Fully charge the traction battery regularly.	*178*
	When storing machines in extremely cold temperature, remove the service battery and store them at room temperature.	*90*
	Before parking, remove the mud and the dirt from the tracks.	-
Demolition work	Use fall protection over the cab against falling objects.	*115*
Dusty atmosphere	Clean the oil cooler at shorter service intervals.	*175*
	Clean the areas on the machine where dust, chips and similar may collect at shorter service intervals in order to minimize the risk of fire.	*182*
	Pay attention to and clean the battery and service compartment and surrounding areas regularly.	*185*

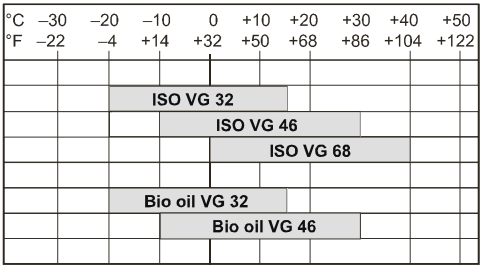
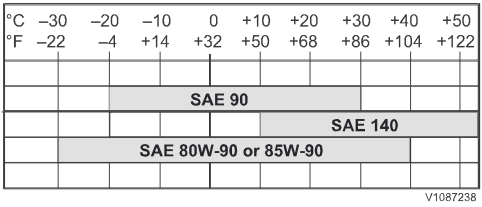
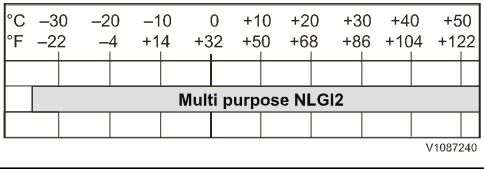
Specifications

Recommended lubricants

The Volvo lubricants have been specially developed to fulfil the demanding operating conditions, in which Volvo CE's machines are used in. The oils have been tested according to Volvo CE's specifications and therefore meet the high requirements for safety and quality.

Other mineral oils can be used if they conform to our viscosity recommendations and meet our quality requirements. The approval of Volvo is required, if any other oil base quality (e.g. biologically degradable oil) is to be used.

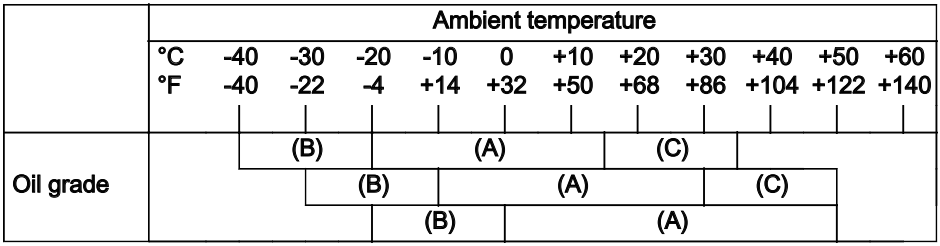
NOTE!
BIO-OIL and mineral oil must be disposed separately. Mixing is prohibited!

	Oil quality	Viscosity under different ambient temperatures
Hydraulic system	**Hydraulic oil** Acc. to ISO 6743/4 HV or DIN 51524-HVLP **Volvo Super Hydraulic Oil ISO 6743/4** Volvo Biodegradable Hydraulic oil	
Travel gear	**Gear oil Volvo Super Transmission Oil API GL5**	
Lubrication points	**Lubrication grease ISO 6743/0** **Volvo Super Grease Lithium EP2**	

ASTM: American Society of Testing and Material
SAE: Society of Automotive Engineers
ISO: International Standardization Organization
API: American Petroleum Institute

Hydraulic oil

Only Volvo genuine hydraulic oil approved by Volvo Construction Equipment must be used. Do not mix different brands of hydraulic oil as this can lead to damage in the hydraulic system.
For the hydraulic oil specification, see page *191*.



(A) : Ambient temperature recommended for general use of hydraulic system and components.
(B) : Ambient temperature guide for machine operation is from a hydraulic oil viewpoint only. In this range a warming-up period is needed to obtain proper performance.
(C) : Ambient temperature range to operate machine under special conditions, not a recommendation for general use conditions.

Additional recommendation for severe cold areas

A field solution for severe cold condition of ambient temperature between -40°C and +20°C.

- Type : Anti-wear type hydraulic oil
- Viscosity characteristic
  Viscosity index : More than 130
  Kinematic Viscosity : Less than 5,000cSt at -40°C, More than 5.6cSt at +90°C

NOTE!
This value is approximately equivalent to ISO Viscosity grade #22.

NOTE!
It is minimum theoretical recommendation without the guarantee of machine condition.

Service capacities and change intervals

Change capacities

Filling capacities Litres (US gal.)	
Hydraulic oil tank	23 (6.08)
Hydraulic system (total)	33 (8.72)
Travel gear	2 x 0.6 (2 x 0.16)

Change intervals

Please see lubrication and service chart on page *162*.

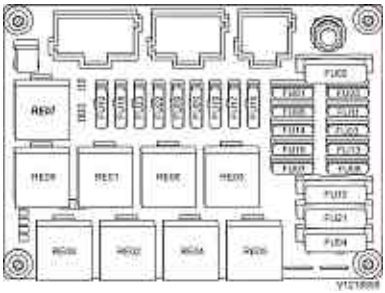
Electrical system

Electrical System	12 V	48 V
System voltage	12 V	48 V
Batteries	1	3
Battery voltage	12 V	48 V
Battery capacity	42 Ah	150 Ah per battery
Energy storage		19.8 kWh

Relays and fuses, 12V

NOTE!
The operator is only allowed to change the fuses and relays for the 12 V system.

Relays and fuses are located on the left hand side of the machine behind the side cover.



Relays

Relay	Relay function
RE01	V-ECU V2–ECU
RE02	I-ECU Key pad
RE03	Power outlet, horn V2–ECU, travel speed switch, travel pressure sensor, overload sensor
RE04	Eneble MBMU
RE05	Working light front
RE06	Cab fan Radio Rotating beacon, green Switch, rotating beacon backlight
RE07	Rotating warning beacon Working light, rear

RE08	Lock type 2
RE09	Lock type 2

Fuses

Fuse	Ampere	Function
FU01	15 A	Starter key
FU02	30A	Cooling fan hydraulic
FU03	5 A	Lock type 2
FU04	30 A	V-ECU V-ECU2
FU05	10 A	Rear hood sensor/Interlock fast charge plug
FU06	15 A	V-ECU
FU07	10 A	Working light front
FU08	5 A	I-ECU Key pad
FU09	15 A	Cab fan
FU10	30 A	Power outlet, horn V2–ECU, travel speed switch, travel pressure sensor, overload sensor
FU11	10 A	Rotating warning beacon Working light, rear
FU12	5 A	+ 30 key
FU13	10 A	MBMU On board charger
FU14	15 A	V2–ECU
FU15	10 A	V2–ECU
FU16	15 A	Power outlet, horn
FU17	15 A	V2–ECU, travel speed switch, travel pressure sensor, overload sensor
FU18	10 A	Armrest, quick coupler
FU19	10 A	Radio Rotating beacon, green
FU20	10 A	Switch rotating beacon backlight
FU21	30 A	Cab fan Radio Rotating beacon, green Switch, rotating beacon backlight

Fuse	Ampere	Function
FU22	10 A	V-ECU V2–ECU
FU23	20 A	V2–ECU

NOTE!
Use only fuses of specified capacity (Ampere rating).

Cab

General	
Cab interior, upholstery and insulation	Fire retardant (fire resistant) ISO 3795 and EN 474–1
Cab filter	Conforms to 43m^3/hour (1519 cu ft)

Operator seat	Operators seat meets the criteria of EN ISO 7096. Seat belt meets criteria of EN ISO 6683
Adjustment for operator weight	50–130 kg (110–287 lb)
Upholstery	Fire resistant
Lap type seat belt with reel	Yes (optional equipment)

Vibration and sound information

Hand-arm vibrations

Emission of hand-arm vibration during real operating conditions at its intended use is less than 2.5 m/s^2 RMS (root mean square) (8.1 ft/s^2) acceleration according to ISO 8041.

Whole-body vibrations

Emission of whole-body vibration during real operating conditions at its intended use is according to the table below.

Typical operating conditions	Vibration emission value $1.4a_{w,eqx}$ RMS	Vibration emission value $1.4a_{w,eqy}$ RMS	Vibration emission value $a_{w,eqz}$ RMS
Excavating	0.31 m/s² (1.01 ft/s²)	0.16 m/s² (0.52 ft/s²)	0.23 m/s² (0.75 ft/s²)
Hydraulic breaker app.	0.46 m/s² (1.51 ft/s²)	0.28 m/s² (0.92 ft/s²)	0.28 m/s² (0.92 ft/s²)
Transfer movement	0.56 m/s² (1.83 ft/s²)	0.45 m/s² (1.47 ft/s²)	1.36 m/s² (4.45 ft/s²)

The following vibration directions are defined:
x = fore and aft
y = lateral
z = vertical

The whole-body vibration values given above have been taken from ISO/CEN Technical Report.

NOTE!
These whole body vibration values was determined at particular operating and terrain conditions and it is therefore not representative for the various conditions in accordance with the intended use of the machine. Consequently this whole body vibration emission value declared by the manufacturer in accordance with European Standard is not intended to determine the whole body vibration exposure to the operator using this machine.

To ensure that the whole-body vibration emission during machine use is kept to a minimum, see “Whole-body vibrations”.

Sound information

	Canopy	Cab
Sound pressure level (LpA) at operator position (Measurement according to ISO 6396)	74 LpA dB(A)	74 LpA dB(A)
Sound power level (LwA) around the machine (Measurement according to 2000/14/EC with applicable appendices and measuring method according to ISO 6395)	84LwA dB(A)	84LwA dB(A)

Hydraulic system

Hydraulic system

	ECR25
Type:	LS flow sharing
Servo pressure:	35 bar (508 psi)
Standby pressure:	19 bar (290 psi)
Operating pressure, hydraulic system:	250 bar (3626 psi)
Secondary pressure:	
Boom cylinder	300 bar (4351 psi)
Bucket cylinder	280 bar (4061 psi)
Dipper arm cylinder	300 bar (4351 psi)
X1 Accessory	250 bar (3626 psi)

Specifications

Transmission

Travel system	ECR25D
Travel speed	1. Gear: 2.4 km/h (1.5 mph) 2. Gear: 4.5 km/h (2.8 mph)
Braking system	
Primary brake	Hydrostatic brake on both motors. If the traveling levers are released, the machine will come to a stop after a few seconds.
Secondary brake	Hydrostatic brake on one motor (in case one counterbalance valve fails). If the traveling levers are released, the machine will come to a stop after a few seconds.
Parking brake	Place the bucket and the blade to the ground.

Slewing system

Slewing system	
	Slewing ring with internal gearing and remote lubrication.
Slewing speed	9.4 rpm

Brake system	
Parking brake	Automatic (interlocking of slewing superstructure spring friction brake).
Primary brake	Hydrostatic brake. Release slewing gear control lever in order to stop the slewing gear.

Machine weights

Machine weights

The total machine weight (as specified on the machine's PIN plate) is calculated according to ISO 6016.

Configuration	Weight
Standard operational weight* (Machine with 250 mm (9.84 in) rubber tracks, cab, short arm and an operator weighing approximately 75 kg (165 lb))	2690 kg (6009 lb)
Maximum operational weight Machine with 300 mm rubber tracks, cab, long arm, hydraulic breaker HB03TLN with pin-on attach (187 kg/412 lb), OPG level 2, other options and an operator weighing approximately 120 kg (265 lb).	3140 kg (6923 lb)
MuC* (without operator)	2610 kg (5754 lb)
Weight reduction with canopy	– 88 kg (– 194 lb)

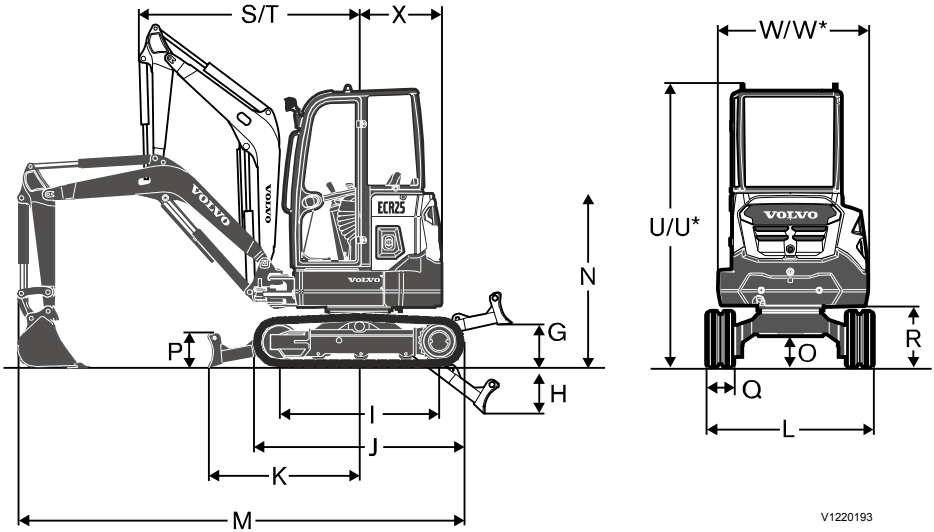
*MuC = Most usual Configuration

Ground pressure

(including operator weighing approximately 75 kg (165 lb))

ECR25			
Version	**Rubber tracks 250 mm (9.84 in)**	**Rubber tracks 300 mm (11.81 in)**	**Steel tracks 300 mm (11.81 in)**
Cab	0.33 kg/cm² (32.4 kPa)	0.29 kg/cm² (28.4 kPa)	0.30 kg/cm² (29.4 kPai)
Canopy	0.32 kg/cm² (31.4 kPa)	0.28 kg/cm² (27.5 kPa/3.7 psi)	0.29 kg/cm² (28.4 kPa/3.8 psi)

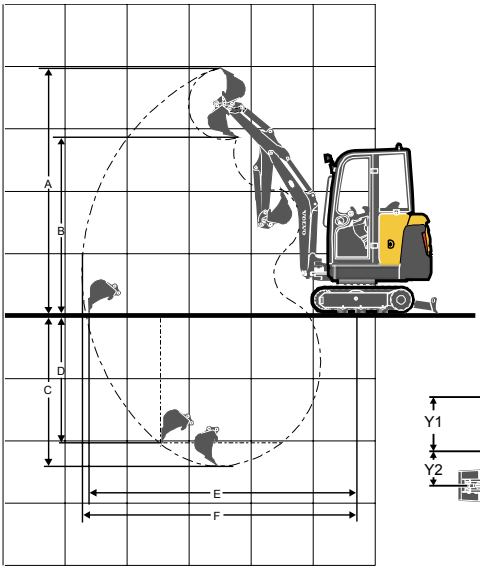
Dimensions

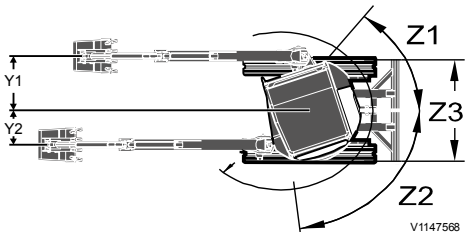


	ECR25, mm (in)	
Dipper arm	**Short arm, 1050 (41.3)**	**Long arm, 1350 (53.1)**
G Highest position dozer blade	401 (15.8)	
H Lowest position dozer blade	422 (16.6)	
I Tumbler length	1440 (56.7)	
J Track length	1906 (75.0)	
K Dozer blade, maximum reach at ground level	1365 (53.7)	
L Overall width	1550 (61.0)	
M Overall length	4060 (159.8)	3940 (155.1)
N Overall height of rear hood	1570 (61.8)	
O Minimum ground clearance	290 (11.4)	
P Dozer blade height	315 (12.4)	
Q Shoe width	250 (9.8) / 300 (11.8)	
R Ground clearance to superstructure	554 (21.8)	
S Front slew radius	2002 (78.8)	2025 (79.7)
T Front slew radius with max. offset	1555 (61.2)	
U Overall height (canopy)	2505 (98.6)	
V Overall height (cab)	2535 (99.8)	

W Overall width of superstructure	1340 (52.8)	
X Tail slew radius	750 (29.5)	825 (32.2)

Working ranges





Working ranges	ECR25	
Dipper arm	**1050 mm (41.3 in)**	**1350 mm (53.2 in)**
A. Maximum cutting height	4010 mm (157.9 in)	4183 mm (164.7 in)
B. Maximum dumping height	2897 mm (114.1 in)	3070 mm (120.9 in)
C. Maximum digging depth (with dozer blade lowered to ground)	2461 mm (96.9 in)	2761 mm (108.7 in)
D. Maximum vertical wall digging depth	1832 mm (72.1 in)	2119 mm (83.4 in)
E. Maximum digging reach at ground level	4313 mm (169.8 in)	4602 mm (181.2 in)
F. Maximum digging reach	4484 mm (176.5 in)	4768 mm (187.7 in)
Y1	784 mm (30.9 in)	
Y2	496 mm (19.5 in)	
Z1	56°	
Z2	72°	
Z3 (with 300 mm (11.8 in) tracks)	1550 mm (61 in)	

Recommended bucket sizes

Volvo recommended buckets, pin on type			
ECR25	**Cutting Width mm (in)**	**Capacity l (gal.)**	**Weight kg (lb)**
General purpose	250 (9.8)	34 (9)	40 (88.2)
	300 (11.8)	42 (11)	44 (97)
	350 (13.8)	56 (14.8)	50 (110.2)
	400 (15.7)		
	450 (17.7)	65 (17.2)	54 (119)
	500 (19.7)	74 (19.5)	59 (130)
	600 (23.6)	92 (24.3)	65 (143.3)
	750 (29.5)	119 (31.4)	78 (172)
Fixed ditching	1200 (47.2)	125 (33)	90 (198.4)
	1300 (51.8)	141 (37.2	96 (211.6)
Tiltable ditching	1200 (47.2)	125 (33)	131 (288.8)

Volvo recommended buckets, Lehnhoff quick coupler			
EC27D/ECR25D	**Cutting Width mm (in)**	**Capacity l (gal.)**	**Weight kg (lb)**
General purpose	300 (11.8)	43 (11.4)	50 (110.2)
	400 (15.7)	56 (14.8)	56 (123.5)
	500(19.7)	77 (20.3)	65 (143.3)
	600 (23.6)	92 (24.3)	72 (158.7)
	700 (27.6)	111 (29.3)	81 (178.6)
Fixed ditching	1200 (47.2)	125 (33)	96 (211.6)
	1300 (51.8)	141 (37.2)	102 (224.9)
Tiltable ditching	1200 (47.2)	125 (33)	138 (304.2)

Volvo recommended buckets, symmetrical type, Interface: S40				
ECR25D	**Bucket Width mm (in)**	**Cutting Width mm (in)**	**Capacity l (gal.)**	**Weight kg (lb)**
General purpose GPX with teeth	515 (20.3)	550 (21.7)	95 (25.1)	113 (249)
General purpose GPX without teeth				100 (220)
Cable bucket CAX	315 (12.4)	350 (13.8)	50 (13.2)	74 (163)
			85 (22.5)	95 (209)

Volvo recommended buckets, symmetrical type, Interface: S40				
ECR25D	Bucket Width mm (in)	Cutting Width mm (in)	Capacity l (gal.)	Weight kg (lb)
Tiltrotator grading bucket TGX	1075 (42.3)	1100 (43.3)	120 (31.7)	124 (273)
Tiltable ditching bucket	1164 (45.8)	1200 (47.2)	125 (33)	136 (300)

Contact your dealer to define the optimal tool for your business.

Digging forces

Digging forces with direct mounted buckets		
Bucket radius	SAE, at bucket tooth	626 mm (24.6 in)
	ISO, at bucket blade	568 mm (22.4 in)
Break-out force	SAE, at bucket tooth	20.26 kN (4555 lbf)
	ISO, at bucket blade	22.33 kN (5020 lbf)
Tear-out force	SAE, at bucket tooth	17.28 kN (3885 lbf)
	ISO, at bucket blade	17.76 kN (3993 lbf)
Angle of rotation, bucket		205°

Lifting capacities

NOTE!
Do not transport objects in lifting gear operation if the machine is not equipped with a line rupture valve on the boom, appropriate lifting hook, an overload warning function and a table stating the nominal lifting loads for lifting gear operation.
The lifting table is a decal inside the cab.

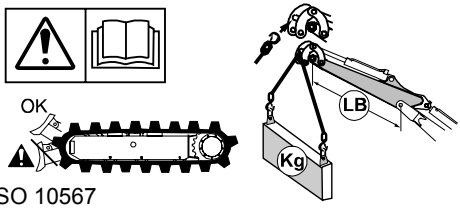
Lifting capacities are 75% of the tipping load or 87% of the hydraulic limit.
Load capacities marked with an asterisk (*) are limited by machine's hydraulic lifting capacity rather then tipping load.

The specified values are valid for a machine:
- without attachment and without attachment bracket.

NOTE!
If handling is accomplished in lifting gear operation the weight of the attachments must be subtracted from the values stated in the table.

- on level and firm ground.
- with rubber tracks.
- equipment during full rotation.
- equipment parallel to the axis of the superstructure.
- with a 75 kg (165 lb) driver in the cab.

Lifting capacities ECR25, Cab, with safety valves on dipper arm and boom (not on dozer blade)



ISO 10567

	X(m)	1,0		1,5		2,0		2,5		3,0		3,5		4,0		Max		X
	Y (m)	L	F	L	F	L	F	L	F	L	F	L	F	L	F	L	F	max
L= 1.05m	3									519	544					506	530	3048
	2,5									520	545					420	440	3429
	2							636*	636*	513	538	408	424			377	394	3667
	1,5							655	690	502	526	401	419			353	369	3808
	1							633	668	490	514	394	413			343	358	3858
	0,5							617	652	480	504	389	407			344	360	3824
	0					849	904	610	644	474	498	385	403			358	374	3708
	-0,5	1300*	1300*	1397	1494*	850	907	609	643	473	497					388	406	3489
	-1	1919*	1919*	1407	1534	858	914	613	647	477	501					449	471	3144
	-1,5			1436	1556	872	929	626	661							593	625	2600
L= 1.35m	2,5											410	429			395	382	3752
	2									500*	500*	407	425			332	347	3971
	1,5							662	677*	503	528	400	418	326	341	314	328	4094
	1					884	942	637	672	489	514	392	410	322	337	306	319	4142
	0,5					850	907	616	651	477	501	384	402	318	333	306	320	4111
	0			789*	789*	838	894	604	638	468	492	379	397	316	330	316	330	4002
	-0,5	1029*	1029*	1264*	1264*	835	892	599	633	464	488	376	394			337	353	3807
	-1	1480*	1480*	1378	1503	840	897	600	634	464	488	379	397			379	397	3502
	-1,5	2048*	2048*	1396	1522	851	907	607	642	472	496					463	486	3046
	-2			1427	1550*	872	930									700	741	2314

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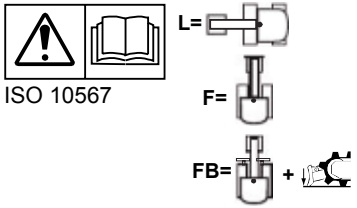
V1220143

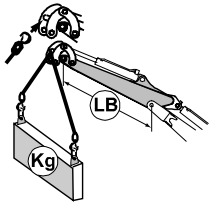
C = additional counterweight

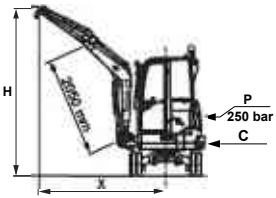
LB = length of dipper arm

* = Limited by machine's hydraulic lifting capacity rather than tipping load.

Lifting capacities ECR25, Cab, with safety valves on dipper arm, boom and dozer blade







	X(m)	1.0			1.5			2.0			2.5			3.0			3.5			4.0		
	Y (m)	L	F	FB	L	F	FB	L	F	FB	L	F	FB	L	F	FB	L	F	FB	L	F	FB
L= 1.05 m	3													619	544	587*						
	2,5													630	545	547*						
	2										636*	636*	636*	513	536	600*	406	424	502*			
	1,5										655	690	825*	502	526	693*	401	419	632*			
	1										633	668	1025*	490	514	797*	394	413	696*			
	0,5										617	652	1168*	480	504	894*	389	407	733*			
	0							848	904	1602*	610	644	1231*	474	496	934*	385	403	758*			
	-0,5	1300*	1300*	1300*	1397	1494*	1494*	850	907	1704*	602	643	1221*	473	497	933*						
	-1	1919*	1919*	1919*	1407	1534	2341*	856	914	1546*	613	647	1129*	477	501	850*						
	-1,5				1428	1556	1837*	872	929	1238*	626	661	879*									
L= 1.35 m	2,5																410	429	464*			
	2													500*	500*	500*	407	425	508*			
	1,5										662	677*	677*	503	528	599*	400	418	560*	326	341	547*
	1							884	942	1334*	637	672	895*	489	514	715*	392	410	626*	322	337	577*
	0,5							850	907	1464*	616	651	1077*	477	501	827*	384	402	687*	318	333	606*
	0				789*	789*	789*	838	894	1608*	604	638	1187*	466	492	897*	376	397	733*	316	330	623*
	-0,5	1028*	1028*	1028*	1264*	1264*	1264*	836	890	1755*	599	633	1222*	464	488	829*	376	394	748*			
	-1	1480*	1480*	1480*	1378	1503	1843*	840	897	1659*	600	634	1183*	464	488	902*	379	397	893*			
	-1,5	2048*	2048*	2048*	1396	1522	2281*	851	907	1449*	607	642	1046*	472	496	764*						
	-2				1427	1550*	1550*	872	930	1012*												

VOLVO - ECR25Electric

54457425 P01

V1220144

C = additional counterweight

LB = length of dipper arm

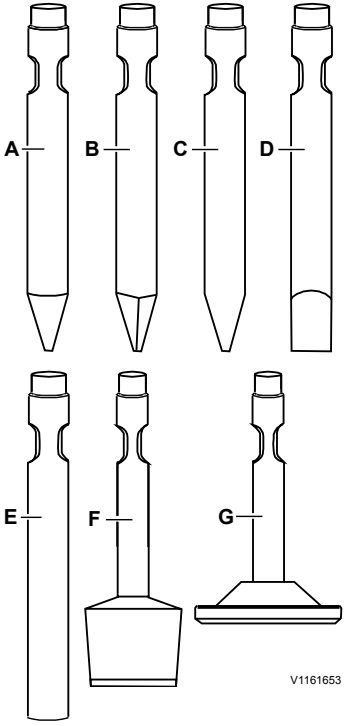
* = Limited by machine's hydraulic lifting capacity rather than tipping load.

Hammer (hydraulic breaker)

Hydraulic breaker

ECR25	HB03TLN
Operating weight	175 kg (385.8 lb)
Breaker weight	153 kg (337.3 lb)
Overall length	1488 mm (58.58 in)
Tool diameter	57 mm (2.24 in)
Flow rate	23–70 l/min (6–18.5 US gal/min)
Operating pressure	9–12 MPa
Impact rate	600–1500 bpm
Sound power level	110 dB(A)

Breaker brackets for HB03TLN	Pin on type	Lehnhoff	Symmetrical type (S40)
Weight	18 kg (39.7 lb)	20 kg (44.1 lb)	17.5 kg (38.6 lb)



Hammer tools

A Moil point

B Pyramid moil

C Chisel parallel

D Chisel transversal

E Blunt

F Spade

G Compacting plate

Service history

Service 50 hours		Type of service	Signature and stamp
Date	Hours	☐ 50 hours inspection	

Service 250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and Maintenance	

Service 500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 1000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 1250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 1500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 1750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 2000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 2250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 2500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 2750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 3000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 3250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 3500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 3750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 4000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 4250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 4500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 4750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 5000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 5250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 5500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 5750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 6000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 6250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 6500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 6750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 7000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 7250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 7500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 7750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 8000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 8250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 8500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 8750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 9000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 9250 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 9500 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 9750 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

Service 10000 hours		Type of service	Signature and stamp
Date	Hours	☐ Service and maintenance	

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