

EC15D/EC18D/EC20D

VOLVO CONSTRUCTION EQUIPMENT

OPERATOR'S MANUAL

EC15D/EC18D/EC20D



VOLVO

Volvo Construction Equipment

Ref. no. PUB20043147
2015.03
Volvo, Konz

English

English



Foreword

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.

OPERATOR'S MANUAL

Table of contents

Presentation

Instrument panels

Other controls

Operating instructions

Operating techniques

 Safety when servicing

Maintenance

Specifications

Alphabetical index

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 21.

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



Handwriting practice lines consisting of 20 horizontal dotted lines.

Table of contents

Foreword	1
Identification numbers	3
Presentation	9
Machine view	14
CE-marking, EMC-directive	16
Communication equipment, installation	19
Safety components	20
Product plates	21
Information and warning decals	23
USA federal clean air act	27
Instrument panels	30
Instrument panel, left	31
Display unit	33
Instrument panel, right	36
Other controls	40
Controls	40
ROPS	48
Operator comfort	49
Operating instructions	56
Safety rules when operating	58
Measures before operating	63
Starting engine	64
Stopping	68
Parking	69
Retrieving and towing	71
Attachments, alternative lowering	72
Transporting machine	74

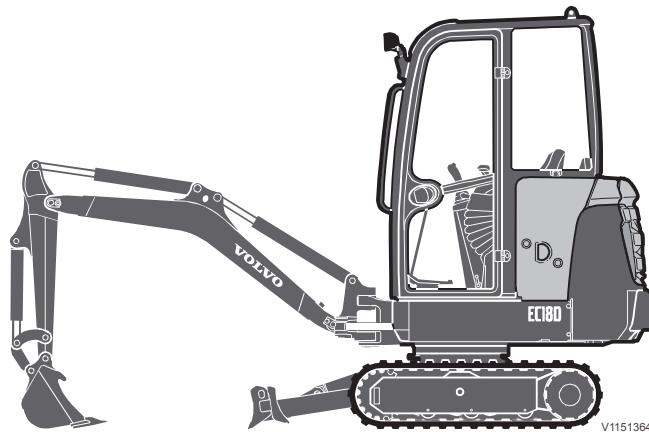
Operating techniques	77
Eco driving	78
Whole-body vibrations	79
Rules for digging	81
Working within dangerous areas	82
Attachments	90
Attachments, connecting and disconnecting	92
Attachment brackets	93
Pressure release	96
Buckets	97
Offset boom	98
Special hydraulics	99
Hammer	100
Hose rupture valves	104
Tracks	105
Lifting objects	106
Signalling diagram	110
Safety when servicing	113
Service position	114
Before service, read	115
Entering, leaving and climbing the machine	118
Fire prevention	119
Handling hazardous materials	122
Handling line, tubes and hoses	125
Maintenance	126
Lubrication and service chart	130
Maintenance service, every 10 hours	136
Maintenance service, every 50 hours	140
Maintenance service, every 500 hours	142
Maintenance service, every 1000 hours	144
Maintenance service, when required	145

Specifications	154
Recommended lubricants	154
Fuel system	159
Service capacities and change intervals	161
Engine	162
Electrical system	163
Cab	165
Hydraulic system	167
Specifications	168
Machine weights	169
Ground pressure	170
Dimensions	171
Working ranges	173
Digging forces	175
Lifting capacities	176
Hammer	192
Service history	193
Alphabetical index	199



Handwriting practice lines consisting of 20 horizontal dotted lines.

Presentation



Intended use

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

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.

Engine

The Volvo engine is a 3-cylinder D0.9A type diesel engine with water cooling.

Electrical system

The machine has six electronic units:

- I-ECU (display unit, includes V-ECU/vehicle unit)
- H-ECU 1 (X1, boom offset)

- H-ECU 2 (X3, optional)
- A-ECU (anti theft, optional)
- K-ECU (anti-theft key pad, optional)
- W-ECU (CareTrack, 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 relays and fuses are grouped in the electrical box under the cover on the left side of the machine, close to the battery disconnect switch.

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 3471-1
- 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, through a dealer, having discussed the alteration with personnel at the Volvo Construction Equipment Engineering Department. This department 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 bracket and hammer.

Modifications

Modifications of this machine, including the use of unauthorized attachments, accessories, units, or parts, may affect the machine's integrity (condition) and/or the machine's ability to function in the way for which it is designed. Persons or organizations performing unauthorized modifications assume all responsibility for consequences that arise due to modifications or can be attributed to modifications, including damaging affect 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 through the main chassis via two rubber tracks. The tracks for EC18D and EC20D are each driven by a two speed travel motor. The tracks for EC15D are each driven by a one 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 supplies anti-theft devices as optional equipment. If your machine is not yet equipped with one, check the possibilities of having such a device installed by your dealer.

CareTrack

(optional equipment)

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

The system stores machine data, e.g. machine position, operating hours, daily usage hours, that can be sent by wireless transmission to a computer. The service history can be reviewed on a secure website and service reminders can be sent both by email and on a mobile phone. Part changes can be planned for specific wear parts and reminders can be sent when the changes are due.

The geofence and timefence functionality gives the opportunity to decide in which geographical boundaries and at which times the machine must operate. An alarm can be sent by email or to a mobile phone if it breaks those rules.

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.

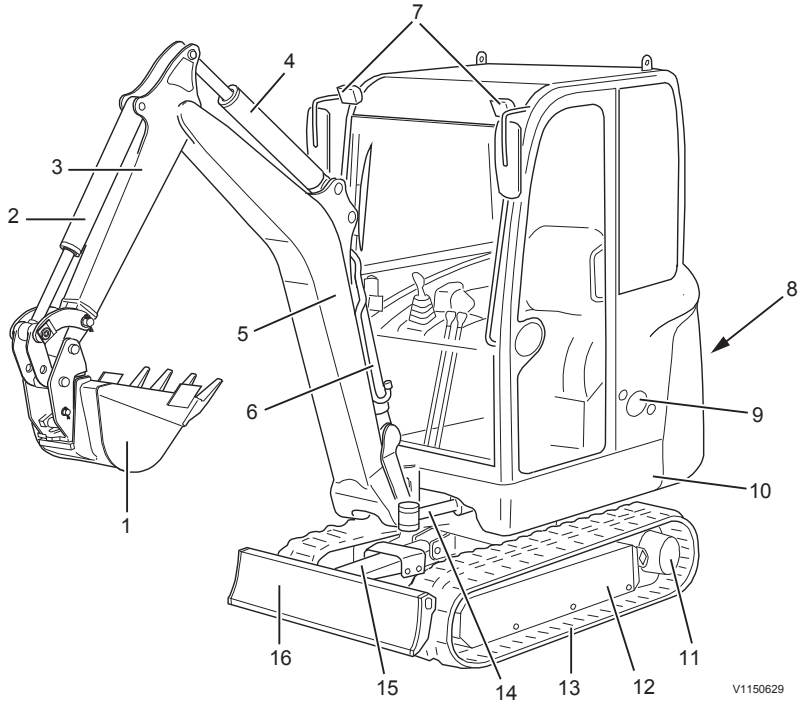
Local precautions and restrictions applicable to mobile phones, for example safety distance, also apply to the CareTrack system.



Machine view

Applies to models: EC15D, EC18D

EC15D/EC18D

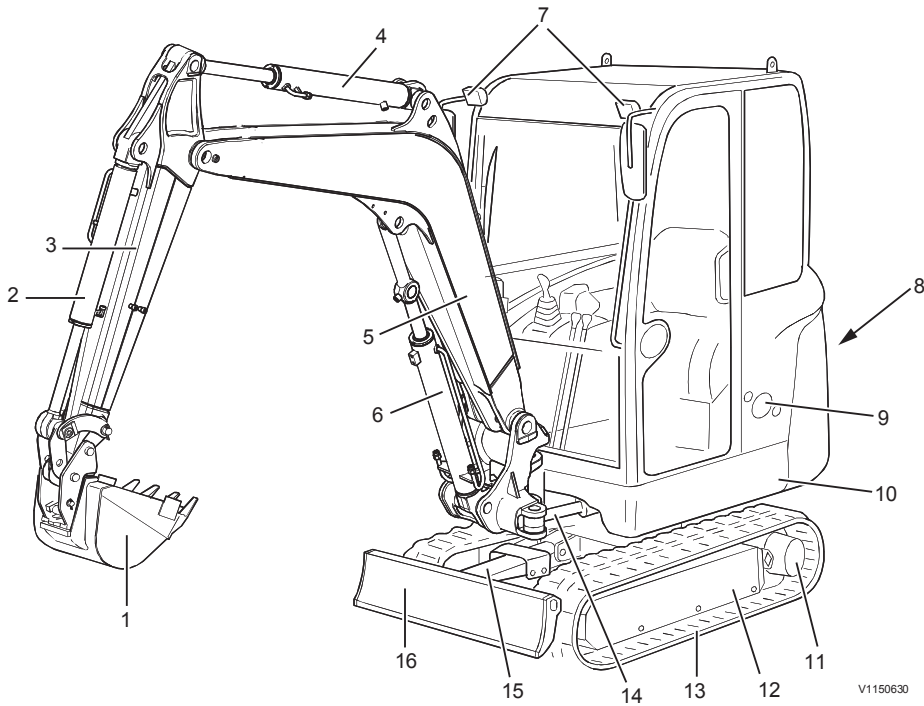


V1150629

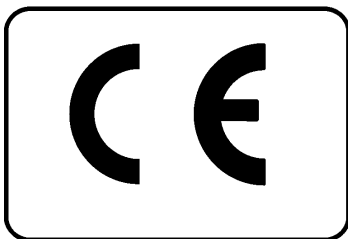
1	Bucket	9	Batterie disconnect switch
2	Bucket cylinder	10	Superstructure
3	Dipper arm	11	Travel motor
4	Dipper cylinder	12	Undercarriage
5	Boom	13	Tracks
6	Boom cylinder	14	Boom offset cylinder
7	Working lights	15	Dozer blade cylinder
8	Rear hood	16	Dozer blade

Applies to models: EC20D

EC20D



1	Bucket	9	Batterie disconnect switch
2	Bucket cylinder	10	Superstructure
3	Dipper arm	11	Travel motor
4	Dipper cylinder	12	Undercarriage
5	Boom	13	Tracks
6	Boom cylinder	14	Boom offset cylinder
7	Working lights	15	Dozer blade cylinder
8	Rear hood	16	Dozer blade



V1054128

CE-marking, EMC-directive

CE marking

(Declaration of Conformity)

This machine is CE-marked. This means that, when delivered, it meets the applicable "Essential Health and Safety Requirements", stated in the EU Machinery Directive 2006/42/EC.

The manufacturer is not responsible for unauthorized changes that can affect machine safety.

An EU Declaration of Conformity as well as a sound certificate regarding sound power in dB(A) are supplied as proof that the requirements are fulfilled. The sound certificate includes both measured external values and guaranteed sound power level. These declarations are issued by Volvo for every individual machine. This EU-declaration also includes attachments manufactured by Volvo. The documentation is a valuable document and shall be saved in a safe location for at least ten years. The documentation shall always accompany the machine when it is sold.

If the machine is used for other applications or with other attachments than described in this manual, safety must always be ensured in each individual case. A change may in certain cases require a new CE-marking and issuing of a new EU Declaration of Conformity. The person responsible for this is the same person who makes the change.

EU EMC Directive

The machine's electronic equipment may in some cases interfere with other electronic equipment, or be interfered with by external electromagnetic interference, which may result in safety risks.

The EU EMC directive 2004/108/EC about "Electromagnetic compatibility" provides a general description of what requirements can be made of the machine from a safety perspective, where permitted limit values have been determined and stated in international standards.

A machine or device must meet the requirements to be CE-marked. Our machines have been specially tested for electromagnetic interference.

Presentation
CE-marking, EMC-directive 17

The machine's CE-marking 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

Below you find a generic copy of the EU conformity certificate for machinery.

NOTE!

The Declaration of Conformity is only applicable in the European Union.

EU conformity certificate

We, the manufacturer

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

The technical documentation is maintained by:
Mr. Marc Gergaud, Volvo Construction
Equipment, Belley France

declare that the following equipment

Excavator

Model	Serial Number	Output	Representative Sound Power Level (LWA)	Guaranteed Sound Power Level (LWA)	Year of CE-Marking
EC15D		12 kW	93 dB(A)	93 dB(A)	
EC18D			93 dB(A)	93 dB(A)	
EC20D			93 dB(A)	93 dB(A)	

complies with the following relevant directives:

- EC Directive "Machinery" 2006/42/EC
- EC Directive "Noise Emission" 2000/14/EC
- EC Directive "EMC" 2004/108/EC
- As well as EC Directive "Low Voltage" 2006/95/EC for electric heating / electric generator

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.

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 2004/108/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 means that the components are intended to fulfil a safety 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
- Components included in systems to improve the operator's visibility
- Complete operator's seat incl. lap-type 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.

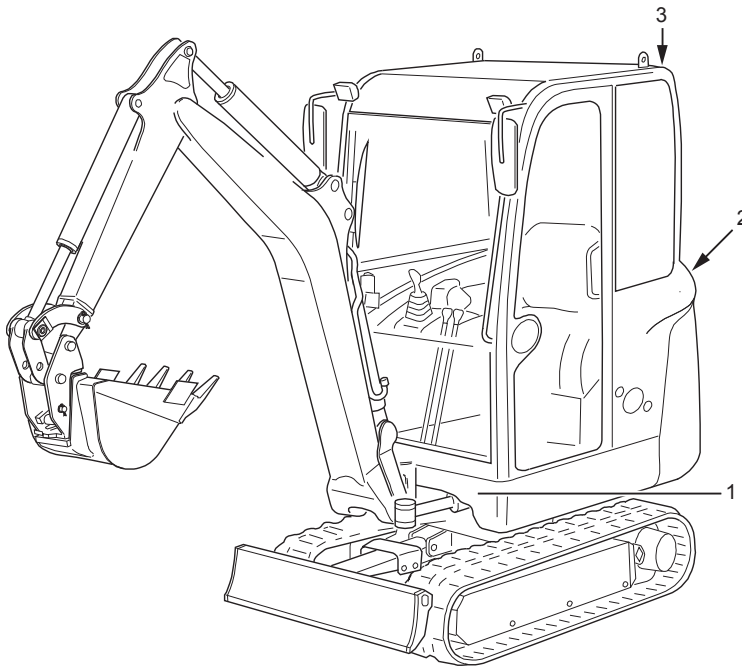
When changing machine operator/owner, malfunctions and defects of safety-classified machine and spare parts shall be reported immediately and an action plan shall be established.

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.



V1150631

V	C	E	E	C	3	5	C	C	0	0	0	1	2	3	4	5
A							B									D

V1076896

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) and supplementary PIN plate (EU countries only)

The product plate contains name and address of manufacturer, model/type designation and 17 digit PIN number.

The supplementary plate contains information about machine mass in kg, engine net power in Kw, manufacturing year, machine serial number and a CE-mark.

Machine mass

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

For safety reasons, 103% of the machine mass will be shown on the supplementary PIN plate.

2 Engine identification plate

The engine identification contains information about manufacturer, designation and engine serial number.

3 TOPS/ROPS and OPG plate

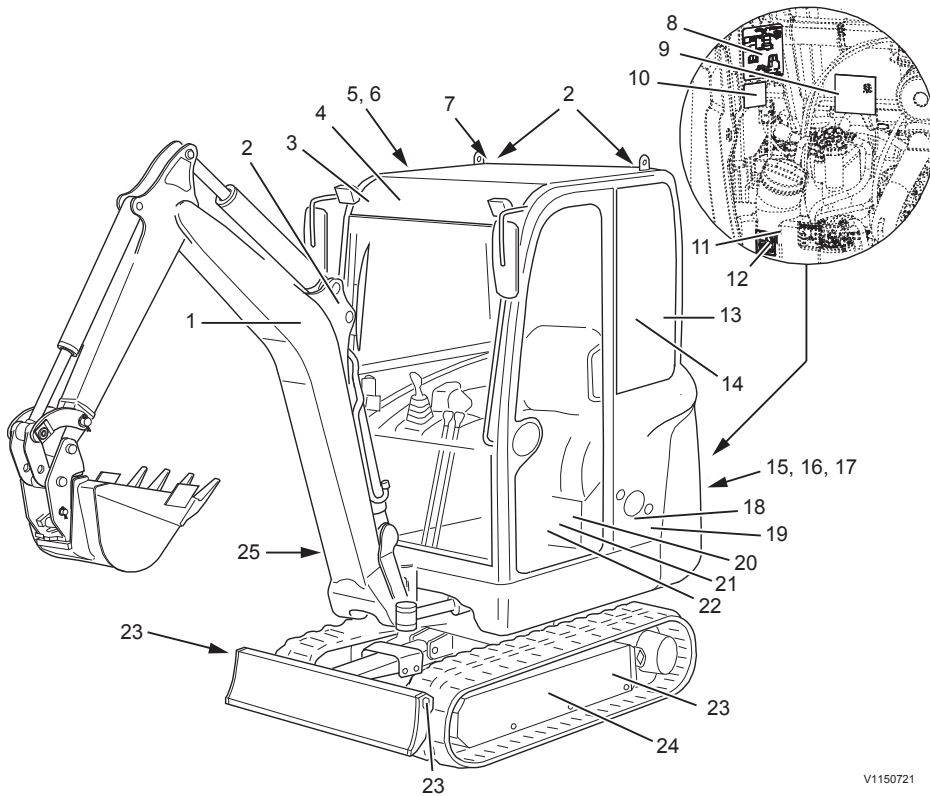
The plate is located inside the cab above the rear windscreen (Canopy: underneath the roof). TOPS (Tip-Over-Protection-Structure) and ROPS (Roll-Over-Protection-Structure) provide roll over protection in case the machine should turn over. OPG (Operator Protective Structure) provides protection against 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.

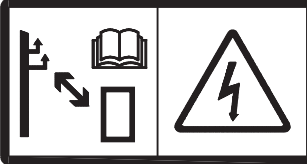
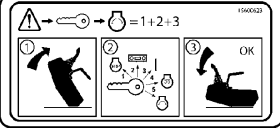
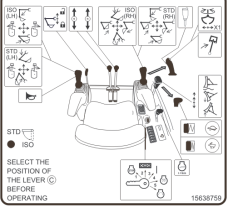
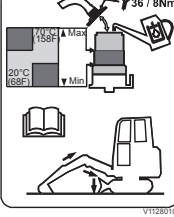
NOTE!

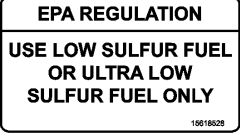
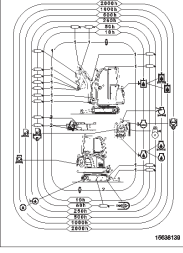
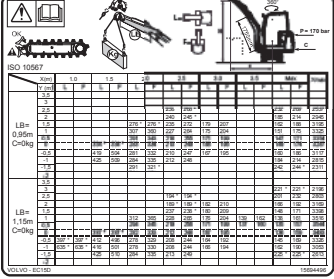
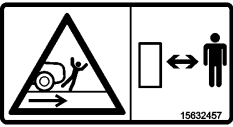
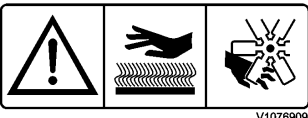
The word WARNING is given on the warning decals for North America.



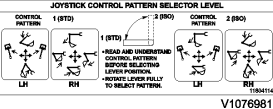
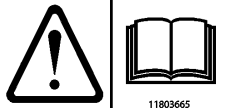
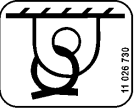
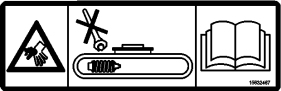
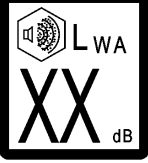
V1150721

24 Presentation Information and warning decals

 V1142086 1 WARNING! Do not stand in the vicinity of a raised load (Decal on both sides of the boom).	 V1076978 2 Lifting points (2 lifting points on roof, 2 on boom).
 V1077000 3 WARNING! Operate backhoe from operator's seat (North America only).	 V1079478 4 WARNING! High voltage. Keep sufficient distance from electrical power lines. See page 82.
 V1076984 5 Procedure to start the engine (Canopy: underside the roof).	 V1076970 6 Operator's stand control elements (Canopy: underneath the roof).
 V1076977 7 Alternative exit path.	 V1128010 8 WARNING! Read and understand the hydraulic oil filling instruction before filling.

 9 WARNING! No ether (North America only).	 10 Hydraulic oil filler point.
 11 Use low sulfur fuel (North America only).	 12 Fuel filler point.
 13 Lubrication and maintenance chart (Canopy: underside the roof).	 14 Lifting capacities (not in machines without safety valves) (Canopy: underneath the roof).
 15 WARNING! Do not enter the machine's working area. Risk of crushing!	 16 WARNING! Rotating parts and hot surfaces.
 17 VOLVO Coolant VCS (Decal underside the rear hood). For coolant specifications see page 157.	 18 Battery disconnect switch.

26 Presentation Information and warning decals

 19 WARNING! Read and understand control pattern before selecting lever position (North America only).	 20 WARNING! Move the control lockout lever up to lock the system securely when leaving the machine.
 21 WARNING! First read the Operator's Manual.	 22 Fasten seat belt.
 23 Tie down points (2 tie down points on blade, 2 on undercarriage).	 24 WARNING! Track tension, check the tension every day – read the Operator's Manual.
 25 Sound power level outside the machine.	

USA federal clean air act

The Federal Clean Air Act Section 203.a (3) prohibits the removal of air pollution control devices or the modification of an EPA-certified non-road engine to a non certified configuration.

The Federal regulations implementing the Clean Air Act for non-road engines, 40 CFR 89.1003(a)(3)(i), reads as follows:

The following acts and the causing thereof are prohibited:

For a person to remove or render inoperative a device or element of design installed on or in a non-road engine vehicle or equipment in compliance with the regulations under this part prior to its sale and delivery to the ultimate purchaser or for a person knowingly to remove or render inoperative such a device or element of design after the sale and delivery to the ultimate purchaser.

The law prescribes a fine of up to \$2,750 USD for each violation.

An example of a prohibited modifications is the recalibration of the fuel system so that the engine will exceed the certified horsepower or torque.

You should not make a change to an EPA-certified non-road engine that would result in an engine that does not match the engine configuration certified to meet the Federal Standards.

Customer Assistance

Volvo Construction Equipment wishes to help assure that the Emission Control System Warranty is properly administered. In the event that you do not receive the warranty service to which you believe you are entitled under the Emission Control System Warranty, you should contact the nearest Volvo Construction Equipment regional office for assistance.

Normal non-road engine use

The maintenance instructions are based on the assumption that this conventional machine will be used as designated in the operator's instruction manual and operated only with the specified fuel and lubrication oils.

Non-road engine maintenance

This is a non-road engine of conventional design and any local dealer may perform the necessary non-road emission control maintenance as defined in this manual.

Volvo recommends that the purchaser use the service program for the non-road engine, known as preventative maintenance, including the recommended engine emission control maintenance.

In order to document that the proper regular maintenance has been performed on the non-road engine, Volvo recommends that the owner keep all records and receipts of such maintenance. These records or receipts should be transferred to each subsequent purchaser of the non-road engine.

Service performed by your local dealer

Your local dealer is best suited to give you good, dependable service since he has trained service technicians and is equipped with genuine original manufacturer's parts and special tools and the latest technical publications. Discuss your servicing and maintenance requirements with your local dealer. He can tailor a maintenance program for your needs.

For scheduled service or maintenance, it is advisable to contact your local dealer in advance to arrange for an appointment to ensure availability of the correct equipment and service technician to work on your machine. In this way you will assist your local dealer in reducing the time required to do service on your machine.

Preventive maintenance program

In order for the conventional non-road engine to retain the reliability and performance parameters such as noise level and emission levels it had when delivered, it is essential that it receives regularly scheduled service, inspections, adjustments, and maintenance.

Fuel system

Fuel recommendations:

The fuel used must be clean, completely distilled, stable and non-corrosive. Distillation range, cetane level and sulfur content are most important when selecting fuel for optimum combustion and minimum wear.

Engine working conditions and ambient temperature influence the selection of the fuel with respect to cold handling properties and cetane levels.

In cold weather conditions, below 0 °C (32 °F), the use of lighter distillate or higher cetane level fuel are recommended. (Final boiling point maximum 349 °C (660 °F) and cetane minimum 45.).

In order to avoid excessive sedimentation and to minimise the emissions of sulfur dioxide, the fuel's sulfur content should be as low as possible. The diesel fuels recommended for use shall meet ASTM designation: D 975 no. 1D (C-B) or no. 2D (T-T) with a cetane level above 42 and sulfur content not exceeding 0.05 percent by weight.

Check for fuel leaks (with the engine running at high idle):

- Visually check unions and hose connections.

Check the condition of the fuel hoses for:

- Ageing
- Cracks
- Blisters
- Scuffing

Check the condition of the fuel tank:

- Drain condensation water.
- Check for cracks.
- Check for leaks.
- Check the mounting.

Check the turbocharger:

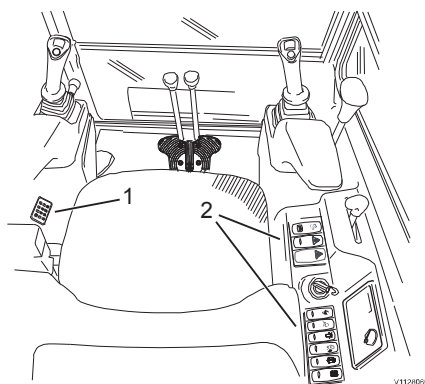
- Visually check for leaks in the intake hoses and exhaust pipe of the turbocharger.

Instrument panels

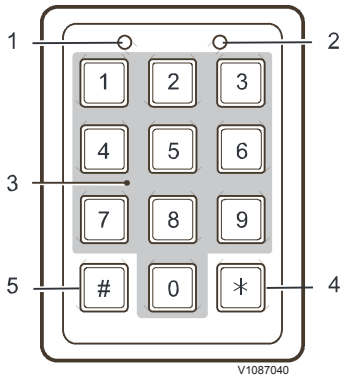
NOTE!

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	Instrument panel, left
2	Instrument panel, right



Instrument panel, left

Anti-theft system (optional equipment) on left instrument panel

- 1 Green LED (Light Emitting Diode) shows the function of the keyboard.
 - Lights for a moment when pressing one of the keys.
- 2 Red function LED shows the status of the anti-theft device.
 - Flashes, if the machine can be started without entering the code.
 - Lights permanently if the anti-theft device is activated. The machine cannot be started.
- 3 Keys for input of code.
 - The system allows for the use of a maximum of two 4-digit codes. The machine can be protected by either one or two codes. In either of these cases the engine can be started after one of the two codes is entered. Both codes can be individually changed.
- 4 Key to confirm or release a code.
- 5 Key to edit a stored code.

Function

1	Code (current) + 	Unlocking or enabling the anti-theft device.
2	Code (current) + 	Preparing the anti-theft device to change the code.
	Code (current) + 	
3	Code (new) + 	Setting the new code for the anti-theft device.
	Code (new) + 	

- 1 Insert the ignition key into the ignition switch and turn it to running position (position 1), the red LED (2) lights permanently.
 - 2 Enter the code (4-digit), press key (4) and start the engine. The red LED (2) flashes.
- When shutting down the engine (ignition key in stop position (position 0)) the anti-theft device is

activated after 15 minutes. After this the code must be entered again for starting.

- However, the anti-theft device can also be activated directly, which requires to enter the code and press key (4) before switching off the ignition.
- If the pause between the input of each digit exceeds ten seconds, the input of the code must be repeated from the beginning.
- The input of the code must also be repeated if the input is interrupted by switching off the ignition or the battery.
- Disconnecting the battery automatically activates the anti-theft device.

Changing the code

- 1 Insert the ignition key into the ignition switch and turn it to running position (position 1). Enter the current code and press key (4) to unlock or enable the anti-theft control. The red function LED flashes.
- 2 Enter the current code, press key (5), enter the current code again and press key (5) again to confirm the programming (both control lights light up for approx. 1 sec.).
- 3 Enter the new code, press key (5), enter the new code again and press key (5) again to confirm programming of the new code (both control lights light up for approx. 1 sec.).

Factory code

- If both codes are unknown, or have been inadvertently edited, you must inform the customer service department of Volvo about the serial number of the machine, so that the anti-theft device can be deactivated.

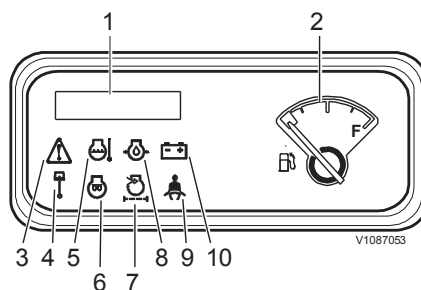
After validation you will receive the auxiliary code, which enables you to delete both programmed codes. After this you can again individually program one or two codes.

Display unit

The display unit is located on the right instrument panel.

An automatic test is performed on the I-ECU when the ignition key is turned to running position. For 3 seconds all the control lamps light up, buzzer sounds and fuel gauge needle goes to maximum position.

The preheating control lamp goes out as soon as the operating temperature is reached.



1	Operating hour meter
2	Fuel level gauge
3	Central warning lamp
4	Offset control lamp
5	Engine temperature control lamp
6	Preheating control lamp
7	Air filter control lamp
8	Engine oil pressure control lamp
9	Seat belt control lamp
10	Battery charge control lamp

1. Operating hour meter

- The operating hour meter shows the total number of machine operating hours.
- Maintenance work is to be carried out according to the reading of the operating hour meter.

2. Fuel level gauge

- The fuel level gauge shows the level in the fuel tank.
- Always refuel in due time, thus to prevent air from entering into the fuel system.



3. Central warning lamp (red)

The lamp lights up when control lamps 5, 7, 8 or 10 light up. The buzzer sounds when control lamp 5 and 8 lights up. If any red control lamp lights up, shut down the engine immediately, determine the cause and have the cause of the fault corrected as quickly as possible, or contact our service department.



4. Offset control lamp (green)

- The offset control lamp lights up green after offset switch on the right hand control lever has been switched to offset.
- If the accessory flow setting menu is activated, this symbol is flashing, in this case, this means that we are in settings menu.

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. The offset control lamp blinks when the roller is not in its neutral position and the proportional function (X1 or boom offset) is disabled.

The function becomes active (operational) once the roller comes back to its neutral position.



5. Engine temperature control lamp (red)

- The engine temperature control lamp lights up in case of impermissibly high engine temperatures and the buzzer sounds.
- Shut down the engine, perform trouble shooting, if necessary contact a workshop authorised by Volvo Construction Equipment.



6. Preheating control lamp (yellow)

- Ignition key in preheating position, the control lamp lights up and goes out as soon as the specified operating temperature is reached.



7. Air filter control lamp (yellow)

- The control lamp informs about the condition of the air filter.
- If the control lamp lights up during operation in connection with central warning lamp (3), shut down the engine, clean or replace the air filter immediately, if necessary contact a workshop authorised by Volvo Construction Equipment.



8. Engine oil pressure control lamp (red)

- The control lamp indicates low engine oil pressure.
- If the control lamp lights up during operation in connection with general control light (3), shut down the engine and perform trouble shooting. If necessary contact a workshop authorised by Volvo Construction Equipment.



9. Seat belt control lamp (red)

Always fasten your seat belt when operating the machine.

- The control lamp will illuminate when the seat belt is not fastened. The control lamp goes out as soon as the seat belt is fastened.



10. Battery control lamp (red)

- The control lamp indicates the charge condition of the battery. The control lamp lights up if the battery is not being charged.
- If the control lamp lights up during operation in connection with general control lamp (3), turn off the engine, perform trouble shooting. If necessary contact a workshop authorised by Volvo.



Central warning lamp



Engine temperature control lamp



Engine oil pressure control lamp

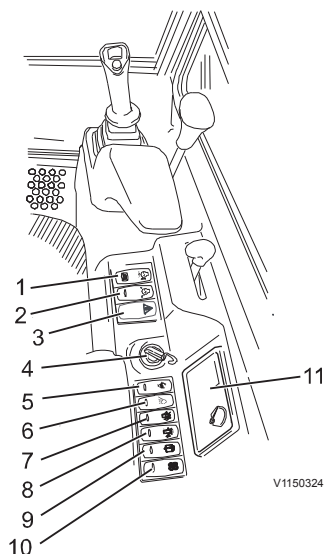
Automatic engine shutdown function

This function is made to avoid engine damage. In case of low oil pressure or high water temperature (or both) the central warning lamp, the related lamps (engine temperature control or engine oil pressure control) and the buzzer are activated.

The engine will shut down automatically if these warning conditions are still valid after 15 seconds.

To retrieve the machine out of a dangerous area the engine can be restarted.

- Turn the key to off position and start the engine again. The countdown resets and if conditions are still valid it will shut down again after 15 seconds.



Instrument panel, right

1	Switch for automatic shutdown (optional equipment, not for EC15D)
2	Switch for automatic engine speed control — auto idle (optional equipment, not for EC15D)
3	Switch for attachment (not engaged in machines with selector switch on the right hand control lever)
4	Ignition switch
5	Switch for fast travel speed (not for EC15D)
6	Switch for working lights on cab and boom
7	Switch for variable tracks (not for EC15D)
8	Switch for rotating beacon
9	Switch for windscreen washer
10	Switch for fan
11	Display unit

1. Switch for automatic shutdown

(optional equipment, not for EC15D)

- Press lower end of switch = automatic shutdown is off
- Switch in middle position = engine will shut down after 2 minutes of inactivity
- Press upper end of switch = engine will shut down after 10 minutes of inactivity

NOTE!

A countdown sound signal of around 10 beeps will appear before shutdown

To restart, the ignition switch must first be put in pos. 0. See also point 4.

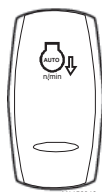
2. Switch for automatic engine speed control — auto idle

(optional equipment, not for EC15D)

- Operation activates the automatic engine speed control. The throttle lever may remain in any desired position. With stopping the work load the automatic engine speed control reduces the engine speed to idle speed level after approx. 5 seconds



V1150317



V1150316

- When operating a control lever the engine speed will rise again up to the speed level set by the throttle lever

3. Switch for attachment

(not in machines with selector switch on right hand control lever)

- Press upper end of switch = the function of the rocker switch/proportional roll switch on the right hand control lever is set to attachment movement
- Press lower end of switch = the function of the rocker switch/proportional roll switch on the right hand control lever is set to offset boom

For information about attachment activation of machines with selector switch on right hand control lever see page 40.

4. Ignition switch

The ignition switch is used for preheating and starting. The ignition switch has five positions:

- P: Radio and cab interior light
- 0: Engine off
- 1: Running position / Ignition
- 2: Preheating
- 3: Start the engine

NOTE!

Turn the key off before re-starting the engine to prevent starter damages.

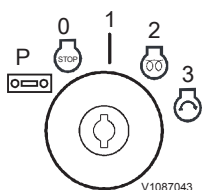
5. Switch for fast travel speed

(not for EC15D)

- Press upper end of switch = the travel speed rises up
- Press lower end of switch = the travel speed goes back to normal

After switching to fast travel speed the automatic control of the travelling speed is activated. When a certain resistance appears in front of the dozer blade, the travelling speed automatically drops down to low speed. When the resistance is gone the speed rises up to high speed again.

A high speed function push button is also located in the blade lever, see page 40.





6. Switch for working lights

- Press lower end of switch = working lights are off
- Switch in middle position = front working lights are on
- Press upper end of switch = front working lights, rear working light (optional equipment) and working light on boom (optional equipment) are on

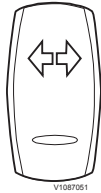
NOTE!

The working lights can only be switched on if the ignition has been activated (running position/ position 1).

7. Switch for variable tracks

(not for EC15D)

- Activate this switch and the track can be adjusted via the dozer blade control lever (see page 40)



8. Switch for rotating warning beacon

- 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 engine while the rotating warning beacon is on, the rotating warning beacon will stay on.



9. Switch for windscreen wiper and washer

- 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.





10. Switch for fan

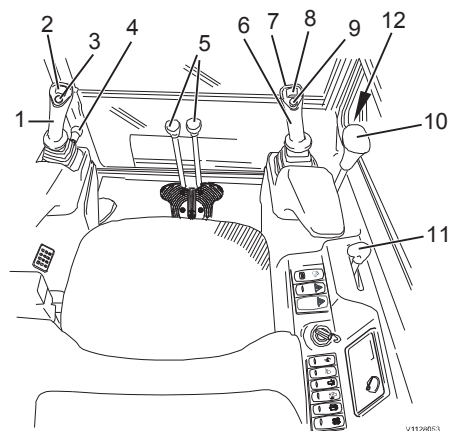
- Press lower end of switch = fan is off
- Switch in middle position = fan is in low position
- Press upper end of switch = fan is in high position

11. Display unit

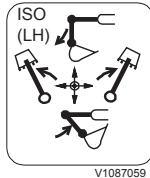
See page 33.



Other controls Controls

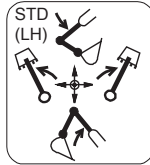


1	Left hand control lever for attachments
2	Proportional roll switch to control X3 hydraulic flow (optional equipment)
3	Horn
4	Control lockout lever for hydraulics
5	Control levers for travel motion (pedals are optional equipment)
6	Right hand control lever for attachments
7	Push button for X1 max flow (optional equipment)
8	Rocker switch or proportional roll switch to control X1 or boom offset hydraulic flow
9	Offset boom or X1 selection (optional equipment)
10	Dozer blade control lever
11	Throttle lever
12	Button to activate fast travel speed gear (not for EC15D)



V1087059

Decal ISO control pattern



V1087060

Decal STD control pattern

1. Left control lever for attachments (ISO 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 (STD control pattern, North America only)

- 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!

Market dependent optional equipment. North America only. See Control pattern selector switch in this chapter.

WARNING

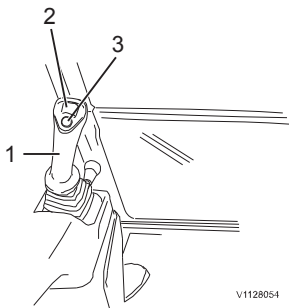
Risk of serious accidents.

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.

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

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



V1128054

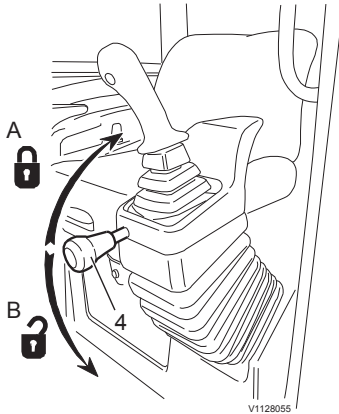
Left control lever

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.



V1087062



V1128055

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

(pedals are optional equipment)

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

WARNING

Risk of fatal accidents.

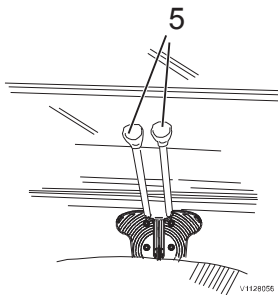
Unexpected driving direction could lead to accidents resulting in serious injury or death.

Always check the driving direction before moving the machine.

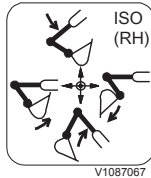
- Push both levers forward: Forward travel.
- Pull both levers backward: Reverse travel.
- Push right lever forward: Turn left.
- Push left lever forward: Turn right.

NOTE!

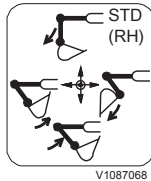
When operating the travel levers the travel alarm (optional equipment) emits a warning signal.



V1128056



Decal ISO control pattern



Decal STD control pattern

6. Right control lever for attachments (ISO 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 (STD control pattern, North America only)

- 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!

Market dependent optional equipment. North America only. Control pattern selector switch, see below.

Control pattern selector switch (ISO/STD) (optional equipment)

WARNING

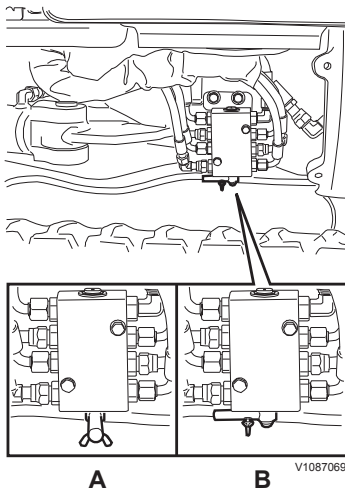
Risk of serious accidents.
Unfamiliar control patterns could cause confusion and accidents resulting in serious injury.
Use extreme caution when using the control levers after changing the control pattern and until you become familiar with the new pattern.

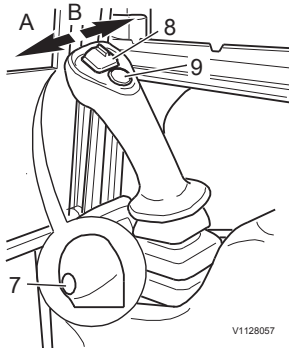
NOTE!

Market dependent optional equipment. North America only. Control pattern selector switch, see below.

The selector switch is located on the left hand side of the machine.

- Lever in vertical position (A): ISO control pattern.
- Lever in horizontal position (B): STD control pattern.





Right control lever



7. Push button for X1 max flow (optional equipment)

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

8. Rocker switch or proportional roll switch to control X1 or boom offset hydraulic flow

- Switch in central position: Neutral
- Switch to the left (A) in boom offset mode: offset boom to the left
- Switch to the right (B) in boom offset mode: offset boom to the right
- Switch to the left (A) in X1 mode: accessory flow through pipe on left side of boom
- Switch 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. The offset control lamp blinks when the roller is not in its neutral position and the proportional function (X1 or boom offset) is disabled.

The function becomes active (operational) once the roller comes back to its neutral position.

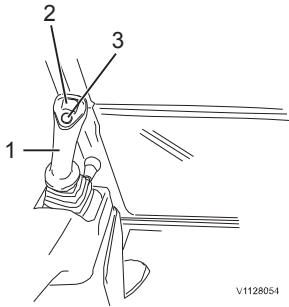
Hydraulic oil flow, changing maximum setting for X1 and X3

There is a possibility to set the maximum hydraulic oil flow used for the first auxiliary (X1) and for X3 (only for machines equipped with switches 7 and 9 and on 8 with a proportional roll switch).

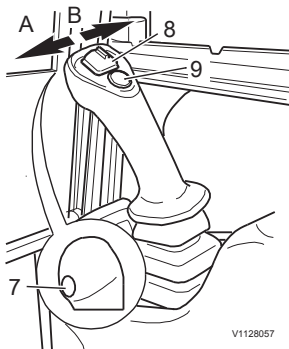
- 1 Select the boom offset mode. The control lamp in the instrument panel lights up when the offset boom is activated.

NOTICE

Boom offset must be selected before changing the maximum hydraulic oil flow setting. If attachment movement is selected this can result in an unexpected movement of the optional equipment.



Left control lever



Right control lever

- 2 First press the switch for optional equipment (7) and then at the same time press selector switch (9) on the right control lever. Keep both switches depressed in 5 seconds until the boom offset control lamp is flashing in the instrument panel. As long as the control lamp flashes the attachment movement is activated and changing the maximum hydraulic oil flow setting is possible.
- 3 To change the setting for the X1: Move the proportional roller (8) on the right control lever to the left or right until the wanted maximum hydraulic oil flow is reached. Keep the proportional roller in this position and press switch for optional equipment (7) to confirm.
- 4 To change the setting for the X3: Move the proportional roller (2) on the left control lever to the left or right until the wanted maximum hydraulic oil flow is reached. Keep the proportional roller in this position and press switch for optional equipment (7) on the right control lever to confirm.
- 5 Make sure that the control lamp for boom offset on the information panel has stopped flashing.

Exit without saving a new value:

- 1 Shift the control lockout lever upwards.
- 2 Turn the ignition key to off position.
- 3 Control lamp flashes more than 15 minutes.

9. Offset boom or X1 selection (optional equipment)

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!

Machines without this switch on the right hand control lever have a switch for attachment on the right instrument panel, see page 36.

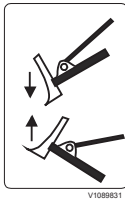
NOTE!

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

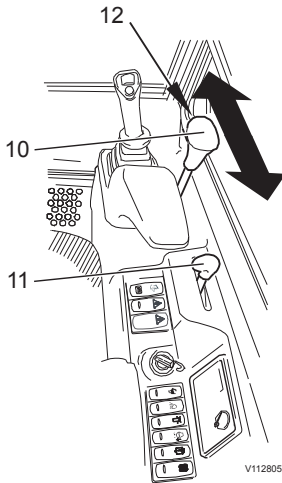
10. Dozer blade control lever

The control lever controls the position of the dozer blade.

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



V1088631



V1128058

11. Throttle lever

- Pull the lever back to raise the engine speed.
- Push the lever fully forward before shutting down the engine.

12. Button to activate fast travel speed gear (not for EC15D)

- Hold button depressed: Fast speed is activated.

- Button released: Fast speed is deactivated.

NOTE!

Fast speed is automatically disabled when the button is released. The switch for fast speed in the right instrument panel does not have to be activated.



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.

Do not jump out of cab if the machine should roll over. Keep stay in seat wearing seat belt.

Protection from falling or scattering materials (optional equipment)

The top of the cab and the canopy is approved as a protective structure according to the OPG (Operator Protective Guard) Level 1.

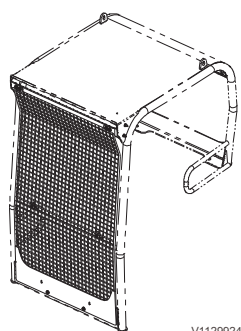
OPG 1 front is available as option on canopy. OPG 2 top and front are available as option for cap and canopy.

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

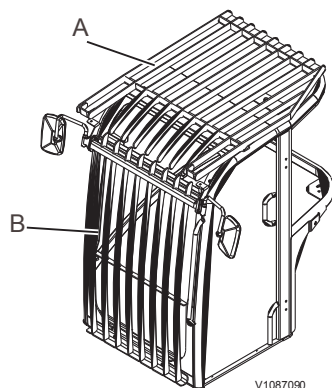
In working conditions where falling or scattering materials are capable of entering the cab, for example in mining applications and when operating with a hammer (hydraulic breaker), protective roof and window guards should be installed.

By installing OPG 2 top (A) and front (B), the cab and canopy is approved according to OPG Level 2.

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.



OPG 1



A OPG 2 top
B OPG 2 front

NOTICE

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 and/or when buckets have lifting eyes welded.

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

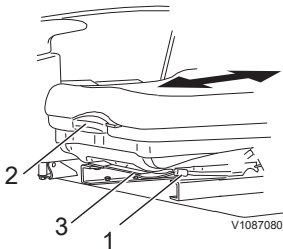
Risk of serious injury.

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!

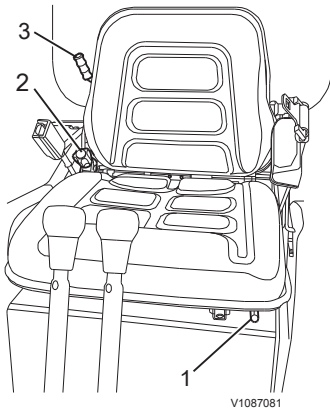
Weight adjustment

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

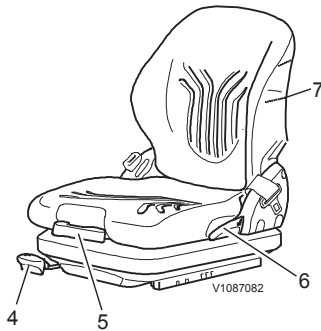
- 1 Pull lever (1) slightly up.
- 2 Adjust the seat to the desired position.
- 3 Check that the seat has properly engaged.

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

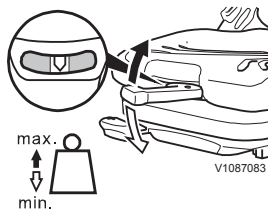
- 1 Pull lever (4) slightly up.
- 2 Adjust the seat to the desired position.
- 3 Check that the seat has properly engaged.

Backrest adjustment

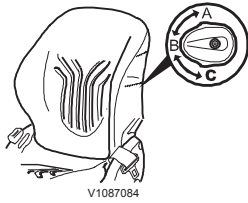
- 1 Pull up lever (6).
- 2 Adjust the inclination of the backrest. Release the lever to lock the backrest.
- 3 Check that the backrest has properly engaged.

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.

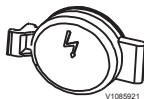
NOTICE

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.

Windows

Upper windscreen

Loosen windscreen (1):

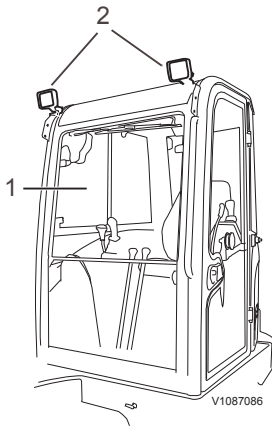
- 1 Push the buttons (3) on both sides.
- 2 Then push the windscreen upward under the cab roof.

NOTICE

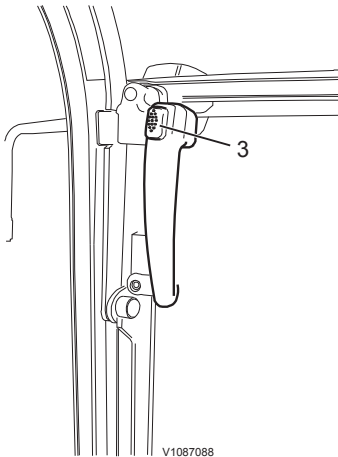
The windscreen is fastened in the roof when you hear a click.

Close windscreen:

- 1 Push the buttons (3) on both sides.
- 2 Push the windows down into position.

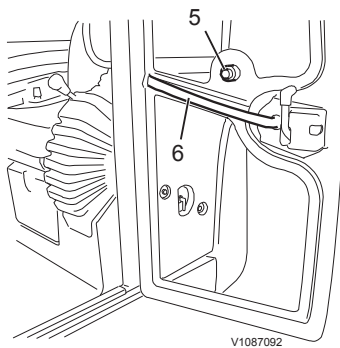
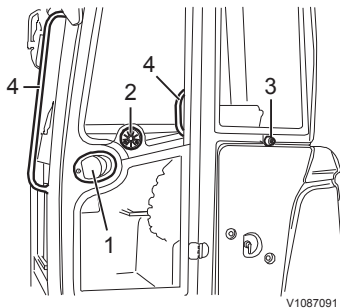


- 1 Windscreen
- 2 Working lights



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), boom (optional equipment) 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 is located below the cab roof on the right hand side of the machine.

For further information on operation of the radio and CD unit, please refer to the operating instructions issued by the manufacturer.



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.

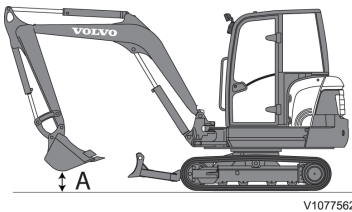
Use a signal man if operator's view is obstructed.

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 and mirrors can be used.

In order to minimize hazards that may be caused by restricted visibility, rules or procedures should be established by the work site management. For example:

- Make sure that operators and workers on the site have received thorough safety instructions.
- Control the traffic flow of machines and other vehicles. Avoid travelling in reverse if possible.
- Limit the machine's operating area.



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

- Use a signalman to help the operator. Use signals according to the signal diagram, see 110.
- Provide two-way communication equipment if necessary.
- Make sure workers on site communicate with the operator before approaching the machine.

Standard ISO 5006 "Earthmoving machinery – Operator's field of view" is dealing with the operator's visibility around the machine and is meant to be used for measuring and evaluate the visibility. Compliance with this standard gives improved visibility around the machine.

The machine is tested according to methods and criteria for this standard. The method used to evaluate visibility cannot cover all points regarding operator visibility, but it does give information to determine if optional devices for indirect visibility are needed, e.g., warning systems.

The test was conducted on stationary machines with standard equipment and standard attachments. If the machine is modified or retrofitted with other equipment or attachments which result in impaired visibility, it shall be tested again according to ISO 5006 and ISO 14401. And it shall be equipped with optional visibility-enhancing devices as needed.

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 warning beacon (optional equipment) are working properly.
- 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 danger area, i.e. the area around the machine and at least 7 m (23 ft) beyond the maximum reach of the attachment. The operator may allow a person to remain in the risk zone, 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.

Safety rules when operating

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

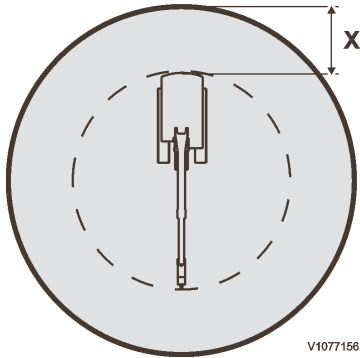
Operator obligations

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.**

- Always sit in the operator seat with the seat belt fastened when starting the engine/machine and when operating controls, e.g. levers and switches.

- Check that the seat belt is not worn, see page 52.

- 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 10.

- 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.

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	Fuel / hydraulic hose - leakage of connections and end fittings
Monthly	Fuel / hydraulic hose - leakage, damage of connections and end fittings
Yearly	Fuel / hydraulic hose - leakage, damage, deformity and aging of connections and end fittings

Safety critical parts for periodic replacement		Replacement interval
Engine	Fuel hoses and clamps	Check every 250 hours, replace if required
	Air intake line	
Cab / Canopy	Seat belt	Every 3 years

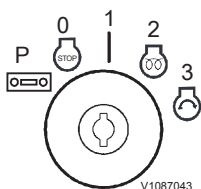
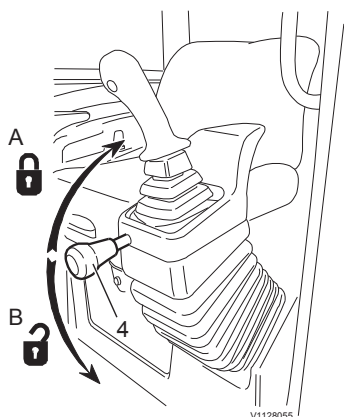


V1065709

Measures before operating

For safety, observe the following rules.

- Read the Operator's manual.
- Carry out daily service, see page *Lubrication and service chart*. In cold weather, make sure that the freezing point of the coolant is sufficiently low and that the lubricating oil is intended for winter use.
- Clean / scrape ice off the windows.
- Clean the dust around engine, battery and cooler.
- Check the level of hydraulic fluid, refill if required.
- Check that there is sufficient fuel in the fuel tank.
- Check that there are no faulty, loose parts or leaks, which can cause damage.
- Check that the battery disconnected switch is switched on.
- Check for cracks on frame and tracks.
- Check that hoods and covers are closed.
- Make sure fire extinguisher if equipped is fully charged.
- Inspect steps and handholds for damage or loose parts. Make necessary repairs if needed.
- Check that there are no persons in the vicinity of the machine.
- Adjust the operator seat and fasten the seat belt.
- Adjust and clean the mirrors.
- Inspect working and other lights for proper operation.
- Travel alarm should be on before operating the machine.
- Inspect the failure of gauges in the instrument panels.
- Check the function of the attachment bracket (optional attachment).



- P: Radio and cab interior light
0: Engine off
1: Running position / Ignition
2: Preheating
3: Start the engine

Starting engine

- 1 Shift control lockout lever (4) to position (A). You are now able to start the engine and 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.

- 2 Insert the ignition key into the ignition switch and turn it to running position (position 1). All control and function lamps (except preheating lamp) light up for a period of approx. 3 seconds.
- 3 The control lamps engine oil pressure and battery charge control must light up.
- 4 Adjust the throttle lever to the minimum engine speed.
- 5 Turn the key to preheating (position 2).
- 6 Preheat depending on engine temperature. At colder temperatures longer preheating is needed. The preheating control light goes out after 5 seconds. However, if the ignition key remains in preheating position, the preheating function remains active, even though the control lamp is off.
- 7 Once the preheating control lamp has gone out turn the ignition key to position start the engine (position 3) and start the engine. As soon as the engine starts, release the ignition key. Do not continue to start for longer than 25 seconds without interruption.
- 8 If the engine does not start turn the ignition key back to engine off position and repeat the starting procedure.

NOTE!

Turn the key off before re-starting the engine to prevent starter damages.

- 9 Let the engine warm up during at least one minute before operating the machine.
- 10 Shift control lockout lever to horizontal position to be able to operate the machine.

Avoid excessive loading of the engine immediately after starting. Observe the warm-up instructions.



Control lamp for preheating



These control lamps must light up when you turn the ignition key to position 1.

Warm-up instructions

- 1 Start the engine.
- 2 After a longer period of standstill and particularly at temperatures around or below the freezing point the engine must be warmed up at medium speed.
- 3 Run the engine warm for about 5–10 minutes at approx. 1/2 engine speed. During this period frequently operate the levers for the working hydraulics, whenever possible.

NOTICE

Do not turn off the battery disconnect switch when the engine is running. The electrical system may be damaged.

NOTE!

Turn the key off before re-starting the engine to prevent starter damages.

Starting with booster batteries

WARNING

Risk of explosion.

Batteries could explode due to the current surge if a fully charged battery is connected to a completely discharged or frozen battery.

Do not boost start a machine with a completely discharged or frozen battery.

When starting with booster batteries, check that the booster batteries or other power source have the same voltage as the batteries of the machine. If the batteries in another machine are used the engine of that machine must be turned off.

NOTICE

Do not attempt to start the engine while the battery charger is still connected to the mains. This may cause serious damage to the electronic control units.

- 1 Turn OFF the battery disconnect switch.
- 2 Remove the protections from the battery pole studs.

Connect two 12 V batteries as follows :

- 3 Connect one of the jump leads between (+) terminal on the battery of the machine and the (+) terminal on the booster battery.
- 4 Connect the other jump lead between the (-) terminal of the booster battery and a grounding point on the machine.

NOTICE

Do not connect ground to the undercarriage on the machine. This may seriously damage the swing bearing.

- 5 Connect the batteries of the machine by turning on the battery disconnect switch.
- 6 Start the engine with the ignition switch in a cab.
- 7 Leave the batteries connected for 5-10 minutes after starting the engine.
- 8 Disconnect the jump lead from the chassis connection on the machine, and then disconnect the other end of the jump lead from the (-) terminal on the booster battery.

- 9 Finally disconnect the jump lead between the (+) terminals.
- 10 Re-install the battery pole stud protections.

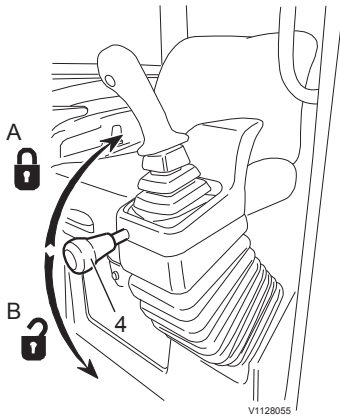
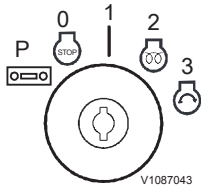
Warming up

NOTICE

Do not turn the ignition key while the engine is running, as this will generate a surge voltage that may damage the electrical system.

- 1 Start the engine.
- 2 After a longer period of standstill and particularly at temperatures around or below the freezing point the excavator must be warmed up by running the engine at medium speed.
- 3 Run the excavator warm for about 5 to 10 minutes at approx. 50% engine speed. During this period frequently operate the levers for the working hydraulics, whenever possible.

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.

- 1 If possible park the machine on solid and level ground and lower the attachment and dozer blade to the ground.
- 2 Make sure that the cab is parallel to tracks, that allows best possible leaving situation.
- 3 Reduce the engine speed: Set the throttle lever to idle speed position.

NOTE!

Do not shut the engine down all of a sudden from full load, but let it idle for a short while for temperature equalization.

- 4 To shut the engine down turn the ignition key to "Stop engine" (position 0). The control levers for working and travel hydraulics are locked (no movement possible).
- 5 All control lamps go out.
- 6 Check whether all switches and controls are switched off or deactivated.
- 7 Remove the ignition key to prevent unauthorised use of machine.
- 8 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).

After operation

- The fuel tank should not be left dry. This prevents the formation of condensation water.

Parking

WARNING

Risk of crushing.

A raised attachment could fall and cause crushing injury.

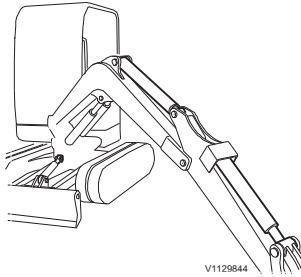
Before leaving the cab, always lower all attachments to the ground and lock the control functions.

- 1 Park the machine on firm, horizontal ground.
- 2 Open the bucket totally and lower it to the ground. 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 Turn off the engine and pull out the ignition key.
- 5 Check that there is enough anti-freezing solution in the cooling system (see page 103) and in the windscreen washer reservoir if the temperature can fall below -20 °C (-4 °F) during parking.
- 6 Close and lock windows, door and covers.
- 7 Disconnect the battery by turning the battery disconnect switch counter-clockwise and remove the key.

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

- removing the starter key when the machine is left unattended
- locking doors and covers after working hours
- turning off the current with the battery disconnect switch and removing the handle of the switch
- 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

NOTICE

If the machine is not going to be used every day, all cylinders should 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 $-40\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$) or exceed $+70\text{ }^{\circ}\text{C}$ ($158\text{ }^{\circ}\text{F}$).
- 3 Check that the batteries are fully charged.
- 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 fuel tank and the hydraulic oil tank to the max. marks.
- 7 Cover the exhaust pipe (for outdoors parking).
- 8 Drain water from any compressed-air reservoirs.
- 9 Make sure the freezing point of the coolant is sufficiently low (in cold weather).
- 10 When storing machines in extreme cold temperatures, remove batteries and store them at room temperature. Make sure to place the batteries over a wooden/plastic/rubber surface.

Check after long-term parking

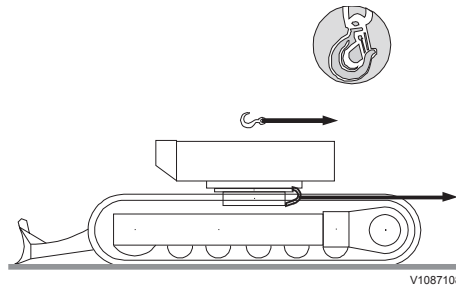
- All oil and fluid levels
- Tension of all belts
- Air cleaner unit
- Track tension

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



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).

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.

Towing		
EC15D/EC18D	daN MAX	1450
EC20D	daN MAX	1800

The angle for pulling should not exceed $\pm 10^\circ$ from the horizontal and longitudinal line. Be careful, there should not be also interference with parts of the machine.

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.

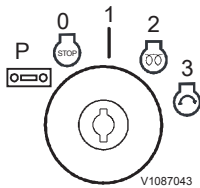
Even in technical incidents the attachment can be lowered to the ground.

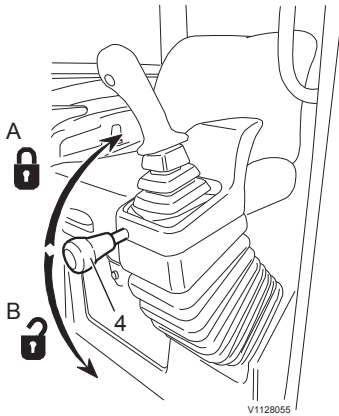
Lowering attachment using accumulator pressure

In case of standstill or engine defect.

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 running position (position 1).





- 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 40) can be used to lower the attachment.

NOTE!

If lowering of the attachment is not possible because the accumulator is depressurized, restart the engine to pressurize the accumulator.

Relieving residual pressure from the accumulator

- 1 Turn the ignition key to running position (1).
- 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.

NOTE!

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

Transporting machine

When transporting the machine pay attention to applicable regulations regarding weight, width, height, length and securing the load. Make sure that the ramp is of ample width, stability, thickness and length. Remove sludge, grease, oil etc. from ramp and trailer in order to avoid slipping of the machine. Block both crawler tracks after loading and lash the machine down with chains and belts of sufficient capacity for the respective load.

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!

Only use lifting points intended for lifting.

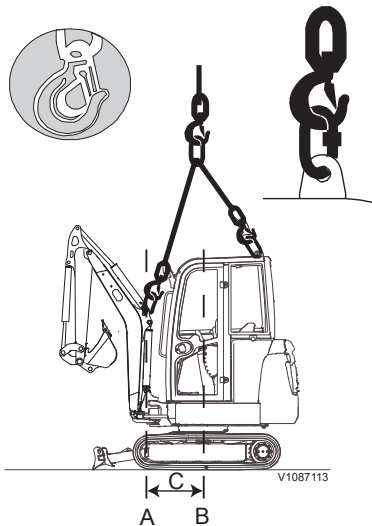
Make sure that the machine is in the same position as shown in the illustration. Use the specified lifting points to lift the machine. Two lifting points on the roof and one lifting point on the boom. The illustration shows the location of the lifting points.

- Park the machine on ground as solid and level as possible.
- Use suitable lifting equipment to lift the machine. Make sure that the lifting chains are strong enough for the weight of the machine. For machine weight, see page 169.

NOTE!

Volvo is not responsible neither for lifting equipment nor for lifting techniques.

- Position dipper arm, boom and dozer blade as shown in the illustration.
- Remove any attachments.
- Move the control lockout lever down to lock the system securely.



Lifting points

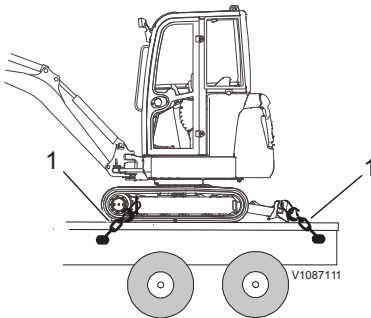
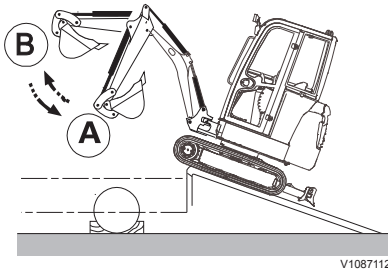
- Close and lock windows, doors and hoods securely.
- The distance (C) between axis (A) and (B) at the lifting point on the boom must be observed when lifting.

	EC15D/EC18D	EC20D
C	625 mm (24.6 in)	510 mm (20.1 in)

- At the beginning of the lift, check that the machine is level before continuing the lift.
- Maintain good visibility of the machine at all times during the lift. And continuously check that the machine is level.

Loading

Loading machine on trailer



Location of the tiedown points

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.

- 1 Align the machine's tracks to the ramp, the dozer blade to the rear (to serve as a support in case of an operating error) and the attachments to the front position (A).
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.

- 2 Drive to the end of the ramp, extend the attachments to position (B), so that the machine

76 Operating instructions

Transporting machine

tips on to the loading platform of the trailer.
Lower the excavating equipment and the dozer blade to the loading platform.

- 3 Secure both tracks with wheel chocks and tie the machine with chains (1) and belts to the loading platform of the trailer.

Unloading

- 1 Raise excavating equipment and dozer blade, rotate the slewing superstructure by 180 degrees.
- 2 Slowly drive to the beginning of the ramp, extend the excavating equipment position (B) and drive forwards until the machine tips on to the ramp.
- 3 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 reduce fuel consumption and emissions and can also lower wear on the machine.

Always try to:

- **Stay in the most economical area**

Reduce rpm's in order to stay in the most economical area.

- **Do not idle unnecessarily**

A machine turned off does not consume any fuel.

- **Plan your work site**

Take care 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 fuel and maintenance. 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 fuel 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 165.

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.

80 Operating techniques Whole-body vibrations

- 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 59.

- 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 landslide 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.

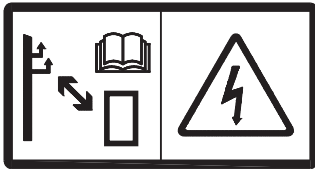
NOTICE

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, 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 certified engine 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.



V1079478

High voltage overhead power line



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.

84 Operating techniques

Working within dangerous areas

- 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.

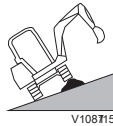
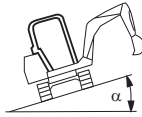
Overhead railway power lines

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 110. 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.

NOTICE

Follow the recommendations for maximum permitted angle in the table below. Machine function may be compromised, e.g., lubrication, if recommendations are not followed. This may result in machine damage.

	In any machine position the maximum machine inclination should not be more than (a)	Manageable gradients (b) (engine lubrication)	Manageable gradients (c) (engine lubrication)
EC15D	$\alpha = 9^\circ$ (16%)	$\alpha = 20^\circ$ (37%)	$\alpha = 30^\circ$ (58%)
EC18D	$\alpha = 11^\circ$ (19%) $\alpha = 17^\circ$ (30%) (d)		
EC20D	$\alpha = 10^\circ$ (18%) $\alpha = 14^\circ$ (25%) (d)		

a) $\alpha = 50\%$ of tipping limit

b) manageable gradient continually

c) manageable gradient for max. 10 minutes

d) the tracks are in their widest position

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 from the ground.
- If the engine 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.

NOTE!

The water must not reach higher than the middle of the upper roller.

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 landslide

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 landslide. 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 landslide. 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

DANGER

Risk of electrical shock.

Personal injury results if a body part comes into contact with a machine that conducts electric power.

Disconnect the electrical engine heater before working on the machine.

WARNING

Risk of frostbite.

Bare skin can freeze stuck to cold metal which could cause injury.

Use personal protective equipment when handling cold objects.

WARNING

Risk of crushing injury.

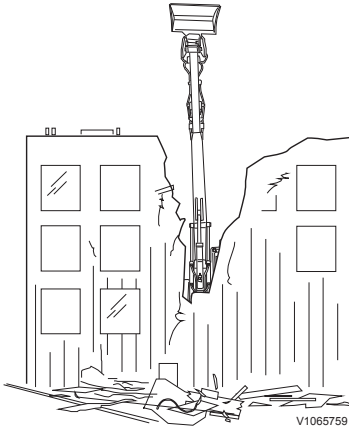
The hydraulic system could respond slowly at low temperatures and could cause unexpected machine movements.

Operate carefully until the hydraulic system has reached operating temperature.

Read the advice for starting, see page 64 .

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.



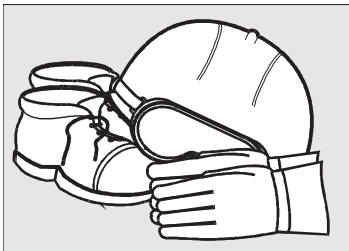
Demolition work

The machine is often used for demolition work. 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.

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 96 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 engine 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.

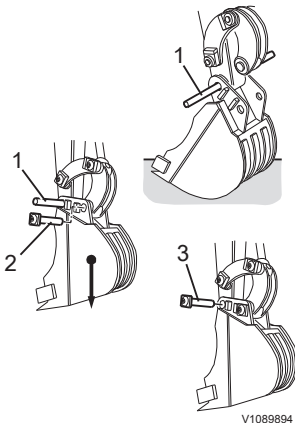
WARNING

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.

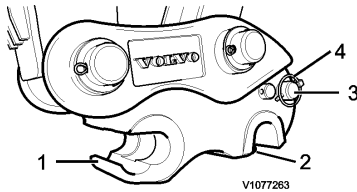
Installing a bucket with manual fastening



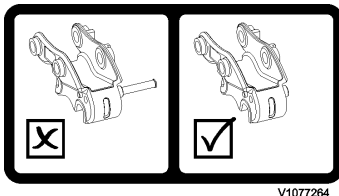
- 1 Position the excavating equipment to the bucket to be installed.
- 2 Align bores in dipper arm and bucket.
- 3 Insert a $\varnothing 20$ mm (0.787 in) assembly rod into the bore.
- 4 Raise the excavating equipment and operate the bucket cylinder until the bores in bucket and toggle link are in line.
- 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.



- 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.

Attachment brackets

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.

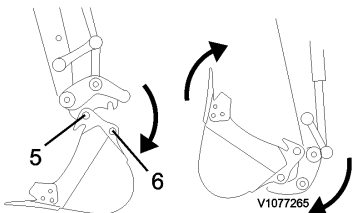
An unsecured attachment could fall and cause serious injury or death.

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

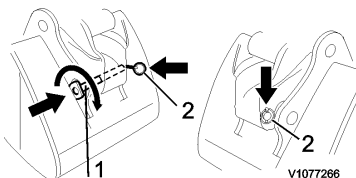
- 1 Remove the linch pin and extract the locking pin.
- 2 Rotate the locking pin 90° to lock it in extracted position.

94 Operating techniques Attachment brackets



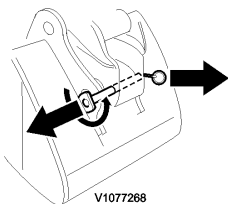
Lower the attachment bracket towards the rear bucket pin and tilt the bucket rearwards.

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

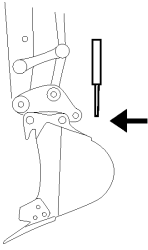


Extract the linch pin and the locking pin. Rotate the locking pin 90° to lock it in extracted position.

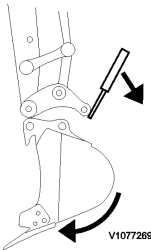
- 3 Lower the dipper arm into a position where the attachment bracket connects with the front bucket pin.
- 4 Lower the attachment bracket towards the rear bucket pin. Tilt the bucket rearwards (bucket in) until the hook on the attachment bracket is in contact with the rear bucket pin.
- 5 Position the 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

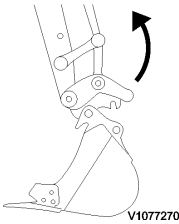
- 1 Lower the bucket to the ground.
- 2 Extract the linch pin and the locking pin.
- 3 Rotate the locking pin 90° to lock it in extracted position.
- 4 Position the bucket 10 cm (4 in) above the ground.



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



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



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.

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 engine has not been running for some time.

Always release the pressure before any kind of service of the hydraulic system is carried out.

- 1 Place the machine on firm and level ground.
- 2 Lower the attachment and the blade to the ground.
- 3 Shut down the engine and turn the ignition key to travel position (running position).
- 4 Move the control lockout lever down to unlock the system.
- 5 Shift the rollers on the joysticks 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:
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 engine cannot be started after hydraulic couplings have been opened.

Buckets

Working with buckets

Digging a trench

When excavating a trench it is recommended to dig in layers, thus to obtain a level trench bottom. Use a combination of bucket, dipper and boom motions to maintain the angle of the bucket while digging.

- 1 Anchor the dozer blade into the ground behind the machine.
- 2 Extend the excavating equipment and place the bucket vertically with teeth on the ground.
- 3 Start digging by operating the bucket cylinder. Simultaneously operate the bucket and the dipper arm cylinders once half of the digging cycle has been reached.

NOTE!

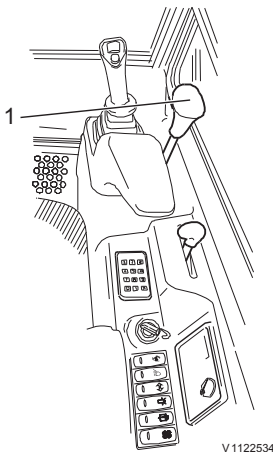
Do not dig the bucket too deep into the ground, since this would block the digging action. However, should this occur, slightly raise the boom. Work in a smooth way and avoid quick movements.

Completely close the bucket when filled. Raise the boom and simultaneously start the swing motion, until the unloading position is reached.

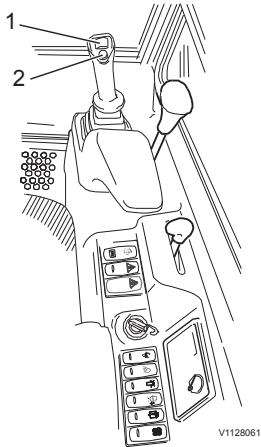
Backfilling or grading

- 1 In order to backfill a trench, position the machine perpendicularly to the trench and press the dozer blade against the ground.
- 2 Once the machine starts to push correctly do not leave the dozer blade control lever (1) in maximum position, but release it.

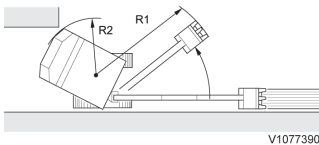
Do not use the bottom of the bucket to level the ground by swinging it back and forth. This is the purpose of the dozer blade.



1 Control lever



Control lamp for offset boom



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) or press the switch for attachment in instrument panel (both optional equipment) to the lower position to activate it. You know that the function is activated when the control lamp is on.
- 2 Use the roller switch/proportional roller switch (1) on the right hand lever to operate the offset boom:

- Switch to the left: Offset boom to the left.
- Switch to the right: Offset boom to the right.

This work can be accomplished under confined spatial conditions. With reference to the axis of the slewing superstructure the offset can have the following values.

Offset in degree (°)	to left	to right
	75°	55°

EC15D/EC18D minimum radius, mm (in)

Type		Dipper arm 950 mm (37.4 in)	Dipper arm 1150 mm (45.3 in)
R1	to left	1147 (45.2)	1164 (45.8)
	to right	1327 (52.2)	1345 (52.9)
R2		1052 (41.4)	

EC20D minimum radius, mm (in)

Type		Dipper arm 1050 mm (41.3 in)	Dipper arm 1350 mm (53.2 in)
R1	to left	1383 (54.4)	1430 (56.3)
	to right	1555 (61.2)	1605 (63.2)
R2		1090 (42.9)	

Special hydraulics

Release the hydraulic pressure in the system before removing or connecting hydraulic hoses for hydraulically controlled attachments. See page 96 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 engine has not been running for some time.

Always release the pressure before any kind of service of the hydraulic system is carried out.

NOTE!

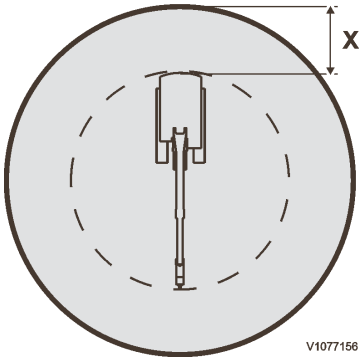
Any persons involved in the process of changing attachments must be familiar with the operation of the machine and should know the signalling pattern.

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



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 hammer.

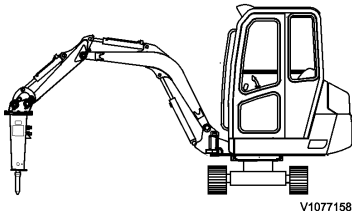
NOTICE

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.

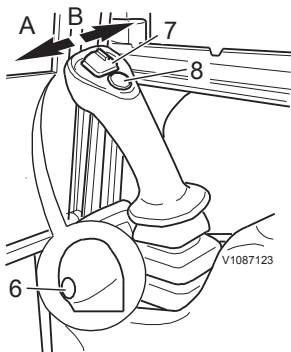
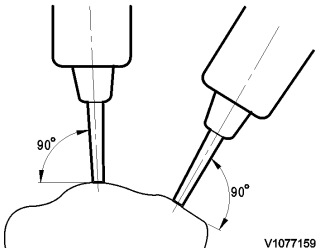
NOTICE

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

- 1 Prepare the machine for normal excavation work. Move the machine to the required position. Lower the dozer blade to the ground
- 2 Set the engine speed to the recommended engine RPM for correct amount of oil supply.
- 3 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



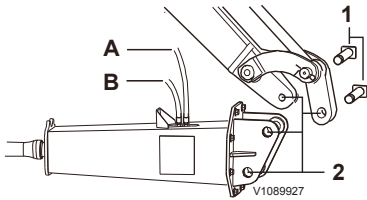
- 4 Place the tool perpendicular to the surface of the object. Keep the feed force aligned with the tool. Avoid small irregularities on the object which will break easily and cause either idle strokes or an incorrect working angle. When demolishing vertical structures (e.g. brick walls), place the tool perpendicular to the wall.
- 5 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.
- 6 Start the hammer.
 - Depress button (6, optional equipment) or move the rocker switch/proportional roll switch (7) to the right (B) to activate the hammer function.
 - Release the button (6) or rocker switch/proportional roll switch (7) 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 96 for the procedure to release the hydraulic pressure.



Connecting with pivot pins

A Pressure line
B Return line

1 Pivot pins
2 Fastening bores

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 engine 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.

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.

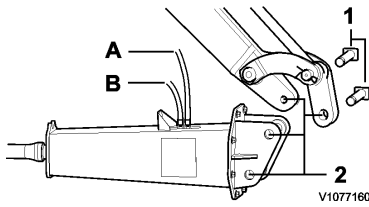
NOTICE

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 96.
- 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 96.
- 4 Remove the ignition key to make sure the engine 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 96.

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

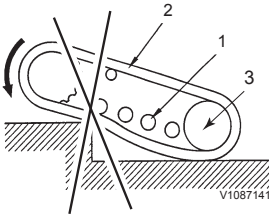
In case of standstill or engine defect and power failure during loading operation, the accumulator pressure is sufficient to lower the attachment to the ground with the control levers.

NOTE!

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

Tracks

When using rubber tracks



WARNING

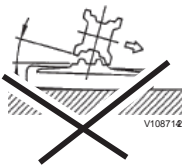
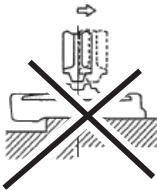
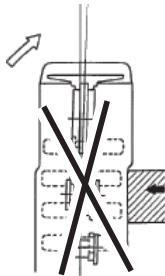
Risk of crushing.
Moving tracks could cause serious crushing injury.
Always ensure that no persons are near the tracks while the machine is in motion.

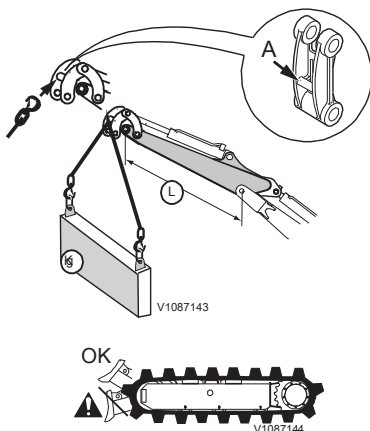
Moving over obstacles

- 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.





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.

Lifting objects

Always use appropriate lifting hook and read the table stating the lifting capacities for object handling operation. Within EU countries the transport of objects in lifting gear operation is prohibited if the machine is not equipped with a hydraulic safety valve on the boom (optional equipment). Various countries have their own regulations concerning the use of the machine for lifting work. For more detailed information you should contact your authorized Volvo dealer.

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

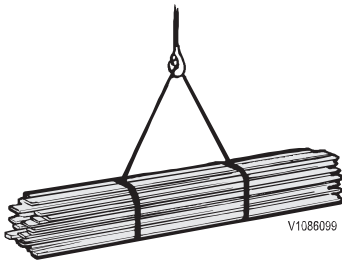
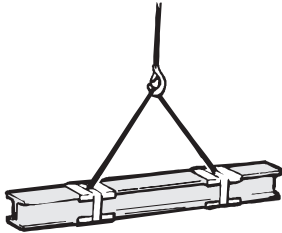
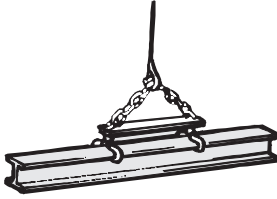
Risk of crushing.
Swinging objects could cause serious injury.
Always ensure no persons are in the danger zone before lifting or moving objects.

Various countries have their own regulations concerning the use of the machine for lifting work, e.g. lifting freely suspended loads. For more detailed information you should contact your authorised Volvo dealer.

Read the below recommended steps before starting any lifting.

- 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 machine to normal working temperatures.
- 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.
- Be ware of soft, uneven or sloping ground and of landslips, sideways loads and other similar risks. If the machine is standing on sloping ground, the centre of gravity is displaced and, when lifting, the machine may take up a position where it will be close to tipping over.

NOTICE

For safe engine lubrication the machine must not be tilted by more than the values specified in these operating instructions. In addition it may be unsuitable to operate at this inclination as the machine may become unstable and unbalanced, depending on the load.

- 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

Lifting capacities are 75% of the tipping load or 87% of the hydraulic limit.

NOTE!

If the overload warning lamp lights up, you have reached the maximum lifting limit. Immediately lower the equipment and unload some of the weight or move to a more safe position where the light does not illuminate.

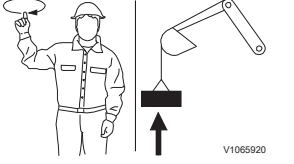
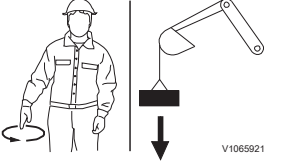
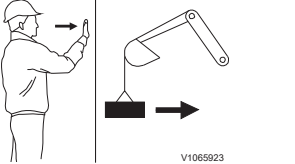
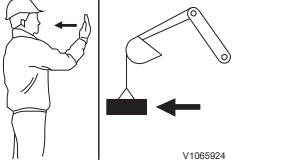
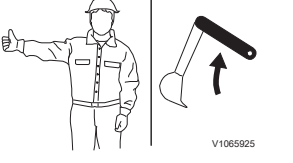
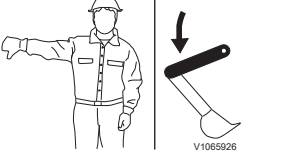
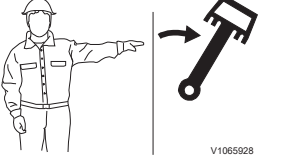
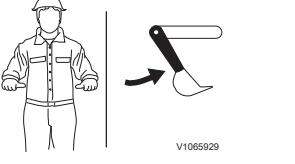
For lifting capacities specifications, see page 176.

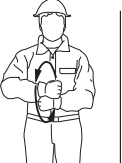
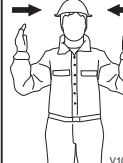
Signalling diagram

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

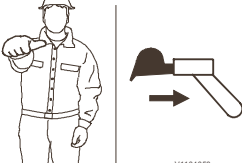
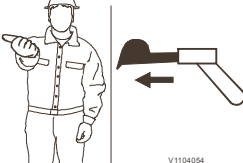
The primary use of hand signals is for a signalman to direct the lifting, handling, and placement of loads attached to working equipment. Hand signal usage may also be applicable to earth moving operations and/or machine travel when the operator's visibility is obstructed.

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.
 V1065930	 V1104049
DIPPER ARM OUTWARD With both hands clenched, point thumbs outward.	RETRACT TELESCOPIC BOOM With both hands clenched, point thumbs inward.
 V1065931	 V1065932
EXTEND TELESCOPIC BOOM With both hands clenched, point thumbs outward.	TURN Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.
 V1104051	 V1104052
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.
 V1065933	 V1065940
TURN Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.	 V1065937
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.	 V1065936
TURN Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.	 V1065935
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.	 V1065934

Operating techniques 112 Signalling diagram

TRAVEL Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.		THIS FAR TO GO With hands raised and open inward, move hands laterally, indicating distance to go.
 V1065838	 V1065941	 V1065942
MOVE SLOWLY Place one hand motionless in front of hand giving motion signal. Raise load slowly is shown.	STOP With either arm extended laterally, hand open downward, move arm back and forth.	EMERGENCY STOP With both arms extended laterally, hands open downward, wave arms back and forth.
 V1065922	 V1104053	 V1104054
STOP ENGINE Draw thumb or forefinger across throat.	RETRACT TELESCOPIC DIPPER ARM With either arm outstretched horizontally in front of body, close fingers and point thumb in direction of required movement.	EXTEND TELESCOPIC DIPPER ARM With either arm outstretched horizontally in front of body, close fingers and point thumb in direction of required movement.

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.

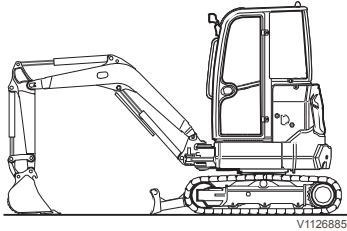
WARNING

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

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 blade to the ground.
- Depressurize the hydraulic system according to procedure on page 96.

WARNING

Risk of burns!

Hot machine parts could cause burns.

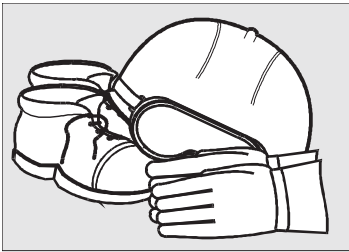
Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.

- Pull the ignition key off and pull down the control lockout lever in order to eliminate the risk of unintended starting of the engine.
- 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

Preventing personal injury

- 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 jewellery, which can get caught and cause injury.
- Always wear a hard hat, protective goggles, gloves, protective shoes and other protective articles when the work so requires.
- Make sure that the ventilation is sufficient when starting the engine indoors.
- Do not stand in front of or behind the machine when the engine is running.
- If service work has to be carried out under raised lifting arms, these must first be secured. (Engage the control lever lockout and apply the parking brake if the machine is equipped with one).
- Turn off the engine before opening the rear door and engine cover.
- When the engine is stopped, 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.
- When checking for leaks, use paper or hardboard, not your hand.
- Make sure that stepping surfaces, handholds and anti-slip surfaces are free from oil, diesel fuel, dirt and ice. Never step on parts of the machine that are not intended for this.
- It is important to use correct tools and equipment. Broken tools or equipment should be repaired or changed.



V1065951

Preventing 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 Construction Equipment 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.

116 **Safety when servicing** **Before service, read**

- 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 carried out in accordance with the manufacturer's instructions in order to eliminate interference with the electronic system and components intended for the function of the machine, see page 19.
- Measures to be taken in connection with electric welding, see page *Welding*.
- Make sure that all covers on the machine are in position before the engine is started and the machine is put to work.

Preventing environmental influence

Be conscious of the environment when carrying out service and maintenance. Oil and other liquids dangerous to the environment and released into the environment will cause damage. Oil degrades very slowly in water and sediment. One litre of oil can destroy millions of litres of drinking water.

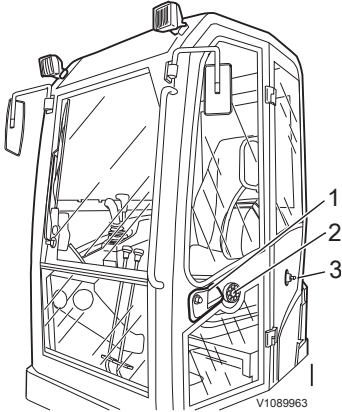
NOTE!

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

- When draining, oils and liquids must be collected in suitable vessels and steps taken to avoid spillage.
- Used filters must be drained of all liquid before they are passed on as waste. Used filters from machines which work in environments with asbestos or other dangerous dust, must be placed in the bag supplied with the new filter.
- Batteries contain substances dangerous to the environment and health. Used batteries must therefore be handled as waste dangerous to the environment.
- Consumables, for example used rags, gloves and bottles may also be contaminated with oils and liquids dangerous to the environment and must in that case be treated as waste dangerous to the environment.

Entering, leaving and climbing the machine

Access to cab



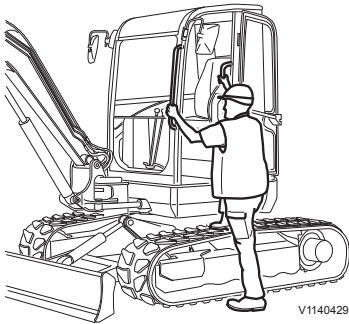
- The cab door is fitted with an external door handle with a lock (1) and an internal door handle.
- The door can be locked in open position by application of manual force (a fixed locking bolt (3) on the cab engages in the round bolt receptacle (2) in the door).
- By pressing the unlocking button the 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

- Stop engine and remove key before leaving the cab to prevent unauthorised use of machine.
- Make sure that the cab is parallel to tracks, that allows best possible leaving situation.
- 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.



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

- Do not smoke or have an open flame near a machine when filling with fuel or when the fuel system is opened and in contact with the surrounding air.
- Diesel fuel oil is flammable and must not be used for cleaning. 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, for example underbelly plates are free from dust



120 Safety when servicing Fire prevention

and oil. Besides reducing the risk of fire, it is also easier to detect faulty or loose components.

NOTE!

Take great care if a high-pressure wash is used for cleaning. Electrical components and electrical leads can be damaged even at a moderately high pressure and temperature. Protect electrical leads in an appropriate way.

- Take extra care when cleaning a machine working in a fire-sensitive environment, for example saw-mill and refuse dumps. The risk of spontaneous combustion can be further reduced by installing insulation of the silencer guard.
- It is important that the fire extinguisher is maintained in order to work when it is needed.

- Check that fuel lines, 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. This applies particularly to unfused cables, which are red and marked R (B+) and routed:

- between the batteries
- between battery and starter motor
- between alternator and starter motor

Electrical cables must not lie directly against oil or fuel 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 jeopardised, take the following steps at the slightest sign of fire:

- 1 Stop the machine, if the machine is in motion.
- 2 Lower attachments to the ground.
- 3 Move the control lockout lever to locked position, if so equipped.
- 4 Turn the ignition key to stop position.
- 5 Exit the cab.
- 6 Call the fire brigade.
- 7 If possible to access safely, turn off the battery disconnect switch.
- 8 Attempt 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 plenty of lime water (a solution consisting of calcium hydroxide, that is slaked lime in water).
- Handling heated fluoro-carbon rubber, see page 122.

Handling hazardous materials

Heated paint



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



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.

Batteries



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 tilt a battery in any direction. Battery electrolyte may leak out.
- 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.

Starting with booster batteries, see page 66.

Charging batteries, see page 145.

Crystalline silica (quartz) dust

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.

Oil or fuel leaks from high pressure hoses could cause serious injury caused by high pressure injection.

If oil or fuel leaks from high pressure hoses or loose screws is found, stop operations immediately and contact an authorized Volvo dealer workshop.

- 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 Volvo-authorized dealer.

The chapter "Lubrication and service chart" (see page 131) presents all the jobs and actions that are included in the machine's service program.

Service history

After each completed service at a workshop authorised by Volvo Construction Equipment, the service history should be filled in, see page 193. Service history is a valuable document, which can be referred to when for example selling the machine.

The image shows three overlapping Volvo maintenance forms. The top form is titled 'Arrival and delivery inspection' and includes a section for 'Inspection of the machine' with a table for recording various components. The middle form is titled 'Delivery Instructions' and contains a list of instructions for the buyer. The bottom form is titled 'Service Programme' and includes a table for recording service intervals. The forms are labeled with the Volvo logo and the text 'VOLVO'.

V1068257

Arrival and delivery inspection

Before the machine leaves the factory, it is tested and adjusted. The dealer must also, if the warranty is to apply, carry out "Arrival and delivery inspections" according to applicable form, which must be signed.

Delivery Instructions

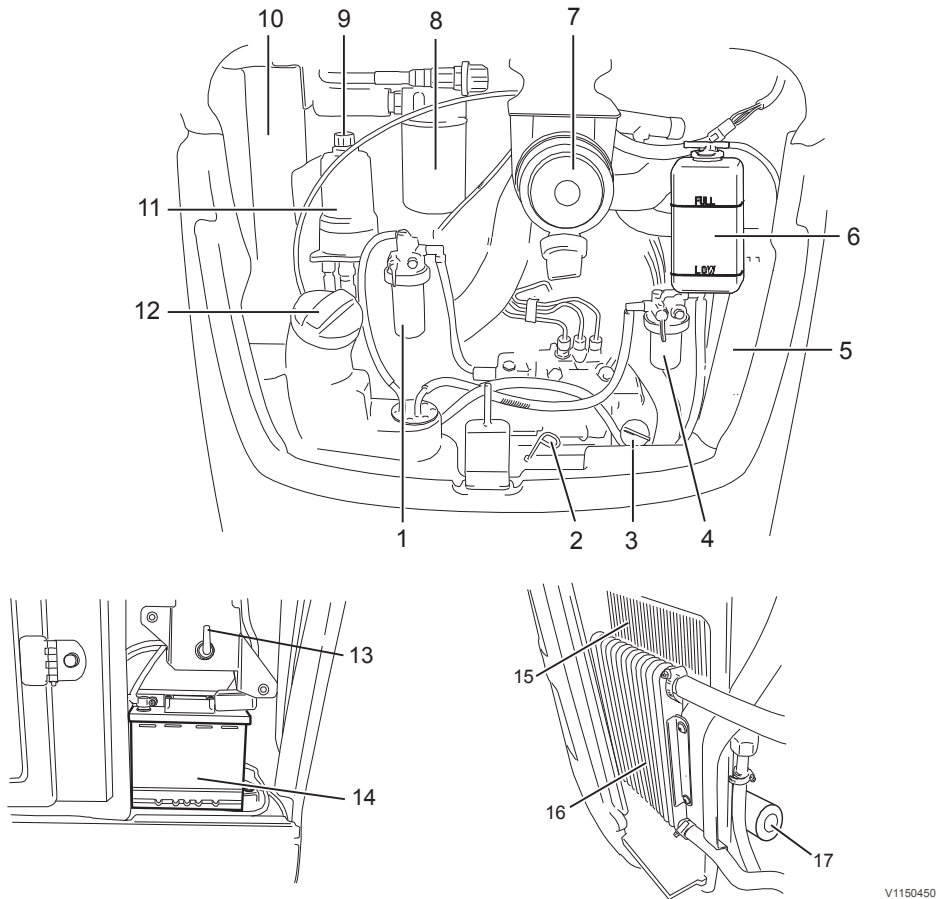
When handing the machine over, the dealer must give the buyer "Delivery instructions" according to applicable form, which must be signed, if the warranty is to apply.

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.

Service points

Service points rear, left side and right side



V1150450

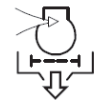
1	Fuel filter
2	Engine oil dipstick
3	Engine oil filler neck
4	Fuel prefilter / water separator
5	Radiator (see also position 15)
6	Expansion tank
7	Air filter
8	Hydraulic oil filter
9	Hydraulic oil filling
10	Hydraulic oil tank

11	Hydraulic oil level sight glass including a hydraulic oil filter
12	Fuel filler neck
13	Battery disconnect switch
14	Battery
15	Radiator
16	Hydraulic oil cooler
17	Engine oil filter

Lubrication and service chart

Symbol key

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

 V1072402	Lubrication	 V1077088	Check travel gear oil
 V1072398	Fuel system	 V1077089	Check track tension
 V1077018	Drain condensation water	 V1077029	Check the hydraulic oil level
 V1077017	Replace fuel filter	 V1077024	Change the hydraulic oil
 V1077020	Check coolant level	 V1077025	Replace the hydraulic oil filter
 V1077022	Change coolant	 V1077086	Check the V-belt tension
 V1087231	Clean filter element	 V1077016	Check engine oil level
 V1087232	Change filter element	 V1072803	Change engine oil
 V1087233	Replace cab ventilation filter	 V1077015	Replace engine oil filter
 V1077034	Change travel gear oil	 V1072403	Grease nipple

Every: 10, 50, 250, 500, 1000, 1500, 2000 and 3000 operating hours (according to Service Programme of the machine).



Maintenance

132 Lubrication and service chart

When required	Page
Batteries, charging	145
Alternator	147
Welding. Any unauthorized welding leads to a loss of warranty.	147
Cleaning machine	148
Paint finish maintenance	149
Touch-up painting	149
Cleaning engine compartment	150
Washer reservoir	150
Front windscreen rail, lubricate	150
Bucket teeth, replacing	151
Seat belt, replace (minimum every third year)	Workshop job ⁽¹⁾

DAILY (every 10 hours)	Page
General inspection (machine, leakages, connections, function of control elements, lights, loose or lost of bolts)	
Test-run and check (start, stop, instruments, warning lamps, lights, wiper, washer, horn, decals, reflectors, back-up/travel alarm, heater and so on) (check end-position dampening, cylinder at boom)	
Machine, visual check (for leakages, loose connections, external damages, cracks and wear damages)	
Fan belt, visual check (for cracks and interferences)	
Engine oil level, check	138
Coolant level, check	136
Water separator, check and drain if necessary	138
Hydraulic oil level, check	136

EVERY 50 hours After carrying out daily service	Page
Lubrication according to Lubrication chart	see Lubrication chart and page 141
Track unit, check tension and condition	140
Hydraulic oil filter, replace (once after the first 50 hours , then every 500 hours)	workshop job ⁽¹⁾

1. Contact a workshop authorized by Volvo

FIRST 50 hours inspection
This inspection shall be performed by an authorized Volvo dealer.

EVERY 250 hours After carrying out daily and 50 hours services	Page
Engine oil, change	workshop job ⁽¹⁾
Engine oil filter, replace (with every engine oil change)	workshop job ⁽¹⁾
Track gearbox oil level, check	workshop job ⁽¹⁾

EVERY 500 hours After carrying out daily, 50 and 250 hours services	Page
Fuel hoses and clamps, check and replace when necessary (minimum once a year)	workshop job ⁽¹⁾
Radiator and hydraulic oil cooler, check, clean when necessary (check more often when working under dirty or dusty conditions!)	142
Radiator hoses and clamps, check and replace when necessary (minimum once a year)	workshop job ⁽¹⁾
Hydraulic oil filter, replace (first after 50 hours)	workshop job ⁽¹⁾
Hydraulic pump, suction hose and pressure hose, check and replace if necessary	workshop job ⁽¹⁾
Water separator filter element, draining and cleaning	workshop job ⁽¹⁾ , see instruction after daily check on page 138
Fuel filter element, replacing	workshop job ⁽¹⁾
Hoses for boom-, dipper-, and bucket-cylinder, check and replace if necessary	workshop job ⁽¹⁾
Hose on boom for X1 and X3, check and replace if necessary	workshop job ⁽¹⁾
Quick coupler lock mechanism, check and replace if necessary	workshop job ⁽¹⁾
Fan belt, check and adjust tension	workshop job ⁽¹⁾

1. Contact a workshop authorized by Volvo

Maintenance

134 Lubrication and service chart

EVERY 500 hours After carrying out daily, 50 and 250 hours services	Page
Primary air filter, cleaning and replace (or earlier when warning light illuminates)	142
Exhaust manifold, check for damages and leakages, mounting screws (minimum once a year)	workshop job ⁽¹⁾
Intake air line, replace (minimum once a year)	workshop job ⁽¹⁾

Maintenance Lubrication and service chart **135**

EVERY 1000 hours After carrying out daily, 50, 250 and 500 hour services	Page
Hydraulic oil, change (if using bio oil, every 750 hours)	workshop job ⁽¹⁾
Hydraulic oil filter in filling device, replace (if using bio oil, every 750 hours)	workshop job ⁽¹⁾
Hydraulic pressure, check	workshop job ⁽¹⁾
Valve clearance, check and adjust	workshop job ⁽¹⁾
Track gearbox oil, change	workshop job ⁽¹⁾
Cab, main filter, replace	workshop job ⁽¹⁾
Secondary air filter, replace (or earlier when primary filter is replaced the third time, minimum every second year, optional equipment)	144

EVERY 1500 hours After carrying out daily, 50, 250 and 500 hour services	Page
Injection nozzle pressure, check	workshop job ⁽¹⁾
Fuel injectors, check and clean if necessary	workshop job ⁽¹⁾
Crankcase breather system, check	workshop job ⁽¹⁾

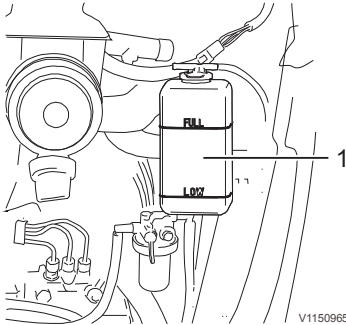
EVERY 2000 hours After carrying out daily, 50, 250, 500, and 1000 hour services	Page
Coolant, change (minimum every four years, only VOLVO coolant VCS)	workshop job ⁽¹⁾

EVERY 3000 hours After carrying out daily, 50, 250, 500, 1000, and 1500 hour services	Page
Injection timing, check	workshop job ⁽¹⁾
Injection pump, check	workshop job ⁽¹⁾

1. Contact a workshop authorized by Volvo

Maintenance service, every 10 hours

Coolant level, checking



WARNING

Risk of scalding and severe burns to unprotected skin.

High pressurized hot coolant may rush out of expansion tank and cause severe burns. Before removing the expansion tank pressure cap:

- Shut down the engine.
- Allow the engine to cool
- Turn the pressure cap slowly to release any pressure.

The coolant expansion tank (1) is located under the rear hood on the right hand side.

Once the cooling system has cooled down the coolant level must be between the FULL (MAX) and LOW (MIN) marks in the coolant expansion tank (1).

If the coolant level is near the LOW (MIN), top up with coolant.

Coolant, topping up

NOTICE

In order to avoid damage to engine and cooling system, different brands of coolant or corrosion protection must not be mixed.

NOTE!

For quality of coolant please refer to the specification on page 157.

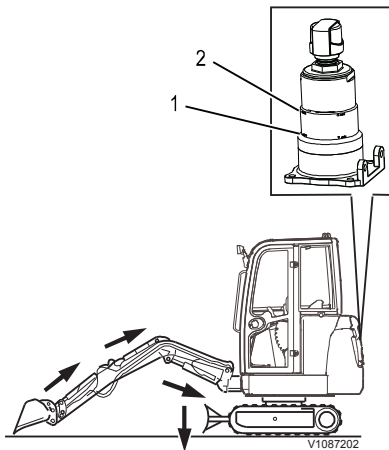
- 1 Shut down the engine
- 2 Open the rear hood
- 3 Slowly remove the compensation tank cap and relief the pressure in the cooling system
- 4 Top up coolant
- 5 Reinstall the cap on the expansion tank

If the warning of high coolant temperature is shown on the display unit, stop the engine immediately. Check the coolant level and top up as explained if necessary



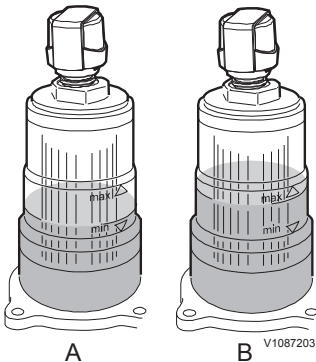
V1065481

Hydraulic oil level, checking



Position for hydraulic oil level check

- 1 Minimum level
- 2 Maximum level



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

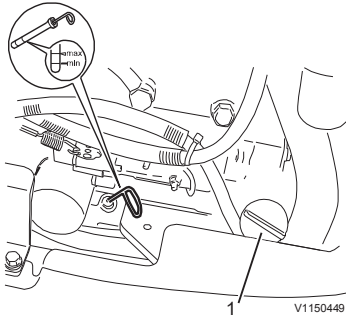
When you check the oil, the temperature of the oil must be 20 °C (68 °F) or 50 °C (122 °F) [± 5 °C (9 °F)].

If the machine is equipped with the option variable tracks, the track width must be set to a minimum.

- 1 Park the machine on horizontal ground.
- 2 Operate all cylinders to both directions while the engine is running.
- 3 Arrange the machine as shown in illustration:
 - dozer blade on the ground
 - equipment parallel to the axis of the machine
 - bucket cylinder 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). If necessary, hydraulic oil must be filled in (workshop job).

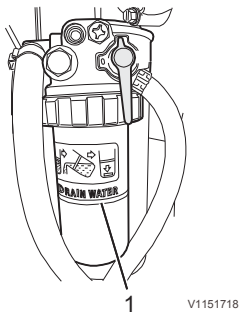
Take care of filters/oils/liquids in an environmentally safe way, see page 115.

Engine oil level, checking



- 1 Stand the machine on level ground.
- 2 Open the rear hood.
- 3 Pull out the dipstick and wipe it clean with a lint-free cloth, reinsert it until it bottoms and pull it back out.
- 4 The oil level should reach the upper mark (MAX).
- 5 If the oil level is near or even below the bottom mark (MIN), top up oil immediately through the oil filler (1) to avoid severe engine damage. Don't fill over upper mark (MAX)! For quality of oil refer to the table of fuels and lubricants, page 154).

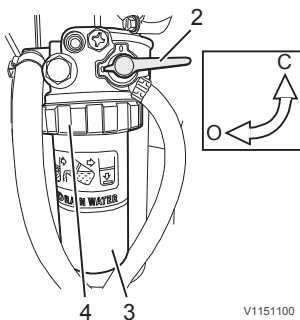
Water separator, checking and draining



Water separator, checking

- 1 Open the rear hood.
- 2 Check the sight glass of the water separator for water and dirt accumulations.

- 3 If the water level is over or near the drain water mark (1) or dirt accumulations can be seen, the water separator must be drained and cleaned.



Water separator, draining and cleaning

- 1 Close the fuel valve (2) by turning it counterclockwise to position C.
- 2 Place a suitable collecting vessel underneath the water separator.
- 3 Release the swivel nut (4) and remove the sight glass (3).
- 4 Drain the content into the collecting vessel.

NOTE!

Do the work in an environmentally safe manner.

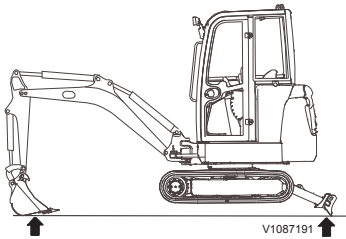
- 5 Clean the sight glass (2) and install it again with the swivel nut (3).
- 6 Open the fuel valve (1) by turning it clockwise to position O.

Maintenance service, every 50 hours

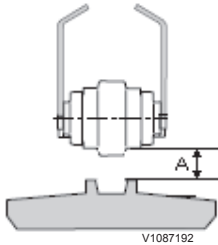
Track unit, checking tension

NOTE!

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

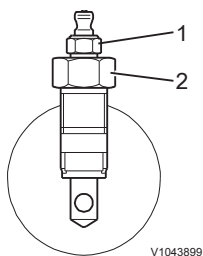


Machine position for track tension check.

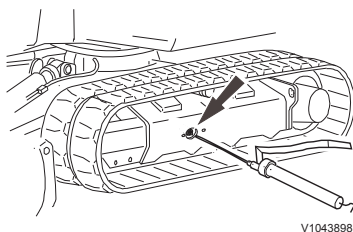


For correct track tension, the sag (A) should be between 10 and 25 mm (0.39 and 0.98 in), target: 15 mm (0.59 in)

- 1 Park the machine on horizontal ground.
- 2 Lower the dozer blade in the back to the ground until the tracks are slightly raised.
- 3 Lower the bucket to the ground, operate the boom until the machine is raised.
- 4 Run the tracks several times in forward and reverse.
- 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 sag (A) must be between 10 to 25 mm (0.39 to 0.98 in), target: 15 mm (0.59 in) (rubber tracks).
- 7 To reduce sag (A), inject grease through the nipple (1) into the adjustment cylinder.



- 1 Nipple
2 Valve assembly



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.**

- 8 To enlarge sag (A), loosen the valve assembly (2) through one turn so the grease can drain off. When the track slack is correct, tighten the valve unit.
- 9 Adjust the other track unit in the same way.
- 10 Run the track several times forward and reverse and measure again if the sag (A) is correct after the adjustments.

NOTE!

For quality of grease please refer to the table of fuels and lubricants on page 154.

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:

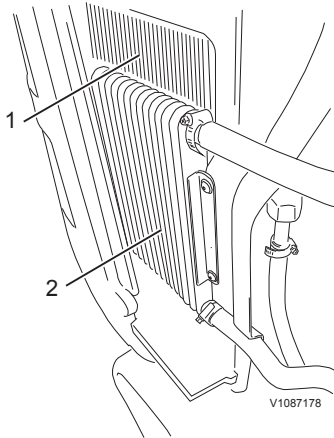
- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease which may contain dirt. The grease in the space inside the outer seal collects dirt and prevents dirt and also water from penetrating into the bearing.

Therefore, grease the bearing until new, clean grease is forced out through the outer seal. For recommended grease, see page 154.

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

Maintenance service, every 500 hours

Radiator and coolers, cleaning



1 Radiator
2 Hydraulic oil cooler

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.

Remove the cover on the right hand side of the machine to access the radiator and hydraulic oil cooler as follows:

- 1 Remove the screw on left side of the panel.
- 2 Push the lower area of panel and turn in clock wise to remove it.
- 3 Reinstall the cover again after the service is done.

Always clean radiator (1) and hydraulic oil cooler (2) with compressed air from inside to outside.

NOTICE

Preferably only clean the radiator fins with compressed air! Only clean the engine with water, when it is cold!

For better cleaning of the cooling fins the hydraulic oil cooler may be removed from the radiator.

Unscrew the hydraulic oil cooler

- 1 Loosen the two screws on the hydraulic oil cooler.
- 2 Swing the hydraulic oil cooler carefully to the side.

Cleaning the cooling fins

Clean the cooling fins on radiator and hydraulic oil cooler with compressed air.

Fasten the hydraulic oil cooler

- 1 Position the hydraulic oil cooler correctly.
- 2 Tighten the screws on the hydraulic oil cooler.

Primary air filter, cleaning and replacing

Air filter, cleaning

NOTE!

Avoid damaging or denting of the front face of the filter.

Never clean the filter by knocking it against a hard object.

Clean the primary filter as needed.

- 1 Open the locking hooks for the housing lid (2) and remove filter from the housing.
- 2 Bang the filter several times with the front face vertically against the palm of your hand or against a flat and soft surface.
- 3 Blow the filter out with dry compressed air (pressure not higher than 5 bar (75.5 psi)) from inside under an oblique angle, until the out flowing air is free of dust.
- 4 Then inspect the filter with a lamp from inside to outside for possible cracks.

NOTE!

Use only genuine filters. Non-genuine filters do not fit and cause danger to the engine!

NOTE!

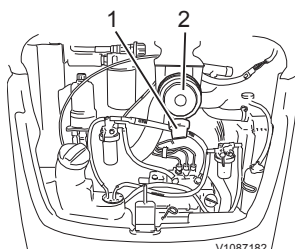
Operating the machine without air filter can lead to major damage. Make sure an air filter is always fitted!

Air filter, replacing

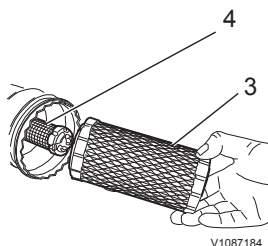
Replace the primary filter once a year or earlier if clogging signal goes on.

- 1 Open the locking hooks for the housing lid and remove filter (3).
- 2 Replace the filter and close the housing lid with the locking hooks.

Take care of filters/oils/liquids in an environmentally safe way, see page 115.



1 Dust valve
2 Housing lid



Maintenance service, every 1000 hours

Secondary air filter, replacing (optional equipment)

NOTE!

Use only genuine filters. Non-genuine filters do not fit and cause danger to the engine!

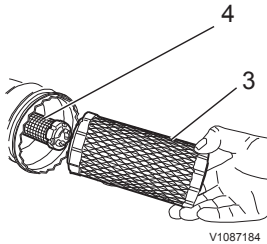
NOTE!

Operating the machine without air filter can lead to major damage. Make sure an air filter is always fitted!

Replace secondary filter (4) when you have replaced the primary air filter three times or every second year.

The secondary filter must not be cleaned. The engine must not be operated just with the secondary filter installed.

Take care of filters/oils/liquids in an environmentally safe way, see page 115.



Maintenance
Maintenance service, when required 145

**Maintenance service, when
required**



Batteries, charging



WARNING

Risk of fire and explosion.

Battery gas contains hydrogen and is flammable and could explode.

Do not open a battery close to sources of fire such as open flames, cigarettes or sparks.



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 disconnecting charging cable clamps. Never charge a battery near open flames or sparks. Always charge a battery in well-ventilated areas.



WARNING

Risk of chemical burns.

Contact with battery acid causes serious chemical burns.

Always wear personal protective gloves, goggles and clothing when handling batteries.

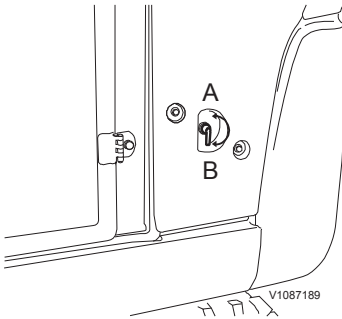


WARNING

Risk of chemical burns.

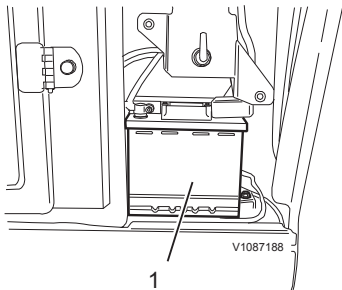
The battery electrolyte contains corrosive sulphuric acid which could cause severe chemical burns.

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.



Battery disconnect switch

A OFF
B ON



Battery disconnect switch

The battery disconnect switch is located on the left side of the cab.

The battery disconnect switch must always be switched off (A) during longer resting periods of the machine, repair work in the elektrik system and battery charging in mounted status.

Access to the battery

- 1 Switch off the battery disconnect switch (position A).
- 2 Unscrew the three screws (not thoroughly, so they remain in the hood).
- 3 Remove the hood.

The battery (1) is maintenance free.

- To remove the battery, disconnect the negative terminal (-) first.
- To re-install the battery, connect the positive terminal (+) first.
- Any contact between a tool and the cable connecting the positive terminal and the frame may cause sparks.

Alternator

- The alternator is sensitive to incorrect connections. The connecting poles of the battery must never be mixed up by mistake. The poles are distinctly marked with (+) or (-). Incorrect connection immediately damages the rectifier in the alternator.
- Make sure that cable lugs and poles are clean, well tightened and greased with Vaseline or similar.

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 119.

- 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.



Cleaning engine compartment

WARNING

Risk of serious injury.
Moving parts could cause serious cutting or crushing injury.
Stop the engine before opening the engine hood and performing any work.

WARNING

Risk of burns.
Engine and exhaust system components get very hot and can cause severe burns.
Avoid contact with engine compartment covers, engine components and exhaust system until the engine is cooled down.

Machines operating in dusty environment or environment exposed to fire hazards for example, wood-processing, woodchip handling or grain handling and animal feed industries require daily attention and cleaning of the engine 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.

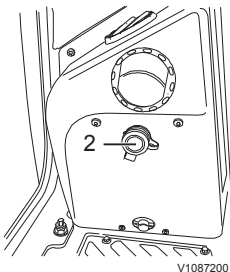
Cleaning should preferably be carried out at the end of the working shift before the machine is parked.

Use personal protective equipment such as protective goggles, gloves and respirator.

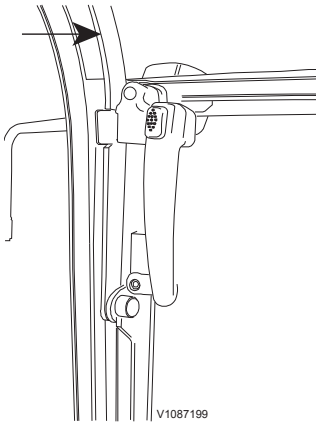
After cleaning, check and rectify any leaks. Close all covers and hoods.

Washer reservoir

Fill up with washing fluid in the washer reservoir (2).
It is located inside the cab on the right side.



2 Washer reservoir



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.

Bucket teeth, replacing

Replace the bucket teeth before the adaptors wear away, this needs to be done by a service technician.



**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 cocks.	-
	After working, replenish the grease to the attachment pins or the areas affected by the water.	86
	When operating the machine, make sure to check and lubricate attachment points affected by water regularly.	-
	After working near the ocean, clean the machine thoroughly with fresh water and service 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.	-
Freezing weather	After working, fill up the fuel tank to prevent water from condensing in the tank.	-
	Use the recommended lubricants.	154
	Fully charge the batteries regularly, electrolyte may freeze. Ventilate well especially when the batteries are charged in a confined space.	145
	When storing machines in extremely cold temperature, remove batteries and store them at room temperature.	69
	Before parking, remove the mud and the dirt from the tracks.	-
Demolition work	Use fall protection over the cab against falling objects.	89
Low fuel quality	Drain the sediments in fuel tank at shorter service intervals.	Workshop job ⁽¹⁾
	Change the engine oil and engine oil filter at shorter service intervals.	Workshop job ⁽¹⁾

1. Contact a workshop authorized by Volvo

Maintenance

Maintenance service, when required

153

Conditions	Maintenance	Related page
Dusty atmosphere	Check regularly that hose and pipe connections from the air cleaner to the engine induction manifold do not leak.	-
	Clean the air filter at shorter service intervals.	142, 144
	Clean the clogging net for radiator and oil cooler at shorter service intervals.	142
	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.	148
	Pay attention to and clean the engine compartment and surrounding areas regularly.	150

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
Engine	Engine oil Volvo Ultra Diesel Engine Oil API / CD, CF, CF-4, CI-4	°C -30 -20 -10 0 +10 +20 +30 +40 +50 °F -22 -4 +14 +32 +50 +68 +86 +104 +122 The chart shows the following viscosity ranges: - SAE 10W: -30°C to -10°C - SAE 10W-30: -20°C to +10°C - SAE 15W-40: -10°C to +20°C - SAE 30: +10°C to +40°C - SAE 40: +20°C to +50°C
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	°C -30 -20 -10 0 +10 +20 +30 +40 +50 °F -22 -4 +14 +32 +50 +68 +86 +104 +122 The chart shows the following viscosity ranges: - ISO VG 32: -10°C to +10°C - ISO VG 46: -5°C to +20°C - ISO VG 68: 0°C to +30°C - Bio oil VG 32: -10°C to +10°C - Bio oil VG 46: -5°C to +20°C
Travel gear	Gear oil Volvo Super Transmission Oil API GL5	°C -30 -20 -10 0 +10 +20 +30 +40 +50 °F -22 -4 +14 +32 +50 +68 +86 +104 +122 The chart shows the following viscosity ranges: - SAE 90: -10°C to +20°C - SAE 140: 0°C to +30°C - SAE 80W-90 or 85W-90: -20°C to +10°C

V1087239

V1087240

NOTE!

Use engine oil of type SAE 10W, SAE 10W/30 or SAE 15W/40, if the engine is to be started under an ambient temperature of less than 0 °C (32 °F), even if the daytime temperature rises up to 10 °C (50 °F).

Engine oil

Oil grade	Sulphur content in the fuel		
	< 0.3 %	0.3 % ~ 0.5 %	> 0.5 %
	Oil changing interval		
Volvo Ultra Diesel Engine Oil or VDS-3 or VDS-2 + ACEA-E7 or VDS-2 + API CI-4 or VDS-2 + EO-N Premium plus	250 hour	125 hour	75 hour
VDS-2	250 hour	125 hour	75 hour
VDS + ACEA-E3 or ACEA : E7, E5, E4 or API : CI-4, CH-4, CG-4	125 hour	75 hour	50 hour

Coolant

Only use Volvo Coolant VCS when topping up or changing coolant. To avoid damage to engine and cooling system, different coolants or corrosion protection must not be mixed. When using concentrated Volvo Coolant VCS and clean water, the mixture should contain 40–60% concentrated coolant and 60–40% clean water. The amount of concentrated coolant must never be less than 40% of the total mixture, see table below.

Freeze protection down to	Mixed-in amount of concentrated coolant
-25 °C (-13 °F)	40%
-35 °C (-31 °F)	50%
-46 °C (-51 °F)	60%

The concentrated coolant must not be mixed with water that contains a high degree of lime (hard water), salt or metals.

The clean water for the cooling system must also meet the following requirements:

Description	Value
Total number of solid particles	< 340 ppm
Total hardness	< 9.5° dH
Chloride	< 40 ppm
Sulphate	< 100 ppm
pH value	5.5-9
Silica	< 20 mg SiO ₂ /litre
Iron	< 0.10 mg Fe/litre
Manganese	< 0.05 mg Mn/litre
Electrical conductivity	< 500 µS/cm
Organic material, COD-Mn	< 15 mg/litre

If there is any doubt about the water quality, use ready-mixed Volvo Coolant VCS, which contains 40% concentrated coolant. Do not mix with any other ready-mixed coolants since this may result in engine damage.

Hydraulic oil

Only use 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 154.

	Ambient temperature											
	°C	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60
	°F	-40	-22	-4	+14	+32	+50	+68	+86	+104	+122	+140
Oil grade		(B)		(A)				(C)				
				(B)		(A)				(C)		
						(B)		(A)				

(A) : Ambient temperature recommended for general use of hydraulic system and components.

(B) : Ambient temperature guide for machine operation from a hydraulic oil viewpoint only, it does not guarantee the completion machine for other conditions like engine starting performance. 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.

Fuel system

Fuel

For fuel specification according to the ambient temperature, please contact a workshop authorized by Volvo Construction Equipment.

Quality requirements

The fuel should at least meet the legal requirements, and national and international standards for marketed fuels, for example: EN590 (with nationally adapted low temperature requirements), ASTM D 975 No 1D and 2D, JIS KK 2204.

Sulphur content

According to current USA legal requirement, the sulphur content in the diesel fuel must not exceed 0.0015 percent (15 ppm) by weight.

According to current EU legal requirements, the sulphur content in the diesel fuel must not exceed 0.001 percent (10 ppm) by weight.

For fuel specification according to the working temperature, please contact a workshop authorized by Volvo Construction Equipment.

Biodiesel fuel

Vegetable oils and/or ester, also referred to as bio-diesel, e.g. methyl ester or rapeseed (RME), are in some markets offered both as a pure product or for mixing with diesel fuel.

Volvo Construction Equipment accept an additive quantity of max. 7 % bio-diesel fuel to the diesel fuel ready-mixed from the oil manufacturers.

An additive component of more than 7% of bio-diesel may have the following effects:

- increased emission of nitric oxides (therefore does not meet existing legislation requirements)
- shorter lifetime of engine and injection system
- increased fuel consumption
- change in engine power
- halving of the interval between engine oil changes
- shortened lifetime of rubber materials in the fuel system

160 Specifications Fuel system

- impaired cold handling properties of the fuel
- limited storage life of the fuel which may lead to clogging of the fuel system, if the machine has not been used over a long period.

Warranty

The warranty does not apply to damage caused by an admixture of more than 7% of biodiesel fuel.

Service capacities and change intervals

Changing capacities in litres (US gal)	EC15D, EC18D & EC20D
Fuel tank	20 (5.3)
Cooling system (total)	4 (1)
Engine oil including filter	3.7 (0.9)
Hydraulic oil tank	14.6 (3.86)
Hydraulic system (total)	21 (5.5)
Track gearbox	2 x 0.33 (2 x 0.09)

Oil and fluid changes	Operating hours
Engine oil	50 (1st time inspection) / 250
Hydraulic oil	1000 (750 if biodegradable oil is used)
Track gearbox	1000

Change intervals

Please see lubrication and service chart on page 131.

Engine

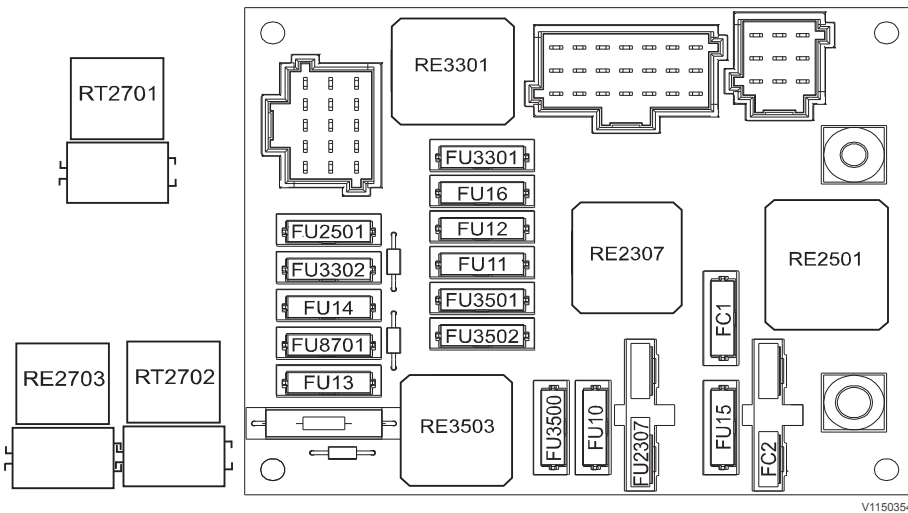
Designation	VOLVO D0.9A
Combustion method	Indirect injection system
Emission certification	EPA TIER4F
Engine power, net (ISO 3046-1 for EU market) (SAE J1995 for US market)	11.2 kW at 2300 rpm
Engine power, gross (ISO 3046-1 for EU market) (SAE J1995 for US market)	12 kW at 2300 rpm
Max. torque ISO 3046-1	51 Nm at 2000 rpm
Number of cylinders	3
Cylinder bore	72 mm (2.83 in)
Stroke	73.6 mm (2.9 in)
Displacement	898 cm ³ (54.8 cu in)
Compression ratio	24 : 1
Firing sequence	1-2-3
Idling speed, low	1300 rpm (+/- 50 rpm)
Idling speed, high	2620 rpm

Electrical system

System voltage	12 V
Batteries	1
Battery voltage	12 V
Battery capacity	52 Ah
Alternator	12 V / 40 A
Starter motor	12 V / 1.4 kW

Relays and fuses

Relays and fuses are located on the left hand side of the machine behind the side cover.



Relays

Relay	Function
RE 2307	Engine stop
RE 2501	Power supply engine
RE 3301	Starter motor
RE 3503	Working lights
RT 2701*	Auto idle delay*
RE 2703*	Auto shutdown delay*
RT 2702*	Auto shutdown delay*

*optional equipment

164 Specifications Electrical system

Fuses

Fuse	Ampere	Function
FC1	30 A	Main fuse
FC2	40 A	Power supply engine
FU10	10 A	Power outlet / horn
FU11	10 A	I-ECU
FU12	10 A	Ignition switch
FU13	10 A	Wiper / washer
FU14	10 A	Travel speed
FU15	10 A	Antitheft device*
FU16	10 A	Radio*/CD*
FU2307	30 A	Engine stop
FU2501	5 A	Engine preheating
FU3301	20 A	Main fuse starter motor
FU3302	5 A	Starter motor
FU3500	20 A	Main fuse working lights
FU3501	10 A	Working lights boom and rear*
FU3502	10 A	Working lights front
FU8701	10 A	Cab fan / heater

*optional equipment

NOTE!

Use only fuses of specified capacity (Ampere rating).

Cab

General	
Cab interior, upholstery and insulation	Fire retardant (fire resistant) ISO 3795-1989 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
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/s² RMS (root mean square) (8.1 ft/s²) 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	0.33 m/s ² (1.08 ft/s ²)	0.21 m/s ² (0.69 ft/s ²)	0.19 m/s ² (0.62 ft/s ²)
Hydraulic breaker app.	0.49 m/s ² (1.61 ft/s ²)	0.39 m/s ² (1.28 ft/s ²)	0.36 m/s ² (1.18 ft/s ²)
Transfer movement	0.45 m/s ² (1.48 ft/s ²)	0.39 m/s ² (1.28 ft/s ²)	0.62 m/s ² (2.03 ft/s ²)

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 page 79.

Sound information

	Canopy	Cab
Sound pressure level (LpA) at operator position (Measurement according to ISO 6396)	78 LpA dB(A)	78 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)	93 LwA dB(A)	93 LwA dB(A)

Hydraulic system

	EC15D	EC18D	EC20D
Closed centre Load Sensing hydraulic system providing total independence of each movement.			
Type	Open circuit		
Servo pressure	31 bar (450 psi)		32 bar (464 psi)
Standby pressure	18 bar (261 psi)		20 bar (290 psi)
Operating pressure: Hydraulic system	170 bar (2466 psi)		210 bar (3046 psi)
Secondary pressure			
Boom cylinder, full bore or piston side	250 bar (3626 psi)	280 bar (4061 psi)	250 bar (3626 psi)
Boom cylinder, rod side	250 bar (3626 psi)		280 bar (4061 psi)
Dipper arm cylinder, full bore or piston side	280 bar (4061 psi)		
Dipper arm cylinder, rod side	250 bar (3626 psi)		

Specifications

Transmission

Travel system	EC15D	EC18D	EC18D (option) EC20D
Travel speed			
1st gear	1.8 km/h (1.1 mph)	1.8 km/h (1.1 mph)	2.5 km/h (1.6 mph)
2nd gear	-	3.6 km/h (2.2 mph)	4.7 km/h (2.9 mph)
Braking system			
Primary brake	Hydrostatic brake on both motors. If the travelling 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 travelling 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	9.2 +0.8/-0.6 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

The total machine weight (as specified on the machine's PIN plate) is calculated according to ISO 6016.

Configuration	EC15D	EC18D	EC20D
Most usual configuration (MuC) (Machine with 230 mm (9.06 in) rubber tracks, cab, long arm, pin-on bucket 500/600*, worklight on boom and tools kit)	1578 kg (3479 lb)	1710 kg (3770 lb)	1890 kg (4167 lb)
Standard operational weight (Machine with 230 mm (9.06 in) rubber tracks, cab, short arm, pin-on bucket 450/500* and 75 kg (165 lb) operator)	1640 kg (3616 lb)	1770 kg (3902 lb)	1950 kg (4299 lb)
Maximum machine weight (Machine with 230 mm (9.06 in) rubber tracks, cab, long arm, 38 kg (84 lb) additional counterweight**, 140 kg (308.6 lb) hammer breaker HB02TLN with pin-on attach, OPG level 2, 3% of the operational weight for options and 120 kg (265 lb) operator)	2000 kg (4410 lb)	2130 kg (4696 lb)	2260 kg (4983 lb)
Weight reduction with canopy	– 88 kg (194 lb)		

* EC20D

**not on EC20D

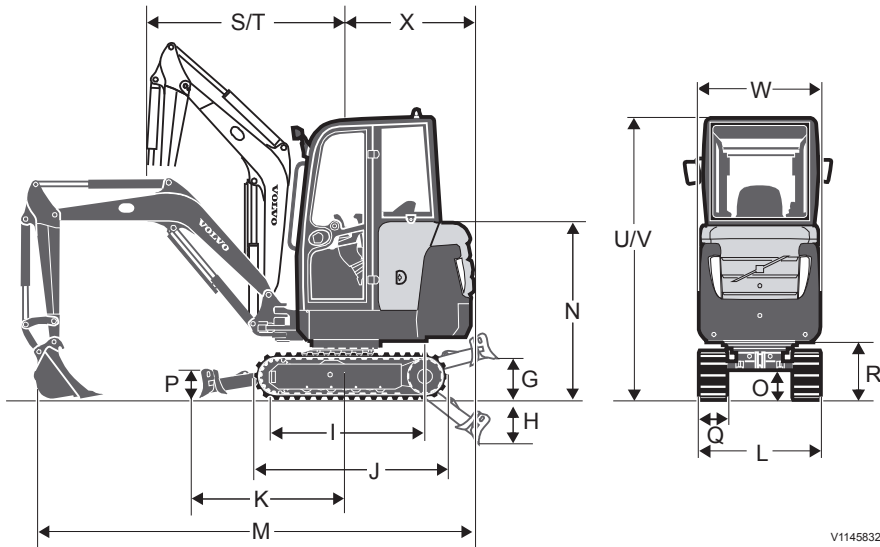
Specifications
170 Ground pressure

Ground pressure

(based on MuC/most usual configuration weight)

Version	EC15D	EC18D	EC20D
Cab	0.27 kg/cm ²	0.31 kg/cm ²	0.31 kg/cm ²
Canopy	0.26 kg/cm ²	0.29 kg/cm ²	0.30 kg/cm ²

Dimensions



V1145832

	EC15D, mm (in)		EC18D, mm (in)		EC20D, mm (in)	
Dipper arm	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 1050 (41.3)	Long arm 1350 (53.2)
G Highest position dozer blade (short blade / long blade)	209 (8.2) / 302 (11.9)		—* / 326 (12.8)			
H Lowest position dozer blade (short blade / long blade)	190 (7.5) / 294 (11.6)		—* / 311 (12.2)			
I Tumbler length	1082 (42.6)				1240 (48.8)	
J Track length	1462 (57.6)				1620 (63.8)	
K Dozer blade, maximum reach at ground level (short blade / long blade)	857 (33.7) / 1166 (45.9)		—* / 1215 (47.8)			
L Overall width min./max	980 (38.6) / 980 (38.6)		994 (39.1) / 1336 (52.6)**		1014 (39.9) / 1356 (53.4)**	
M Overall length	3580 (140.9)	3472 (136.7)	3591 (141.4)	3487 (137.3)	3746 (147.5)	3605 (141.6)
N Overall height of engine hood	1400 (55.1)		1423 (56.0)			

Specifications

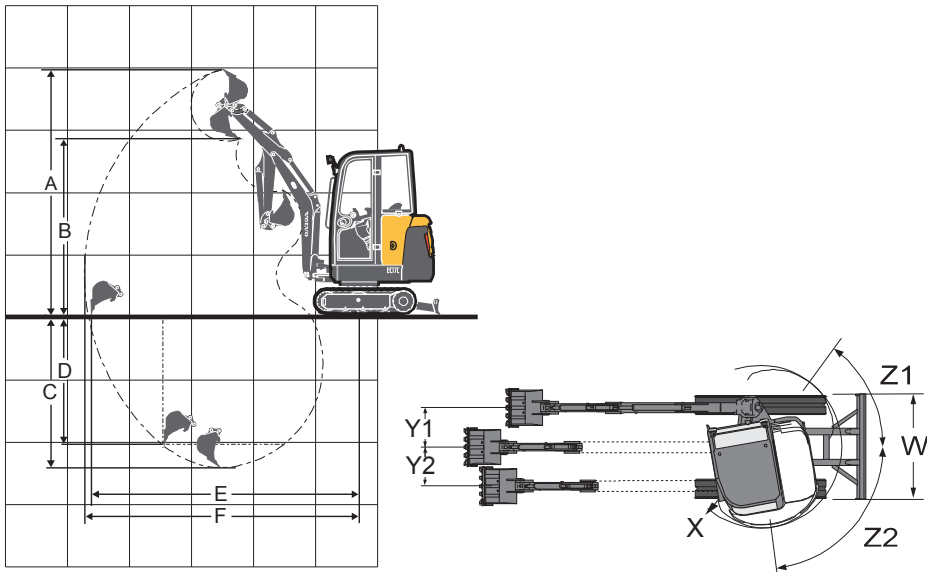
172 Dimensions

	EC15D, mm (in)		EC18D, mm (in)		EC20D, mm (in)	
Dipper arm	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 1050 (41.3)	Long arm 1350 (53.2)
O Minimum ground clearance	210 (8.3)		159 (6.3)			
P Dozer blade height (short blade / long blade)	238 (9.4) / 241 (9.5)		—* / 248 (9.8)			
Q Shoe width	230 (9.1)				250 (9.8)	
R Ground clearance to superstructure	458 (18.0)		481 (18.9)			
S Front slew radius	1452 (57.2)	1471 (57.9)	1452 (57.2)	1471 (57.9)	1683 (66.3)	1731 (68.2)
T Front slew radius with maximum offset	1147 (45.2)	1164 (45.8)	1147 (45.2)	1164 (45.8)	1383 (54.5)	1430 (56.3)
U Overall height (canopy)	2296 (90.39)		2318 (91.26)			
V Overall height (cab)	2371 (93.35)		2395 (94.29)			
W Overall width of superstructure	993 (39.1)					
X Tail slew radius	1052 (41.4)					

*not available

**XTV version with the variable tracks in its widest position.

Working ranges



V1147568

Dipper arm	EC15D, mm (in)		EC18D, mm (in)		EC20D, mm (in)	
	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 1050 (41.3)	Long arm 1350 (53.1)
A. Maximum cutting height	3437 (135.3)	3580 (140.4)	3460 (136.2)	3603 (141.9)	3807 (149.9)	3982 (156.8)
B. Maximum dumping height	2475 (97.4)	2620 (103.1)	2498 (98.4)	2642 (104.0)	2746 (108.1)	2920 (114.9)
C. Maximum digging depth (with dozer blade lowered)	2120 (83.5)	2323 (91.5)	2097 (82.6)	2297 (90.4)	2257 (88.9)	2557 (100.7)
D. Maximum vertical wall digging depth	1793 (70.6)	1985 (78.2)	1772 (69.8)	1961 (77.2)	1962 (66.6)	1978 (73.9)
E. Maximum digging reach at ground level	3803 (149.7)	3996 (157.3)	3799 (149.6)	3992 (157.2)	3971 (156.3)	4261 (167.8)
F. Maximum digging reach	3856 (151.8)	4046 (159.3)	3856 (151.8)	4046 (159.3)	4080 (160.6)	4362 (171.7)
W. Machine width, min./max.	980/980 (38.6/38.6)		994/1336 (39.1/52.6)		1014/1356 (39.9/53.4)	
X. Tail slew radius	1052 (41.4)				1090 (42.9)	

Specifications
174 Working ranges

Dipper arm	EC15D, mm (in)		EC18D, mm (in)		EC20D, mm (in)	
	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 950 (37.4)	Long arm 1150 (45.3)	Short arm 1050 (41.3)	Long arm 1350 (53.1)
Y1. Boom offset	527 (20.8)				547 (21.5)	
Y2. Boom offset	412 (16.2)				392 (15.4)	
Z1. Max. boom angle left	55°					
Z2. Max. boom angle right	75°					

Digging forces

	EC15D/EC18D	EC20D
Dipper arm	950 mm (37.4 in)	1050 mm (41.3 in)
Bucket radius (at the tooth)	499 mm (19.6 in)	599 mm (23.6 in)
Bucket radius (at the blade)	443 mm (17.4 in)	539 mm (21.2 in)
Break-out force (at bucket blade)	1290 daN/2900 lbf	1827 daN/4107 lbf
Break-out force ISO/SAE	1145 daN/2574 lbf	1644 daN/3696 lbf
Tear-out force (at bucket blade)	795 daN	1229 daN
Tear-out force ISO/SAE	770 daN/ 1731 lbf	1193 daN/ 2682 lbf
Angle of rotation, bucket	196°	199°

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 (not in machines without safety valves).

Lifting capacities are 75% of the tipping load or 87% of the hydraulic limit.

The specified values are valid for a machine:

- without attachment and without attachment bracket.

NOTE!

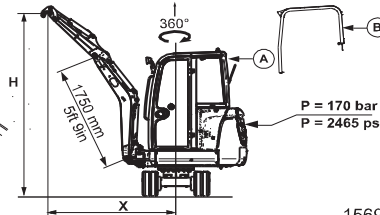
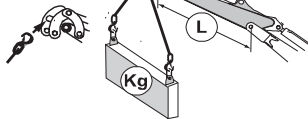
If handling is accomplished in lifting gear operation the weight of the attachments must be subtracted from the values stated in the table.

- 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, EC15D, Cab (A) and
Canopy (B) (North America only)

		X m (ft-in)		1 (3-3.5)		2 (6-7)		3 (9-10)		Maxi (X)		
		H m (ft-in)		Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	m (ft-in)
A	L= 0.95m (37.4 in)	3.0 (9-10)										
		2.0 (6-7)			268 *	591 *				247	545	2.95 (9-8)
		1.0 (3-3.5)			327	721	191	421	173	381	833	3.33 (10-11)
		-1.0 (-3-3.5)	334 *	736 *	311	688	183	403	180	353	773	3.35 (11-0)
		-2.0 (-6-7)	453	999	303	668	179	395	197	434	953	3.12 (10-3)
	L= 1.15m (45.3 in)	3.0 (9-10)			311	688				244 *	538 *	2.31 (7-7)
		2.0 (6-7)								221 *	487 *	2.2 (7-2)
		1.0 (3-3.5)	495	1091	332	732	192	423	158	348	763	3.52 (11-6)
		-1.0 (-3-3.5)	387 *	853 *	313	690	183	403	147	324	713	3.54 (11-8)
		-2.0 (-6-7)	453	999	303	668			216	476	1046	3.33 (10-11)
B	L= 0.95m (37.4 in)	3.0 (9-10)										
		2.0 (6-7)			240	529				232	511	2.95 (9-8)
		1.0 (3-3.5)			307	677	179	395	162	357	783	3.33 (10-11)
		-1.0 (-3-3.5)	334 *	736 *	291	642	171	377	149	328	723	3.35 (11-0)
		-2.0 (-6-7)	425	937	284	626	167	368	184	406	893	3.12 (10-3)
	L= 1.15m (45.3 in)	3.0 (9-10)			291	642				242	534	2.31 (7-7)
		2.0 (6-7)								221 *	487 *	2.2 (7-2)
		1.0 (3-3.5)	467	1030	312	688	180	397	148	326	718	3.52 (11-6)
		-1.0 (-3-3.5)	387 *	853 *	294	648	171	377	136	300	660	3.54 (11-8)
		-2.0 (-6-7)	425	937	278	613	166	366	162	357	783	3.33 (10-11)
A and B	L= 0.95m (37.4 in)	3.0 (9-10)										
		2.0 (6-7)			268 *	591 *				277 *	611 *	2.54 (8-4)
		1.0 (3-3.5)			447 *	985 *	292 *	644 *	271 *	597 *	1303	3.33 (10-11)
		-1.0 (-3-3.5)	334 *	736 *	545 *	1202 *	301 *	664 *	253 *	558 *	1230	3.29 (10-9)
		-2.0 (-6-7)	656 *	1446 *	493 *	1087 *	264 *	582 *	240 *	529 *	1153	2.82 (9-3)
	L= 1.15m (45.3 in)	3.0 (9-10)			321 *	708 *				244 *	538 *	2.31 (7-7)
		2.0 (6-7)								221 *	487 *	2.2 (7-2)
		1.0 (3-3.5)	563 *	1241 *	372 *	820 *	275 *	606 *	242 *	534 *	1170	3.52 (11-6)
		-1.0 (-3-3.5)	387 *	853 *	547 *	1206 *	296 *	653 *	233 *	514 *	1125	3.48 (11-5)
		-2.0 (-6-7)	683 *	1506 *	514 *	1133 *	277 *	611 *	223 *	492 *	1079	3.05 (10-0)

ISO 10567



VOLVO - EC15D

15693063

V1150156

L = length of dipper arm

Specifications 178 Lifting capacities

Lifting capacities, EC15D, Cab, with safety valves on dipper arm and boom, without safety valve on dozer blade

ISO 10567

	X(m)	1.0		1.5		2.0		2.5		3.0		3.5		Max		Xmax
	Y (m)	L	F	L	F	L	F	L	F	L	F	L	F	L	F	
LB= 0,95m C=0kg	3,5															
	3															
	2,5							268 *	268 *					247	276 *	2537
	2							245 *	245 *					197	222	2945
	1,5					276 *	276 *	250	282	191	215			173	195	3195
	1					327	372	242	273	188	212			161	182	3325
	0,5					311	355	233	265	183	207			157	178	3354
	0				334 *	334 *	303	346	228	259	180	204		160	181	3287
	-0,5				448	521	301	345	225	257	179	203		171	194	3117
	-1				453	526	303	347	227	258				197	223	2815
LB= 1,15m C=0kg	-1,5					311	321 *							244 *	244 *	2311
	-2															
	3,5													221 *	221 *	2196
	3													214	247	2803
	2,5							194 *	194 *					177	205	3169
	2							189 *	189 *	194	225			158	184	3398
	1,5							238 *	238 *	192	223			148	173	3516
	1					332	372 *	243	283	188	218	149	174	145	169	3544
	0,5					313	369	234	273	183	213	147	172	147	171	3483
	0				387 *	387 *	302	357	227	266	179	209		155	182	3326
	-0,5	397 *	397 *	441	531	297	352	223	262	177	207			174	204	3053
	-1	635 *	635 *	445	535	298	353	223	262	178	208			216	225 *	2613
	-1,5			453	544	303	358	228	250 *							
	-2															

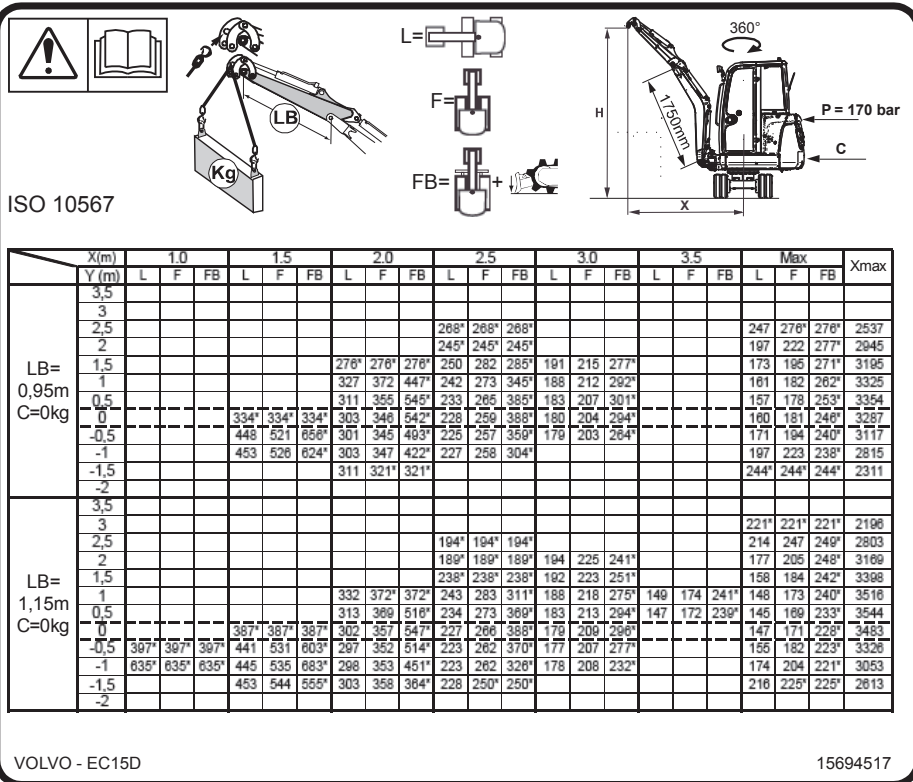
VOLVO - EC15D

VOLVO - EC15D

V1150157

C = additional counterweight, LB = length of dipper arm

Lifting capacities, EC15D, Cab, with safety valves on dipper arm, boom and dozer blade



V1150158

C = additional counterweight, LB = length of dipper arm

180 Specifications Lifting capacities

Lifting capacities, EC15D, Canopy, with safety valves on dipper arm and boom, without safety valve on dozer blade

ISO 10567

	X(m)	1.0		1.5		2.0		2.5		3.0		3.5		Max		Xmax
	Y (m)	L	F	L	F	L	F	L	F	L	F	L	F	L	F	
LB= 0,95m C=0kg	3,5															
	3															
	2,5							238	268 *					232	269	2537
	2							240	245 *					185	214	2945
	1,5					276 *	276 *	235	272	179	207			162	188	3195
	1					307	360	227	264	175	204			151	175	3325
	0,5					291	343	218	255	171	199			147	171	3354
	0			334 *	334 *	263	334	213	249	168	196			149	174	3287
	-0,5			419	504	281	332	210	247	167	195			160	186	3117
	-1			425	509	284	335	212	248					184	214	2815
LB= 1,15m C=0kg	-1,5					291	321 *							242	244 *	2311
	-2															
	3,5															
	3															
	2,5							194 *	194 *					221 *	221 *	2196
	2							189 *	189 *	182	210			201	232	2803
	1,5							237	238 *	180	209			166	192	3169
	1							237	238 *	180	209			148	171	3398
	0,5					312	365	228	265	176	204	139	162	138	161	3516
	0					294	345	219	256	171	199	137	160	135	157	3544
	-0,5					387 *	387 *	262	333	212	248	167	195	136	159	3483
	-1	397 *	397 *	412	496	278	329	208	244	164	192			145	169	3326
	-1,5	635 *	635 *	416	501	278	330	208	244	166	194			162	190	3053
	-2			425	510	284	335	213	249					225 *	225 *	2613

VOLVO - EC15D

15694496

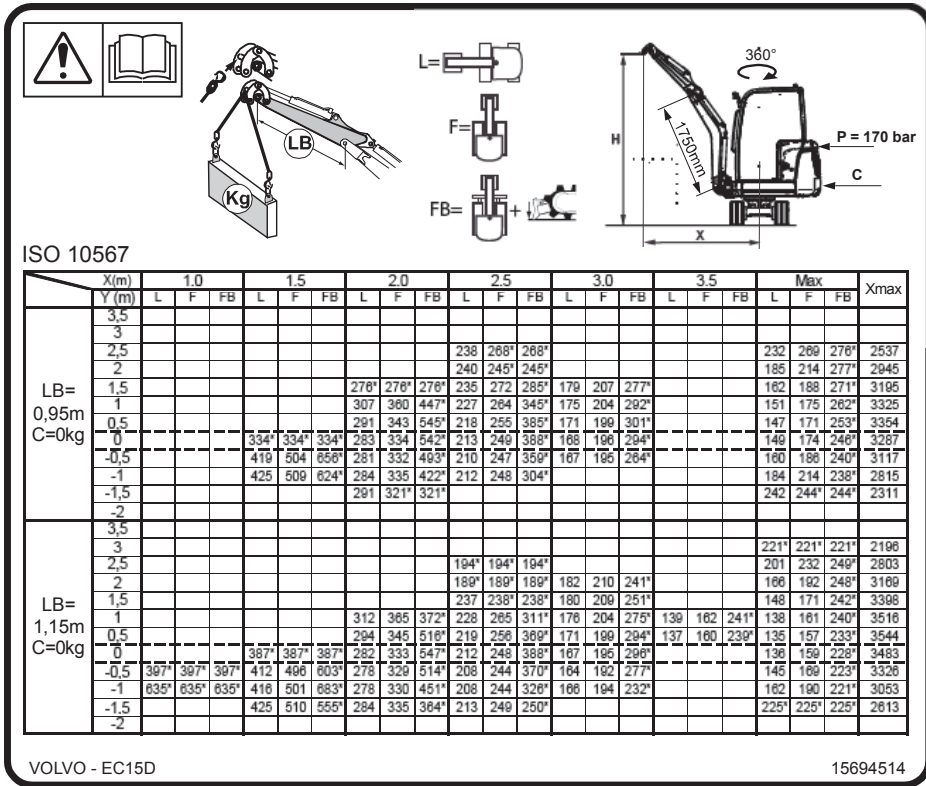
V1150159

C = additional counterweight, LB = length of dipper arm

Specifications

Lifting capacities 181

Lifting capacities, EC15D, Canopy, with safety valves on dipper arm, boom and dozer blade



V1150160

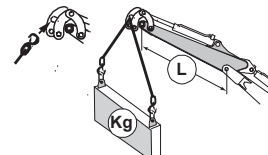
C = additional counterweight, LB = length of dipper arm

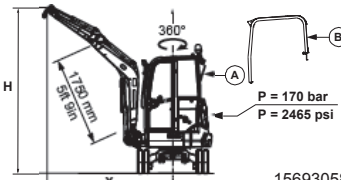
182 Specifications Lifting capacities

Lifting capacities, EC18D, Cab (A) and Canopy (B) (North America only)

→ X m (ft-in)		1 (3-3.5)				2 (5-7)				3 (9-10)				Maxi (X)				
	H m (ft-in)	Min		Max		Min		Max		Min		Max		Min		Max		
		Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	m (ft-in)		
A	L=	3.0 (9-10)																
	0.95m	2.0 (6-7)				268	591	268	591					276	608	276	608	
	(37.4 in)	1.0 (3-3.5)				378	833	398	873	221	487	230	507	201	443	208	459	
		-1.0 (-3-3.5)	522	1151	539	1188	361	798	379	836	213	470	222	489	187	412	194	428
		-2.0 (-6-7)	530	1168	564	1243	354	780	372	820	209	461	218	481	229	505	238	525
		3.0 (9-10)													244	538	244	538
		2.0 (6-7)				321	708	321	708					221	487	221	487	
	L=	2.0 (6-7)				194	428	194	428	224	494	233	514	247	545	249	549	
	1.15m	1.0 (3-3.5)	563	1241	563	1241	372	820	372	820	222	489	231	509	184	406	191	421
	(45.3 in)		539	1188	539	1188	364	802	382	842	213	470	221	487	172	379	178	392
B	L=	3.0 (9-10)																
	0.95m	2.0 (6-7)				268	591	268	591					276	608	276	608	
	(37.4 in)	1.0 (3-3.5)				378	833	398	873	221	487	230	507	201	443	208	459	
		-1.0 (-3-3.5)	522	1151	539	1188	361	798	379	836	213	470	222	489	187	412	194	428
		-2.0 (-6-7)	530	1168	564	1243	354	780	372	820	209	461	218	481	229	505	238	525
		3.0 (9-10)													244	538	244	538
		2.0 (6-7)				321	708	321	708					221	487	221	487	
	L=	2.0 (6-7)				194	428	194	428	212	467	219	483	233	514	241	531	
	1.15m	1.0 (3-3.5)	543	1197	563	1241	362	798	372	820	210	463	217	478	173	381	179	395
	(45.3 in)		539	1188	517	1140	343	756	359	791	200	441	207	456	161	355	166	366
A and B	L=	3.0 (9-10)																
	0.95m	2.0 (6-7)				268	591	268	591					277	611	277	611	
	(37.4 in)	1.0 (3-3.5)				447	985	447	985	262	584	262	584	271	597	271	597	
		-1.0 (-3-3.5)	539	1188	539	1188	361	798	379	836	213	470	222	489	187	412	194	428
		-2.0 (-6-7)	530	1168	564	1243	354	780	372	820	209	461	218	481	229	505	238	525
		3.0 (9-10)													244	538	244	538
		2.0 (6-7)				321	708	321	708					221	487	221	487	
	L=	2.0 (6-7)				194	428	194	428	241	531	241	531	240	529	240	529	
	1.15m	1.0 (3-3.5)	563	1241	563	1241	372	820	372	820	275	608	275	608	242	534	242	534
	(45.3 in)		539	1188	539	1188	347	766	364	802	206	456	206	456	233	514	233	514

ISO 10567





H

360°

1720 mm

59-90 in

X

P = 170 bar

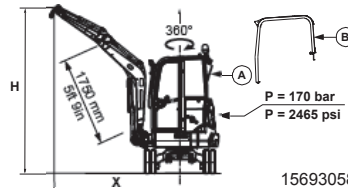
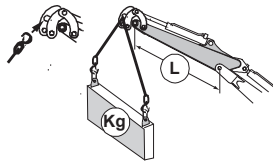
P = 2465 psi

B

VOLVO - EC18D

15693058

ISO 10567



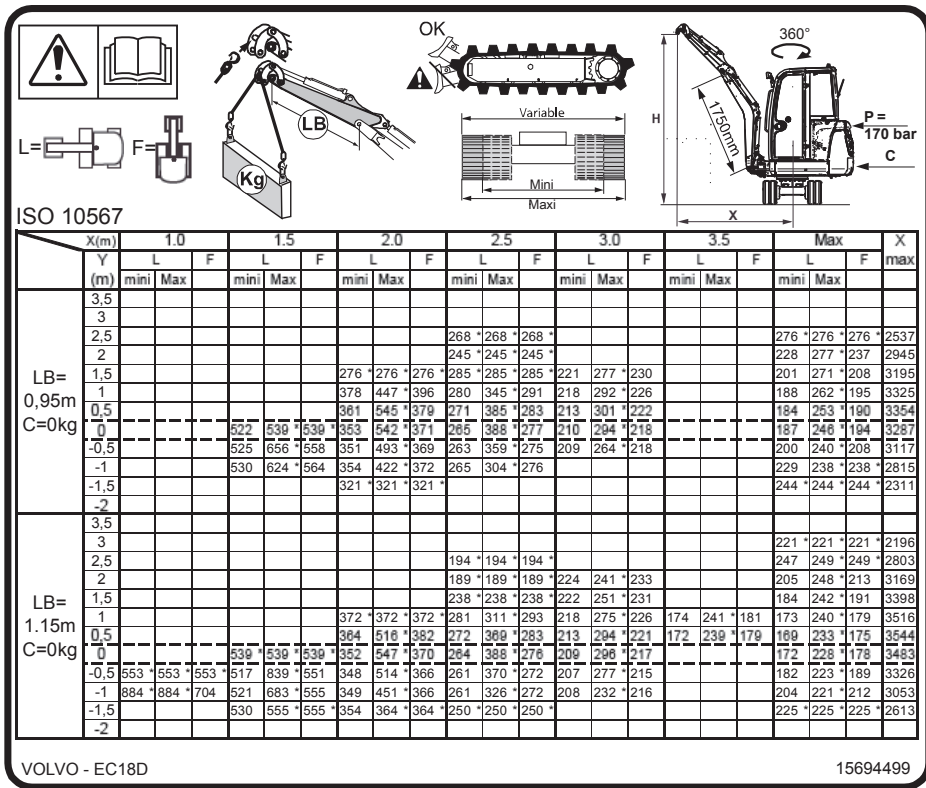
VOLVO - EC18D

15693058

V1150161

L = length of dipper arm

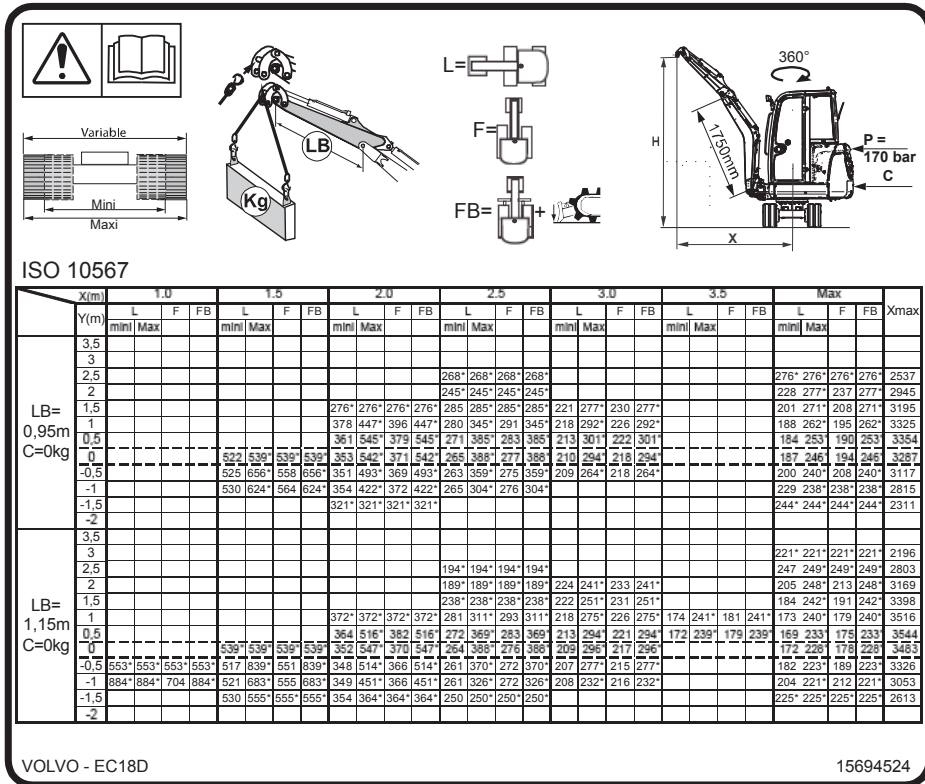
Lifting capacities, EC18D, Cab, with safety valves on dipper arm and boom, without safety valve on dozer blade



C = additional counterweight, LB = length of dipper arm

184 Specifications Lifting capacities

Lifting capacities, EC18D, Cab, with safety valves on dipper arm, boom and dozer blade



C = additional counterweight, LB = length of dipper arm

Lifting capacities, EC18D, Canopy, with
safety valves on dipper arm and boom,
without safety valve on dozer blade

ISO 10567

	X(m)	1.0			1.5			2.0			2.5			3.0			3.5			Max			Xmax
	Y (m)	L		F	L		F	L		F	L		F	L		F	L		F	L		F	
		mini	Max		mini	Max		mini	Max		mini	Max		mini	Max		mini	Max		mini	Max		
LB= 0,95m C=0kg	3,5																						
	3																						
	2,5										268 *	268 *	268 *						276 *	276 *	276 *	2537	
	2										245 *	245 *	245 *						228 *	277 *	237 *	2945	
	1,5							276 *	276 *	276 *	285 *	285 *	285 *	221 *	277 *	230 *			201 *	271 *	208 *	3195	
	1							378 *	447 *	396 *	280 *	345 *	291 *	218 *	292 *	226 *			188 *	262 *	195 *	3325	
	0,5							361 *	545 *	379 *	271 *	385 *	283 *	213 *	301 *	222 *			184 *	253 *	190 *	3354	
	0							522 *	639 *	539 *	353 *	542 *	371 *	265 *	388 *	277 *	210 *	294 *	218 *	187 *	246 *	194 *	3287
	-0,5							525 *	656 *	558 *	351 *	493 *	369 *	263 *	359 *	275 *	209 *	264 *	218 *	200 *	240 *	208 *	3117
	-1							530 *	624 *	564 *	354 *	422 *	372 *	265 *	304 *	276 *			229 *	238 *	238 *	2815	
-1,5										321 *	321 *	321 *						244 *	244 *	244 *	2311		
-2																							
LB= 1.15m C=0kg	3,5																						
	3																						
	2,5										194 *	194 *	194 *						221 *	221 *	221 *	2196	
	2										189 *	189 *	189 *	212 *	241 *	219 *			193 *	248 *	200 *	3169	
	1,5										238 *	238 *	238 *	210 *	251 *	217 *			173 *	242 *	179 *	3398	
	1										362 *	372 *	372 *	266 *	311 *	276 *	205 *	275 *	212 *	164 *	241 *	169 *	
	0,5										343 *	516 *	359 *	256 *	369 *	266 *	200 *	294 *	207 *	162 *	239 *	167 *	
	0										539 *	639 *	517 *	332 *	521 *	347 *	249 *	381 *	258 *	196 *	296 *	203 *	
	-0,5	553 *	553 *	553 *	553 *	487 *	839 *	517 *	327 *	514 *	342 *	245 *	370 *	254 *	194 *	277 *	201 *			171 *	223 *	176 *	3326
	-1	884 *	884 *	884 *	491 *	683 *	521 *	328 *	451 *	343 *	245 *	326 *	254 *	195 *	232 *	202 *			191 *	221 *	198 *	3053	
-1,5																		225 *	225 *	225 *	2613		
-2																							

VOLVO - EC18D

15694503

V1150164

C = additional counterweight, LB = length of dipper arm

Specifications Lifting capacities

Lifting capacities, EC18D, Canopy, with safety valves on dipper arm, boom and dozer blade

ISO 10567

	X(m)	1.0				1.5				2.0				2.5				3.0				3.5				Max				Xmax
		L	F	FB		L	F	FB		L	F	FB		L	F	FB		L	F	FB		L	F	FB		L	F	FB		
LB= 0,95m C=0kg	Y(m)	mini	Max			mini	Max			mini	Max			mini	Max			mini	Max			mini	Max			mini	Max			
	3,5																													
	3																													
	2,5																													
	2																													
	1,5																													
	1																													
	0,5																													
	0																													
	-0,5																													
LB= 1,15m C=0kg	-1																													
	-1,5																													
	-2																													
	3,5																													
	3																													
	2,5																													
	2																													
	1,5																													
	1																													
	0,5																													
LB= 1,15m C=0kg	0																													
	-0,5	553	553	553	553	487	839	517	839	327	514	342	514	249	381	258	368	196	286	203	286									
	-1	884	884	884	884	491	883	521	883	328	515	343	515	245	326	254	326	195	232	202	232									
	-1,5					500	555	530	555	333	364	349	364	250	250	250	250													
	-2																													
	3,5																													
	3																													
	2,5																													
	2																													
	1,5																													
	1																													
	0,5																													
	0																													
	-0,5	553	553	553	553	487	839	517	839	327	514	342	514	249	381	258	368	196	286	203	286									
	-1	884	884	884	884	491	883	521	883	328	515	343	515	245	326	254	326	195	232	202	232									
	-1,5					500	555	530	555	333	364	349	364	250	250	250	250													
	-2																													

VOLVO - EC18D

15694528

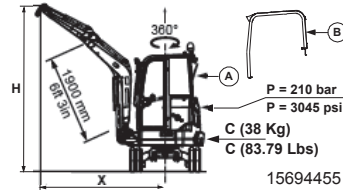
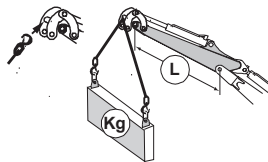
V1150165

C = additional counterweight, LB = length of dipper arm

Lifting capacities, EC20D, Cab (A) and
Canopy (B) (North America only)

→ X m (ft-in)		1 (3-3.5)				2 (5-7)				3 (9-10)				Maxi (X)			
	H m (ft-in)	Min		Max		Min		Max		Min		Max		Min		Max	
		Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs
A	L=	3.0 (9-10)				291	642	398	877					289	637	396	871
	1.05m	2.0 (6-7)				294	648	398	871	215	474	295	650	220	485	302	666
	(41.3 in)	1.0 (3-3.5)				383	844	537	1189	209	461	289	637	199	439	278	609
		-1.0 (-3-3.5)	489	1078	741	1634	335	739	484	1067	195	430	274	604	184	405	441
		-2.0 (-6-7)	976	2152	1482	3269	670	1482	3269	190	419	269	593	213	470	302	666
		-3.0 (-9-10)	517	1140	773	1704	343	756	492	1086				268	587	427	941
	L=	3.0 (9-10)												278	609	313	690
	1.35m	2.0 (6-7)								220	485	301	664	184	406	256	562
	(53.2 in)	1.0 (3-3.5)				364	802	517	1140	210	463	291	642	146	322	206	454
		-1.0 (-3-3.5)	479	1058	730	1609	337	743	487	1074	192	423	272	600	140	309	443
B	L=	3.0 (9-10)				318	701	466	1027	183	403	262	578	173	381	247	545
	1.05m	2.0 (6-7)				326	719	474	1045					220	485	314	692
	(41.3 in)	1.0 (3-3.5)				278	608	377	831					274	604	374	826
		-1.0 (-3-3.5)	480	1058	730	1609	337	743	487	1074	192	423	272	600	140	309	443
		-2.0 (-6-7)	976	2152	1482	3269	670	1482	3269	190	419	269	593	213	470	302	666
		-3.0 (-9-10)	517	1140	773	1704	343	756	492	1086				268	587	427	941
	L=	3.0 (9-10)												278	609	313	690
	1.35m	2.0 (6-7)								220	485	301	664	184	406	256	562
	(53.2 in)	1.0 (3-3.5)				344	758	488	1078	197	434	273	602	136	300	192	423
		-1.0 (-3-3.5)	450	992	686	1512	317	699	458	1010	180	397	255	562	130	287	412
A and B	L=	3.0 (9-10)				298	657	437	963	171	377	245	540	161	355	231	509
	1.05m	2.0 (6-7)				306	675	445	981					206	454	294	648
	(41.3 in)	1.0 (3-3.5)				401	884	401	884	399	880	399	880	402	886	402	886
		-1.0 (-3-3.5)	844	1861	844	1861	865	1905	865	1905	542	1195	542	1195	468	1032	468
		-2.0 (-6-7)	1400	3088	1400	3088	844	1861	844	1861	529	1166	529	1166	514	1133	514
		-3.0 (-9-10)	813	1793	813	1793	633	1396	633	1396				522	1151	522	1151
	L=	3.0 (9-10)								351	774	351	774	351	774	351	774
	1.35m	2.0 (6-7)								427	941	427	941	379	836	379	836
	(53.2 in)	1.0 (3-3.5)				648	1428	648	1428	530	1166	530	1166	413	911	413	911
		-1.0 (-3-3.5)	856	1887	856	1887	831	1831	831	1831	530	1166	530	1166	413	911	413
		-2.0 (-6-7)	1410	3109	1410	3109	779	1717	779	1717				485	1069	485	1069

ISO 10567



VOLVO - EC20D

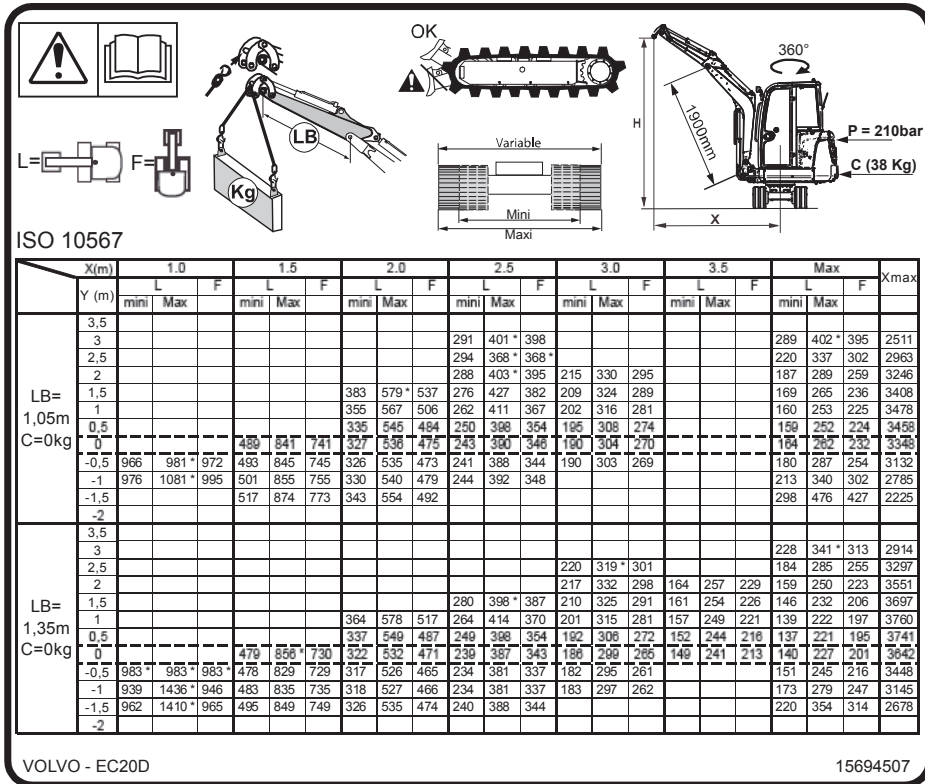
15694455

V1150166

L = length of dipper arm

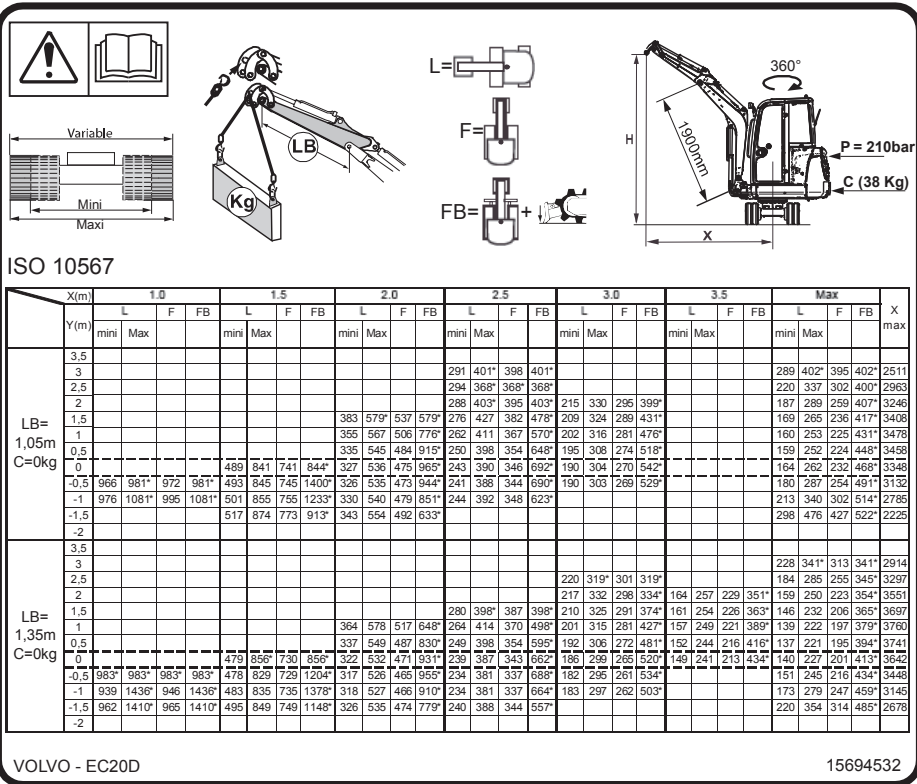
Specifications 188 Lifting capacities

Lifting capacities, EC20D, Cab, with safety valves on dipper arm and boom, without safety valve on dozer blade



C = additional counterweight, LB = length of dipper arm

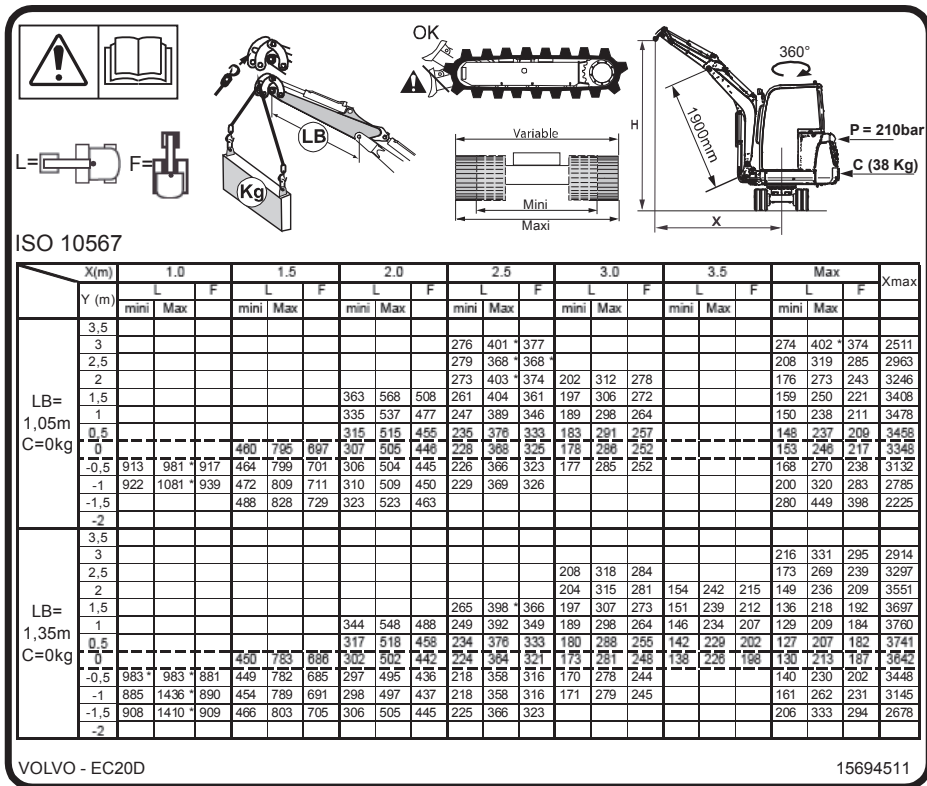
Lifting capacities, EC20D, Cab, with safety valves on dipper arm, boom and dozer blade



C = additional counterweight, LB = length of dipper arm

Specifications 190 Lifting capacities

Lifting capacities, EC20D, Canopy, with safety valves on dipper arm and boom, without safety valve on dozer blade

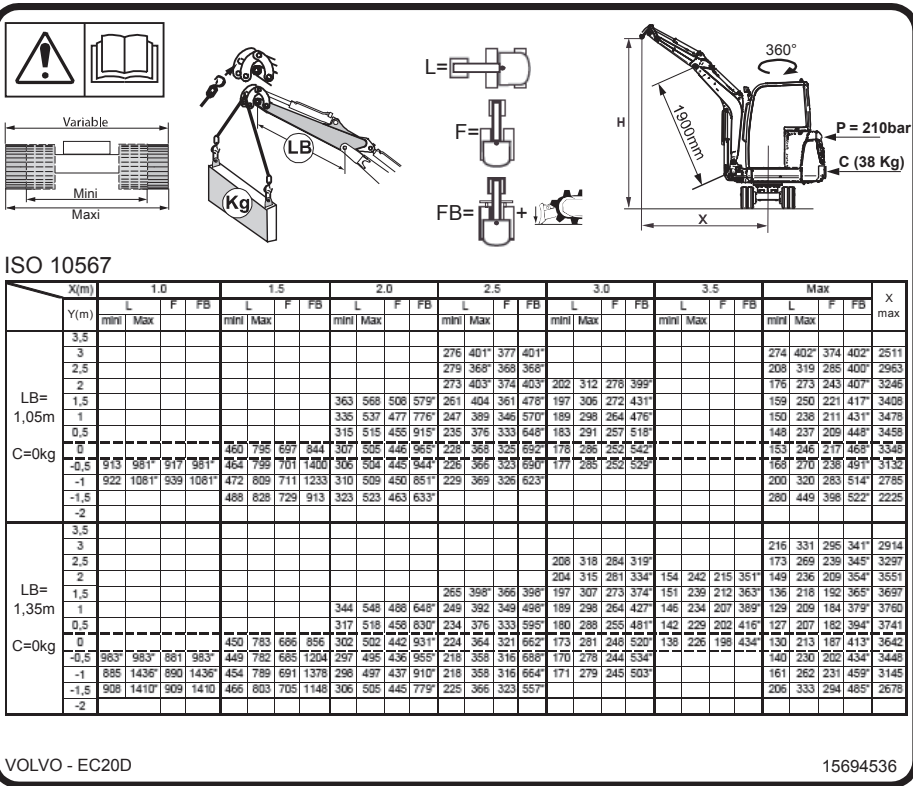


C = additional counterweight, LB = length of dipper arm

Specifications

Lifting capacities 191

Lifting capacities, EC20D, Canopy, with safety valves on dipper arm, boom and dozer blade



C = additional counterweight, LB = length of dipper arm

Hammer

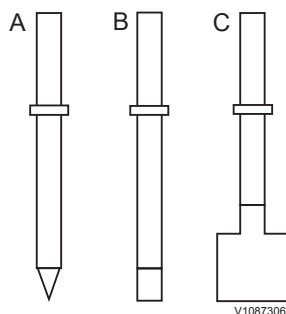
HB100LN STD, QC	
Working weight ^a	100 kg (220 lb)
Impact rate ^b	800–1200 bpm
Hammer operating pressure ^c	80–120 bar (1160–1740 psi)
Oil flow range	23–40 l/min (6.1–10.6 US gal/min)
Pressure line connection (IN)	3/8"
Return line connection (OUT)	1/2"

a) Includes average mounting bracket and standard tool.

b) Actual impact frequency depends on oil flow, oil viscosity, temperature, and material to be broken.

c) Actual pressure depends on oil flow, oil viscosity, temperature, material to be broken and back pressure.

Hammer tools



Type
Pointed chisel (A)
Flat chisel (B)
Spade (C)

Service history

Service 50 hours		Type of service ☐ 50 hours inspection	Signature and stamp
Date	Hours		

Service 250 hours		Type of service ☐ Service and Maintenance	Signature and stamp
Date	Hours		

Service 500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 1000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 1250 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 1500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 1750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 2000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 2250 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

194 **Specifications**
Service history

Service 2500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 2750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 3000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 3250 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 3500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 3750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 4000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 4250 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 4500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 4750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 5000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 5250 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 5500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 5750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 6000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 6250 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 6500 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 6750 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Service 7000 hours		Type of service ☐ Service and maintenance	Signature and stamp
Date	Hours		

Specifications
196 Service history

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	





Handwriting practice lines consisting of 20 horizontal dotted lines.

Alphabetical index

A

Access to cab.....	118
Accidents.....	59
Alternator.....	147
Anti-theft device	12
Arrival and delivery inspection.....	127
Attachment brackets.....	93
Attachments.....	90
Attachments, alternative lowering.....	72
Attachments, connecting and disconnecting.....	92
Audio system.....	55

B

Batteries, charging.....	146
Bearings, greasing	141
Before service, read.....	115
Bucket teeth, replacing.....	151
Buckets.....	97

C

Cab.....	10, 165
CareTrack.....	12
CE-marking, EMC-directive.....	16
Change intervals.....	161
Cleaning engine compartment.....	150
Cleaning machine.....	148
Communication equipment, installation..	19
Connecting to an attachment bracket...	103
Connecting with pivot pins.....	101
Controls.....	40
Coolant.....	157
Coolant level, checking.....	136

D

Delivery Instructions.....	127
Demolition work.....	89
Digging forces.....	175
Dimensions.....	171
Disconnecting with pivot pins.....	103
Display unit.....	33
Door.....	54

E

Eco driving.....	78
Electrical system.....	9, 163
Emergency exit.....	54
Engine.....	9, 162
Engine oil.....	156
Engine oil level, checking.....	138
Entering, leaving and climbing the machine.....	118
Environmental requirements.....	9
Equipment.....	11

EU conformity certificate.....	18
--------------------------------	----

F

Fire extinguisher, location.....	54
Fire prevention.....	119
Front windscreen rails.....	151
Fuel.....	159
Fuel system.....	159

G

Ground pressure.....	170
----------------------	-----

H

Hammer.....	100, 192
Handling hazardous materials.....	122
Handling line, tubes and hoses.....	125
High voltage overhead power line.....	82
Hose rupture valves.....	104
Hydraulic oil.....	158
Hydraulic oil level, checking.....	137
Hydraulic system.....	11, 167

I

Information and warning decals.....	23
Instrument panel, left.....	31
Instrument panel, right.....	36
Intended use.....	9

L

Leaving cab.....	118
Lifting capacities.....	176
Lifting machine.....	74
Lifting objects.....	106
Loading.....	75
Long-term parking.....	70
Lubrication and service chart.....	130

M

Machine view.....	14
Machine weights.....	169
Maintenance service, every 10 hours...	136
Maintenance service, every 1000 hours	144
Maintenance service, every 50 hours...	140
Maintenance service, every 500 hours.	142
Maintenance service, when required....	145
Maintenance under special environmental conditions.....	152
Measures before operating.....	63
Modifications.....	11

O

Offset boom.....	98
Operating on public roads.....	61
Operator comfort.....	49
Operator obligations.....	58
Operator safety.....	60
Operator seat.....	49
Operator's manual, storage.....	54
Operator's seat, adjusting.....	50

Alphabetical index

200

P		Welding.....	148
Paint finish maintenance.....	149	When using rubber tracks.....	105
Parking.....	69	Whole-body vibrations.....	79
Periodic replacement of critical parts for safety.....	62	Windows.....	53
Pressure release.....	96	Working in cold weather.....	88
Primary air filter, cleaning and replacing	143	Working in water and on boggy ground..	86
Product plates.....	21	Working on slopes.....	85
R		Working ranges.....	173
Radiator and coolers, cleaning.....	142	Working where there is risk of landslide...	87
Recommended lubricants.....	154	Working with buckets.....	97
Retrieving and towing.....	71	Working with hammer.....	100
ROPS.....	48	Working within dangerous areas.....	82
ROPS Cab (Roll Over Protective Structure).....	48		
Rules for digging.....	81		
Running-in instructions.....	56		
S			
Safety components.....	20		
Safety rules when operating.....	58		
Seat belt.....	52		
Secondary air filter, replacing.....	144		
Service capacities and change intervals	161		
Service history.....	126, 193		
Service points.....	128		
Service position.....	114		
Service Programme.....	127		
Signalling diagram.....	110		
Slewing system.....	12, 168		
Special hydraulics.....	99		
Starting engine.....	64		
Starting with booster batteries.....	66		
Stopping.....	68		
Symbol key.....	130		
T			
Touch-up painting.....	149		
Towing.....	71		
Track unit, checking tension.....	140		
Tracks.....	105		
Transmission.....	168		
Transporting machine.....	74		
Travel system.....	12		
U			
Underground cables and pipes.....	84		
USA federal clean air act.....	27		
V			
Visibility.....	56		
W			
Warming up.....	67		
Washer reservoir.....	150		
Water separator, checking and draining	138		