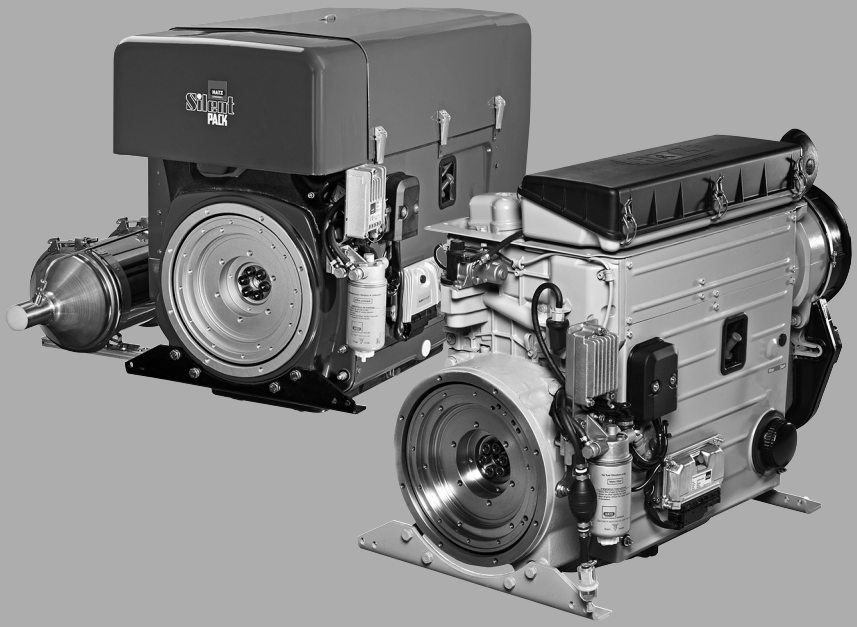
CREATING POWER SOLUTIONS.



3-4L43C | 3-4M43 | 3-4M43Z

INCLUDES SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR MODEL YEAR 2015 FOR EPA AND CALIFORNIA CERTIFIED NON-ROAD COMPRESSION IGNITION ENGINES.

OPERATOR'S MANUAL
Diesel engine

Hatz Diesel

1 Notices

Contact data

© 2014
Motorenfabrik HATZ
Ernst-Hatz-Straße 16
94099 Ruhstorf
Germany

Tel. +49 (0)8531 319-0

Fax +49 (0)8531 319-418

marketing@hatz-diesel.de

www.hatz-diesel.com

Copyright

Original Operator's Manual

This Operator's Manual was translated into multiple languages.

The German version is the **original Operator's Manual**. All other language versions are **translations** of the **original Operator's Manual**.

2 General information

Information on the document

This Operator's Manual was created with due care. It is exclusively intended to offer a technical description of the machine and to provide instructions on commissioning, operating and maintaining the machine. When operating the machine, the applicable standards and legal regulations as well as any in-house regulations apply.

Before commissioning, during operation and before maintenance work is begun on the machine, read the Operator's Manual carefully and keep it close by for ready access.

Machine

This Operator's Manual describes the following machine.

Machine name	HATZ diesel engine
Type number	3-4L43C, 3-4M43, 3-4M43Z

Customer service

Have service work performed by qualified technicians only. We recommend that you work with one of the over 500 **HATZ service stations**. Trained specialists there will repair your machine with **Hatz original spare parts** and with **HATZ tools**. The global HATZ service network is at your disposal to advise you and supply you with spare parts. For the address of the **Hatz service station** nearest you, please see the directory included or visit the Internet at: **www.hatz-diesel.com**

Problems may occur if unsuitable spare parts have been installed. We cannot accept responsibility for damage and secondary damage that result from this.

We therefore recommend the use of **Hatz original spare parts**. These parts are manufactured according to strict Hatz specifications and achieve maximum operational reliability through their perfect fit and functionality. The order number can be found in the included spare parts list or on the Internet at: **www.hatz-diesel.com**

Exclusion of liability

The manufacturer cannot be held responsible for personal injury, damage to property, or damage to the machine itself caused by improper use, foreseeable misuse or failure to follow or adequately follow the safety measures and procedures described in this Operator's Manual. This also applies to changes made to the machine and use of unsuitable spare parts.

Modifications, which serve the technical improvements, are reserved.

3 Safety

3.1 General information

Introduction

This chapter contains the information you need to work safely with this machine.

To prevent accidents and damage to the machine, it is imperative that these safety instructions be followed.

Read this chapter carefully before beginning work.

3.1.1 Intended use and foreseeable misuse

Intended use

The machine described in this Operator's Manual fulfills the following functions:

- Diesel engine intended for installation in a machine or for assembly with other machines to form a machine. See the chapter *11 Installation declaration, page 89*.

This engine is intended exclusively for the purpose specified and tested by the manufacturer of the machine into which the engine is installed.

Any other use is not intended and therefore not permitted. Violations compromise the safety of the personnel working with the machine. Responsibility is not accepted by Motorenfabrik HATZ for damage resulting from this situation.

The operational safety of the machine is only guaranteed if it is used as intended.

Use according to the intended purpose also includes observance of the instructions in this Operator's Manual.

Foreseeable misuse

The following is considered to be foreseeable misuse:

- Any use that varies from or extends beyond the uses specified above.
- Failure to comply with the instructions in this Operator's Manual.
- Failure to comply with the safety instructions.
- Failure to immediately eliminate malfunctions that impact safety before continuing work with the machine (working with the machine when it is not in perfect condition, either functionally or in terms of safety).
- Failure to perform the necessary inspection and maintenance work.
- Any unauthorized modification of or removal of safety equipment.
- Use of spare parts and accessories that are unsuitable or have not been approved by HATZ.
- Operation in flammable or hazardous environments.
- Operation in closed-off or poorly ventilated rooms.

- Installation of the machine in moving equipment (e.g. vehicles, trailers) or in closed rooms without additional measures to handle supply air, extract air and exhaust.
- Improper operation at variance with DIN 6271 and DIN ISO 8528 (climate, load, safety).

Residual risks

Residual risks result during daily use and in association with maintenance work.

These residual risks will be pointed out in chapter *3.2.2 Machine-specific safety instructions for operation, page 14* and in chapter *3.2.3 Machine-specific safety instructions for maintenance work, page 16* as well as in the further contents of the manual, directly in front of the descriptions or operating instructions concerned.

3.1.2 Machine user or machine manufacturer obligations

Machine manufacturer obligations

If you have an engine that is not yet installed in a machine, it is imperative that you follow the **Assembly Instructions for HATZ Diesel Engines** before installing the engine. These assembly instructions contain important information on how to safely install the engine and are available at your nearest **HATZ service station**.

It is prohibited to start the engine before it is fully installed.

In addition, please note that it is prohibited to start up the machine before it has been determined that the machine into which this engine is installed fulfills all safety-related requirements and legal regulations.

User obligations

The user is obligated to only operate the machine while it is in perfect condition. The user must check the condition of the machine before using it and ensure that any defects are eliminated before it is taken into service. Running the machine while identified defects exist is not permitted. The user must also ensure that the information contained in the Operator's Manual has been read and understood.

Obligations of the operating and maintenance personnel

Personnel assigned with operating and maintaining the machine must have read and understood the Operator's Manual or must possess the qualifications necessary for working with this equipment, acquired in training/instructional courses. No one may work with the machine without the necessary qualifications, even if for just a brief period.

The operating personnel must not be under the influence of drugs, medication or alcohol.

All work performed on the machine must be in compliance with the information provided in the Operator's Manual.

Storing the Operator's Manual

This Operator's Manual is an integral component of the machine (also when being sold). It must be stored in the direct vicinity of the machine and be accessible to personnel at all times.

3.1.3 Representation of safety notes

Overview

This machine has been designed and built according to state-of-the-art technology and the recognized safety standards. Despite these precautions, risks exist when operating the machine and during maintenance work.

These risks are identified in this manual by means of safety notes.

The safety notes precede the related description or operating step.

Structure of the safety notes

The safety notes consist of:

- Warning symbol
- Signal word
- Description of danger
- Possible consequences
- Preventative measures

General danger symbol

The general danger symbol is used to identify the danger of personal injury.

Signal words

Signal words identify the magnitude of the risk and the seriousness of the possible injuries:

Danger symbol/ signal word	Meaning
DANGER	This signal word is used to indicate imminently dangerous situations which, if not avoided, will lead to serious injury or death.
WARNING	This signal word is used to indicate potentially dangerous situations which, if not avoided, may lead to serious injury or death.
CAUTION	This signal word is used to indicate potentially dangerous situations which, if not avoided, may lead to minor or moderate injury.

Danger symbol/ signal word	Meaning
CAUTION	This signal word, without a danger symbol, is used to indicate the risk of property damage.
NOTICE	This signal word indicates additional useful information, such as operating tips and cross references.

3.1.4 Meaning of safety symbols

Explanation of symbols

The following table describes the meanings of the safety symbols used in this Operator's Manual.

Symbol	Meaning
	Smoking, fire and open flames are prohibited.
	Warning of personal injury!
	Warning of hot surfaces!
	Warning of flammable substances!
	Warning of explosive substances!
	Warning of toxic engine exhaust!
	Warning of corrosive substances!

Symbol	Meaning
	Warning of heavy loads!
	Warning of environmental damage!
	Comply with the Operator's Manual or additional documentation from other manufacturers or the user.
	Additional information that is useful to the reader.

3.2 Safety notes

3.2.1 Operational safety

Introduction

This chapter contains all of the important safety instructions for personal protection and for safe and reliable operation. Additional, task-related safety instructions can be found at the beginning of each chapter.

	**DANGER**
	Danger to life, danger of injury or danger of property damage due to failure to comply with the Operator's Manual and the safety instructions contained therein. ▪ As the user of the machine, you must ensure that all people working on the machine are familiar with the content of this Operator's Manual. ▪ Before working on the machine, read this Operator's Manual carefully, paying special attention to the safety notes. ▪ Fulfill all required safety conditions before working on the machine. ▪ Follow all general safety instructions as well as the specific task-related safety instructions contained in the individual chapters.

Using the machine

- Only operate the machine for the purposes described in the chapter *3.1.1 Intended use and foreseeable misuse, page 7*.

Compliance with other regulations

- Adhere to the applicable accident prevention regulations of the trade associations.
- Comply with the regulations concerning the minimum safety and health requirements for the use of work equipment by workers at work.
- In addition, local safety, accident prevention and environmental regulations also apply when operating the machine.

Personal protective equipment

During operation and maintenance of the machine, personal protective equipment must be available and must be used if necessary. The required personal protective equipment is specified in the descriptions of the operating steps.

Personal protective equipment	Pictogram	Function
Safety shoes		Safety shoes offer protection against: ▪ Slipping ▪ Falling objects
Hearing protection		Hearing protection offers protection against ear injuries due to excessive and constant noise.
Safety gloves		Safety gloves protect the hands against injury, for example from battery acid.
Safety goggles (with side protection)		Safety goggles protect the eyes from flying objects (for example, dust particles, spraying liquids, spraying acid).
Working clothes		Wear close-fitting clothing. However, it must not restrict the wearer's freedom of movement.

Warning and notice labels on the machine

The warning and notice labels on the machine must be followed (see the chapter *3.3 Labels, page 19*).

The warning and notice labels must be kept legible and must be replaced if necessary. For this purpose, contact your nearest **HATZ service station**.

Maintenance work

Maintenance work that goes beyond the scope described in this manual must only be performed by qualified technicians (see the chapter *2 General information, page 6*).

Independent maintenance work and constructional changes to the machine, especially to the safety equipment, are not permitted.

Safety equipment

Safety equipment must not be modified and must not be rendered ineffective during normal operation.

General safety notes

DANGER
Danger to life and danger of injury due to failure to follow the warnings on the machine and in the Operator's Manual. ▪ Heed the warnings on the machine and in the Operator's Manual.

WARNING
Danger of injury and danger of incorrect operation due to inadequate personnel qualifications. ▪ The personnel must have read and understood this Operator's Manual or must possess the qualifications necessary for working with this equipment, acquired in training/instructional courses. ▪ Only qualified personnel is permitted to operate and maintain this machine. ▪ Failure to comply will cause the warranty to be void.

WARNING

Danger of injury from the failure to follow the operating instructions and from performing unauthorized tasks on the machine.

- Follow all instructions.
- Do not perform activities for which no qualification is available. Contact properly trained personnel if necessary.

CAUTION

Danger of injury from overloading the body.

Lifting the machine to transport it or to move it to another location can lead to injuries (of the back, for example).

- Only lift the machine with a hoist (see the chapter *6.1 Transport, page 28*).

3.2.2 Machine-specific safety instructions for operation

Introduction

The machine can pose residual risks during operation. To eliminate these risks, all persons working on the machine must follow the general and machine-specific safety instructions.

If you have an engine that is not yet installed in a machine, it is imperative that you follow the **Assembly Instructions for HATZ Diesel Engines** before installing the engine.

These assembly instructions contain important information on safe installation.

If the engine is installed in a machine or assembled with other machines to form a machine, it is prohibited to start the engine before it has been determined that the newly created machine fulfills all safety-related requirements and applicable legal regulations .

Safe operation

- Before switching on the machine, ensure that no one can be injured when the machine is started up.
- During machine operation, ensure that unauthorized persons do not have access to the area in which the machine has an impact.
- Parts of the exhaust gas system and the surface of the engine become hot during operation. Risk of injury from touching hot parts! Let the engine cool before maintenance.
- Do not refuel during operation.

Faults

- Immediately eliminate faults that compromise safety.
- Switch off the machine and do not take into service again until all faults have been eliminated.

Safety instructions for operation

DANGER	
	**Danger to life from inhaling exhaust gases.** Toxic engine exhaust gases can lead to loss of consciousness and even death in closed-off and poorly ventilated rooms. ▪ Never operate the machine in closed-off or poorly ventilated rooms. ▪ Do not breathe in the exhaust gases.

DANGER	
 	**Fire hazard from fuel.** Leaked or spilled fuel can ignite on hot engine parts and cause serious burn injuries. ▪ Only refuel while the engine is switched off. ▪ Never refuel in the vicinity of open flames or sparks that can cause ignition. ▪ Do not smoke. ▪ Do not spill fuel.

DANGER	
	**Danger of fire from hot exhaust gas system.** The exhaust gas system and, in particular, the diesel particulate filter can become very hot. Combustible materials can ignite on the exhaust gas system, even when the engine has already been switched off. ▪ Keep combustible materials away from the exhaust gas system. ▪ Do not operate and place the engine in the direct vicinity of combustible materials.

3.2.3 Machine-specific safety instructions for maintenance work

Introduction

The machine can pose residual risks during maintenance. To eliminate these risks, all persons working on the machine must follow the general and machine-specific safety instructions.

Maintenance intervals

- Strictly adhere to the maintenance intervals.
- Check the safety equipment regularly to ensure it is in good condition and functioning properly.
- Check connections, cables and fasteners regularly to ensure they are in good condition.

Maintenance work

Maintenance work that goes beyond the scope described in this manual must only be performed by qualified technicians. We recommend that you work with one of the over 500 **HATZ service stations**.

Replacing parts

- When replacing defective components, we recommend that you use **genuine HATZ original spare parts** (see chapter *2 General information, page 6*).
- When disposing of parts that can no longer be used, do so in accordance with local environmental regulations or send them to a recycling center.

Measures following maintenance and troubleshooting

- Securely reconnect loose electrical connections; check that the electrical components and equipment are functioning properly.
- Check the entire machine for foreign bodies; remove any foreign bodies.

Safety instructions for maintenance work

⚠ DANGER	
	**Danger of explosion from flammable cleaning agents.** Cleaning with benzene is an explosion hazard. It is highly flammable, can become electrostatically charged and can generate an explosive gas-air mixture. ▪ Use halogen-free, cold cleaners with a high flashpoint for cleaning.

WARNING

Danger of injury from compressed air and dust particles.

Eye injuries may occur when cleaning with compressed air.

- Wear safety goggles.

CAUTION

Danger of injury if the maintenance instructions are not followed.

- Only perform maintenance while the engine is switched off.
- For engines with an electric starter:
  disconnect the negative battery terminal.
  Protect the starting key against unauthorized access.

CAUTION

Danger of burns.

There is a danger of burns when working on a hot engine.

- Let the engine cool before maintenance.

3.2.4 Electrical equipment

Safety notes

DANGER

Danger to life, danger of injury or danger of property damage due to incorrect use of batteries.

- Do not place tools on the battery.
- Before performing work on the electrical equipment, always disconnect the negative terminal of the battery.
- Never swap the positive (+) and negative (–) battery terminals.
- When installing the battery, first connect the **positive cable** and then the **negative cable**.
- When removing the battery, first disconnect the **negative cable** and then the **positive cable**.
- It is imperative that you prevent short circuits and mass contact of current-carrying cables.
- If faults occur, check the cable connections for good contact.

DANGER

Danger of explosion from flammable substances.

There is a danger of explosion from flammable gases.

- Keep batteries away from open flames and incendiary sparks.
- Do not smoke when working with batteries.

CAUTION

Danger of chemical burns

Chemical burns can occur when using batteries for the electrical operation.

- Protect your eyes, skin and clothing from the corrosive battery acid.
- Immediately rinse areas affected by splashed acid with clear water and consult a physician if necessary.

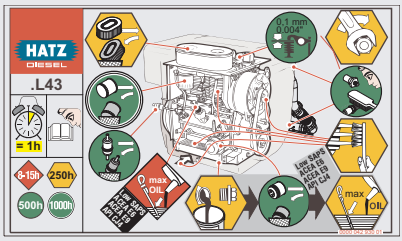
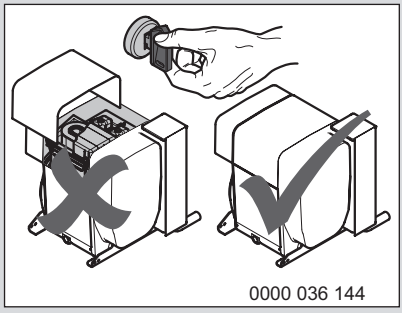
NOTICE

- The necessary wiring diagrams are included with the machine if it is equipped with electrical equipment. Additional wiring diagrams can be requested when needed.
- We cannot be held liable for electrical equipment that is not designed according to HATZ wiring diagrams.

- Promptly replace faulty indicator lamps.
- Do not disconnect the battery while the machine is running. Resulting voltage peaks could destroy the electronic components.
- When cleaning, do no spray the electrical equipment components with a water jet or high pressure cleaner.
- When performing welding work on the machine, disconnect the battery and place the ground clamp of the welding equipment as close as possible to the welding area. Disconnect the plug-in connection to the voltage regulator.

3.3 Labels

Warning labels and information signs on the engine

Label	Meaning
	Maintenance instructions (see the chapter *8.1 General maintenance instructions, page 45*)
	CAUTION! Damage from inadequate engine cooling. ▪ Only operate the engine when all covers are installed.
	Refuel with diesel fuel only. Specification, see the chapter *4.3 Fuel, page 22* Do not use bio diesel.

4 Technical data

4.1 Engine information and filling quantities

Type		3L43C, 3M43, 3M43Z		4L43C, 4M43, 4M43Z
Type		Air cooled four stroke diesel engine		
Combustion system		Direct injection		
Number of cylinders		3		4
Bore/stroke	mm	102 / 105		102 / 105
Displacement	cm^3	2574		3432
Engine oil pressure at oil temperature of 100 ± 20°C		Min. 0.6 bar at 950 rpm^{-1}		
Engine oil consumption (after running-in period)	Max.	1% of fuel consumption, pertaining to full load		
Sense of rotation		When viewing flywheel: left		
Tappet clearance at 10 - 30°C inlet/outlet	mm	0.10		0.10
Net weight .M43 .M43**Z** .L43**C**	Approx. kg	 328 335 383		 393 408 453
Max. perm. inclination during continuous operation in direction		**With** oil sump	**Without** oil sump	Only **with** oil sump
Operating side Exhaust air side Timing cover side Flywheel side		30° [1)] 30° [1)] 25° [1)] 22° [1)]	25° [1)] 30° [1)] 25° [1)] 25° [1)]	25° [1)] 30° [1)] 15° [1)] 18° [1)]
Battery capacity	Min/max	12 V – 88/143 Ah/24 V – 55/110 Ah		

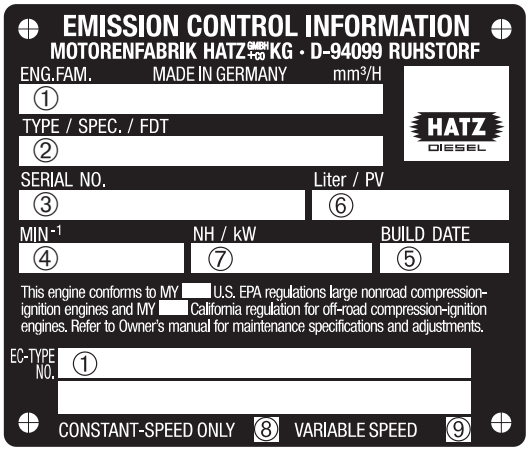
[1)] Exceeding these limit values causes engine damage.

Engine oil capacities and dipstick equipment

Type	oil sump	Engine oil capacity liter[2)]	Code letter on the dipstick
3L43C	With	10.5	D
	Without	8.0	A
3M43	With	11.0	D
	Without	8.5	A
3M43Z	With	10.5	D
	Without	8.0	A
4L43C	With	13.0	D
4M43	With	14.0	D
4M43Z	With	13.0	D

[2)] These values are approximations only. In any case, the max. mark on the dipstick is decisive (see chapter *7.8 Checking the oil level and adding oil if necessary, page 41*).

4.2 Engine type plate



The engine type plate is located on the crankcase or sound protection hood and contains the following engine information:

1	Number of the engine family or the EU approval (for engines with exhaust certificate only)
2	Engine type, customer specification and setting of pumping start (° crankshaft before top dead center)
3	Engine serial number

4	Max. engine speed (rpm)
5	Model year
6	Displacement (liters) and inspection requirement for special settings
7	Injection pump effective stroke (mm) and engine capacity (kW)
8	"Constant speed only" (for engines with EPA/CARB exhaust certificate only)
9	"Variable speed" (for engines with EPA/CARB exhaust certificate only)

The following data must always be specified for requests and spare part orders

2	Engine type and customer specification
3	Engine serial number
4	Max. engine speed (rpm)

4.3 Fuel

Fuel type

All types of diesel fuel that meet the minimum requirements of the following specifications are suitable:

- **EN 590** or
- **ASTM D975 S15 Ultra Low Sulfur** or
- **JIS K 2204 with an HFRR value of maximum 520 µm**

	CAUTION
	Danger of engine damage from low quality fuel. The use of fuel that does not meet the specifications can lead to engine damage. ▪ Only use fuel that is very low in sulfur or that contains no sulfur at all. ▪ The use of fuel that does not meet specifications requires approval by Motorenfabrik HATZ (main plant).

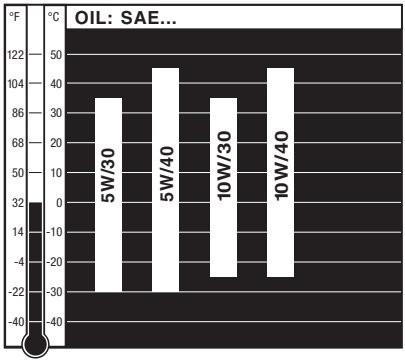
4.4 Engine oil

Oil quality

A diesel particulate filter is used in order to reduce the soot particles in the exhaust gas. In order to ensure the functionality of the particulate filter, the use of special engine oils is stipulated. Suitable engine oils are those identified as **Low SAPS** and which fulfill at least one of the following specifications:

- **ACEA E6** (preferred, as "Low SAPS")
- **ACEA E9**
- **ACEA C3 / C4** (HTHS ≥ 3.5 mPas)
- **API CJ-4**

Oil viscosity



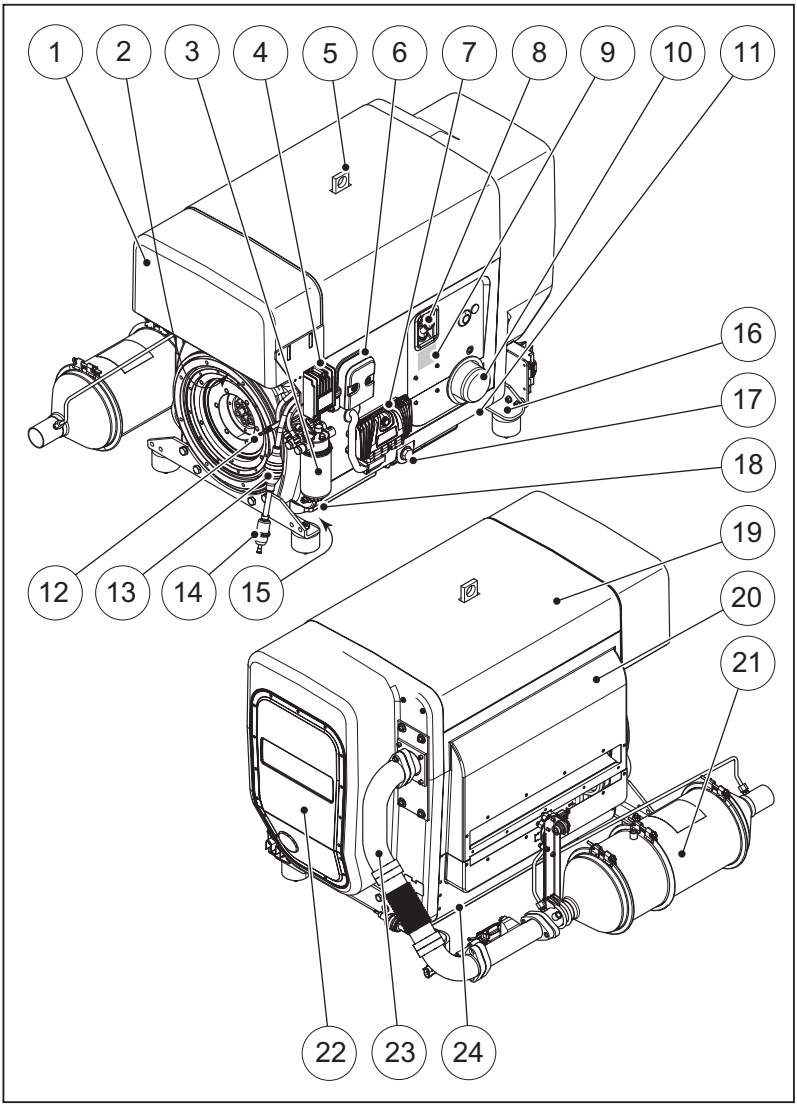
Select the recommended viscosity depending on the ambient temperature in which the engine will be operated.

	CAUTION
	Engine damage from unsuitable engine oil. Unsuitable engine oil considerably reduces engine service life. Only use engine oil that fulfills the specifications stipulated above.

	CAUTION
	Danger to the particulate filter from using unsuitable engine oil. Unsuitable engine oil diminishes the functionality and service life of the particulate filter. Only use engine oil which fulfills the aforementioned specifications and additionally bears the **Low SAPS** marking.

5 Engine design

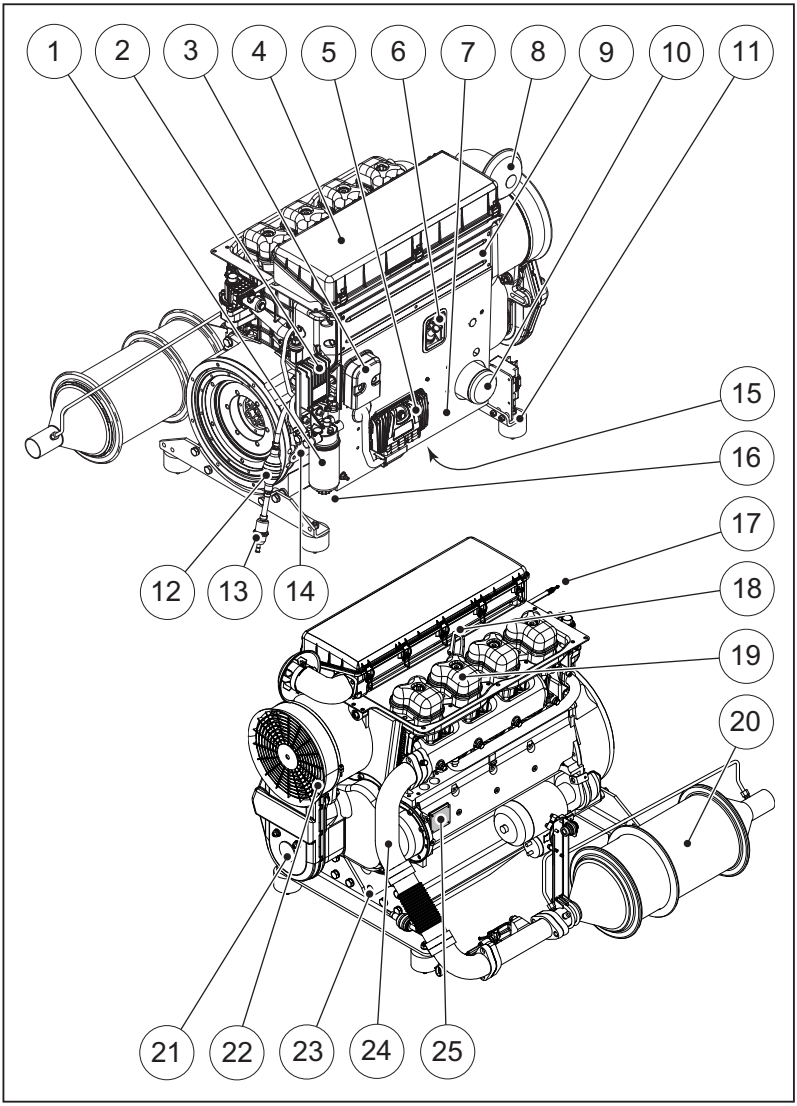
Engine 3-4L43C (sealed version - *Silent Pack*)



Pos.	Designation
1	Capsule intake shaft
2	Intake opening for combustion air and cooling air

Pos.	Designation
3	Fuel filter
4	Powerbox
5	Retractable lifting eye, max. load 5000 N
6	Central connector for electrical equipment
7	Control unit for exhaust emission after-treatment
8	Oil filling opening and dipstick
9	Engine type plate
10	Oil filter
11	Cover plate on operating side
12	Fuel return line
13	Manual fuel pump
14	Fuel feed line with fuel prefilter
15	Battery connections
16	Engine fixation
17	Oil drain screw
18	Drain screw on the water separator
19	Capsule hood
20	Exhaust air duct
21	Catalytic converter with diesel particulate filter
22	Air guide housing cover (access to the poly v belt)
23	Exhaust pipe
24	Cover plate on exhaust side

Engine 3-4M43, 3-4M43Z (standard version)



Pos.	Designation
1	Fuel filter
2	Powerbox
3	Central connector for electrical equipment
4	Air filter housing cover

Pos.	Designation
5	Control unit for exhaust emission after-treatment
6	Oil filling opening and dipstick
7	Cooling air guide for oil cooler
8	Intake opening for combustion air
9	Side trim panel
10	Oil filter
11	Engine fixation
12	Manual fuel pump
13	Fuel feed line with fuel prefilter
14	Battery connections
15	Oil drain screw (on oil sump)
16	Drain screw on the water separator
17	Fuel return line
18	Lifting eye, max. load 5000 N
19	Cylinder head cover
20	Catalytic converter with diesel particulate filter
21	1/2-inch square socket for turning the engine
22	Belt guard (access to the poly v belt)
23	Oil drain screw
24	Exhaust pipe
25	Engine type plate

6 Transport, assembly and commissioning

6.1 Transport

Safety notes

WARNING

Danger of injury from improper lifting and transport.

Danger of crushing from falling or tipping of the engine.

- Only use the lifting eye already mounted on the machine for lifting.
- Only use a suitable hoist with a sufficient carrying capacity.
- Do not remain under suspended loads.

CAUTION

Only use lifting lugs for transporting the engine.

Do not use for lifting the entire machine.

CAUTION

Danger of injury from overloading the body.

Lifting the machine to transport it or to move it to another location can lead to injuries (of the back, for example).

- Only lift the machine with a hoist.

NOTICE

Danger of environmental damage from leaking fluid.

If the machine is tilted, engine oil and fuel can run out.

- Only transport the machine in an upright position.

Transport conditions

- When transporting the machine, follow the safety instructions.
- When transporting, follow the applicable safety and accident prevention regulations of the trade associations.
- After delivery, check the machine for completeness and transport damage.
- Only transport the machine when it is switched off and has cooled down.
- If you have questions on transporting the machine, please contact your nearest **HATZ service station**. For contact data, see the chapter *1 "Notices", page 5* or **www.hatz-diesel.com**.

6.2 Installation notes

Assembly notes

HATZ diesel engines are efficient, robust and long-lived. Therefore, they are usually installed in machines that are used for commercial purposes.

The machine manufacturer must follow the applicable regulations regarding machine safety – the engine is a part of a machine.

Depending on the use and installation of the engine, it may be necessary for the machine manufacturer and machine user to install safety equipment to prevent inappropriate use. Note the following:

- Parts of the exhaust gas system and the engine surface become hot during operation and should not be touched until they cool down after the engine is switched off.
- Incorrect cable connections and incorrect operation of the electrical equipment can lead to sparking and must be avoided.
- After the engine is installed in the machine, rotating parts must be protected against contact.
  HATZ safety equipment is available for the belt drive of the cooling fan and alternator.
- Comply with all notice and warning labels on the engine and keep them in a legible condition. If a label should become detached or be difficult to read, it must be replaced promptly. For this purpose, contact your nearest **HATZ service station**.
- Any improper modification of the engine results in a loss of liability coverage for resulting damage.

Only regular maintenance, as specified in this Operator's Manual, will maintain the operating readiness of the engine.

The assembly instructions contain important information on how to safely assemble the engine. They are available from any **Hatz service station**.

If you have any questions, please contact your nearest **HATZ service station** before commissioning the engine.

6.3 Preparations for commissioning

- Check the delivered parts for completeness, damage and other noticeable issues.
- Ensure that the setup location is adequately ventilated.

	DANGER
	**Danger to life from inhaling exhaust gases.** Toxic engine exhaust gases can lead to loss of consciousness and even death in closed-off and poorly ventilated rooms. ▪ Never operate the machine in closed-off or poorly ventilated rooms. ▪ Do not breathe in the exhaust gases.

7 Operation and use

7.1 Safety notes

NOTICE
 **Comply with the safety chapter!** Follow the basic safety instructions in the chapter *3 Safety, page 7*.

⚠ WARNING
 **Danger of injury from damage and defects on the machine.** ▪ Do not take the machine into service if damage has been localized and identified. ▪ Replace faulty components.

⚠ WARNING
 **Danger of injury from the failure to follow the operating instructions and from performing unauthorized tasks on the machine.** ▪ Define the responsibilities of the personnel taking the machine into service. ▪ Replace faulty machine parts immediately. ▪ Check the installation conditions when the machine is first taken into service and after the machine has been inactive for a lengthy period.

7.2 Performing tests

Before starting

Before starting the engine, several tests need to be performed to ensure the machine is working properly.

Procedure

Step	Test
1	The machine is standing securely and on a level surface.
2	The installation location is adequately ventilated.
3	There is a sufficient amount of fuel in the fuel tank (see the chapter *4.3 Fuel, page 22*).

Step	Test
4	There is a sufficient amount of engine oil in the engine housing (see the chapter *4.4 Engine oil, page 23*).
6	No persons are located in the danger zone of the engine or machine.
7	All safety equipment is in place.

7.3 Start preparation

Procedure

Step	Activity
1	Before the first start and with an empty fuel system: ▪ Pump the fuel with the manual fuel pump (see chapter *7.3.1 Pumping fuel with the manual fuel pump, page 32*)

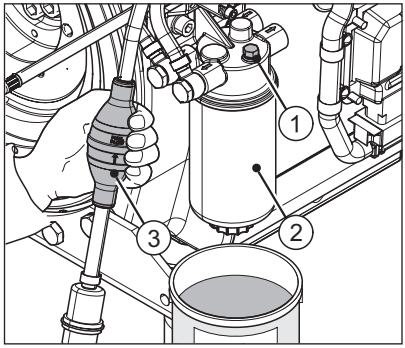
7.3.1 Pumping fuel with the manual fuel pump

Requirements

Pre-pumping of fuel with the manual fuel pump is necessary in the following situations:

- Engine shuts down due to empty fuel tank
- at first filling of the fuel tank
- after changing the fuel filter

Overview



Pos.	Designation
1	Bleed screw
2	Filter
3	Rubber ball

Procedure

Step	Activity
1	Fill with fuel if necessary.
2	Place a suitable container under the filter (2) to collect emerging fuel.
3	Open the bleed screw (1) by approx. one turn.
4	Squeeze and release the rubber ball (3) repeatedly until fuel emerges from the bleed screw (1).
5	Close the bleed screw (1) and then activate the rubber ball **two more times**.

7.4 Starting the engine

The standard equipment of the engine is an electric start mechanism.

If possible, separate the engine from the machine being driven by uncoupling it. Always switch the machine into idle mode.

Safety notes

DANGER

Danger to life from inhaling exhaust gases.

Toxic engine exhaust gases can lead to loss of consciousness and even death in closed-off and poorly ventilated rooms.

- Never operate the machine in closed-off or poorly ventilated rooms.
- Do not breathe in the exhaust gases.

CAUTION

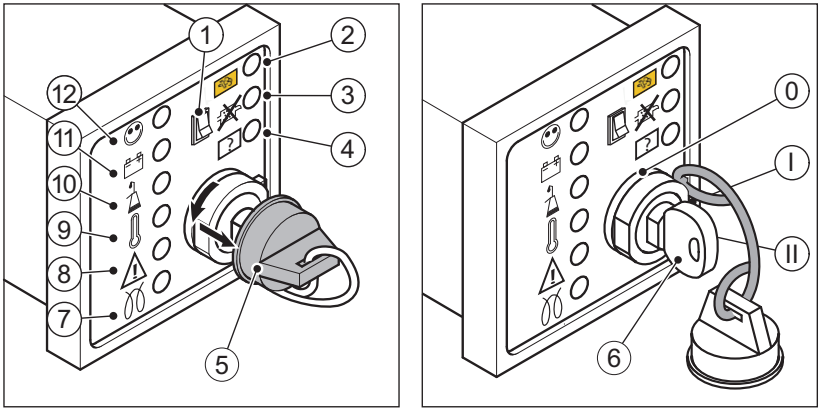
Danger of engine damage from the use of starting fluid.

- The use of engine damage from the use of starting fluid can lead to uncontrolled ignition.
- Engine damage from uncontrolled ignitions.
- Never use starting fluid.

NOTICE

See also starting instructions in the documentation for the complete machine.

Overview — HATZ instrument boxes



Pos.	Designation
1	"Suppress DPF regeneration" switch
2	"Increase load" indicator
3	"DPF regeneration active" indicator
4	"Suppress DPF regeneration active" indicator
5	Protective cap
6	Starting key
7	Pre glow display (option)
8	Combined indicator for air filter maintenance and other engine faults
9	Engine temperature display (option)
10	Oil pressure display
11	Charge control
12	Operating display
Ignition lock	
0	Off
I	Operation
II	Start

Procedure

	NOTICE
	▪ Start for max. 30 seconds. If the engine is still not running after that, turn the starting key back to position "0" and eliminate the cause (see the chapter *9.1 Troubleshooting, page 81*). ▪ Turn the starting key to position "0" every time you want to start the engine. ▪ The anti repeat device in the ignition lock makes it impossible for the starter to engage while the engine is running and become damaged.

Step	Activity
1	Remove the protective cap (5) from the ignition lock.
2	Insert the starting key all the way and turn to position "I". Depending on the model, the following indicators light up: ▪ Charge control (11) ▪ Oil pressure display (10) ▪ Pre glow display (7) at temperatures below 0°C *NOTE:* If the optional engine temperature display (9) lights up, the cylinder head temperature is impermissibly high. Do not start the engine; eliminate the cause. When the optional pre glow display (7) goes out, continue with step 3.
3	Turn the starting key to position "II".
4	As soon as the engine is running, release the starting key. ▪ The starting key springs back to position "I" and remains in this position during operation. ▪ The charge control (11) and oil pressure display (10) go out. ▪ The operating display (12) lights up.

	NOTICE
	▪ In case of irregularities, switch off the engine immediately. ▪ Identify the fault and eliminate it. ▪ For troubleshooting details, see the chapter *9.1 Troubleshooting, page 81*.

Electrical automatic shutoff (additional equipment)

The identifying feature of the electrical automatic shutoff is brief flashing of all indicators after the starting key is turned to position "I".

NOTICE
 ▪ If the engine stops again immediately after starting, or stops independently during operation, this is an indication that a monitoring element of the automatic shutoff has been activated. ▪ Remedy the fault before further starting attempts (see the chapter *9.1 Troubleshooting, page 81*). ▪ Despite the automatic switch-off, check the oil level every 8-15 hours of operation (see the chapter *7.8 Checking the oil level and adding oil if necessary, page 41*).

7.5 Switching off the engine

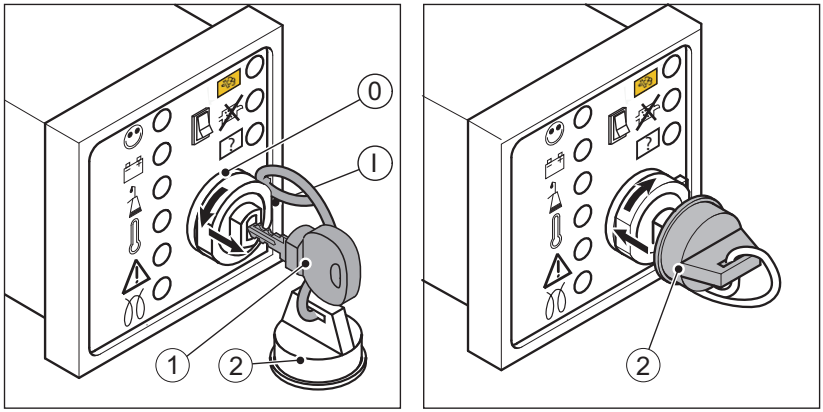
Safety note

⚠ CAUTION
 **Danger of injury from unauthorized access.** There is a danger of injury if unauthorized persons handle the machine. ▪ Protect the starting key against unauthorized access during breaks in operation or after completing work.

CAUTION
Protect the ignition lock against dirt and moisture. ▪ With the starting key pulled out, seal the ignition lock with the protective cap.

NOTICE
 See also instructions in the documentation for the complete machine.

Overview — HATZ instrument boxes



Pos.	Designation
1	Starting key
2	Protective cap
Ignition lock	
0	Off
I	Operation

Procedure

	NOTICE
	Danger of exhaustive battery discharge. ▪ When the machine is switched off, always turn the starting key to position "0" or else this may cause the exhaustive discharge of the battery.

Step	Activity
1	Turn the starting key (1) to position "0". The engine switches off. All indicator lamps go out.
2	Remove the starting key.
3	Seal the ignition lock with the protective cap (2).

Automatic electrical switch-off with fault storage

This is identified by brief flashing of all indicators after the starting key is turned to position "I".

NOTICE	
	If the engine stops again immediately after starting, or stops independently during operation, this is an indication that a monitoring element of the automatic shutoff has been activated.

Procedure

Step	Activity
1	Check the indicators (9-11). After the engine comes to a standstill, the fault will continue to be displayed by the indicator for approx. another 2 minutes.
2	Then the electrical equipment switches off automatically.
3	Set the starting key to position "0".
4	Turn the starting key back to position "I". The fault display lights up again. Remedy the fault before further starting attempts (see the chapter *9.1 Troubleshooting, page 81*). The indicator goes out at the next start.

7.6 Refueling

This diesel engine is intended for installation in a machine or for assembly with other machines to form a machine and does not have its own fuel tank. Follow the instructions from the manufacturer and comply with the following safety information.

Safety notes

DANGER	
 	**Fire hazard from fuel.** Leaked or spilled fuel can ignite on hot engine parts and cause serious burn injuries. ▪ Only refuel while the engine is switched off. ▪ Never refuel in the vicinity of open flames or sparks that can cause ignition. ▪ Do not smoke. ▪ Do not spill fuel.

	CAUTION
	**Danger of environmental damage from spilled fuel.** Do not overfill the fuel tank and do not spill fuel. ▪ Collect emerging fuel and dispose of it in an environmentally compatible manner.

	CAUTION
	Engine damage from using low quality fuel. The use of fuel that does not meet the specifications can lead to engine damage. ▪ Only use fuel as specified in the chapter *4.3 Fuel, page 22*. ▪ The use of fuel that does not meet specifications requires approval by Motorenfabrik HATZ (main plant).

7.7 Checking the water separator

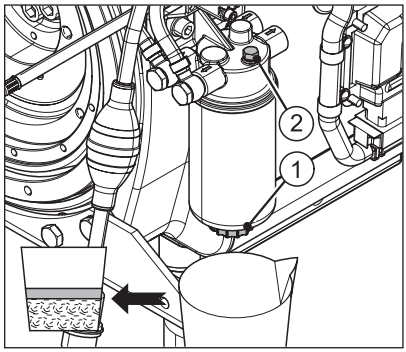
Safety notes

	CAUTION
	**Danger of environmental damage from spilled fuel.** When water is drained from the water separator, a small amount of fuel is drained as well. ▪ Catch the emerging water-fuel mixture and dispose of it in an environmentally compatible manner.

	NOTICE
	The interval for checking the water separator depends entirely on the proportion of water in the fuel and on the care exercised during refueling; the water separator should be checked at least once a week.

Overview

Water in the fuel collects at the lowest point of the fuel filter in the water separator.



Pos.	Designation
1	Drain plug
2	Bleed screw

Procedure

Step	Activity
1	Place a suitable container under the drain plug (1). *NOTE:* In inaccessible locations, an extension hose can be mounted on the drain screw (1).
2	Open the drain screw (1) and drain the water into the container.
3	If not enough liquid escapes, undo additional screw (2).
4	As soon as fuel escapes, close the drain plug (1) and screw (2). *NOTE:* First water escapes then fuel. This can be seen by a clear separator.
5	Dispose of the water-fuel mixture in an environmentally compatible manner.

	NOTICE
	Note - If starting difficulties occur: Bleed the injection system with the aid of the manual fuel pump with the aid of the injection system (see chapter *7.3.1 Pumping fuel with the manual fuel pump, page 32*).

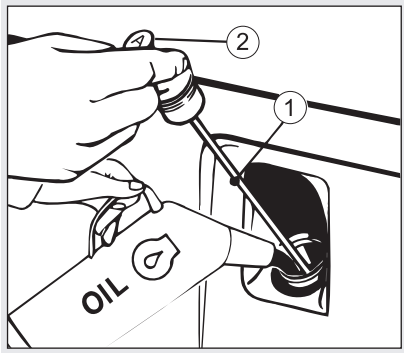
7.8 Checking the oil level and adding oil if necessary

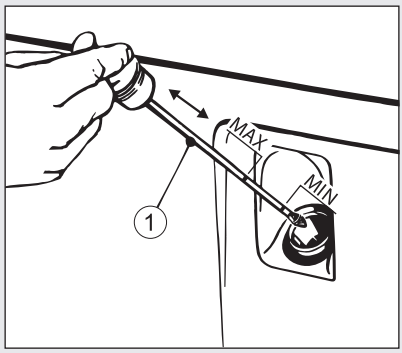
Safety notes

CAUTION
 **Danger of burns.** There is a danger of burns when working on a hot engine. ▪ Wear safety gloves.

CAUTION
Danger of later engine damage. ▪ Operating the engine with an oil level below the min. mark or above the max. mark can lead to engine damage. ▪ When checking the oil level, the machine must be horizontal and the engine must have been switched off for a few minutes.

Overview — Checking oil level/adding oil





Pos.	Designation
1	Dipstick
2	Code letter on the dipstick

Procedure — Checking oil level/adding oil

Step	Activity
1	Switch off the engine and wait several minutes for the engine oil to collect in the crank housing. The machine must be horizontal.
2	Remove contamination on the engine in the area of the dipstick (1).
3	Pull out the dipstick and clean it.
4	Reinsert the dipstick.
5	Pull out the dipstick and check the oil level.
6	If the oil level is close to the **min.** mark, add engine oil to the **max.** mark. For specifications and viscosity see chapter *4.4 Engine oil, page 22*.
7	Reinsert the dipstick.

7.9 Regenerating the diesel particulate filter

The engine has an automatic regeneration process for cleaning the diesel particulate filter (DPF).

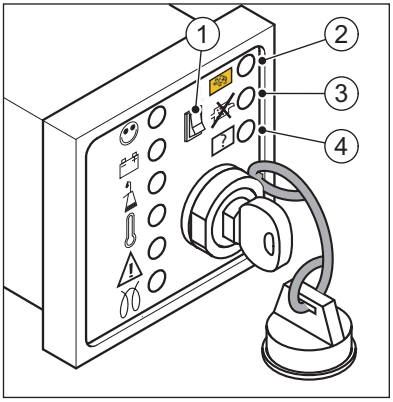
The regeneration process starts automatically and takes approx. 15 minutes. In special situations, it can be suppressed using a switch on the instrument box.

Safety notes

	DANGER
	**Danger of fire from hot exhaust gas system.** The exhaust gas system and, in particular, the diesel particulate filter can become very hot. Combustible materials can ignite on the exhaust gas system, even when the engine has already been switched off. ▪ Keep combustible materials away from the exhaust gas system. ▪ Do not operate and place the engine in the direct vicinity of combustible materials.

	CAUTION
	Danger of damaging the diesel particulate filter. If the regeneration of the diesel particulate filter is suppressed over a longer period, a large amount of particles collects in the filter. This can damage or destroy the diesel particulate filter. ▪ Only press the "Suppress DPF regeneration" switch if needed and switch it back off again as soon as possible.

Overview



Pos.	Designation
1	"Suppress DPF regeneration" switch
2	"Increase load" indicator
3	"Suppress DPF regeneration on" indicator
4	"DPF regeneration active" indicator

Procedure

	NOTICE
	▪ The full regeneration process of the diesel particulate filter takes approx. 15 minutes. ▪ If the regeneration process is interrupted, it is automatically continued at the next opportunity until regeneration has been entirely completed.

Step	Activity
1	The regeneration process starts automatically, the "DPF regeneration active" indicator (4) lights up.

Step	Activity
2	If the "Increase load" indicator (2) lights up, increase the engine load. *NOTE*: The way the engine load is increased depends on the respective use of the engine. Do not reduce the engine load during the regeneration process.
3	If the regeneration process is to be suppressed in the short-term, press the "Suppress regeneration" switch (1). The indicator (3) lights up. *NOTE:* ▪ Switch off the switch (1) again as soon as possible to enable the regular regeneration process. ▪ Long-term suppression of the regeneration can result in damage to the diesel particulate filter.

8 Maintenance

8.1 General maintenance instructions

Safety notes

WARNING
	**Danger of injury from the failure to follow the operating instructions and from performing unauthorized tasks on the machine.** ▪ Follow all instructions. ▪ Do not perform activities for which no qualification is available. Contact properly trained personnel if necessary.

NOTICE
	**Comply with the safety chapter!** Follow the basic safety instructions in the chapter *3 Safety, page 7*.

- Maintenance tasks may only be performed by trained personnel.
- Accident prevention measures must be in accordance with the local accident prevention regulations.
- Perform setting and maintenance work at the specified intervals.
- Replace faulty machine parts as soon as possible.
- Always use personal protective equipment.
- Only use fully functional tools.
- Problems may occur if unsuitable spare parts have been installed. We cannot accept responsibility for damage and secondary damage that result from this. We therefore recommend the use of **Hatz original spare parts**.
- Closely adhere to the maintenance conditions prescribed in this Operator's Manual.
- Only make changes on the machine in agreement with the manufacturer.
- Only perform maintenance while the engine is switched off.
- Adhere to legal regulations when handling and disposing of used oil, filters and cleaning agents.
- Protect the starting key against unauthorized access.
- For engines with an electric starter: disconnect the negative battery terminal.
- After completing maintenance work, check that all tools, bolts, aids and other objects are removed from the machine and that all safety equipment has been replaced.

- Before starting, ensure that no persons are located in the danger zone of the engine or machine.

Performance of maintenance work

The entire machine is designed to be maintenance friendly. Parts that require maintenance are easily accessible.

- Perform maintenance work faithfully at the specified intervals to prevent premature wear of the machine.
- Follow the notice and warning labels on the machine.
- Always retighten screw connections loosened during maintenance work.
- After the necessary maintenance and repair work is completed, perform a function test (test run).
- For maintenance work that is not listed and described in the maintenance documentation, please contact your nearest **HATZ service station**.

8.2 Maintenance work

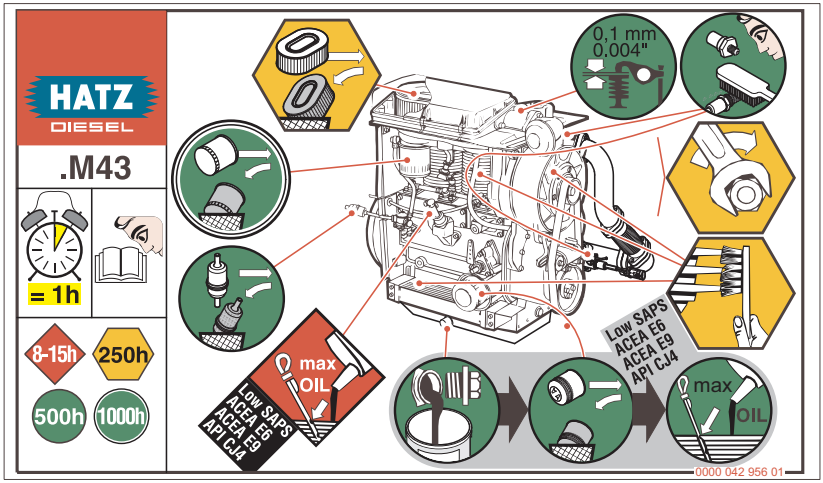
Safety note

	CAUTION
	**Danger of injury if the maintenance instructions are not followed.** ▪ Only perform maintenance while the engine is switched off. ▪ Protect the starting key against unauthorized access. ▪ For engines with a starter: disconnect the negative battery terminal. ▪ After the maintenance work is completed, ensure that all tools have been removed from the machine.

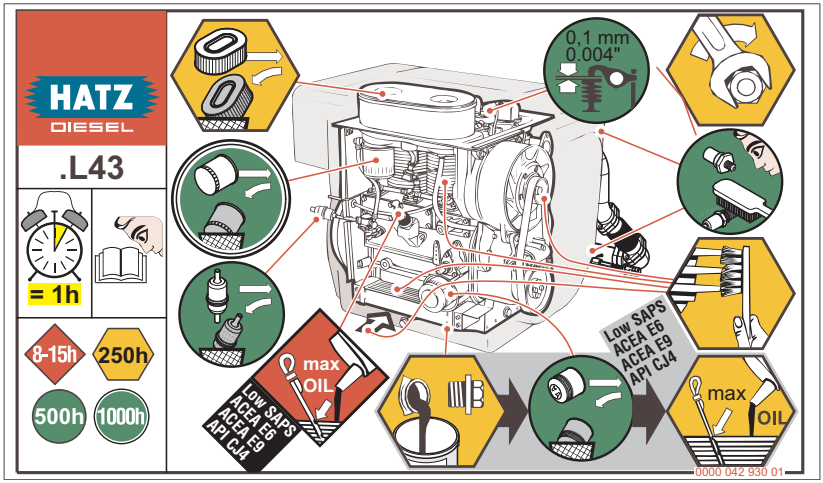
8.2.1 Maintenance notice label

	NOTICE
	Depending on the engine type, one of the maintenance plans shown below is supplied with the engine. ▪ It should be mounted on the engine or machine in a clearly visible location. ▪ The maintenance intervals specified on the maintenance plan must be adhered to (see the chapter *8.2.2 Maintenance plan, page 48*)

3-4M43, 3-4M43Z



3-4L43C



8.2.2 Maintenance plan

The degree of contamination of the fuel, the care with which refueling is performed and the soiling on the inside of the fuel tank are decisive in determining the change interval of the fuel **pre**filter and the fuel filter.

Symbol	Maintenance interval	Maintenance activity/check	Chapter
	Every 8-15 operating hours or every day before starting	Check the oil level.	*7.8 Checking the oil level and adding oil if necessary, page 41*
		Check the intake area of the combustion air.	*8.2.3 Checking the intake area of the combustion air, page 50*
		Check the cooling air area.	*8.2.4 Checking the cooling air area, page 51*
	Weekly	Checking the water separator.	*7.7 Checking the water separator, page 39*
	Every 250 operating hours	Change the engine oil (3-4L43C).	*8.2.5 Changing the engine oil, page 52*
		Clean the cooling fan, cooling fins and oil cooler.	*8.2.6 Cleaning the cooling fan, cooling fins and oil cooler, page 54*
		Check the screw connections.	*8.2.7 Checking the screw connections, page 57*
		Check the fuel **pre**filter for contamination and change it if necessary.	*8.2.8 Changing the fuel prefilter, page 58*
	Every 500 operating hours	Change the fuel **pre**filter.	*8.2.8 Changing the fuel prefilter, page 58*

Symbol	Maintenance interval	Maintenance activity/check	Chapter
		Maintain the dry air filter. Change the filter cartridge.	*8.2.9 Maintaining the dry air filter, page 60*
		Check and set the tappet clearance.	*8.2.11 Checking and setting the tappet clearance, page 64*
		Change the engine oil (3-4M43 and 3-4M43Z).	*8.2.5 Changing the engine oil, page 52*
		Changing the oil filter.	*8.2.12 Changing the oil filter, page 67*
		Clean the fuel evaporator.	*8.2.16 Cleaning the fuel evaporator, page 76*
		Check the exhaust gas pressure sensor.	*8.2.17 Checking the exhaust gas pressure sensor, page 79*
1000h	Every 1000 operating hours	Change the fuel filter.	*8.2.13 Changing the fuel filter, page 68*
---	Every 3000 operating hours	Clean the EGR valve, EGR housing and intake area. (To be carried out by a trained specialist).	---

In new and generally overhauled engines, after 25 operating hours:

- Changing the engine oil
- Check the tappet clearance and adjust if necessary
- Check the screw connections (do not retighten the screws for attaching the cylinder head)

In case of a low number of operating hours, change the engine oil no later than every 12 months, regardless of the actual number of operating hours.

8.2.3 Checking the intake area of the combustion air

Safety notes

⚠ CAUTION

Danger of burns.

There is a danger of burns when working on a hot engine.

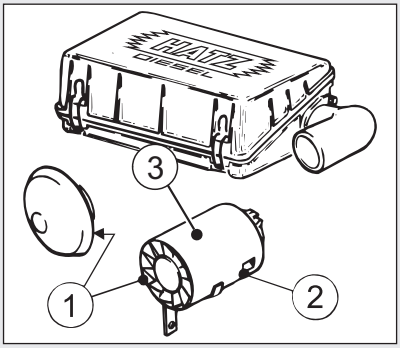
- Let the engine cool.
- Wear safety gloves.

NOTICE

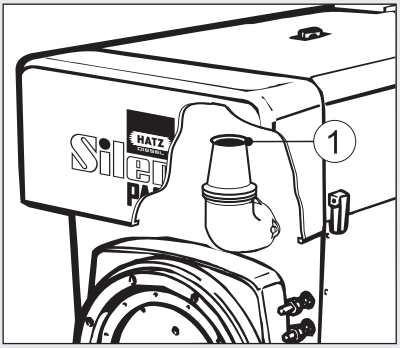
In case of heavy contamination, shorten the maintenance intervals accordingly (see the chapter *8.2.2 Maintenance plan, page 48*).

Overview

3-4M43 and 3-4M43Z



3-4L43C



Pos.	Designation
1	Intake opening for combustion air
2	Dust outlet opening
3	Cyclone (option)

Procedure

Step	Activity
1	Check the intake opening (1) for coarse contamination such as leaves, heavy dust deposits, etc., and clean if necessary.
2	Check that the dust outlet opening (2) at the bottom of the cyclone precleaner is clear.
3	If the dirt contamination is oily, remover the cyclone (3) and clean it.

8.2.4 Checking the cooling air area

Safety notes

CAUTION

Danger of burns.

There is a danger of burns when working on a hot engine.

- Let the engine cool before maintenance.

CAUTION

Danger of injury.

When working with compressed air, foreign bodies may fly into your eyes.

- Wear safety goggles.
- Never direct the compressed air jet toward people or toward yourself.

CAUTION

Danger of engine damage from overheating.

The engine temperature display (option) lights up as soon as the engine becomes impermissibly hot.

- Switch off the engine immediately and eliminate the cause.

NOTICE

In case of heavy contamination, shorten the maintenance intervals accordingly (see the chapter *8.2.2 Maintenance plan, page 48*).

Procedure

Step	Activity
1	Check the supply and exhaust air areas for coarse contamination such as leaves, heavy dust deposits, etc., and clean if necessary (see the chapter Cleaning the cooling fan, cooling fins and oil cooler).

8.2.5 Changing the engine oil

Safety notes

⚠ CAUTION

Danger of burns.

When working on the engine there is a danger of burns from hot oil.

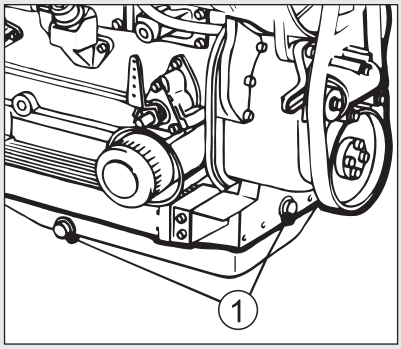
- Wear personal protective equipment (gloves).
- Collect the used oil and dispose of it according to local environmental regulations.

NOTICE

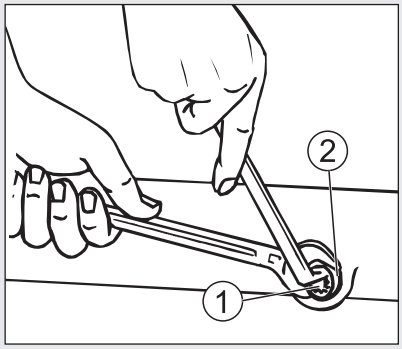
- The engine must be level.
- The engine must be switched off.
- Only drain engine oil while it is warm.
- The engine oil should be changed when the oil filter is changed.

Overview — Draining the oil

3-4M43, 3-4M43Z
(standard version)



3-4L43C
(sealed version)

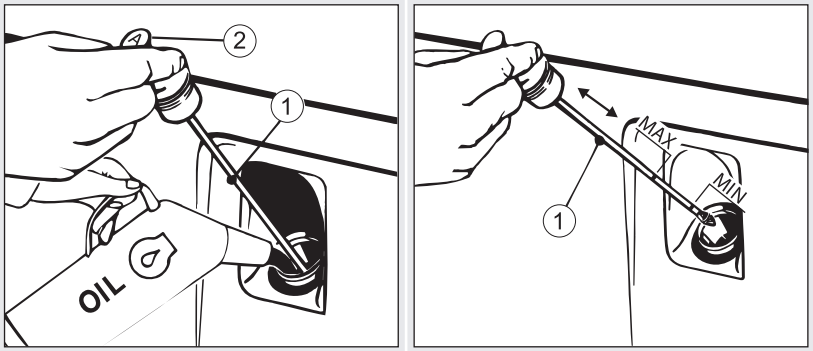


Pos.	Designation
1	Oil drain screw
2	Drain pipe

Procedure — Draining the oil

Step	Activity
1	Unscrew the oil drain screw (1) and drain the oil entirely. In case of sealed engines, when unscrewing the oil drain screw (1) ensure that the drain pipe (2) is not loosened. Hold it with an open-end wrench.
2	Screw in the cleaned oil drain screw (1) with the new gasket and tighten.

Overview — Checking oil level/adding oil



Pos.	Designation
1	Dipstick
2	Code letter on the dipstick

Procedure — Adding oil

Step	Activity
1	Add engine oil to the **max.** mark on the dipstick (1). ▪ For the specifications and viscosity, see the chapter *4.4 Engine oil, page 23*. ▪ The code letter on the dipstick (2) indicates whether the engine is equipped **with** an oil sump or **not** (see the chapter *4 Technical data, page 20*).
2	Reinsert the dipstick (1).

Step	Activity
3	After a short test run, check the oil level and correct it if necessary (see the chapter *7.8 Checking the oil level and adding oil if necessary, page 41*).

8.2.6 Cleaning the cooling fan, cooling fins and oil cooler

Safety notes

DANGER

Danger of explosion from flammable cleaning agents.

Cleaning with benzene is an explosion hazard. It is highly flammable, can become electrostatically charged and can generate an explosive gas-air mixture.

- Use halogen-free, cold cleaners with a high flashpoint for cleaning.

CAUTION

Danger of burns.

There is a danger of burns when working on a hot engine.

- Let the engine cool before maintenance.

CAUTION

Danger of injury.

When working with compressed air, foreign bodies may fly into your eyes.

- Wear safety goggles.
- Never direct the compressed air jet toward people or toward yourself.

CAUTION

Danger of engine damage from overheating.

The engine temperature display (option) lights up as soon as the engine becomes impermissibly hot.

- Switch off the engine immediately and eliminate the cause.

CAUTION

Danger of damage to the machine from incorrect engine cleaning.

- Do not spray components of the electrical equipment with a water jet or high pressure jet during cleaning.
- Do not use gasoline or acid-based cleaning agents.
- Let the engine fully cool down before cleaning.

CAUTION

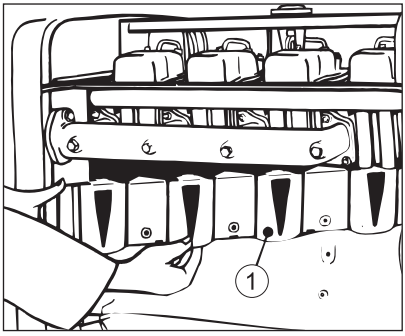
Damage from inadequate engine cooling.

Only operate the engine when all covers are installed.

NOTICE

In case of heavy contamination, shorten the maintenance intervals accordingly (see the chapter *8.2.2 Maintenance plan, page 48*).

Overview — Preparatory activities

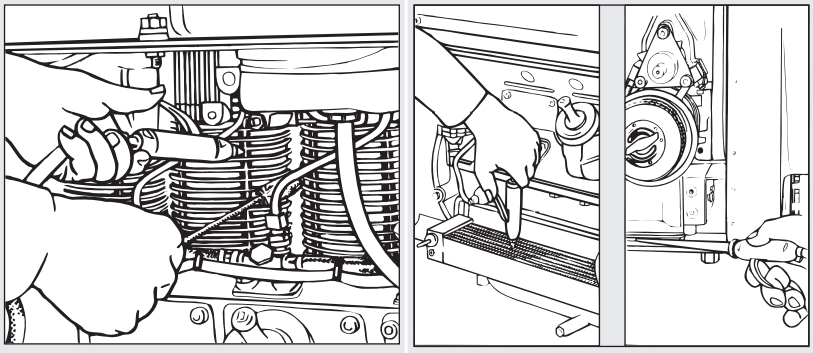


Pos.	Designation
1	Baffle plate

Preparation — Cleaning

Step	Activity
1	**Unscrew the following on encapsulated engines:** ▪ Hood ▪ Side wall ▪ Cover plate on operating side ▪ Exhaust air duct ▪ Cover plate on exhaust side (see chapter *5 Engine design, page 24*).
1	**Remove the following on engines without a capsule:** ▪ Side trim panel ▪ Cooling air guide for lubrication oil cooler
2	Unscrew the baffle plate (1)

Overview — Cleaning



Procedure — Cleaning

Step	Activity
Cleaning in case of dry dirt contamination	
1	Clean the cooling fan, cylinder head and cylinder with a suitable brush.
2	Blow out the entire cooling air area with compressed air.
3	Blow out the oil cooler with compressed air only. *NOTE:* ▪ Do not place the compressed air gun against the sensitive radiator fins.

Step	Activity
4	On encapsulated engines, also clean the area between the floor plate and crankcase.
5	Mount the capsule and air guide parts again.
Cleaning of wet or oily dirt contamination	
1	Disconnect the negative terminal of the battery.
2	Manually clean the alternator and regulator.
3	Cover the alternator with the installed regulator and do not spray directly.
4	Spray the entire area with a suitable cleaning solution according to manufacturer instructions and then clean off with a jet of water. Do not spray components of the electrical equipment with a water jet or high pressure jet during cleaning.
5	Blow dry the engine with compressed air.
6	Determine the cause of the oil contamination and have leaks corrected by the **HATZ service station**.
7	Mount the capsule and air guide parts again.
8	Let the engine run warm to prevent rust formation.

8.2.7 Checking the screw connections

NOTICE	
	▪ Do not retighten the screws for attaching the cylinder head. ▪ The adjustment screws on the speed regulator and the injection system are secured with locking varnish and are not permitted to be tightened or adjusted. ▪ Only retighten loose screw connections. Screw connections can be secured with thread locking adhesive or tightened to a defined torque. Retightening tight screw connections can cause damage.

Procedure

Step	Activity
1	Check the condition of all screw connections and ensure that they are tight (for exceptions, see note).
2	Tighten any lose screw connections.

8.2.8 Changing the fuel prefilter

Safety notes

DANGER

Fire hazard from fuel.

Leaked or spilled fuel can ignite on hot engine parts and cause serious burn injuries.

- Never refuel in the vicinity of open flames or sparks that can cause ignition.
- Do not smoke.
- Do not spill fuel.

CAUTION

Danger of injury

Repeated contact with diesel fuel can cause chapped and cracked skin.

- Wear safety gloves.

CAUTION

Danger of environmental damage from spilled fuel.

When the filter is removed, a small amount of fuel is drained as well.

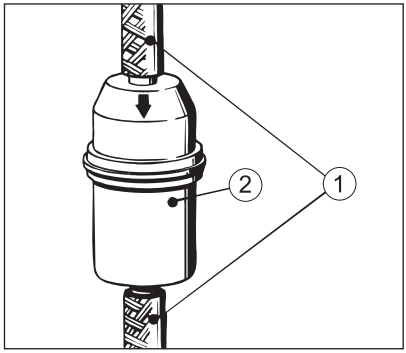
- Collect emerging fuel and dispose of it in an environmentally compatible manner.

CAUTION

Dirt particles can damage the injection system.

- Maintain clean conditions to ensure that dirt does not enter the fuel line.

Overview



Pos.	Designation
1	Fuel lines
2	Fuel prefilter

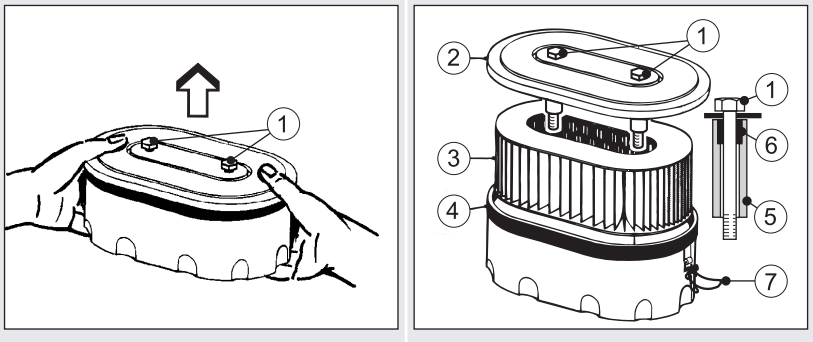
Procedure

Step	Activity
1	Place a suitable container under the filter to collect emerging fuel.
2	Close the fuel feed line.
3	Pull the fuel lines (1) off of the fuel prefilter (2) on both sides.
4	Dispose of the old filter in accordance with local environmental regulations.
5	Insert a new fuel prefilter. Note the following: ▪ Direction of arrow for the flow-through direction depends on position of the fuel tank: HIGH or LOW ▪ Installation position/flow-through direction should be as vertical as possible
6	Open the fuel feed line.
7	Perform a test run. While doing this, check the filter and lines for leak-tightness.
8	If you have difficulties starting the engine, bleed the injection system with the aid of the manual fuel pump (see the chapter *7.3.1 Pumping fuel with the manual fuel pump, page 32*).

8.2.9 Maintaining the dry air filter

NOTICE
▪ Clean the filter cartridge immediately if, at maximum speed, the combined indicator on the instrument box flashes 14 times. ▪ The air filter cartridge either needs to be replaced, or cleaned or checked depending on the degree of contamination. ▪ Renew the filter cartridge after a use period of 500 operating hours. ▪ Four cylinder engines have two filter cartridges.

Overview — Removing the air filter cartridge (engines 3-4L43C)



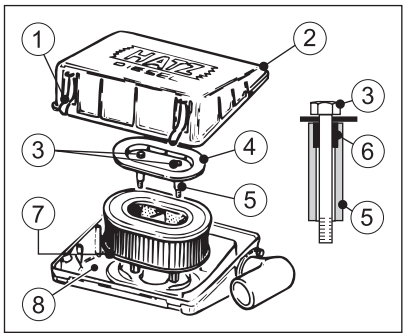
Pos.	Designation
1	Screw
2	Cover
3	Filter cartridge
4	Air filter housing
5	Spacer
6	Bushing
7	Clamp

Procedure — Removing the air filter cartridge (engines 3-4L43C)

Step	Activity
1	Remove the capsule hood.
2	Remove adherent dirt in the area of the air filter housing (4).

Step	Activity
3	Only loosen the screws (1) to the point where you can lift off the complete air filter housing (4).
4	Cover the opening in the intake pipe to prevent ingress of dirt and other foreign bodies.
5	On three cylinder engines, open the clamp (7). ▪ On three cylinder engines, the cover (2) is additionally held by a clamp (7).
6	Open the air filter housing (4).
7	Take out the filter cartridge (3).
8	Clean the air filter housing (4) and cover (2).
9	Renew the bushing (6) if the spacer (5) is loose. ▪ The spacer (5) is connected with the screw (1) by the elastic bushing (6) to ensure that it cannot fall into the intake pipe during disassembly and assembly.

Overview — Removing the air filter cartridge (engines 3-4M43 and 3-4M43Z)



Pos.	Designation
1	Clamp
2	Air filter housing cover
3	Screw
4	Filter cover
5	Spacer
6	Bushing
7	Filter cartridge
8	Air filter housing

Procedure — Removing the air filter cartridge (engines 3-4M43 and 3-4M43Z)

Step	Activity
1	Release the clamps (1) and remove the cover of the air filter housing (2).
2	Remove adherent dirt in the air filter area.
3	Only loosen the screws (3) to the point where the filter cover (4) can be removed with the filter cartridge (7).
4	Cover the opening in the intake pipe to prevent ingress of dirt and other foreign bodies.
5	Clean the air filter housing cover (2), filter cover (4) and air filter housing (8).
6	Renew the bushing (6) if the spacer (5) is loose. ▪ The spacer (5) is connected with the screw (3) by the elastic bushing (6) to ensure that it cannot fall into the intake pipe during disassembly and assembly.

8.2.10 Checking and cleaning the air filter cartridge

Safety notes

⚠ CAUTION

Danger of injury.

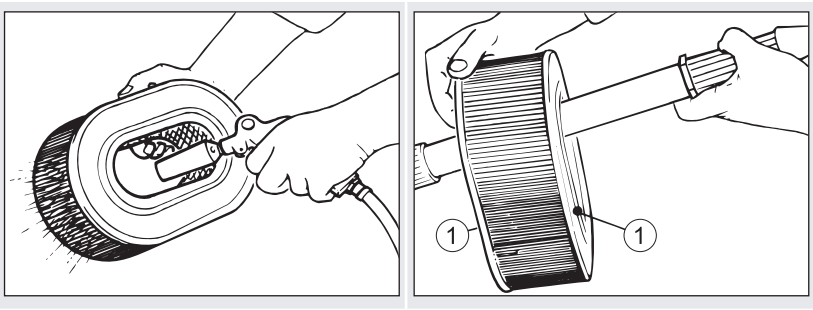
When working with compressed air, foreign bodies may fly into your eyes.

- Wear safety goggles.
- Never direct the compressed air jet toward people or toward yourself.

NOTICE

- The pressure must not exceed 5 bar.
- A distance of approx. 150 mm must be maintained between the filter cartridge and the compressed air gun.
- Even minor damage in the areas of the sealing surface, filter paper or filter cartridge makes it impossible to reuse the filter cartridge.

Overview — Checking/cleaning the air filter cartridge



Pos.	Designation
1	Sealing surface

Procedure — Checking/cleaning the air filter cartridge

Step	Activity
Dry contamination	
1	Blow out the filter cartridge with dry compressed air from the inside to the outside until dust no longer emerges.
2	Check the sealing surfaces (1) of the filter cartridge for damage.
3	Check the filter cartridge for cracks in the filter paper and other damage by holding it against the light at a slant or letting light from a lamp shine through it.
4	Replace the filter cartridge if necessary (see note).
Moist or oily contamination	
1	Renew the filter cartridge.

Procedure — Mounting the air filter cartridge

Step	Activity
1	When assembling, mount the parts individually one after the other to make sure they are correctly seated and to ensure leak tightness.

8.2.11 Checking and setting the tappet clearance

Safety notes

CAUTION

Danger of burns.

There is a danger of burns when working on a hot engine. Only perform the settings while the engine is cold (10-30°C).

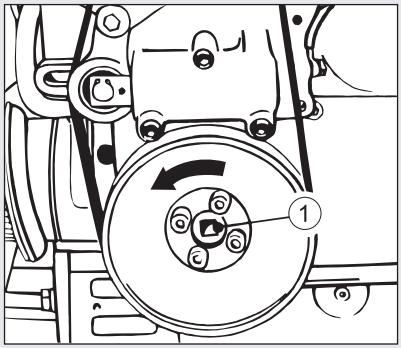
- Let the engine cool.

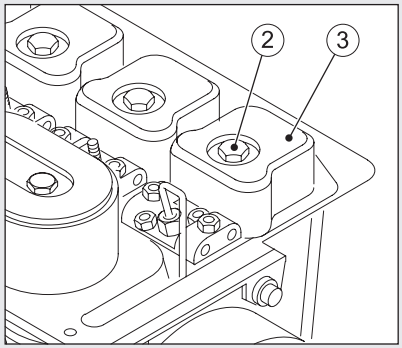
CAUTION

Damage from inadequate engine cooling.

Only operate the engine when all covers are installed.

Overview — Preparatory activities





Pos.	Designation
1	Square opening
2	Hex nut
3	Cylinder head cover

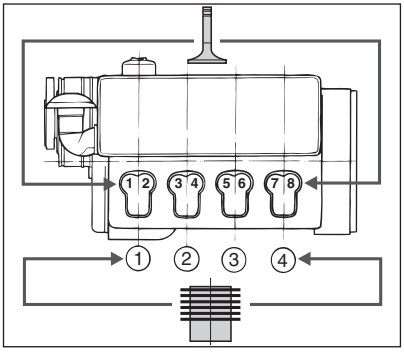
Preparation — Adjusting the tappet clearance

Step	Activity
1	On encapsulated engines, remove the hood of the capsule (see the chapter *5 Engine design, page 24*).
2	Remove the hex nut (2) and remove the cylinder head cover (3).

Step	Activity
3	Remove the air guide housing cover (see the chapter *5 Engine design, page 24*) or the belt guard.
4	Insert the ratchet or T-piece 1/2" with the required extension (1) into the square opening.

	NOTICE
	**Turn the engine in the sense of rotation.** Anti-clockwise in both cases - flywheel side or timing cover side.

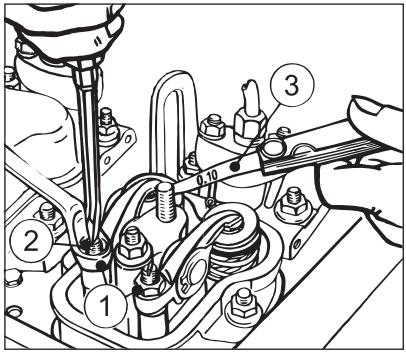
Numbering of the valves and cylinders from the fan side



Setting method for three and four cylinder engines

Type	Valve no. ... fully opened	Check the valves of the ... cylinder
3-cylinder	1	3rd cylinder
	5	2nd cylinder
	3	1st cylinder
4th cylinder	1	3rd cylinder
	5	4th cylinder
	7	2nd cylinder
	3	1st cylinder

Overview — Adjusting the tappet clearance



Pos.	Designation
1	Hex nut
2	Adjusting screw
3	Feeler gauge

Procedure — Adjusting the tappet clearance

Step	Activity
1	Check the tappet clearance with the feeler gauge (3). For the setting, see the chapter *4 Technical data, page 20*.
2	If the tappet clearance needs to be corrected: ▪ Release the hex nut (1). ▪ Turn the adjustment screw (2) so the feeler gauge (3) can be pulled through with a barely perceptible resistance after the hex nut (1) is tightened again.
3	Repeat the above procedure for the entire valve area, taking special care to use the described adjustment method.
4	Mount the cylinder head cover again: ▪ Always renew the gaskets. ▪ Use the fixing nuts for the cylinder head cover no more than twice before renewing them. ▪ Tightening torque: **10 Nm**.
5	Mount all covers. *NOTE:* ▪ Under no circumstances is the engine permitted to be operated if not all covers are mounted.

Step	Activity
6	After a brief trial run, check the cylinder head cover for tightness.

8.2.12 Changing the oil filter

Safety notes

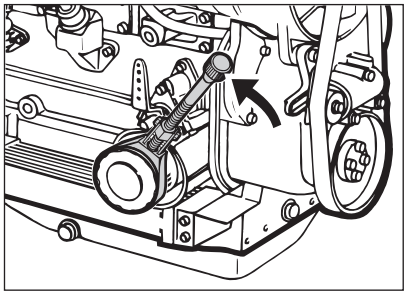
CAUTION

Danger of burns.

When working on the engine there is a danger of burns from hot oil.

- Wear personal protective equipment (gloves).
- Collect the used oil and dispose of it according to local environmental regulations.

Overview



Procedure

Step	Activity
1	Release the oil filter with a strap wrench and quickly unscrew and remove it. ▪ HATZ order no. for strap wrench: 620 307 01.
2	Dispose of the old filter in accordance with local environmental regulations.
3	Wipe spilled engine oil out of the oil baffle.
4	Lightly oil the sealing lip of the new oil filter.
5	Screw in the oil filter and tighten it by hand.

Step	Activity
6	Add engine oil to the **max.** mark on the dipstick. ▪ For the specifications and viscosity, see the chapter *4.4 Engine oil, page 23*. ▪ The mark on the dipstick indicates whether the engine is equipped **with** an oil sump or **not** (see the chapter *4.1 Engine information and filling quantities, page 21*).
7	Reinsert the dipstick.
8	Check the oil level after a short test run and correct if necessary.
9	Check the oil filter for tightness and retighten by hand if necessary.

8.2.13 Changing the fuel filter

Safety notes

DANGER

Fire hazard from fuel

Leaked or spilled fuel can ignite on hot engine parts and cause serious burn injuries.

- Do not spill fuel.
- No open flames when working on the fuel system.
- Do not smoke

CAUTION

Danger of injury

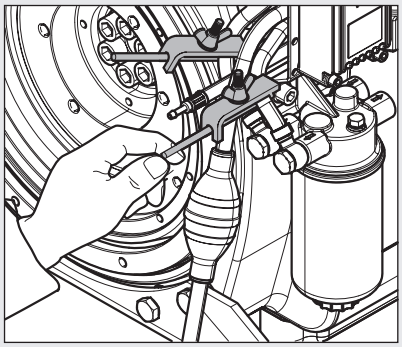
Repeated contact with diesel fuel can cause chapped and cracked skin.

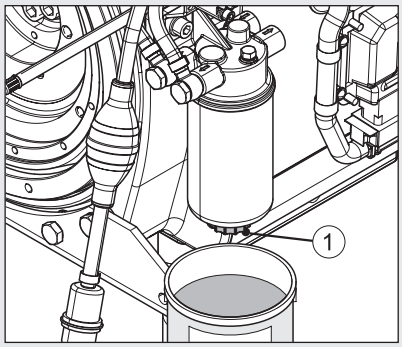
- Wear safety gloves.

	CAUTION
	**Danger of environmental damage from spilled fuel.** When the filter is removed, a small amount of fuel is drained as well. ▪ Collect emerging fuel and dispose of it in an environmentally compatible manner.

	CAUTION
	Dirt particles can damage the injection system. ▪ Maintain clean conditions to ensure that dirt does not enter the fuel line.

Overview — Preparatory activities



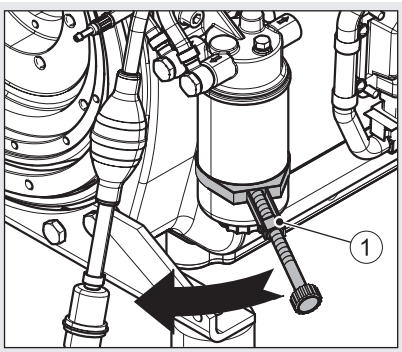


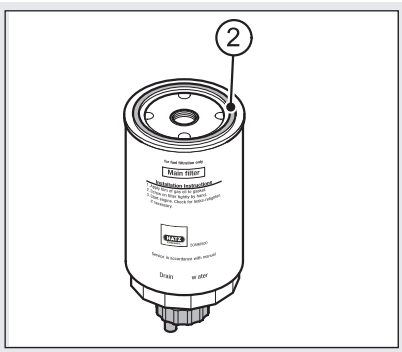
Pos.	Designation
1	Drain plug

Preparation — Changing the fuel filter

Step	Activity
1	Close the fuel lines on the filter housing.
2	Place a suitable container under the filter to collect emerging fuel.
3	Release the drain screw (1) and drain the fuel.

Overview — Changing the fuel filter





Pos.	Designation
1	Strap wrench (HATZ order no.: 620 307 01)
2	Gasket

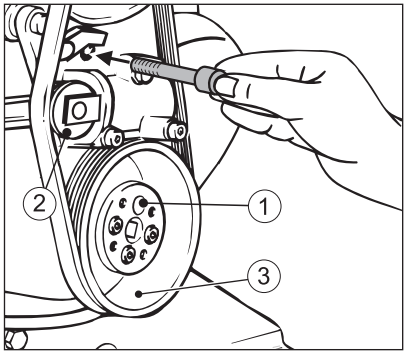
Procedure — Changing the fuel filter

Step	Activity
1	Slide on the strap wrench (1) and unscrew the fuel filter counter-clockwise.
2	Dispose of the old filter in accordance with local environmental regulations.
3	Lightly oil the gasket (2) of the new fuel filter.
4	Mount the fuel filter and tighten it **by hand**.
5	Open the fuel feed line.
6	Bleed the injection system with the aid of the manual fuel pump with the aid of the injection system (see chapter *7.3.1 Pumping fuel with the manual fuel pump, page 32*).
7	After a brief trial run, check the fuel filter for leak tightness and retighten by hand.

8.2.14 Renewing the poly v belt and checking the function of the switch-off unit

NOTICE
When changing the belt: ▪ Always check the function of the switch-off unit. The switch-off pin must emerge by spring force, or else the machine will not switch off automatically if the belt tears. ▪ If the grooves are broken off or bent, renew the damaged pulley.

Overview — Removing the poly v belt

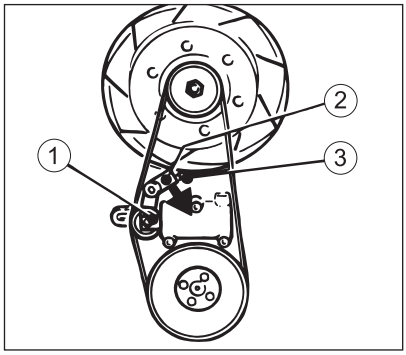


Pos.	Designation
1	Cylinder screw
2	Tension pulley
3	Pulley

Procedure — Removing the poly v belt

Step	Activity
1	Unscrew one cylinder screw (1) from the pulley (3).
2	Push back the tension pulley (2) and lock it using the cylinder screw (1).
3	Unscrew the pulley (3).
4	Check the pulley (3) for broken or bent grooves.
5	Remove the poly v belt.

Overview — Checking the function of the switch-off unit of the belt monitoring system

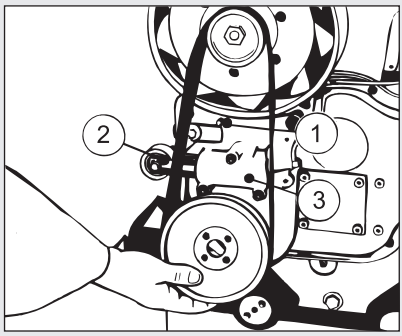


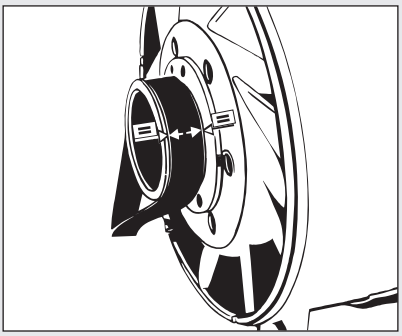
Pos.	Designation
1	Tension pulley
2	Angle lever
3	Switch-off pin

Procedure — Checking the function of the switch-off unit of the belt monitoring system

Step	Activity
1	Release the piston with the tension pulley (1) by removing the cylinder screw. ▪ The piston with the tension pulley is pushed out of the housing by spring pressure. ▪ The angle lever (2) turns downward and releases the switch-off pin (3). ▪ The switch-off pin (3) must emerge by spring force, or else the machine will not switch off automatically if the belt tears.
2	If there is no reaction, please contact the nearest **HATZ service station**.

Overview — Mounting the poly v belt



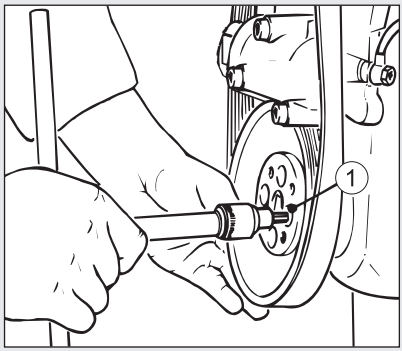


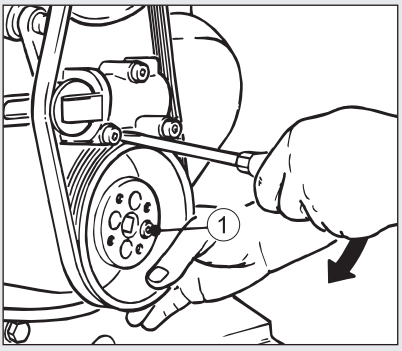
Pos.	Designation
1	Switch-off pin
2	Tension pulley
3	Housing

Procedure — Mounting the poly v belt

Step	Activity
1	Slide in the switch-off pin (1).
2	Slide the piston with the tension pulley (2) into the housing (3) and lock it using the cylinder screw.
3	Position the poly v belt centrally on the pulley of the fan wheel, the tension pulley (2) and the pulley at the bottom.

Overview — Centering the pulley





Pos.	Designation
1	Cylinder screw

Procedure — Centering the pulley

Step	Activity
1	Lightly secure the pulley with a cylinder screw (1) without placing the pulley fully on the centering.
2	Insert a large screwdriver between the hydraulic belt tensioner and pulley and push down until it slides fully into the centering.
3	Insert the remaining cylinder screws (1) and tighten.

8.2.15 Replacing the diesel particulate filter

Safety notes

⚠ CAUTION

Danger of burns.

During the regeneration process, the diesel particulate filter and the exhaust system become very hot. There is a danger of burns when working on a hot exhaust system.

- Let the diesel particulate filter and exhaust system cool down.
- Wear safety gloves.

CAUTION

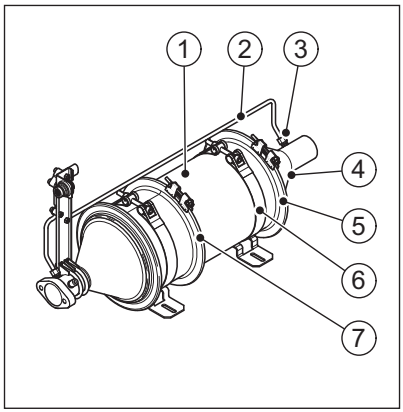
Damage of the diesel particulate filter from improper cleaning.

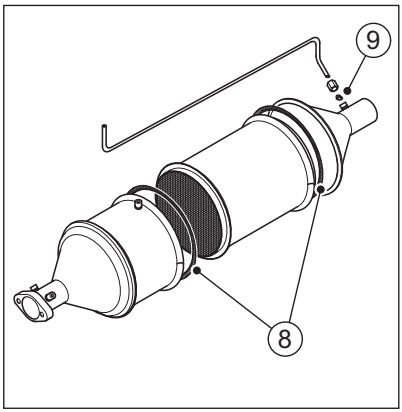
- Do not spray the filter fabric of the diesel particulate filter with a water jet or high pressure jet.
- Do not use gasoline or chemical cleaning agents.
- Do not burn the filter fabric of the diesel particulate filter free of soot.

NOTICE

- The diesel particulate filter must be conditioned/replaced when the combined indicator on the instrument box flashes 1 time (=warning message) or 2 times (=fault message) (long flashing pulse approx. 2 seconds).
- The reconditioning of the diesel particulate filter must be carried out by a specialized company. In order to ensure shutdown times as short as possible, the "Hatz EasyClean" exchange program is recommended.

Overview





Pos.	Designation
1	Diesel particulate filter
2	Differential pressure line
3	Cap nut
4	Discharge funnel
5	V-band clamp (discharge funnel)
6	Retaining foot clamp
7	V-band clamp (diesel particulate filter)
8	Cord packing
9	Sealing dome

Procedure

Step	Activity
1	Undo the cap nut (3) of the differential pressure line. Carefully pull off the differential pressure line, take care with the sealing dome (9).
2	Loosen the V-band clamp (5) of the discharge funnel, remove the discharge funnel (4) from the diesel particulate filter.
3	Loosen the V-band clamp (7) of the diesel particulate filter.
4	Loosen the retaining foot clamp (6) and remove the diesel particulate filter (1).
5	Remove the cord packings (8) from the diesel particulate filter.
6	Fit new cord packings on the new/conditioned diesel particulate filter.
7	Reinstall the diesel particulate filter, discharge funnel and differential pressure line in reverse order. NOTE: The installation direction of the diesel particulate filter is determined by the design. Only tighten the retaining foot clamp fully at the end.

8.2.16 Checking, if necessary cleaning the fuel evaporator (vaporizer)

Safety notes

DANGER

Danger of explosion due to fuel mist.

There is a danger of explosion from the fuel-air mixture.

- Do not clean the fuel evaporator in the vicinity of open flames and hot surfaces.
- Do not smoke when cleaning the fuel evaporator.

CAUTION

Danger of burns.

During the regeneration process, the diesel particulate filter and the exhaust system become very hot. There is a danger of burns when working on a hot exhaust system.

- Let the diesel particulate filter and exhaust system cool down.
- Wear safety gloves.

CAUTION

Danger of injury.

When working with compressed air, foreign bodies may fly into your eyes.

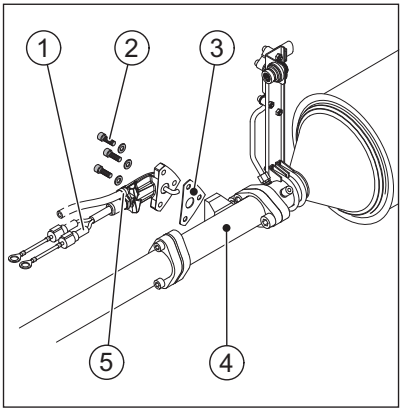
- Wear safety goggles.
- Never direct the compressed air jet toward people or toward yourself.

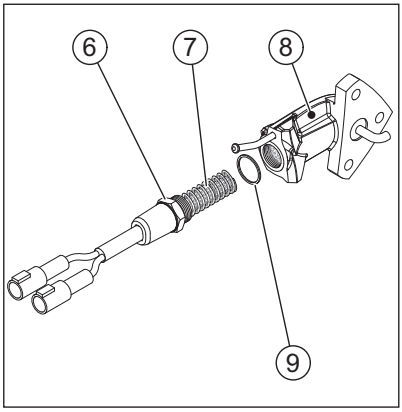
CAUTION

Damage to the coiled filament from wire brush.

- Clean the coiled filament only with a soft copper or brass wire brush.
- Do not use a hard steel wire brush.

Overview — Removing the fuel evaporator (vaporizer)





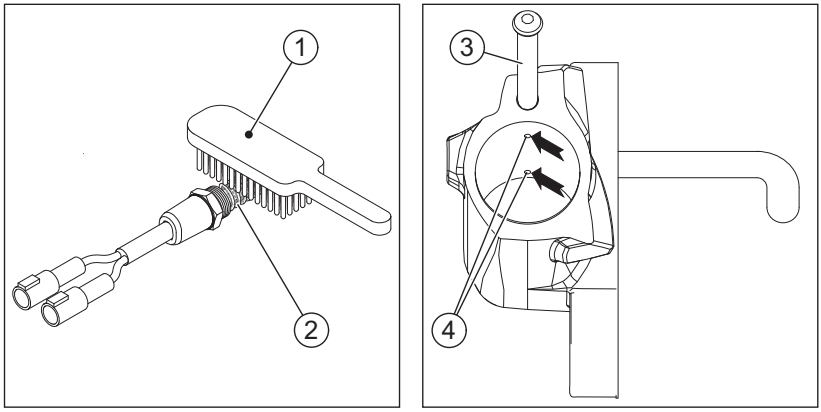
Pos.	Designation
1	Electrical connection cable
2	Evaporator unit fixing screws
3	Gasket
4	Exhaust pipe
5	Fuel hose
6	Hex nut
7	Coiled filament

Pos.	Designation
8	Evaporator housing
9	Copper ring

Procedure — Removing the fuel evaporator (vaporizer)

Step	Activity
1	Disconnect the electrical connection cable (1) by loosening the connector fasteners.
2	Loosen the fuel hose clamp (5) and pull off the fuel hose.
3	Loosen the evaporator unit mounting bolts (2).
4	Carefully slacken the evaporator unit, the gasket (3) should not be damaged. The gasket can be reused if it remains undamaged.
5	Remove the complete evaporator unit from the exhaust pipe (6).
6	Screw the coiled filament (7) out of the evaporator housing (8) by using the hex net (6), remove the copper ring (9).

Overview — Checking, if necessary cleaning the fuel evaporator (vaporizer)



Pos.	Designation
1	Copper or brass wire brush
2	Coiled filament
3	Fuel line connection
4	Fuel holes

Procedure — Checking, if necessary cleaning the fuel evaporator (vaporizer)

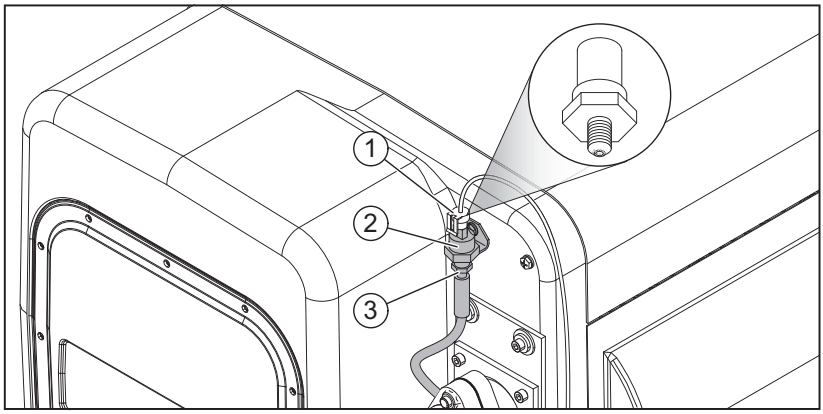
Step	Activity (Step 1, 3 and 4 only if necessary)
1	Brush off soot deposits from the coiled filament (2) with a copper or brass wire brush (1).
2	Visually check the coiled filament for damage. If damage is visible, replace the coiled filament.
3	Blow out the fuel line connection (3) with compressed air. Cover the fuel holes (4) in the evaporator housing with a cloth when doing this.
4	Use a wire to carefully remove hard soot and carbon deposits from the fuel holes (4). After this, blow out the fuel line connection again.
5	Replace the copper ring (9), screw the coiled filament back into the evaporator housing, tightening torque 55 Nm.
6	Screw the evaporator unit tightly on the exhaust pipe. Undamaged gaskets may still be used, replace the gasket when damage is visible.
7	Connect the fuel hose and secure with the clamp.
8	Reconnect the electrical connection cable.

8.2.17 Checking the exhaust gas pressure sensor

Safety notes

⚠ CAUTION
  **Danger of burns.** There is a danger of burns when working on a hot engine. ▪ Let the engine cool. ▪ Wear safety gloves.

CAUTION
Damage to the exhaust gas pressure sensor by cleaning. The exhaust gas pressure sensor is destroyed by cleaning in the majority of cases. The correct operation of the sensor can not be easily checked. The exhaust gas pressure sensor must therefore always be replaced when it is sooted up.



Overview

Pos.	Designation
1	Signal line with connector
2	Exhaust gas pressure sensor
3	Line connection

Procedure

Step	Activity
1	Disconnect the signal line (1) from the exhaust gas pressure sensor (2) by loosening the connector fastener.
2	Unscrew the line connection (3) and remove the exhaust gas pressure sensor.
3	Check the bore hole for the exhaust gas pressure sensor. When the bore hole is blocked with soot, the exhaust gas pressure sensor must be replaced.
4	Refit the exhaust gas pressure sensor and reconnect the signal line.

9 Faults

9.1 Troubleshooting

Troubleshooting notes

If the cases listed below have been worked through but the fault continues to persist, please contact your nearest **HATZ service station**.

Type of fault	Possible causes	Remedy	Chapter
The engine does not start or does not start immediately, but it can be turned with the starter.	No fuel at the injection pump.	Refuel.	*7.6 Refueling, page 38*
		Operate the manual fuel pump.	*7.3.1 Pumping fuel with the manual fuel pump, page 32*
		Systematically check the entire fuel supply: If this does not yield results: ▪ Check the feed line to the engine. ▪ Check the fuel prefilter. ▪ Check the fuel filter. ▪ Check the function of the feed pump.	*8.2.8 Changing the fuel prefilter, page 58* *8.2.13 Changing the fuel filter, page 68*
	Insufficient compression: ▪ Wrong tappet clearance.	Check the tappet clearance and adjust if necessary.	*8.2.11 Checking and setting the tappet clearance, page 64*
	▪ Cylinder and/or piston ring wear.	Contact Hatz Service.	
	Injection nozzle is not functional.	Contact Hatz Service.	

Type of fault	Possible causes	Remedy	Chapter
	Torn cooling fan belt.	Renew the poly v belt.	*8.2.14 Renewing the poly v belt and checking the function of the switch-off unit, page 71*
At low temperatures	Pre-glow system defective.	Contact Hatz Service.	
	Fuel gelled due to insufficient cold resistance.	Check whether the fuel that emerges from the detached fuel feed line directly at the injection pump is clear and not cloudy. If the fuel has gelled, either warm the engine or drain the entire fuel supply system. Fill with a temperature-resistance fuel mixture.	*4.3 Fuel, page 22* *8.2.8 Changing the fuel prefilter, page 58* *8.2.13 Changing the fuel filter, page 68*
	Starter speed is too low: ▪ Oil is too viscous.	Change the engine oil and add oil of the right viscosity class.	*8.2.5 Changing the engine oil, page 52*
	▪ Insufficiently charged battery.	Check the battery and contact the service center if necessary.	*3.2.4 Electrical equipment, page 18*
	The machine is not uncoupled.	If possible, separate the engine from the machine by uncoupling it.	

Type of fault	Possible causes	Remedy	Chapter
The starter does not switch on and the engine does not turn.	Irregularities in the electrical equipment: ▪ Battery and/or other cable connections are incorrectly connected. ▪ Cable connections are loose and/or oxidized. ▪ Battery is faulty and/or not loaded. ▪ Faulty starter. ▪ Faulty relay, monitoring elements, etc.	Check the electrical equipment and their components. Contact Hatz Service.	*3.2.4 Electrical equipment, page 18*
The engine starts, but does not continue running after the starter is switched off.	The machine is not uncoupled.	If possible, separate the engine from the machine by uncoupling it.	
	Fuel prefilter is clogged.	Change the fuel prefilter.	*8.2.8 Changing the fuel prefilter, page 58*
	Fuel filter is clogged.	Change the fuel filter.	*8.2.13 Changing the fuel filter, page 68*
	Fuel supply is interrupted.	Systematically check the entire fuel supply.	

Type of fault	Possible causes	Remedy	Chapter
	Stop signal from monitoring elements that are associated with the automatic switch-off (additional equipment): ▪ No oil pressure. ▪ Dirty air filter unit. ▪ Faulty three phase alternator.	▪ Check the oil level. ▪ Check the degree of dirt contamination of the air filter, and clean or renew it if necessary. ▪ Contact Hatz Service.	*7.8 Checking the oil level and adding oil if necessary, page 41* *8.2.9 Maintaining the dry air filter, page 60*
Engine switches off spontaneously during operation.	The tank ran out of fuel during operation	Fill with fuel.	*7.6 Refueling, page 38*
	Fuel prefilter or fuel filter is clogged.	Change the filter.	*8.2.8 Changing the fuel prefilter, page 58* *8.2.13 Changing the fuel filter, page 68*
	Torn cooling fan belt.	Renew the poly v belt.	*8.2.14 Renewing the poly v belt and checking the function of the switch-off unit, page 71*
	Mechanical faults.	Contact Hatz Service.	

Type of fault	Possible causes	Remedy	Chapter
With automatic electrical switch-off mechanism (additional equipment)	Stop signal of monitoring elements for: ▪ Oil pressure too low. ▪ Cylinder head temperature too high.	Check the engine for: ▪ Engine oil filling level ▪ Contamination of the cooling air guides or another impairment of the cooling system.	*7.8 Checking the oil level and adding oil if necessary, page 41* *8.2.6 Cleaning the cooling fan, cooling fins and oil cooler, page 54*
	Irregularities in the electrical equipment, such as: ▪ Loose contacts on cable connections. ▪ Faulty three phase alternator. ▪ Faulty relay.	Check the electrical equipment and its components, contacting the service center if necessary.	*3.2.4 Electrical equipment, page 18*
The engine loses power and speed.	The fuel supply is impaired ▪ The tank ran out of fuel during operation. ▪ Fuel prefilter or fuel filter is clogged. ▪ Inadequate tank venting. ▪ Line connections are not leak tight.	Add fuel. Change the filter. Ensure that the tank is sufficiently vented. Check the line screw connections for leak tightness.	*7.6 Refueling, page 38* *8.2.8 Changing the fuel prefilter, page 58* *8.2.13 Changing the fuel filter, page 68*
	Dirty air filter unit.	Check the degree of dirt contamination of the air filter, and clean or renew it if necessary.	*8.2.9 Maintaining the dry air filter, page 60*

Type of fault	Possible causes	Remedy	Chapter
	Tappet clearance not OK.	Adjust the tappet clearance.	*8.2.11 Checking and setting the tappet clearance, page 64*
	Injection nozzle is not functional.	Contact Hatz Service.	
	Diesel particulate filter blocked for a long time, engine is automatically limited.	Replace the diesel particulate filter.	*8.2.15 Replacing the diesel particulate filter, page 74*
Engine becomes very hot. Indicator lamp for the cylinder head temperature (additional equipment) lights up.	Too much engine oil in the engine.	Drain the engine oil to the upper mark of the dipstick.	*7.8 Checking the oil level and adding oil if necessary, page 41*
	Inadequate cooling: ▪ Contamination in the entire area of the cooling air guides.	Clean the cooling air area.	*8.2.6 Cleaning the cooling fan, cooling fins and oil cooler, page 54*
	▪ Incompletely closed air guide parts or capsule parts.	Check the air guide parts and shafts for completeness and good sealing properties.	
Combined indicator on the instrument box flashes briefly 14 times at maximum speed (flashing pulse 0.4 sec.).	Dirty air filter unit.	Check the degree of dirt contamination of the air filter, and clean or renew it if necessary.	*8.2.9 Maintaining the dry air filter, page 60*
Different short flashing pulses at the combined indicator on the instrument box.	Various faults that can only be remedied by Hatz Service.	Contact Hatz Service.	

Type of fault	Possible causes	Remedy	Chapter
Combined indicator on the instrument box flashes 1 time or 2 times (flashing pulse approx. 2 sec.).	The diesel particulate filter is blocked and must be conditioned.	Have the diesel particulate filter exchanged and professionally conditioned as part of the Hatz Easy-Clean program.	*8.2.15 Replacing the diesel particulate filter, page 74*

10 Storage and disposal

10.1 Storing the machine

General information

NOTICE	
	**Comply with the safety chapter!** Follow the basic safety instructions in the chapter *3 Safety, page 7*.

Storing the machine for a lengthy period

Take the following measures if you intend to take the machine out of service for a lengthy period:

Step	Activity
1	After the machine has cooled down, cover it to protect it against dust and store it in a dry and clean place.

The new engine can normally be stored for up to 1 year.

The protection lasts up to approx. 6 months at very high humidity and with sea air.

If the storage time is longer, please contact the nearest **Hatz service**.

10.2 Disposing of the machine

Disposal information

Dispose of the machine (including machine parts, engine oil and fuel) according to the local disposal regulations and the environmental laws in the country of use.

Because of the danger of possible environmental damage, only permit an approved specialist company to dispose of the machine.

NOTICE	
	When the machine has reached the end of its lifecycle, ensure that it is disposed of safely and properly, especially parts and substances that can be dangerous to the environment. These also include fuel, lubricants, plastics and batteries (if present). ▪ Do not dispose of the battery with the household trash. ▪ Dispose of the battery at a collection point for possible recycling.

11 Installation declaration

Extended Declaration of Incorporation
EC Machinery Directive 2006/42/EC

The manufacturer: **Motorenfabrik Hatz GmbH & Co.KG**
Ernst-Hatz-Straße 16
D-94099 Ruhstorf a. d. Rott

hereby declares that the incomplete machine: product description: **Hatz diesel engine**
Type designation and as of serial number:
3L43C=14910; 4L43C=15010; 3M43=15110; 4M43=15210

satisfies the following basic safety and health protection requirements in acc. with Annex I to the above-mentioned Directive.

- Annex I, General principles no. 1
  - Nr. 1.1.2., 1.1.3., 1.1.5., 1.2.1., 1.2.2., 1.2.3., 1.2.4.1., 1.2.4.2., 1.3.1., 1.3.2., 1.3.3., 1.3.4., 1.3.7., 1.3.9., 1.4.1., 1.5.1., 1.5.2., 1.5.8., 1.5.9., 1.6.1., 1.6.2., 1.6.4., 1.7.

All relevant basic safety and health protection requirements down to the interfaces described
- ☒ in the operating manual
- ☒ in the enclosed data sheets
- ☒ in the enclosed technical documents

have been complied with.

The special technical documents in acc. with Annex VII B of the Directive 2006/42/EC have been prepared.

The following standards have been used (completely or partially):
- EN 1679-1: 092011
- EN ISO 12100: 032011
- EN ISO 13857: 062008
- EN 60204-1: 062007
- EN ISO 13849-1: 122008

The Operating Manual has been enclosed to the incomplete machine and the Assembly Instructions have been provided to the customer electronically together with the order confirmation.

Commissioning has been prohibited until it has been established, if applicable, that the machine into which the above-mentioned incomplete machine is to be incorporated, satisfies the provisions of the Machinery Directive.

Wolfgang Krautloher / see "Manufacturer"
Name / address of EC documentation officer

06.03.2014	Krautloher / Directives official	i. V. Krautloher
Date	Signature and information on the undersigned	Signature

12 EPA AND CARB CERTIFIED ENGINES

**SUPPLEMENTAL INFORMATION
TO THE OWNER'S MANUAL FOR MODEL YEAR 2015
FOR EPA AND CALIFORNIA CERTIFIED NONROAD
COMPRESSION IGNITION ENGINES.**

**EPA AND CALIFORNIA EMISSION CONTROL
SUPPLEMENTAL WARRANTY STATEMENT.**

EPA AND CARB EMISSION CONTROL WARRANTY STATEMENT.

YOUR WARRANTY RIGHTS AND OBLIGATIONS.

The California Air Resources Board and Motorenfabrik Hatz GmbH & Co. KG is pleased to explain the emission control system warranty on your Model Year 2015 engine. In California, new heavy-duty off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. The Motorenfabrik Hatz GmbH & Co. KG must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Where a warrantable condition exists, the Motorenfabrik Hatz GmbH & Co. KG will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts, and labor.

MANUFACTURER´S WARRANTY COVERAGE.

The Model Year 2015 heavy-duty off-road engines are warranted for the periods described below. Motorenfabrik Hatz GmbH & Co. KG warrants to the original owner, and to each subsequent owner, of a new, diesel engine that the emission control system of your engine:

- Was designed, built and equipped so as to conform at the time of sale with all applicable regulations of the California Air Resources Board (CARB).
- Is free from defects in material and workmanship that will cause such engine to fail to conform with applicable regulations for the following warranty period:

If your engine is certified as . . .	And its maximum power is . . .	And its rated speed is . . .	Then its warranty period is . . .
Variable speed or constant speed	kW <19 (25 HP)	Any speed	1.500 hours or two years, whichever comes first.
Constant speed	19≤ kW <37 (25≥ HP <50)	3.000 rpm or higher	1.500 hours or two years, whichever comes first.
Constant speed	19≤ kW <37 (50≥ HP <50)	Less than 3.000 rpm	3.000 hours or five years, whichever comes first.
Variable speed	19≤ kW <37 (50≥ HP <50)	Any speed	3.000 hours or five years, whichever comes first.
Variable speed or constant speed	kW ≥37 (>50 HP)	Any speed	3.000 hours or five years, whichever comes first.

If any emission-related part on your engine is defective, the part will be repaired or re- placed by Motorenfabrik Hatz GmbH & Co. KG.

The warranty period shall begin:

- on the date the equipment is first delivered to the first retail purchaser, or;
- if the equipment is placed in service for demonstration purposes prior to sale at retail, on the date the engine is first placed in service.

The emission control systems of your new Motorenfabrik Hatz engine was designed, built and tested using genuine Motorenfabrik Hatz parts, and the engine is certified as being in conformity with CARB and US EPA emission control regulations. Accordingly, it is recommended that any replacement parts used for maintenance, repair or replacement of emission control systems be Motorenfabrik Hatz parts. Any replacement part that is equivalent in all material respects may be used in the performance of any maintenance or repairs, although Motorenfabrik Hatz recommends that the owner obtain assurance that such parts are warranted by their manufacturer to be equivalent to genuine Motorenfabrik Hatz GmbH & Co. KG parts. Such use shall not reduce the remaining warranty obligations of the engine manufacturer, provided they are warranted to be equivalent to genuine Motorenfabrik Hatz parts.

Any warranted part that is not scheduled for replacement, as required maintenance shall be warranted for the warranty period defined above. If any such part fails during the period of warranty coverage, it will be repaired or replaced under warranty. Any such part repaired or replaced under the warranty shall be warranted for the remaining warranty period.

Any warranted part that is scheduled only for regular inspection in the written instructions shall be warranted for the warranty period defined above. A statement in the written instructions to the effect of "repair or replace as necessary" shall not reduce the period of warranty coverage. Any such part repaired or replaced under warranty shall be warranted for the remaining warranty period.

Any warranted part that is scheduled for replacement, as required maintenance shall be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part shall be repaired or replaced by the engine manufacturer under warranty. Any such part repaired or replaced under warranty shall be warranted for the remainder of the period prior to the first scheduled replacement point for the part.

Repair or replacement of any warranted part under warranty shall be performed at no charge to the owner at a warranty station.

Motorenfabrik Hatz provides warranty services or repairs at all manufacturer distribution centers (warranty stations) that are franchised to service the subject engines. Please see the Customer Assistance section of this statement for help in locating such service centers.

The owner will not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at a warranty station.

Motorenfabrik Hatz is liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.

OWNER‘S WARRANTY RESPONSIBILITIES.

As the engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Motorenfabrik Hatz recommends that you retain all receipts covering maintenance on your engine, but Motorenfabrik Hatz cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

As the engine owner, you should be aware, however, that Motorenfabrik Hatz may deny you warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate ultra-low sulfur fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California’s emissions requirements.

You are responsible for presenting your engine to a Motorenfabrik Hatz authorized service center as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

Add-on or modified parts, as defined in CCFR Section 1900(b)(1) and (b)(10), Title 13, that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts shall be grounds for disallowing a warranty claim made in accordance with this article. The engine manufacturer shall not be liable under this article to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

Customer Assistance

If you have any questions regarding your warranty rights and responsibilities, you should contact HATZ DIESEL OF AMERICA, Inc. at (262)-544-0254.

What is Not Covered by the Emission Warranty

Please note that Emission Warranty does not cover:

- Systems and parts that were not first installed on the new equipment or engine as original equipment by Motorenfabrik Hatz.
- Part malfunctions caused by abuse, misuse, improper adjustment, modification, alteration, tampering, disconnection, improper or inadequate maintenance, or use of non-recommended fuels and lubricating oils.
- Damage caused by accident, acts of nature, or other events beyond Motorenfabrik Hatz’s control.
- Replacement of expendable items made in connection with scheduled maintenance.
- Parts requiring replacement, inspection or adjustment during scheduled maintenance intervals where the part is not defective.
- Parts that are not Motorenfabrik Hatz Service Parts.
- Loss of time, inconvenience, loss of use of equipment/engine or commercial loss.

- Equipment with an altered or disconnected hourmeter where the hours cannot be determined. Equipment normally operated outside the United States.
- Non-defective parts replaced by other than Motorenfabrik Hatz dealers.

What is Covered by the Emission Warranty

The following is a list of systems and parts that are considered a part of the Emission Control System and are covered by the Emission Warranty for engines that were built to conform to EPA and CARB regulations:

IMPORTANT!
This may not include expendable maintenance items. Emission related parts requiring scheduled maintenance are warranted until their first scheduled replacement point only.

The following parts as manufactured according to HATZ specifications are mandatory for engine operation which meets exhaust emission regulations:

- Fuel Injection pump(s)
- Injection nozzle(s)
- Intake and exhaust manifold
- EGR valve body
- EGR rate feedback and control system
- Crankcase breather valve assembly
- Oil filler cap
- Vacuum switch
- Diesel Oxidation Catalyst
- Diesel Particulate Filter
- Diesel Fuel Vaporizer/Evaporator
- Electronic control unit
- Oil temperature sensor
- Governor position sensor
- Engine speed sensor
- Solenoids
- Wiring harnesses
- Fuel hoses
- Intake and exhaust gaskets
- Emission Control Information Labels

Only parts manufactured by Hatz and which have passed the Hatz Quality Assurance Program have been assured of meeting EPA and CARB exhaust emission regulations.

HATZ DIESEL SUPPLEMENTAL WARRANTY FOR MODEL YEAR 2015 EPA AND / OR CARB CERTIFIED ENGINES.

PARTS WITH SUPPLEMENTAL LIMITED WARRANTY.

The following limited warranty is supplemental to the standard HATZ DIESEL LIMITED ENGINE WARRANTY and covers Model Year 2015 EPA and / or CARB certified engines and applies to the exhaust emission-related components are also listed in this manual.

SUPPLEMENTAL LIMITED WARRANTY.

Hatz Diesel of America, Inc. hereinafter referred to as “HATZ” warrants each of the above-listed parts when installed in a new engine sold by Hatz to be free from defects in material and workmanship under normal use and service, only under the named warranty coverage conditions, after the date of delivery to the original retail purchaser and Hatz will at their option, repair or replace at Hatz's sales headquarters, or at a point designated by Hatz, any part or parts which shall appear to the satisfaction of Hatz upon inspection at such point, to have been defective in material or workmanship.

- Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part.
- Any replacement part which is equivalent in performance and durability may be used in non-warranty maintenance or repairs and will not reduce the overall engine warrranty obligations of Hatz. However, Hatz is not responsible for failure of such replacement parts or failure of any other parts directly caused by failure of such replacement parts.
- This warranty does not obligate Hatz to bear any transportation charges in connection with the repair or replacement of defective parts. This warranty is transferrable to subsequent owners, only under the named warranty coverage conditions.
- In order to obtain service under this warranty, the retail purchaser should contact Hatz Diesel of America, Inc. at (262)-544-0254 for information and the nearest service center. The retail purchaser will not be charged for diagnostic labor which leads to the determination that a warranted part is defective, nor for the repair or replacement of warranted parts if the work is performed at an authorized Hatz service center. If other engine components are damaged due to a failure of the above-listed warranted parts still under warranty, these other engine components will also be repaired or replaced at no charge.
- This warranty shall not apply to any engine which shall have been installed or operated in a manner not recommended by Hatz, nor to any engine which shall have been repaired, altered, neglected, or used in any way which, in the opinion of Hatz, adversely affects its performance, nor to any engine in which parts not authorized by Hatz have been used, which parts or the use of which have damaged or caused defects in or otherwise adversely affected the engine or its performance, nor to normal maintenance service or replacement of normal service items.

Hatz reserves the right to modify, alter, and improve any engine or parts in accordance with the applicable regulations without incurring any obligation to replace any engine or parts previously sold with such modified, altered, or improved engine or parts.

EMISSION-RELATED INSTALLATION INSTRUCTIONS.

"Failing to follow the Emission related installation instructions provided by Motorfabrik Hatz when installing a certified engine in a piece of nonroad equipment violates federal law (40CFR1068.105(b)), subject to fines or other penalties as described in the Clean Air Act."

The emission related installation instructions can be downloaded at http://www.hatz-diesel.com/doku/assembly-instructions.html

"If you install the engine in a way that makes the engine's emission control information labels hard to read during normal engine maintenance, you must place duplicate labels on the equipment."

Assembly and handling of emission related components (e.g. catalyst mounting on the non-road equipment) are explained in the manual.

EQUIPMENT-LABELLING REQUIREMENTS: FUEL LABEL (see chapter *3.3 Labels, page 19*)

The "ultra-low sulfur fuel only" label has to be permanently attached to the equipment.
In case of an engine mounted fuel tank, every engine is equipped with an additional fuel label nearby the fuel inlet.
Otherwise, there are two loose fuel labels available with the engine

If the original fuel label is not readily visible after the engine is installed in the equipment then the second loose fuel label must be attached on the equipment in such a manner that it is readily visible to an average person.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Motorenfabrik Hatz GmbH & Co. KG
Ernst-Hatz-Str. 16
94099 Ruhstorf a.d. Rott
Deutschland
Tel. +49 8531 319-0
Fax +49 8531 319-418
marketing@hatz-diesel.de
www.hatz-diesel.com

0000 436 007 00 - 12.2014 - 0.1
Printed in Germany
USA - EPA IV - CARB

HATZ DIESEL

CREATING POWER SOLUTIONS.