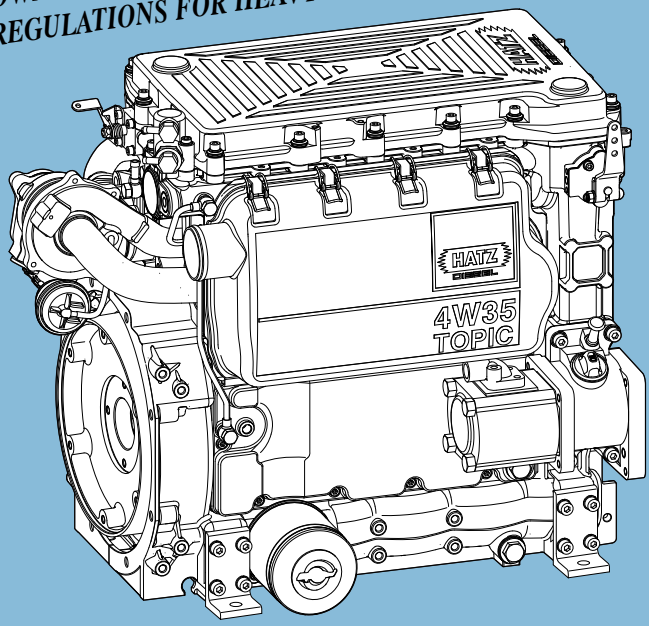
INSTRUCTION BOOK

HATZ DIESEL

INCLUDES SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR 2008 AND LATER EPA CERTIFIED NONROAD COMPRESSION-IGNITION ENGINES

INCLUDES SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR 2008 AND LATER CALIFORNIA REGULATIONS FOR HEAVY-DUTY OFF-ROAD ENGINES



2W35
3W35
4W35
4W35T

43391601-USA-EPA IV-CARB
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Printed in Germany

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A new HATZ Diesel engine - working for you

This engine is intended only for the purpose determined and has been tested by the manufacturer of the equipment in which it is installed. Using it in any other manner contravenes the intended purpose. For danger and damage due to this, Motorenfabrik HATZ assumes no liability. The risk is with the user only.
Use of this engine in the intended manner presupposes compliance with the maintenance and repair instructions laid down for it. Noncompliance leads to engine breakdown.

Please do not fail to read this operating manual before starting the engine for the first time.
This will help you to avoid accidents, ensure that you operate the engine correctly and assist you in complying with the maintenance intervals in order to ensure long-lasting, reliable performance.

Please follow all maintenance references carefully including the schedule for 2008 and later EPA certified nonroad compression-ignition engines and for 2008 and later CARB certified off-road engines to prevent our environment.

Please pass this Instruction Manual on to the next user or to the following engine owner.

The worldwide **HATZ Service Network** is at your disposal to advise you, supply with spare parts and undertake servicing work.
You will find the address of your nearest **HATZ service station** in the enclosed list.

Original-Ersatzteile
Original-spare parts
Pièces de rechange d'origine
Repuestos originales

Use only **original spare parts** from **HATZ**. Only these parts guarantee a perfect dimensional stability and quality. The order numbers can be found in the enclosed spare parts list. Please note the spare parts kits shown in Table M00.

We reserve the right to make modifications in the course of technical progress.

MOTORENFABRIK HATZ GMBH & CO KG

Contents

This symbol identifies important safety precautions.
Please comply with these most carefully in order to avoid any risk of injury to persons or damage to materials.
General legal requirements and safety regulations issued by the competent authorities or industrial accident insurers must also be complied with.

1. Important safety notes when operating the engine

HATZ diesel engines are efficient, strong and durable. For this reason they are mostly installed on equipment used for commercial purposes.
The manufacturers of such equipment must observe any relevant equipment safety regulations when the engine forms part of an overall system.
A few general points concerning operating safety should nonetheless be noted.
Depending on the engine's operating and installation conditions, equipment manufacturers and their users may have to fit safety or protective devices in order to prevent improper use. Examples:

– Exhaust system components as well as the surface of the engine will naturally be hot and must not be touched while the engine is running or until it has cooled down after being stopped.

– Incorrect wiring or improper operation of the electrical system may cause sparking and must therefore be avoided.

– Provide protection against contact with rotating parts once the engine is connected to the driven equipment or machine.
HATZ protective guards are available for the belt drive of the cooling fan and alternator drive systems.

– Always observe the start-up information in the operating instructions before starting the engine.

– Mechanical starting devices should not be operated by children or persons deficient in physical strength.

– Check that all safety devices are in place before starting the engine.

– Ensure that operation, maintenance and repair of the engine are undertaken by suitably trained personnel only.

– Protect the starter key against unauthorised use.

– Do not run the engine in closed or insufficiently ventilated rooms.
Do not breathe in emissions – danger of poisoning!

– Also fuel and lubricants could contain poisonous components. Please follow the appropriate instructions of the mineral oil producer.

– Radiator protection fluids are detrimental to health. Thus, they may only be stored in closed original containers and in a place inaccessible to non-authorized persons. Eye and skin contact must be avoided. Comply with the manufacturer’s instructions

Important safety notes when operating the engine

– The engine must be stopped before performing any maintenance, cleaning or repair work.

– It is essential to stop the engine before refilling the fuel tank.
Never refuel near a naked flame or sparks which could start a fire. Don't smoke. Don't spill fuel.

– Keep explosive materials as well as flammable materials away from the engine because the exhaust gets very hot during operation.

– Never spill consumables, such as fuel, oil or radiator protection fluid over hot engine components. The fluid might catch fire.

– Work on the cooling system must not be performed while the engine is warm - risk of scalding ! The cooling system is pressurized.

– Wear close-fitting clothing only when working on the engine while it is running.
Please don't wear necklaces, bracelets or any other objects which you could get caught with.

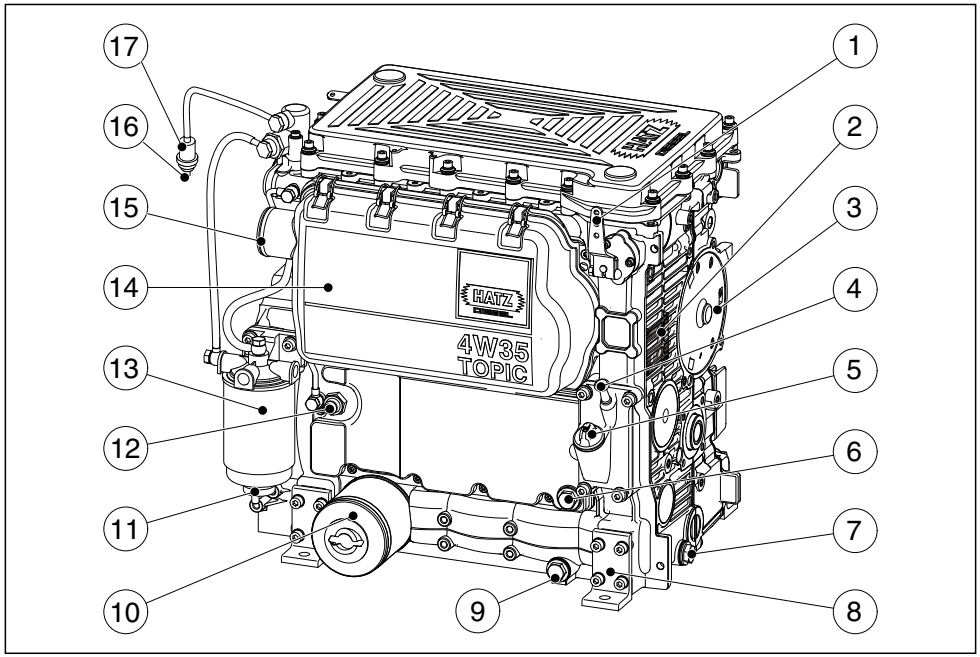
– Please pay attention to all advice- and warning stickers placed on the engine and keep them in legible condition. Contact your next **HATZ service station** if a sticker comes off or is illegible and ask for a new one.

– We accept no liability for damage resulting from improper modifications to the engine.

Regular servicing in accordance with the details provided in this Instruction Book is essential to keep the operating reliably and to ensure the exhaust quality of the engine.

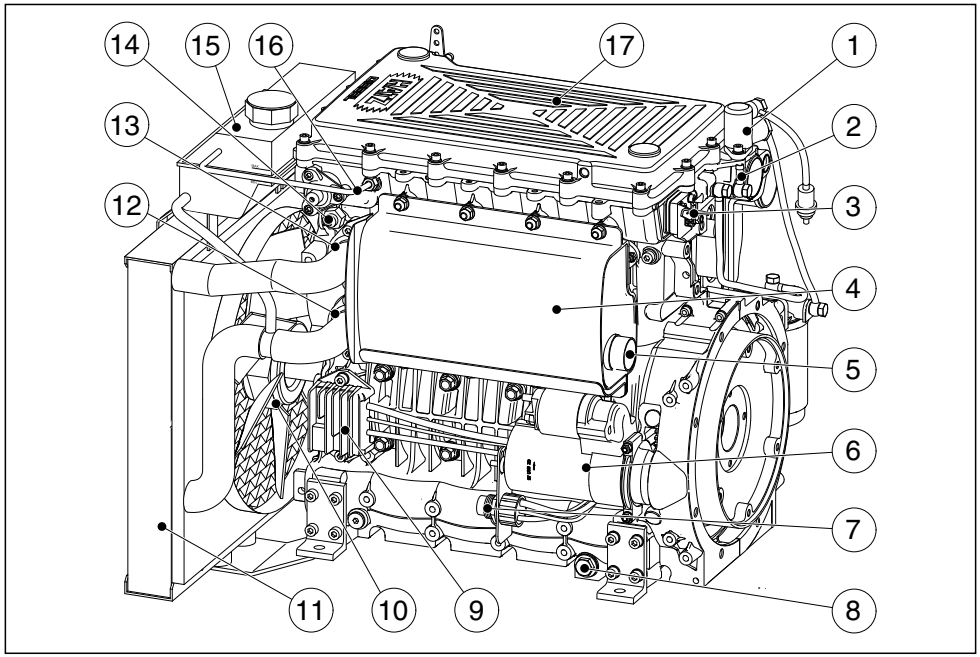
When in doubt, consult your local **HATZ service station** before starting the engine.

2. Description of the engine 2 W 35 • 3 W 35 • 4 W 35



1 Operator's side

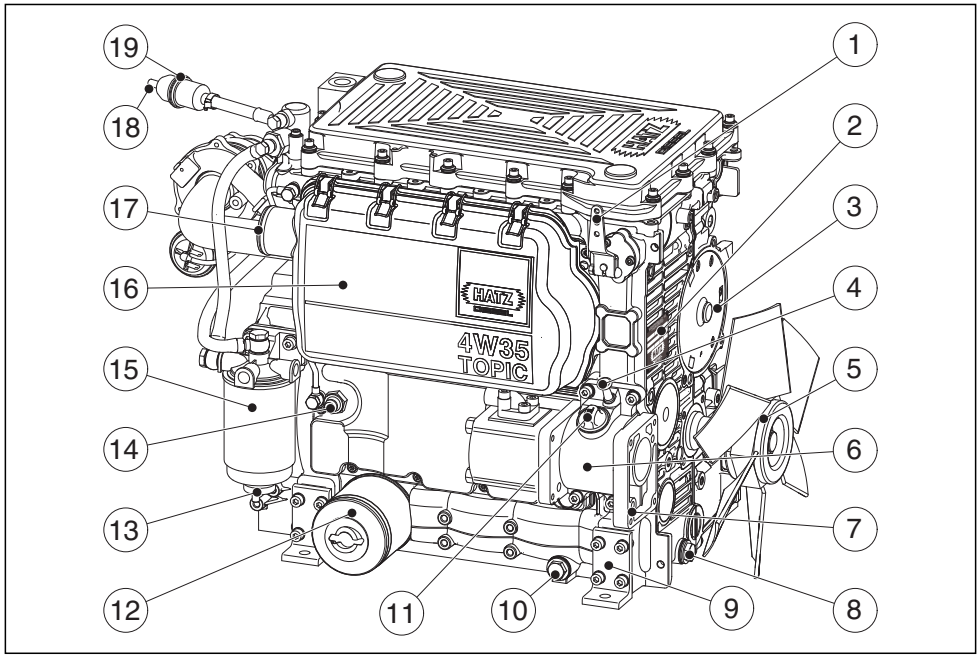
1 Speed adjustment lever
2 Type plate
3 Coolant pump
4 Oil dipstick
5 Oil filler cap
6 Drain plug for coolant
7 Oil drain plug (governor side)
8 Engine mountings (optional equipment)
9 Oil drain plug (operator's side)
10 Engine oil filter
11 Water drain plug on fuel filter
12 Oil pressure switch
13 Fuel filter with water trap
14 Dry-type air cleaner
15 Combustion air intake port
16 Fuel suction line connector
17 Fuel pre-filter



2 Exhaust side

1 Fuel feed pump
2 Fuel return line
3 Stop lever (optional equipment)
4 Exhaust silencer
5 Exhaust gas outlet
6 Electrical starter
7 Central plug for electrical system
8 Oil drain plug (exhaust side)
9 Voltage regulator
10 Fan (optional equipment)
11 Radiator (optional equipment)
12 Coolant supply to engine
13 Coolant return to radiator and thermostat
14 Temperature switch
15 Coolant expansion tank (optional equipment)
16 Vent line to expansion tank
17 Cylinder head cover

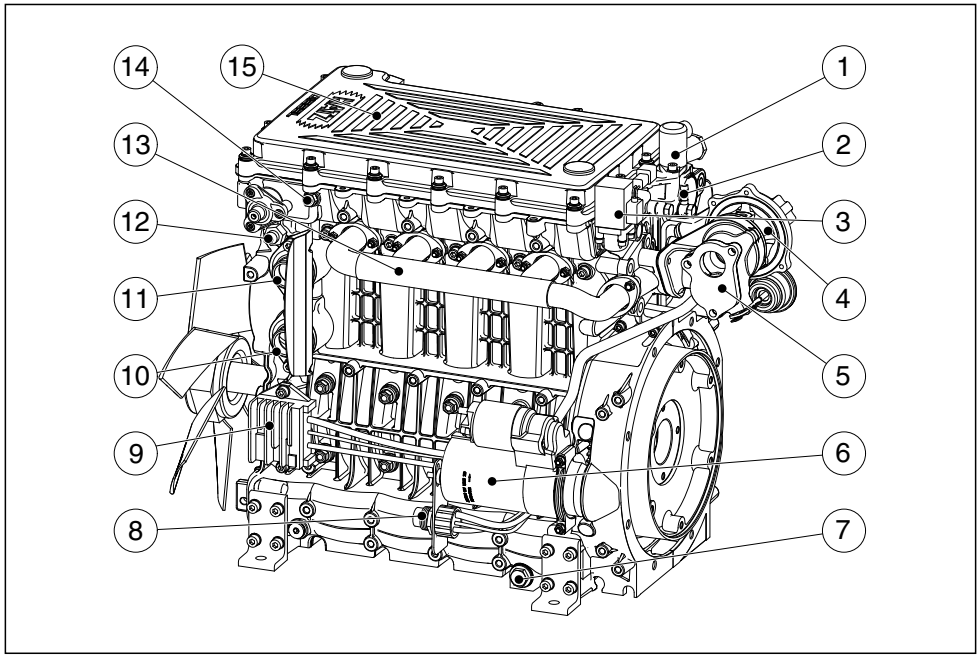
Description of the engine 4W35T (turbocharged engine)



3 Operator's side

1 Speed adjustment lever
2 Type plate
3 Coolant pump
4 Oil dipstick
5 Fan (optional equipment)
6 Hydraulic pump drive (optional equipment)
7 Flange for additional hydraulic pump (optional equipment)
8 Oil drain plug (governor side)
9 Engine mountings (optional equipment)
10 Oil drain plug (operator's side)
11 Oil filler cap
12 Engine oil filter
13 Water drain plug on fuel filter
14 Oil pressure switch
15 Fuel filter with water trap
16 Dry-type air cleaner
17 Combustion air intake port
18 Fuel suction line connector
19 Fuel pre-filter

Description of the engine 4W35T (turbocharged engine)



4 Exhaust side

1 Fuel feed pump
2 Fuel return line
3 Stop lever or stop solenoid (optional equipment)
4 Turbocharger
5 Exhaust flange
6 Electric starter
7 Oil drain plug (exhaust side)
8 Central plug for electrical system
9 Voltage regulator
10 Coolant supply to engine
11 Coolant return to radiator and thermostat
12 Temperature switch
13 Exhaust manifold
14 Connector for vent line to expansion tank (coolant)
15 Cylinder head cover

3. General notes

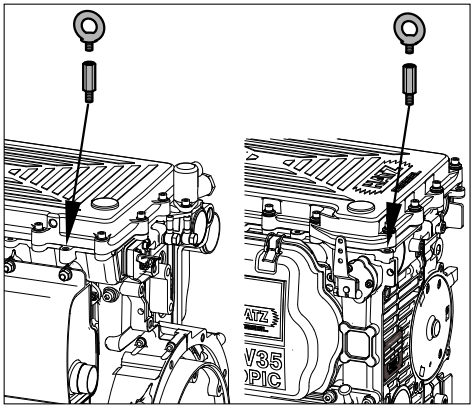
3.1. Technical data

Type		**2W35**	**3W35**	**4W35**	**4W35T**
Design		Fluid-cooled four-stroke diesel engine			
Combustion air		normal intake			turbo-charged
Combustion system		Direct injection			
Number of cylinders		2	3	4	4
Bore / stroke	mm	70/90	70/90	70/90	70/90
Displacement	cm^3	692	1038	1384	1384
Lubricating oil capacity	l. approx.	2.5 [1)]	3.4 [1)]	4.4 [1)]	4.4 [1)]
Difference between "max" and "min" levels	l. approx.	1.2 [1)]	1.4 [1)]	1.6 [1)]	1.6 [1)]
Lubricating oil consumption (after running in)	approx.	0.5 % of fuel consumption at full load			
Lubricating oil pressure (oil temperature 100 °C)	approx.	3.5 bars at 3000 r.p.m.			
Capacity of coolant with HATZ standard radiator	l. approx.	4.6	5.4	6.7	6.7
Direction of rotation, looking at the flywheel		counterclockwise			
Max. admissible tilt angle in operation (with lub-oil level at **max.** marking of dip-stick with the engine in horizontal position)	max.	30° in any direction [2)]			
Weight (incl. electric starter, air-cleaner and exhaust silencer) without radiator	kg approx.	74	89	107	111
Battery capacity		12V / 55 Ah			

1) These values are intended as an approximate guide. The **max.** marking on the dipstick is the determining factor.

2) Exceeding these limits causes engine breakdown.

3.2. Transport



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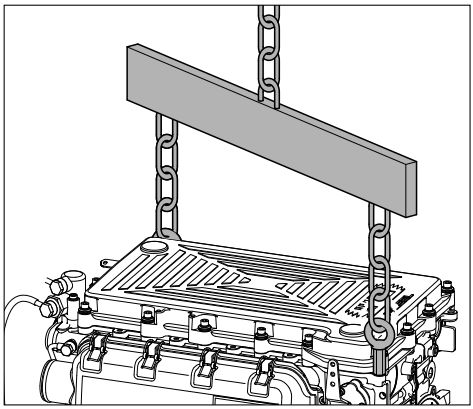
Watch out for the eyebolt securing points.

The eyebolts are used to safely transport the engine incl. the optional equipment.
They are not suited and not approved for hoisting complete machines.



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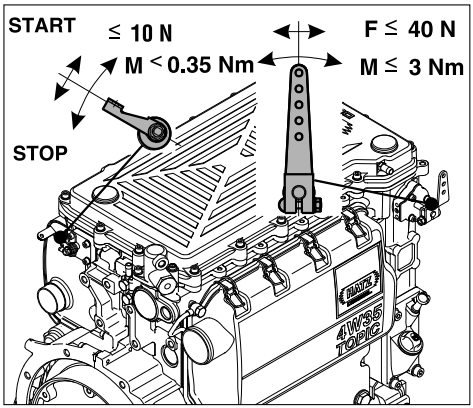
Make sure that only suitable hoisting equipment with a sufficient lifting capacity is used for transport!

3.3. Instructions for installation

The „Manual for Selection and Installation of Engines“ contains all the information you need if your engine has not yet been installed on or in the equipment it is intended to drive, or set up in its correct operating position. You can obtain a copy of this manual from your nearest HATZ service station.



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The admissible forces and torques on the speed adjusting lever and the stop lever should be observed as exceeding them can lead to damage to the stops and inner governor parts.

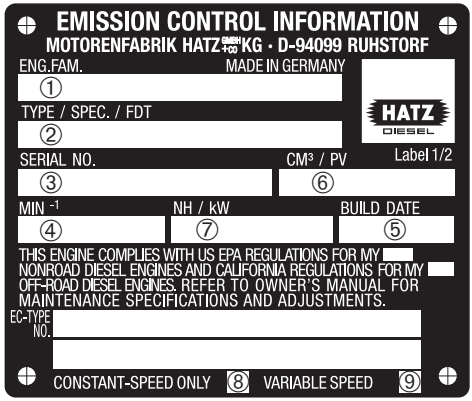
3.4. Load on engine

See supplemental information for EPA certified engines, Page 43; resp. supplemental information for California regulations for off road engines, Page 57.

3.5. EPA/CARB-type plates and fuel label

There are two EPA/CARB- type plates applied for the identification of the engine. The type plates are placed on the crankcase (chapt. 2).
They include the following emission control information (Figure 8a):

Label 1/2



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① EPA/CARB-Engine Family Number
② engine type/spec. (only for special equipment) /Fuel Delivery Timing
③ engine number
(also stamped on crankcase, Fig. 9)
④ max. engine rated speed
⑤ build date
⑥ displacement
⑦ rated power
⑧ “constant speed only” (if requested)
⑨ “variable speed” (if requested)

Every engine is equipped with an additional loose engine type plate. If the original type plate on the engine is not readily visible after the engine is installed in the equipment then the second loose type plate must be attached on the equipment in such a manner that it is readily visible to an average person.

For any offer as well as spare parts orders it is necessary to mention the following data (also see spare parts list, page 1):

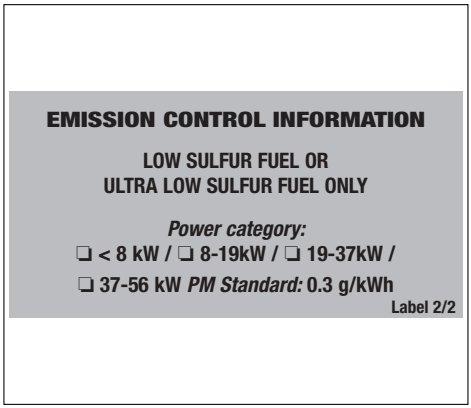
② engine type/spec.
(only for special equipment)
③ engine number
④ max. engine rated speed

The layout is identical for constant-speed and variable speed application.

Attention:
If the engine was certified for constant-speed application and shall be used so, the field "constant-speed only" is marked with “X”.
If the engine was certified for variable speed application and shall be used so, the field "variable speed" is marked with “X”.

Always install the engine for its intended application in order to comply with EPA and CARB emission regulation requirements.

Label 2/2



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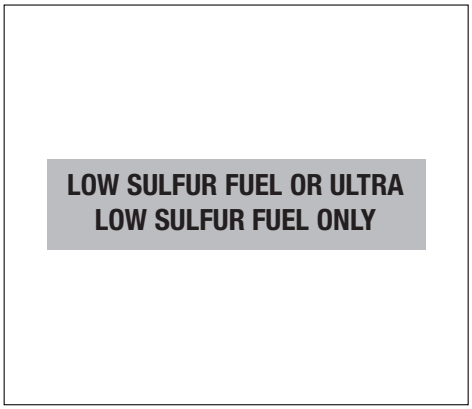
The engine must be operated with “LOW SULFUR FUEL OR ULTRA LOW SULFUR FUEL ONLY”.
The label also states the applicable emission-related power category of the engine.

Fuel label



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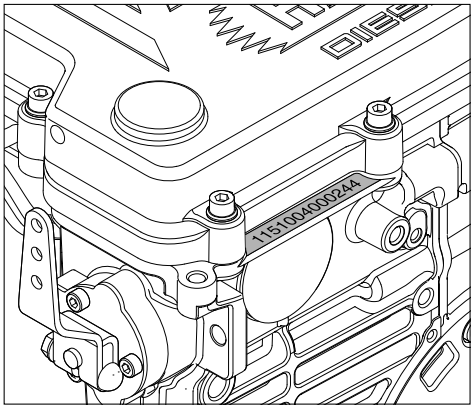
The fuel label is placed nearby the fuel inlet.
If there was no fuel tank mounted to the engine, the label has to be permanently attached to the equipment near the fuel inlet.



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Engine serial number stamped on crankcase.

3.6. EMISSION-RELATED INSTALLATION INSTRUCTIONS

See supplemental information for EPA certified engines, Page 43; resp. supplemental information for California regulations for off road engines, Page 57.

4. Operation

4.1. Before initial start-up

The engines are normally delivered to the customers without fuel, oil and coolant filling!

Important!
When replenishing liquids, it is essential that any danger of confusion be excluded, as mixing up liquids may cause serious damage to the engine.

4.1.1. Engine oil

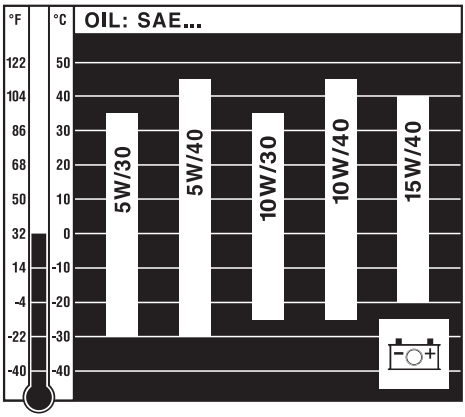
Oil quality
All premium oils which meet at least one of the following specifications are suitable:

for naturally-aspirated engines
ACEA – B2 / E2 or superior
API – CF / CF-4 / CG-4 or superior.

for turbo engines
ACEA – B3 / E2 or superior
API – CF / CF-4 / CG-4 or superior

If engine oil of a poorer quality is used, reduce oil change intervals to 150 operating hours.

Oil viscosity



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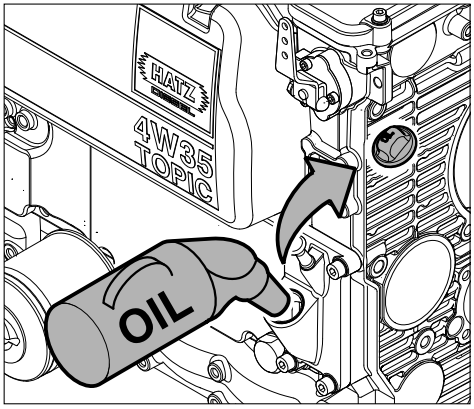
Choose a viscosity according to the ambient temperatures where the engine is to be started from cold.

The engine must be in a horizontal position before adding oil or checking the oil level.



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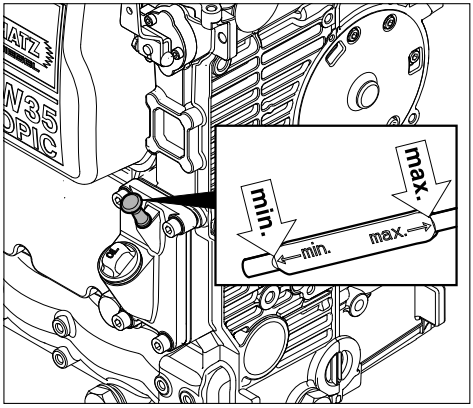
– Remove oil drain plug and pour in engine oil. For the quantity of lubricant required, refer to Chapter 3.1.



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– For oil level inspection, remove the dipstick and wipe it dry using a lint-free, clean piece of cloth; then insert it to its stop and pull it out again.

– Read the oil level on the dipstick; if necessary, add oil until the level reaches the **max**. mark.

Attention!
If the engine is operated while the oil level is below the **min**. mark, it will be damaged.

4.1.2. Coolant

The following radiator protection fluids have been authorized by HATZ:

Manufacturer	Product description
BASF	Glysantin® G 30
TOTAL	Glacelf Plus

These radiator protection fluids provide efficient protection against corrosion, especially in the case of aluminium engines, and against freezing. Moreover, the coolant's boiling point is essentially increased and limescale is prevented from forming in the cooling system.

Important!
The use of other products is only admissible subject to previous consultation with the factory.

Properties of the radiator protection fluids:

Product	Properties
Glysantin® G 30	nitrite-, amine-, phosphate- and **silicate-free**. Identification colour: **violet** Replacement interval: every **4 years**
Glacelf Plus	nitrite-, amine- and phosphate-free. **Contains silicate**. Identification colour: **blue-green** Replacement interval: every **2 years**

Important!
Mixing of the above-mentioned products is admissible, however, the specifications of the lower-grade product shall apply in this case. A replacement interval of 2 years must be complied with.
In the cooling system, mixed radiator protection fluids are characterized by their brown colour.

Glysantin® G 30 and Glacelf Plus are available from every HATZ Service station.

Processing the coolant

⚠ **Radiator protection fluids are detrimental to health. Thus, they may only be stored in closed original containers and in a place inaccessible to non-authorized persons. Eye and skin contact must be avoided. Comply with the manufacturer's instructions.**

– Add water to the coolant **before pouring it** in the cooling circulation.
Clean water which is not excessively hard must be used for processing. Tap water which contains as little salts, minerals and suspended matter as possible is well suited.

The mixing ratio of the coolant should not fall below or exceed the following concentration:

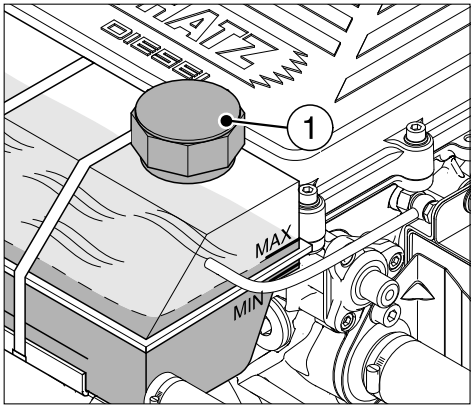
Radiator protection fluid	Water	Frost-resistant down to approx.
min. 35 percent by volume	65 percent by volume	-22 °C
max. 50 percent by volume	50 percent by volume	-40 °C

An insufficient concentration of coolant increases the risk of corrosion in the cooling system, as well as the risk of freezing, depending on the prevailing climate conditions.
If the portion of radiator protection fluid exceeds 50 percent by volume, this will impair the cooling effect as well as the anti-freeze protection.
Thus, if the concentration of the radiator protection fluid falls below or exceeds the specified values, this may cause serious damage to the engine.
Should you have any questions about the ideal mixing ratio at your place of engine operation, please do not hesitate to contact your **HATZ service station**.

Note:
As the concentration of the corrosion- and antifreeze protection fluid deteriorates long-term, it must be checked yearly using a commercial antifreeze tester. If the concentration is too low, no matter at which service interval, the coolant must be replaced as described in Chapter 5.6.1.

Filling the cooling system

Work on the cooling system must not be performed while the engine is warm - risk of scalding!
The cooling system is pressurized.



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– Open cap **1**.

– Pour in coolant until the level reaches the **MAX** mark on the expansion tank.

– Tighten cap **1** by hand.

– After the engine has warmed up, check coolant level again. When the engine is at a standstill and has cooled down, the coolant level must be visible between the tank's **MIN** and **MAX** marks; if the engine is warm, the level may be slightly above the **MAX** mark.

– Check cooling system for leakage; if necessary, re-tighten hose clamps.

Add coolant

While the engine is warm, the cap of the expansion tank must not be opened Risk of scalding. The cooling system is pressurized.

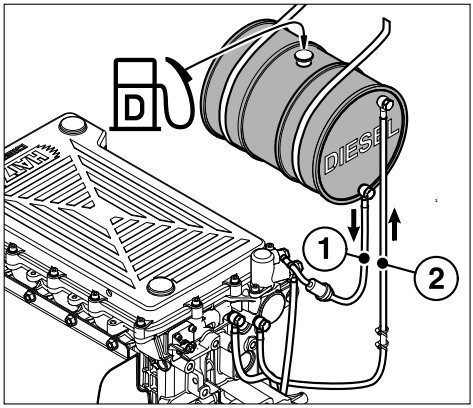
– First stop the engine and allow it to cool down. Then put a piece of cloth over cap **1** of the expansion tank and open cap carefully (Fig. 13).

– Add coolant until the level is between the **MIN** and the **MAX** mark (Fig. 13).

– Tighten cap **1** by hand.

4.1.3. Fuel

⚠ Only refuel when engine is stopped. Never refuel close to open flames or flammable sparks, don't smoke. Use only pure fuel and clean replenishing vessels. Don't spill the fuel.



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Pos. **1** = Fuel feed line
Pos. **2** = Fuel return line

All diesel fuels sold as fuel and complying with the following minimum specification can be used:

EN 590 or
BS 2869 A1 / A2 or
ASTM D 975-1D / 2D

Low temperature resistance
At low temperatures, the viscosity of Diesel fuel increases. This may result in clogging of the fuel system. Thus, winter fuel must be used at outside temperatures below 0 °C, or petroleum must be added in time.

Lowest ambient temperature when starting, in °C	Paraffin content for:	
	Summer fuel	Winter fuel
0 up to –10	20 %	–
–10 up to –15	30 %	–
–15 up to –20	50 %	20 %
–20 up to –30	–	50 %

Bleeding the injection system

Air may enter into the injection system if the fuel tank is completely emptied or while the primary fuel filter or the fuel filter are replaced.
To bleed the system, proceed as described below, depending on whether the fuel tank is arranged in **HIGH** position above the fuel supply pump, or in **LOW** position below the fuel supply pump:

Fuel tank HIGH

– Fill fuel tank completely with diesel fuel.

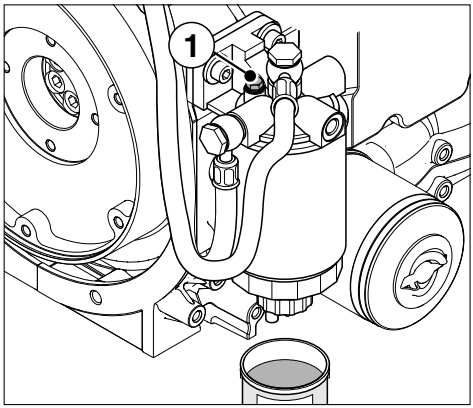
– Start the engine as described in Chapter 4.2.

Note:
The fuel system is bled automatically when the engine is started. To this effect, starting may take longer than usual.
To save the starter and the battery, do not actuate the starter continuously for more than 15 to 20 seconds at a time. Make pauses of approx. 1 minute between the various starting attempts. Should the engine fail to start even at the 2nd attempt, locate and eliminate the trouble (Chapter 6).

Fuel tank LOW

If the fuel tank is located at an even lower level, a manual fuel pump or an electrical supply pump must be used for bleeding.

Models with manual fuel pump



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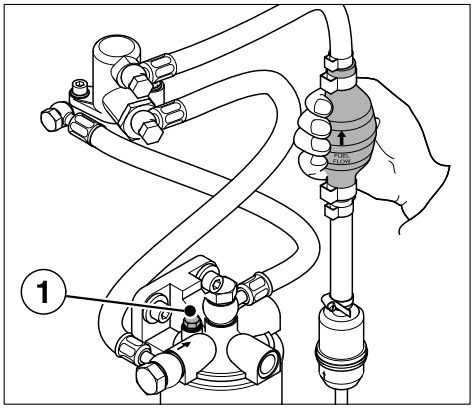
– Place a suitable vessel under the filter to trap escaping fuel.

– Open the vent screw **1** by approx. one turn.



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– Compress and release rubber ball repeatedly, until fuel escapes from the vent screw **1**.

– Close vent screw **1**, **then** actuate rubber ball **another two times**.

– Start the engine as described in Chapter 4.2.

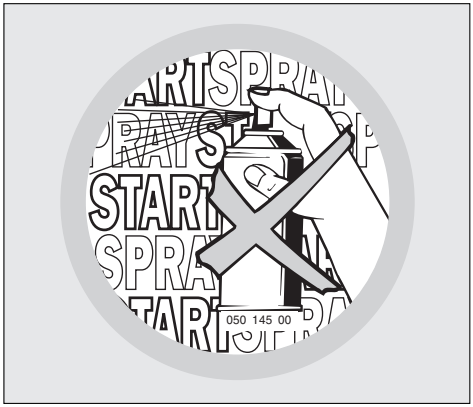
Models with electrical supply pump

– With this model, first turn the starter key to **position I** and wait for approx. one minute, Chapter 4.2.2. During this waiting time, the fuel system is largely bled by means of the electrical supply pump.

– Start the engine as described in Chapter 4.2.

4.2. Starting the engine

Do not run the engine in closed or insufficiently ventilated rooms – danger of poisoning! Before the engine is started, always make sure that nobody is in the danger area (moving parts on engine or machinery) and that all safety guards are in place.



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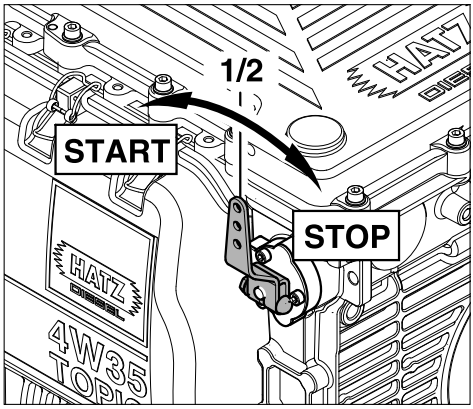
Never use any spray starting aids.

4.2.1. Preparations for starting

– If possible, disengage the engine from any driven equipment. The auxiliary equipment should always be placed in neutral.



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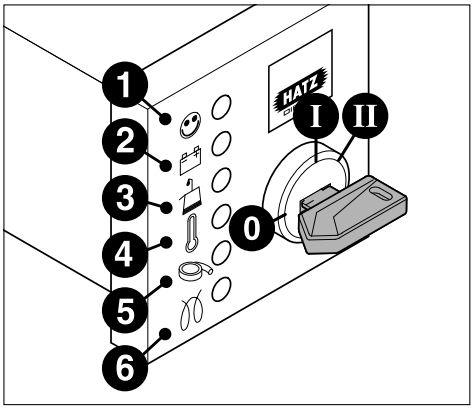
– Set speed control lever to a position between 1/2 START and max. START, according to requirements. Selecting a lower engine speed will reduce smoke when starting.

4.2.2. Electric starter

To save the starter and the battery, do not actuate the starter continuously for more than 15 to 20 seconds at a time. Make pauses of approx. 1 minute between the various starting attempts. Should the engine fail to start even at the 2nd attempt, locate and eliminate the trouble (Chapter 6).



19

– Insert the key **to its stop** and turn it to **position I**.

– Battery charge pilot lamp **2** and oil pressure warning **3** must light up.

– Turn starter key to **position II**.

– As soon as the engine runs, release the starter key. It must return to **position I** by itself and remain in this position during operation. The battery charge pilot lamp and oil pressure warning must go out immediately after starting. Indicator light **1** is on when the engine is in operation, Fig. 19.

– The air cleaner maintenance indicator **5** only goes on during operation to show that the air cleaner needs cleaning or replacement (Fig. 19, Chapter 5.4.3).

– The engine temperature indicator **4** goes on as soon as the coolant becomes inadmissibly hot. **Stop the engine immediately and trace and eliminate the cause of the problem**, Chap. 6.

– Always turn the starter key back to **position 0** before re-starting the engine. The repeat lock in the ignition lock prevents the starter motor from engaging and possibly being damaged while the engine is still running.

Important!
If a start protection module is installed, the starter key has to be returned to **position 0** for at least 8 seconds if the engine has failed to start before a further attempt to start the engine can be made.

Preheating device with automatic heating timer (optional equipment)

The preheating light **6** lights up additionally at temperatures below 0° centigrade (Fig. 19).

– After the light has gone out, start the engine without delay.

Automatic electrical shutdown system
(optional equipment)

This is characterized by a brief flashing of all pilot lamps once the starter key has been turned to **position I**, figure 19.

Important!
If the engine cuts out immediately after starting or switches off by itself during operation, a monitoring element in the automatic shutdown system has tripped. The corresponding indicator light (Fig. 19, positions 2 - 4) will come on.
After the engine has stopped, the indicator remains lit for another approx. 2 minutes.
The electrical device then switches off automatically.
The display lights up again after the starter key has been turned back to **position 0**, and then to **position I** again.
Trace and eliminate the cause of the operating fault before trying to restart the engine (see Chapter 6).

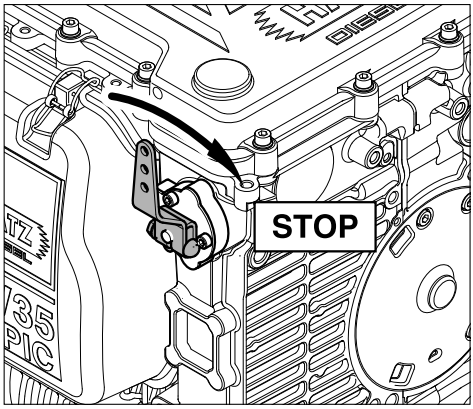
The indicator light goes out when the engine is next started.

Even with automatic shutdown monitoring the oil level must be checked every 8 – 15 operating hours (Chapter 5.2.1. and 5.2.5.).

4.3. Stopping the engine

If operation of the engine is interrupted for any reason, or at the end of the working day, the starter key should be kept out of reach of unauthorised persons.

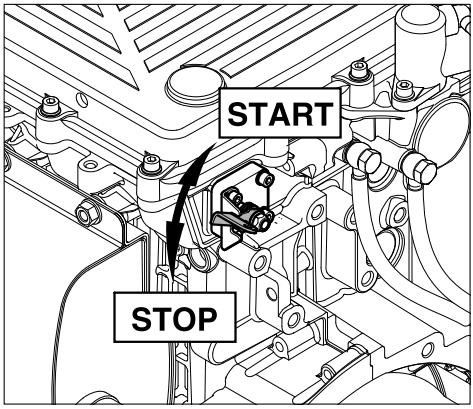
Stop via engine speed setting lever



20

– Move the speed adjustment lever back to the **STOP** position. The engine cuts out.

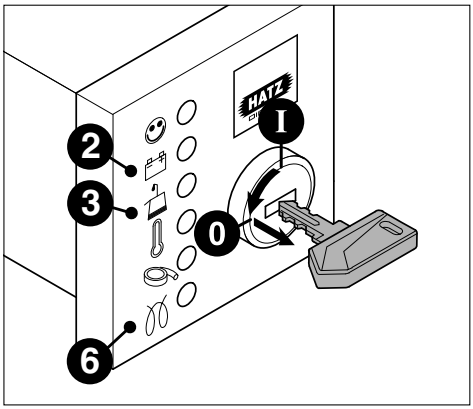
Stop via the stop lever (optional equipment)



21

– Press the stop lever down towards **STOP** and hold it until the engine has come to a standstill.

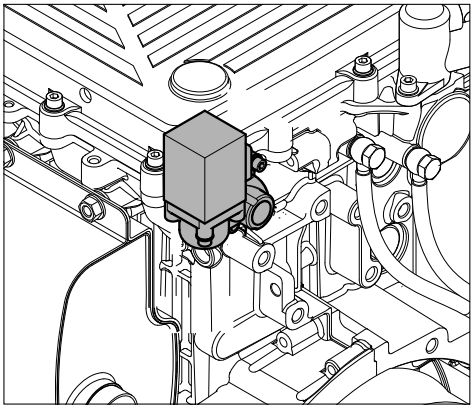
When the engine is not running any longer, release stop lever. The stop lever is returned automatically to its operating position START via a spring (Fig. 21).



22

The charge **2** and oil pressure pilot lamps **3** come on.

– Turn the starter key to the **0 position** and pull it out. The pilot lamp lights must then go out.



23

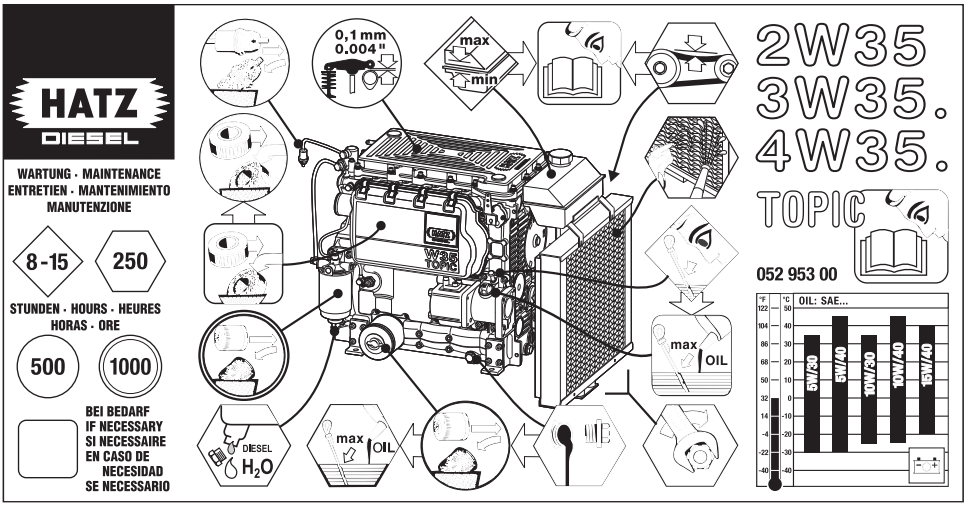
Engines equipped with **stop solenoid** can also be stopped by turning the starter key back to **position 0**.

5. Maintenance

Only carry out maintenance work with the engine switched off.
For handling and disposal of used oil, coolant, filters and cleaning agents, comply with the statutory regulations. Unauthorized access to the starter key must be prevented. Disconnect the negative battery terminal. When maintenance work has been completed, check that all tools have been removed from the engine and all protective guards fitted again.
Before starting the engine, ensure that there are no persons in the danger area close to the engine or equipment.

5.1. Maintenance chart

	Maintenance interval	Maintenance work required	Chap.
8-15	Every 8 – 15 operating hours, or before each daily start-up	• Check oil level. • Check combustion air intake area. • Check air cleaner maintenance indicator. • Check radiator fins for contamination. • Check coolant level.	5.2.1. 5.2.2. 5.2.3. 5.2.4. 5.2.5.
250	Every 250 operating hours	• Change engine oil. • Check for contamination of primary fuel filter, renew if necessary. • Check water trap on the fuel filter. • Clean the radiator fins. • Check screw connections. • Check the Vee belt (optional equipment).	5.3.1. 5.4.1. 5.3.2. 5.3.3. 5.3.4. 5.3.5.
500	Every 500 operating hours	• Replace primary fuel filter. • Replace the engine oil filter. • Maintenance of air cleaner.	5.4.1. 5.4.2. 5.4.3.
1000	Every 1000 operating hours	• Renew the fuel filter.	5.5.1.
	Every 2 – 4 years	• Replacement of coolant. (every 2 years in case Glacelf Plus is used) (every 4 years in case Glysantin® G 30 is used)	5.6.1.



24

The maintenance scheme shown above is supplied with every engine. This stick-on label should be provided in an easily visible position on the engine. However, the maintenance intervals are subject to maintenance chart shown in this chapter.

For **new** or **reconditioned** engines, the following must always be carried out after **first 50 operating hours:**

– Replace engine oil and oil filter, Chap. 5.3.1. and 5.4.2.

– Examine screw connections, Chap. 5.3.4.

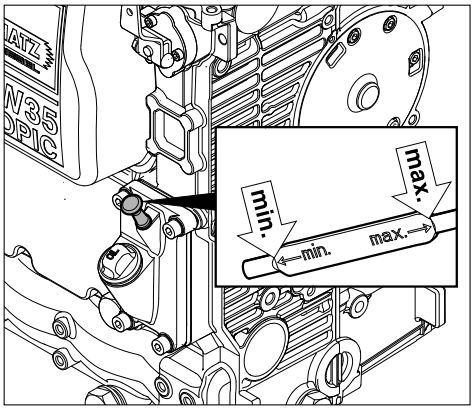
For short operating periods: replace engine oil and oil filter **after 12 months at the latest,** regardless of the number of operating hours.

5.2. Maintenance every 8 - 15 operating hours

5.2.1. Check engine oil level

When checking the oil level, the engine should be standing level, and must not be running.

– Remove any dirt in the dipstick area.



25

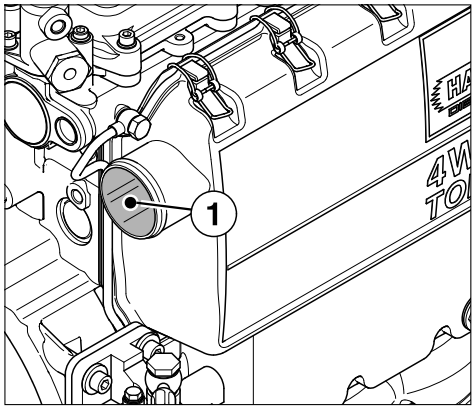
– For oil level inspection, remove the dipstick and wipe it dry using a lint-free, clean piece of cloth; then insert it to its stop and pull it out again.

– Check the dipstick oil level and, if necessary, add oil to the **max**. mark, Chapter 4.1.1.

Attention!
If the engine is operated while the oil level is below the **min**. mark, it will be damaged.

5.2.2. Check combustion air intake area

Severe contamination is a sign that there are large amounts of dust in the atmosphere and the air cleaner maintenance intervals should be reduced, Chapter. 5.4.3.



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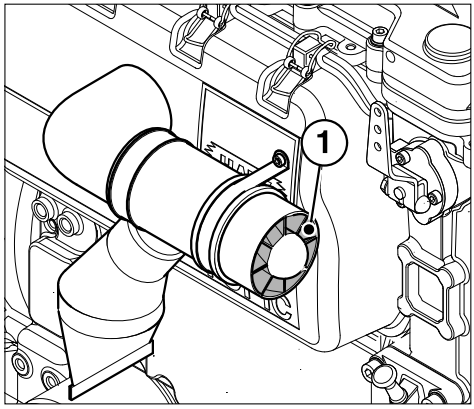
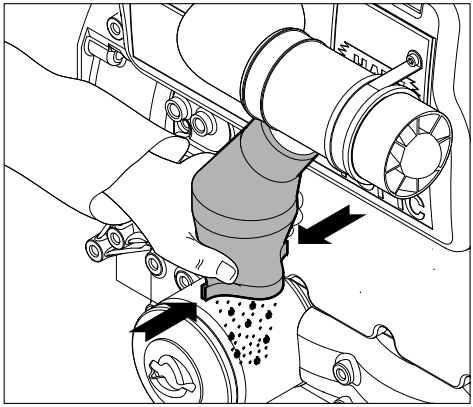


27

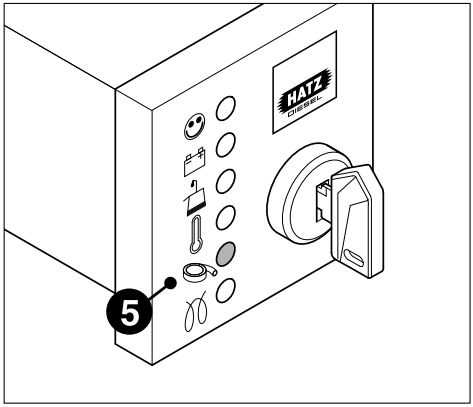
– Check air intake port **1** – depending on version – for coarse contamination, such as leaves, lots of dust etc., if necessary, clean (Fig. 26 and 27).



28

– In case of models with cyclone precleaner, check the dust ejector valve for free passage; if necessary, remove deposited dust by compressing the valve.

5.2.3. Check air cleaner maintenance indicator (optional equipment)

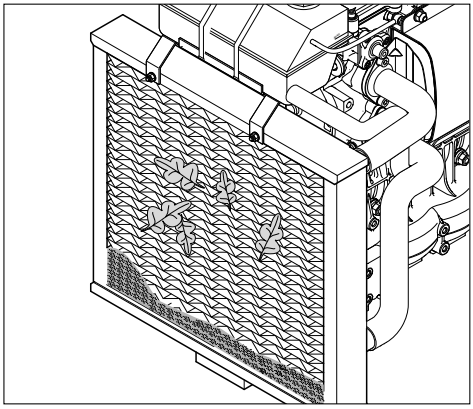


29

– Increase the engine speed briefly to maximum level and watch out for the pilot lamp **5** to go on. When it does go on, check the dry air cleaner, Chapter 5.4.3.

5.2.4. Check radiator fins for contamination

Serious contamination means that the maintenance intervals must be shorted appropriately due to excessive amounts of dust.

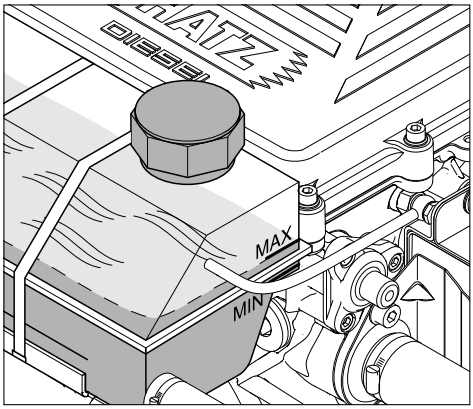


30

– Check radiator fins for coarse contamination, such as leaves, lots of dust etc., if necessary, clean them (Chapter 5.3.3.).

Attention !
Seriously contaminated radiator fins may result in engine overheating.

5.2.5. Check coolant level



31

– When the engine is at a standstill and has cooled down, the coolant level must be visible between the tank's **MIN** and **MAX** marks; if the engine is warm, the level may be slightly above the **MAX** mark (Fig. 31).

Loss of coolant

Work on the cooling system must not be effected while the engine is warm – risk of scalding!
The cooling system is pressurized.

In most cases, loss of coolant is due to leakage in the cooling system.

– In this case, check the cooling system for leakage and eliminate the reason immediately – in case of doubt, consult the **HATZ Service**.
In case of leaky hose connections, re-tighten the hose clamps.

Note:
If the cooling system is perfectly tight, loss only occurs if the coolant is boiling and thus is pressed out of the cooling system via the cap on the expansion tank.
This may be due to contamination in the radiator fin area (Chapter 5.2.4) or to engine overload.

Add coolant

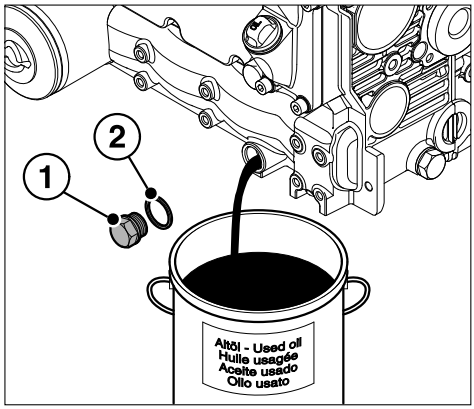
– refer to Chapter 4.1.2.

5.3. Maintenance every 250 operating hours

5.3.1. Change engine oil

The engine must be standing level and be switched off.
Only change the oil when the engine is warm.

Danger of scalding from hot oil!
Trap the old oil and dispose of it in accordance with local legislation.



32

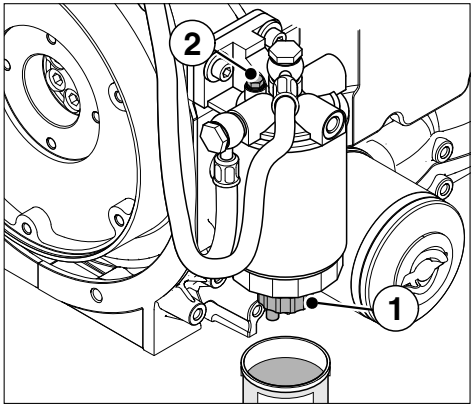
– Take out oil drain plug **1** and allow the oil to drain completely. Possible draining positions, refer to Chapter 2.

– Clean the oil drain plug **1**, fit a new washer **2**, insert and tighten.

– Add engine oil, Chapter 4.1.1.

5.3.2. Check water trap

The water trap inspection interval depends exclusively on the water contained in the fuel and on the care applied in refuelling. It may be admissible to extend the intervals, or it may be necessary to considerably shorten the intervals.



33

– Release the drain plug **1** and collect the liquid in a transparent vessel.
  If the drain plug is not easily accessible, an extension piece of hose can be slipped on the plug.

– If an insufficient amount of liquid leaves the tank, release additionally plug **2**.

As water is heavier than diesel fuel, first the water, then the fuel will escape. This is indicated by the clearly visible separating line.

– If finally only fuel leaves through the port, the drain plug **1** can be closed again.

– Subsequently, re-tighten plug **2**.

Note:
If starting appears difficult, bleed the injection system (Chapter 4.1.3).

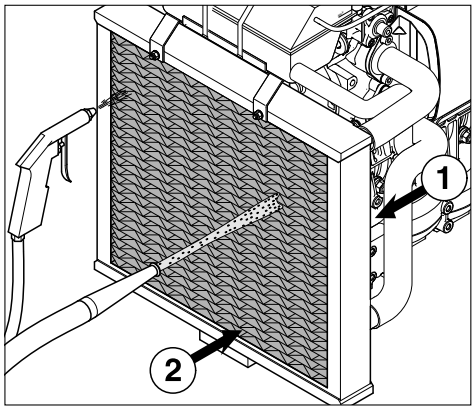
5.3.3. Clean the radiator fins

For cleaning, the engine must be at a standstill and have cooled down.

Important!
The delicate radiator fins must never be cleaned using tools, such as a screw-driver or a spatula. Deformed radiator fins or radiator leakage may reduce the radiator performance.

– Place a vessel below the radiator to collect any contamination.

Dry contamination



34

– Blow-clean radiator fins – depending on the degree of soiling – either using compressed air or rinse them using a water jet (first from item 1, then from item 2).
  Do not use a high-pressure jet.

Damp or oily contamination

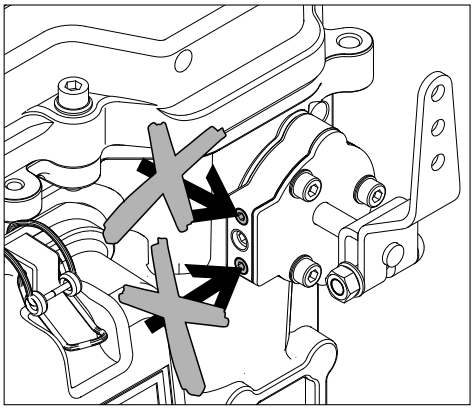
– Spray-coat the whole area with an appropriate cleaning solution according to the manufacturer's specification, and subsequently clean by means of a water jet. **Do not use a high-pressure jet.**

Note:
Do not use gasoline or acidic cleaning agents.

– Determine the cause of oiling and eliminate leakage.

5.3.4. Check screw connections

– Check the tightness of all threaded connections and take up slack if necessary, provided that these can be reached during maintenance work.



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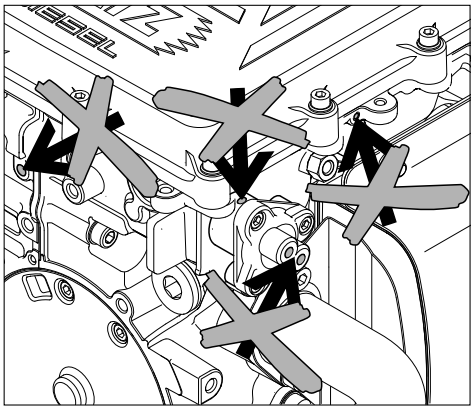


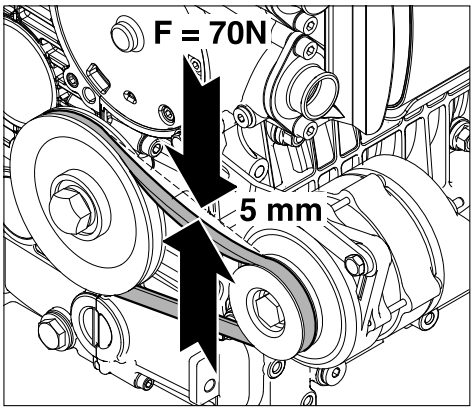
36

⚠ **The adjusting screws at the engine governor and on the injection system are sealed with lacquer and are not to be tightened or adjusted, Figs. 35 and 36.**

5.3.5. Check the Vee belt

(optional equipment)

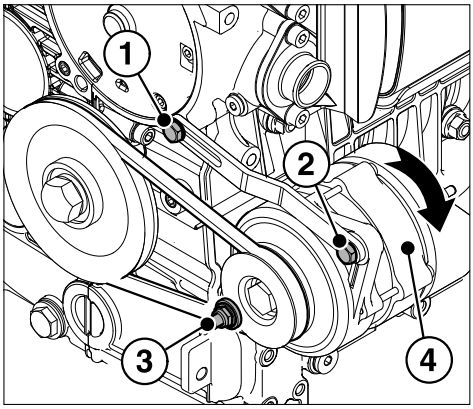
– Check the Vee belt over its entire circumference for cracks or damage; if necessary, replace.



37

– Check the belt tension by pressing it down with your thumb; if necessary, re-tighten.

Re-tighten the Vee belt

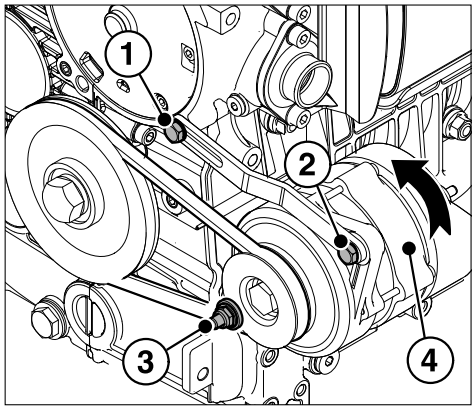


38

– Release the screws **1-3** and pull three-phase alternator **4** outwards.

– Re-tighten the screws and check the belt tension.

Replace the Vee belt



39

– Release the screws **1-3** and push three-phase alternator **4** to the inside.

– Remove Vee belt and replace it by a new one.

– Pull the three-phase alternator **4** outwards and re-tighten the screws (Fig. 38).

– Check the belt tension.

Note:
Check tension of new belts once more after approx. 15 minutes of operation.

5.4. Maintenance every 500 operating hours

5.4.1. Replace primary fuel filter

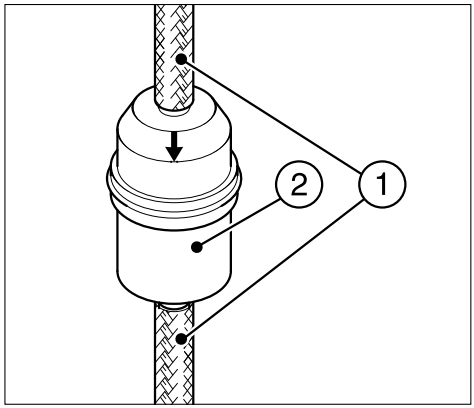
Note:
Primary fuel filter maintenance intervals depend on the purity of the fuel used in the engine and should be reduced to 250 hours if necessary.

Do not smoke and never bring a naked flame near the fuel system when working on it.

Important:
Keep the entire area clean so that no dirt reaches the fuel.

– Place a suitable vessel under the filter to trap escaping fuel.

– Close the fuel supply line.



40

– Pull fuel supply line **1** off the primary fuel filter **2** at both sides.

– Insert the new primary fuel filter.

Important:
When installing a new filter, note the arrow indicating the correct flow direction (depends on whether the tank is mounted HIGH or LOW. The filter's installed position (direction of flow) should be as vertical as possible.

– Open the fuel supply line.

– Check fuel filter and lines for leakage after a short test run.

Note:
If starting appears difficult, bleed the injection system (Chapter 4.1.3).

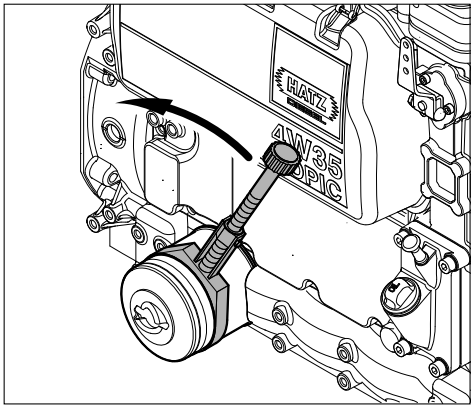
5.4.2. Replace the engine oil filter

It makes sense to replace the filter cartridge simultaneously with the engine oil change.

The engine must be placed horizontally and be at a standstill.

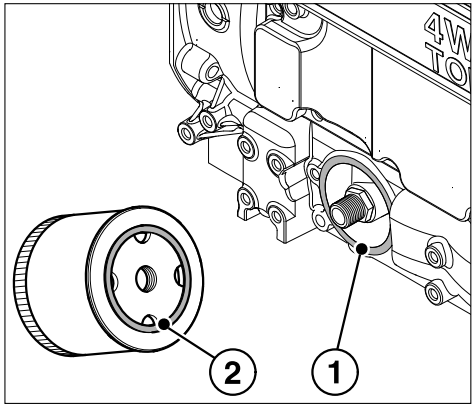
Danger of scalding from hot oil! Trap the old oil and dispose of it in accordance with local legislation.

Horizontal replaceable-cartridge filter
(standard equipment)



41

– Release replaceable-cartridge lubricant filter by means of a strap wrench or a similar tool, and remove it.



42

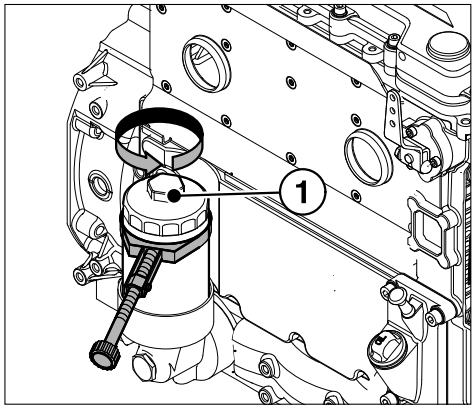
– Clean sealing surface **1** thoroughly.

– Slightly grease the packing ring **2** of the new replaceable-cartridge filter.

– Turn-in replaceable-cartridge filter and tighten it **by hand**.

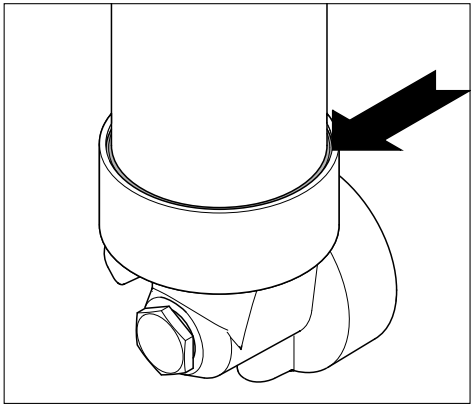
Vertical replaceable-cartridge filter
(optional equipment)

– Remove air cleaner cover including filter cartridges. Chapter 5.4.3.



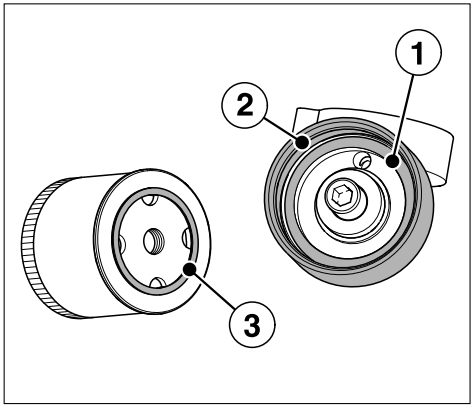
43

– Release replaceable-cartridge lubricant filter by means of a strap wrench or a similar tool. Alternately, an appropriate tool can also be slipped on the hexagon **1**.



44

– Turn-out replaceable-cartridge filter to the extent shown in the illustration. In this position, a valve releases the oil return flow into the crankcase, whereupon the replaceable-cartridge filter is emptied. After a waiting period of approx. 30 seconds, the replaceable-cartridge filter can be unscrewed completely.



45

– Clean sealing surface **1** and moulding **2** thoroughly.

– Slightly grease the packing ring **3** of the new replaceable-cartridge filter.

– Turn-in replaceable-cartridge filter and **tighten it by hand**.

– Assemble the air filter cartridges and the cover for the air cleaner, Chapter 5.4.3.

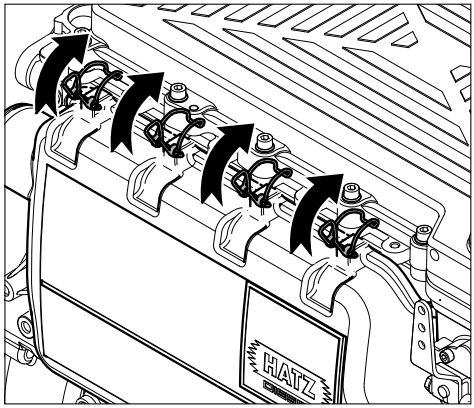
– Replenish lubricant of the appropriate specification and viscosity until the level reaches the **MAX mark** of the dipstick (Chapter 4.1.1).

– After a short test run, check replaceable-cartridge filter for leakage; if necessary, re-tighten.

– Check oil level and, if necessary, replenish.

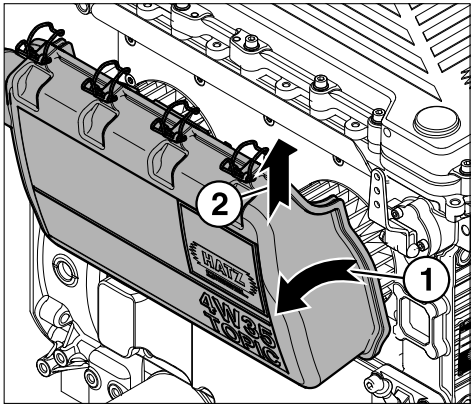
5.4.3. Maintenance of air cleaner

It makes sense to clean the filter cartridge (two each in case of three- and four-cylinder engines) only if the maintenance indicator signals the necessity. Apart from that, the cartridge must be replaced after a period of 500 service hours.



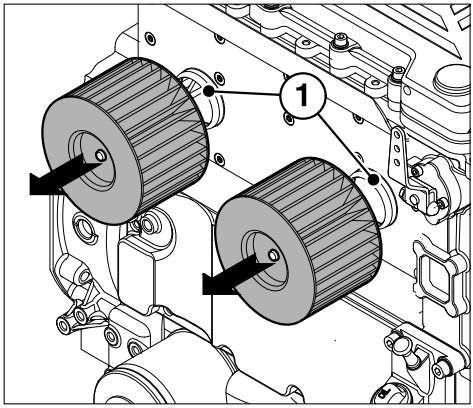
46

– Release the toggle-type fasteners.



47

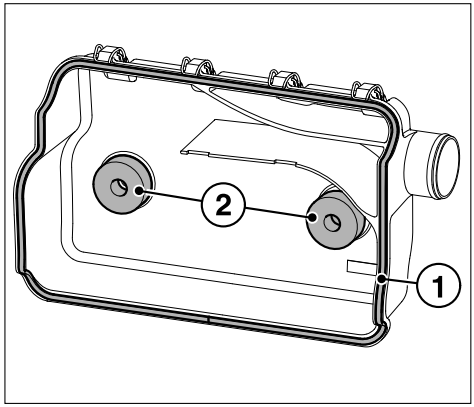
– Tilt air cleaner cover forwards (arrow **1**), then lift it and remove it (arrow **2**).



48

– Pull filter cartridges carefully off the filter support.

– Clean the filter support and the air cleaner cover.
Make sure that dirt or other foreign matter cannot enter the engine air intake port **1**.



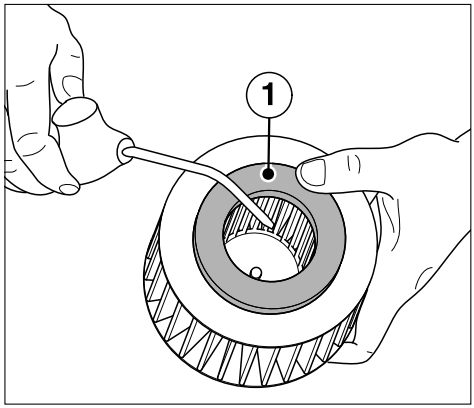
49

– Check seal **1** and rubber pad **2** for damage, deformation and cracks; if necessary, replace.

– The filter cartridge must either be replaced or - depending on the degree of contamination - cleaned or checked:

Cleaning the filter cartridge

Dry contamination



50

– Use compressed air to blow through the filter cartridge from the inside outwards, until no further dirt emerges.

Important!
The pressure must not exceed 5 bar.

Moist or oily contamination
– Renew the filter cartridge.

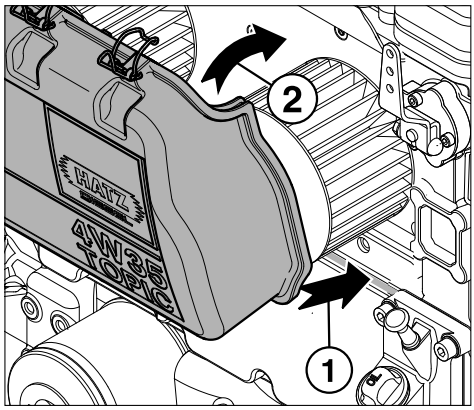
Checking the filter cartridge

– Check filter cartridge's gasket surface **1** for damage, Fig. 50.

– Check the filter cartridge for cracks or any other type of damage to the paper filter by holding it inclined towards the light or by shining a light source through it.

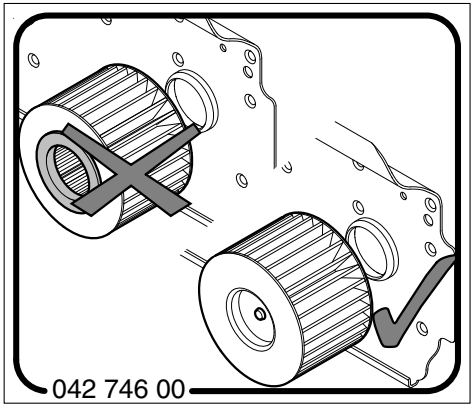
Important !
The slightest damage to the paper filter rules out its being used any longer.

– Re-assemble the filter cartridge in the reverse order of work.



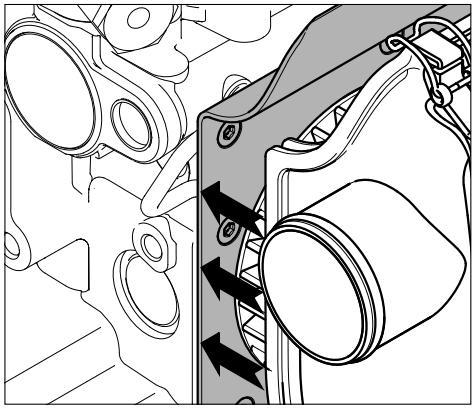
52

– Position air cleaner cover at the bottom of the filter support (arrow **1**), then tilt it towards the engine (arrow **2**).



51

– Make sure the filter cartridge is mounted on the correct end.


53

– Before fastening the toggle-type fasteners, align the air cleaner cover on the left with the filer support.

5.5. Maintenance every 1000 operating hours

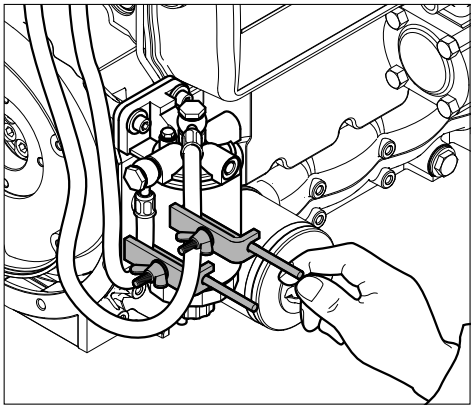
5.5.1. Renew the fuel filter

Note:
Fuel filter maintenance intervals depend on the purity of the fuel used; reduce them to 500 hours of operation if necessary.

Do not smoke and never bring a naked flame near the fuel system when working on it.

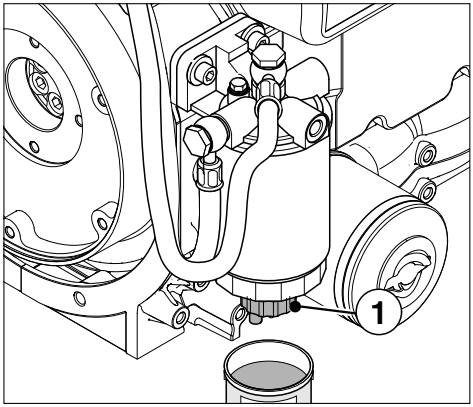
Important!
Maximum cleanliness is required to prevent dirt from entering the fuel system. Fuel particles may damage the injection system.

Replace the fuel filter



54

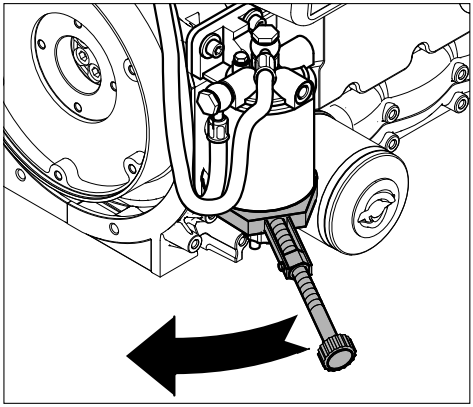
– Close the fuel lines at the filter housing.



55

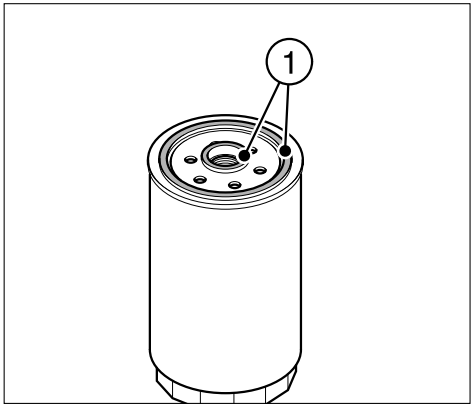
– Place a suitable vessel under the filter to trap escaping fuel.

– Release drain plug **1** to drain the fuel.



56

– Release the fuel filter using a strap wrench or a similar tool, and remove it.



57

– Slightly grease the seals **1** of the new replaceable-cartridge filter

– Assemble **replaceable-cartridge filter** and tighten it **by hand.**

– Bleed the injection system (Chapter 4.1.3).

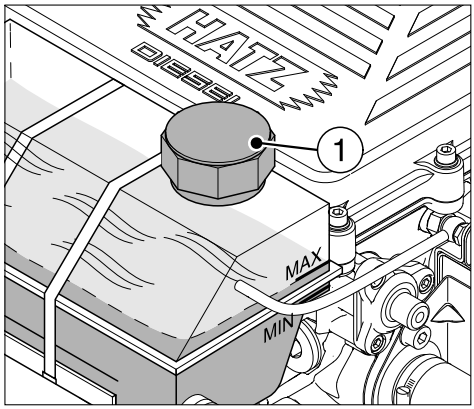
– After a short test run, check fuel filter for leakage; if necessary, re-tighten it by hand.

5.6. Maintenance: every 2 – 4 years

5.6.1. Replacement of coolant

Note:
Depending on which radiator protection fluid is used, a replacement interval of 2 or 4 years is envisaged. The various products are characterized by their identification colour. For further explanations, refer to Chapter 4.1.2.

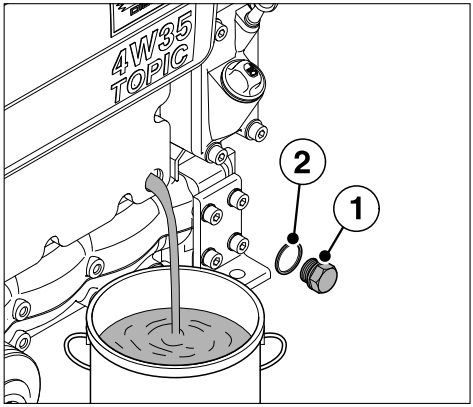
Work on the cooling system must not be effected while the engine is warm – risk of scalding !
The cooling system is pressurized.
Collect the coolant and eliminate it according to the statutory regulations.



58

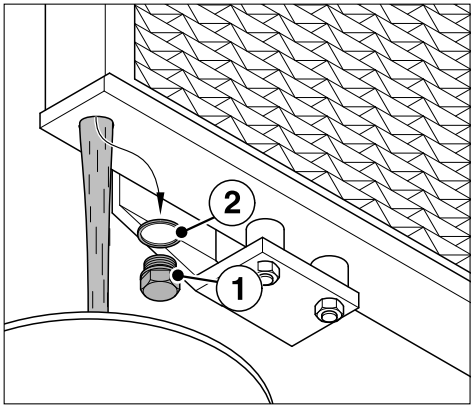
– First stop the engine and allow it to cool down. Then put a piece of cloth over cap **1** of the expansion tank and open cap carefully.

– Provide a vessel to collect the used coolant.



59

– Unscrew the drain plug **1** from the engine and drain coolant.



60

– Subsequently unscrew the drain plug **1** from the radiator and drain the coolant as well.

– Turn-in drain plugs **1** with new packing ring **2** and tighten them (Fig. 59 and 60).

– Fill the cooling system (Chapter 4.1.2.).

6. Malfunctions – Causes – Remedies

Malfunction	Possible causes	Remedy	Chap.
6.1. Engine will not start or start is delayed, although it can be turned over with the starter.	Speed control lever is in stop or idle position. Stop lever in stop position.	Set lever to „START"-position	4.2.1.
	No fuel reaching injection pump.	Add. fuel. Bleed the injection system. Check entire fuel supply system carefully. If no fault is found: - supply line to engine - primary fuel filter - Check the fuel filter.	4.1.3. 4.1.3. 5.4.1. 5.5.1.
	Compression too low: - Valve clearances incorrect	See workshop manual.	
	- Cylinder bore and/or piston ring wear	See workshop manual.	
	Unit Injector System not operating correctly	See workshop manual.	
At low temperatures.	Lower starting temperature limit exceeded.	Operate preheating system (optional equipment).	4.2.2.
	Machinery not uncoupled.	Disengage engine from machinery or equipment if possible.	
	Defective preheating system (optional equipment).	See workshop manual.	
	Fuel highly viscous due to inadequate resistance to low temperatures.	Check that clear fuel - i.e. without turbidity - leaves from the disconnected fuel supply line. If the fuel is highly viscous, either warm up the engine or drain the entire fuel supply system. Pour in a temperature-resistant fuel mix.	

Malfunction	Possible causes	Remedy	Chap.
At low temperatures.	Starting speed too low: - Engine oil is too viscous.	Change lubricating oil and refill with a different grade of oil.	5.3.1. 4.1.1.
	- Battery charge is insufficient.	Check the battery; consult a specialist workshop if necessary.	
If equipped with a stop solenoid or automatic electrical shutdown system (optional equipment)	Solenoid faulty and/or fault in the electrical system.	See workshop manual.	
6.2. Engine fires but does not run.	Speed control lever not moved far enough towards START.	Move lever to START position.	4.2.1.
	Equipment not disengaged.	Disengage engine from equipment if possible.	
	Primary fuel filter or fuel filter clogged.	Replace filter.	5.4.1. 5.5.1.
	Fuel supply interrupted.	Check all fuel supply components systematically.	
With automatic electrical shutdown installed (optional equipment)	One of the automatic shutdown's monitoring elements has initiated a stop signal. (See also Chapter 6.4.).	Locate the responsible monitoring element and clear the fault, or contact a HATZ service station.	
6.3. Starter motor does not operate or engine does not turn over.	Fault in the electrical system: - Battery and/or other cables incorrectly connected. - Cable connections loose and/or oxidised. - Battery faulty and/or flat. - Starter faulty. - Faulty relays, monitoring elements, etc.	Check electrical system and its component. See also the workshop manual.	

Malfunction	Possible causes	Remedy	Chap.
6.4. Engine stops by itself during operation.	Fuel supply interrupted - Tank has run empty. - Primary fuel filter or fuel filter clogged.	 Add fuel. Change fuel filter.	 4.1.3. 5.4.1. 5.5.1.
	Mechanical faults	Contact a HATZ service station.	
With automatic electrical shutdown installed (optional equipment)	One of the automatic shutdown's monitoring elements has initiated a stop signal.	Locate the responsible monitoring element and clear the fault, or contact a HATZ service station.	4.2.2.
	Monitoring element for: - oil pressure too low - engine temperature too high	 - Check lubricating oil supply. - Radiator fins soiled or cooling system function otherwise impaired. - Coolant level. - Check belt tension (only in case of models with belt-driven fan).	 5.2.1. 5.2.4. 5.2.5. 5.3.5.
	- AC generator or three-phase alternator (optional equipment) faulty.	See workshop manual.	
	Malfunction signal from overvoltage and polarity reversal protection in voltage regulator: - Battery and/or other cable connections incorrectly connected. - Cable connections loose.	 Check electrical equipment and the components thereof.	
6.5. Engine output and speed both drop.	Fuel supply interrupted: - Tank has run empty. - Primary fuel filter or fuel filter clogged. - Tank insufficiently ventilated. - Pipe connections leaky. - Speed control lever does not remain in desired position.	 Add fuel. Replace filter. Ensure sufficient ventilation of tank. Check pipe screw couplings for leakage. Lock the lever into position.	 4.1.3. 5.4.1. 5.5.1.

Malfunction	Possible causes	Remedy	Chap.
6.6. Engine output and speed fall, black smoke from exhaust.	Air cleaner contaminated.	Clean or renew the air cleaner.	5.4.3.
	Valve clearances incorrect.	See workshop manual.	
	Unit Injector System not functioning.	See workshop manual.	
6.7. Engine gets very hot. Engine temperature pilot lamp goes on.	Too much lubricating oil in engine.	Drain off lubricating oil as far as upper mark on dipstick.	5.3.1.
	Insufficient cooling effect: - Radiator fins soiled.	Clean the radiator fins.	5.3.3.
	- Loss of coolant.	Check cooling system for leakage and eliminate cause - in case of doubt, contact the HATZ Service station. Subsequently, replenish coolant.	4.1.2.
	- Vee belt broken or slack (only in case of models with belt-driven fan).	Check the Vee belt	5.3.5.
	- Engine overloaded.	Reduce load.	

7. Work on the electrical system

Batteries generate explosive gases. Keep them away from naked flame and sparks which could cause them to ignite.
Do not smoke.
Protect eyes, skin and clothes against the corrosive battery acid. Pour clear water over acid splashes immediately.
In case of emergency call a doctor.
Do not place any tools on top of the battery.

Always disconnect the negative (–) terminal of the battery before working on the electrical system.

– Do not confuse the **positive (+)** and **negative (–)** terminals of the battery.

– When **fitting** the battery, first connect the **positive lead**, then the **negative lead**. **Negative terminal to ground = engine case.**

– When **removing**, first disconnect the **negative lead,** then the **positive lead.**

– Always take care to **avoid short-circuits** and earth (ground) contact of live cables.

– If malfunctions occur, first of all **check** that **cable connections** make good contact.

– Replace a failed pilot lamp without delay.

– **Do not remove the starter key** while the engine is running.

– **Do not disconnect the battery** while the engine is running. Electric voltage peaks can cause damage to electronic components.

– Do not splash electrical system with water jet or pressure jet during engine cleaning.

– When carrying out **welding work** on the engine or equipment, fit the ground terminal of the welding equipment as close to the welding point as possible and **disconnect the battery**. The connecting plug for the voltage regulator must be removed.

The relevant circuit diagrams are enclosed with the engine if it is equipped with an electrical system. Additional circuit diagrams can be supplied to order.

HATZ assumes no liability for electrical systems which have not been carried out acc. to HATZ circuit diagrams.

8. Storage out of use

The new engine can normally be stored dry for up to one year.
In very humid climates or coastal regions, the protective treatment is sufficient for up to about 6 months.
For longer periods of storage, please contact your nearest **HATZ service station**.

SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR 2008 AND LATER EPA CERTIFIED NONROAD COMPRESSION IGNITION ENGINES.

EPA EMISSION CONTROL SUPPLEMENTAL WARRANTY STATEMENT AND EMISSION-RELATED INSTALLATION INSTRUCTIONS.

MAINTENANCE AND WARRANTY.

SUPPLEMENTAL INFORMATION TO THE OWNERS MANUAL FOR 2008 AND LATER EPA CERTIFIED NONROAD COMPRESSION IGNITION ENGINES.

The following supplemental information is furnished for EPA Nonroad Compression Ignition Engines which are certified according to 40 CFR Part 89 and Part 1039.

This information contains the following specific items:

- EPA-related engine parts and engine operating conditions
- Maintenance instructions for EPA-related engine parts
- Emission control system and adjustments
- Warranty statement
- Emission-related installation instructions

ENGINE PARTS AND / OR EQUIPMENT RELATED TO EPA EXHAUST EMISSION REGULATIONS.

Parts which are mandatory for engine operation.

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

- Air cleaner housing
- Cold air duct
- Turbocharger (including wastegate), ducting
- Unit Injectors
- Oil filler cap

- PCV ('positive crankcase ventilation') connection assembly
- Exhaust manifold
- Emission Control Information Labels

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

UNUSUAL OPERATING CONDITIONS.

The engine must not be operated at a load factor less than 25 % for an extended period as such operation will cause the fuel injector to foul. If such a condition occurs, you should contact the nearest HATZ authorized Service Center for necessary repairs.

The engine is designed and adjusted to operate most efficiently at the following conditions:

- Air temperature of 25° C (77° F)
- Atmospheric pressure of 100 kPa (14.5 psi)
- Relative humidity of 30 %

Operation of the engine at conditions other than above will affect performance and exhaust emissions. Normally the equipment manufacturer takes this into account during the design of the machine and your equipment will perform within specifications over a wide range of climatic conditions. However if you must operate your equipment under very unusual climatic conditions, please contact your nearest Hatz distributor for advice.

MAINTENANCE SCHEDULE-EPA-RELATED PARTS

The following minimum intervals are being adopted for adjustment, cleaning, repair, or replacement of following components:

At 1,500 hours, and 1,500-hours intervals thereafter:
- Fuel injector tips (cleaning only)

At 3,000 hours, and 3,000-hours intervals thereafter:
- Fuel injector

The exhaust quality of the engines can be influenced by the execution (the quality of execution) of above described maintenance work.

Therefore, the maintenance work has to be carried out by a qualified workshop.
Hatz authorised workshops, for example, are qualified workshops.

Hatz Diesel of America will give you respective addresses, if required.

EMISSION CONTROL SYSTEM AND ADJUSTMENTS.

The emission control system for this engine is EM (Engine Modification).
No adjustments are needed or possible.

EPA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS.

Motorenfabrik Hatz GmbH & Co. KG warrants 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.

Your emission control system includes:

- Air cleaner housing
- Cold air duct
- Turbocharger (including wastegate), ducting
- Unit Injectors
- Oil filler cap
- PCV ('positive crankcase ventilation') connection assembly
- Exhaust manifold
- Emission Control Information Labels

Where a warrantable condition exists, Motorenfabrik Hatz will repair your engine at no cost to you including diagnosis, parts and labor.

MANUFACTURERS WARRANTY COVERAGE:

The 2008 and later EPA certified nonroad compression ignition engines are warranted for 1500 hours of operation or two years of use, whichever first occurs.

If any emission related part on your engine is defective, the part will be repaired or replaced by Motorenfabrik Hatz.

OWNERS 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.

- 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.

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

HATZ DIESEL SUPPLEMENTAL WARRANTY FOR 2008 AND LATER EPA CERTIFIED ENGINES.

PARTS WITH SUPPLEMENTAL LIMITED WARRANTY.

The following limited warranty is supplemental to the standard HATZ DIESEL LIMITED ENGINE WARRANTY and covers 2008 and later EPA certified engines and applies to the following exhaust emission-related components:

- Air cleaner housing
- Cold air duct
- Turbocharger (including wastegate), ducting
- Unit Injectors
- Oil filler cap
- PCV ('positive crankcase ventilation') connection assembly
- Exhaust manifold
- Emission Control Information Labels

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 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 these instructions 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.”

“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.”

EQUIPMENT-LABELLING REQUIREMENTS: FUEL LABEL (Chapter 3.5)

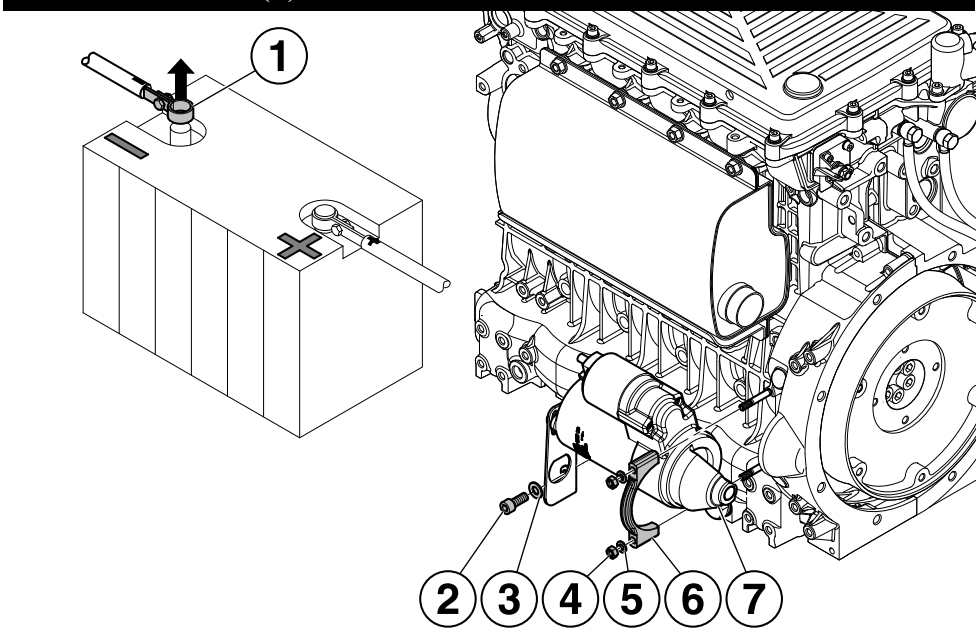
The fuel label has to be permanently attached to the equipment.
In case of an engine mounted fuel tank, every engine is equipped with an additional fuel label.
Otherwise, there are two loose fuel labels available with the engine.

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.

INSTRUCTIONS ON THE INSTALLATION OF THE EXHAUST SYSTEM

Following are the instructions to properly install the exhaust system and related components consistent with the EPA emission regulation requirements.

2W35 · 3W35 · 4W35 (T)



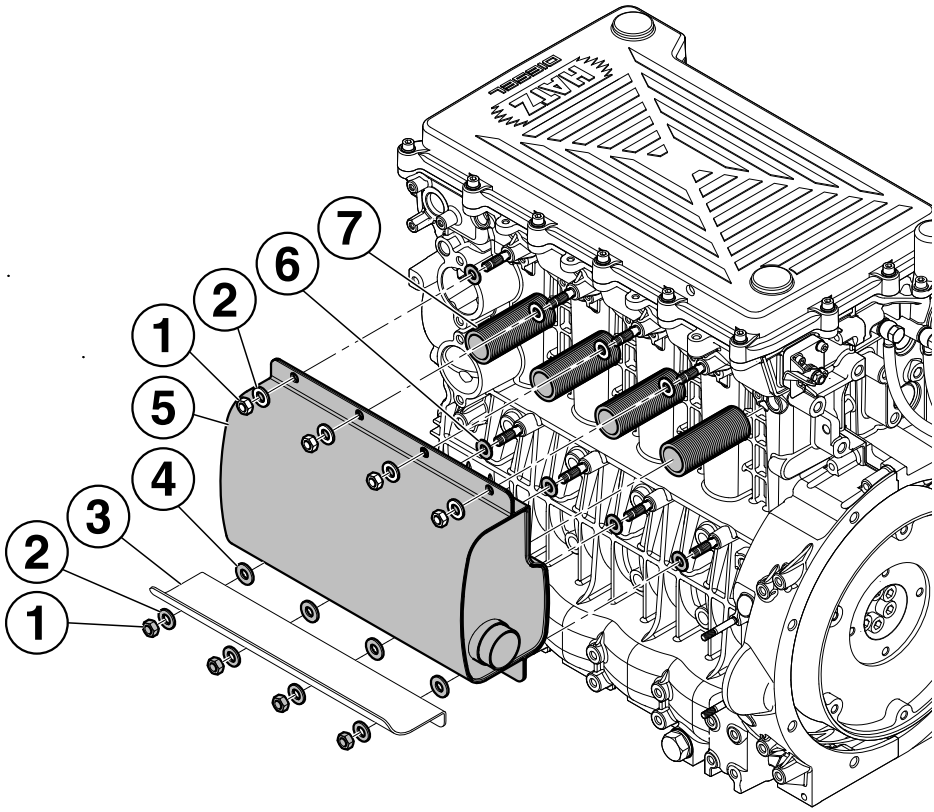
Electrical starter

The electrical starter is fitted in connection with washers, hex.-nuts and Allen screws.

Preparations:
- Disconnect the negative pole **1** of the battery.

Dismantling:
- Remove in numerical sequence **2...7**.

Assembly:
- Assemble in reverse sequence.



Exhaust-silencers

The exhaust silencer is fitted in connection with washers, hex.-nuts, metal bellows and a protection plate.

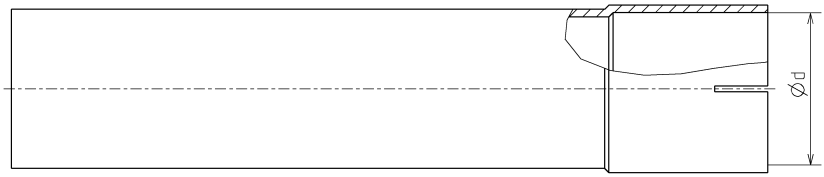
Dismantling:
- Remove in numerical sequence **1...7**.

Assembly:
- Assemble in reverse sequence.

SAMPLING OF EXHAUST EMISSIONS

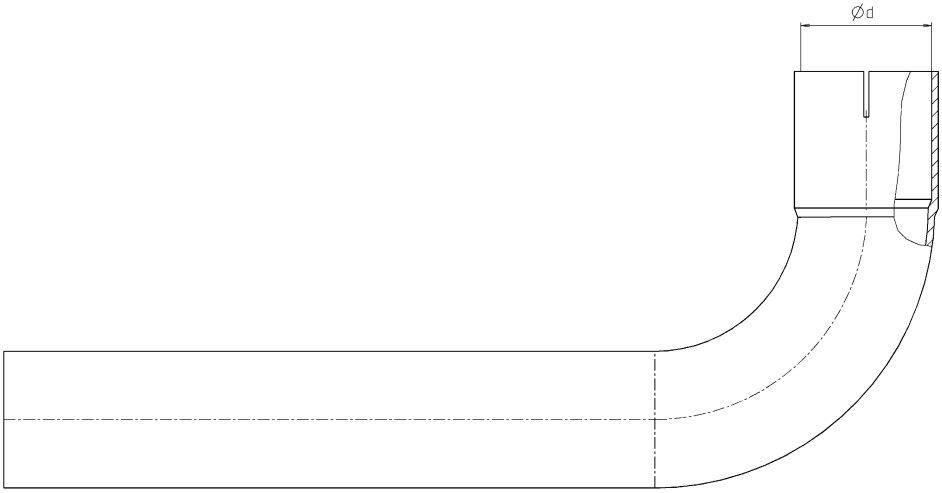
After the engine is installed in the equipment and placed in service, the sampling of exhaust emissions can be performed in a way that prevents diluting the exhaust sample with ambient air as follows:

Version 1



Specification 1: Adding a 20-centimeter linear extension to the exhaust pipe

Version 2



Specification 2: Adding a 20-centimeter bended extension to the exhaust pipe

Engine type	Ø d (mm)	Version 1 HATZ-Ident. Nr.	Version 2 HATZ-Ident. Nr.	Clamp HATZ-Ident. Nr.
2W35	38	830 857 000	830 858 00	037 409 00
3W35	38	830 857 000	830 858 00	037 409 00
4W35 (T)	38	830 857 000	830 858 00	037 409 00

SUPPLEMENTAL INFORMATION TO THE OWNER´S MANUAL FOR 2008 AND LATER CALIFORNIA REGULATIONS FOR HEAVY-DUTY OFF-ROAD ENGINES.

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT AND EMISSION-RELATED INSTALLATION INSTRUCTIONS.

MAINTENANCE AND WARRANTY.

SUPPLEMENTAL INFORMATION TO THE OWNER´S MANUAL FOR 2008 AND LATER CALIFORNIA REGULATIONS FOR HEAVY-DUTY OFF-ROAD ENGINES.

The following supplemental information is furnished for California Heavy-Duty Off-Road Engines.

This information contains the following specific items:

- CARB-related engine parts and engine operating conditions
- Maintenance instructions for CARB-related engine parts
- Emission control system and adjustments
- Warranty statement
- Emission-related installation instructions

ENGINE PARTS AND / OR EQUIPMENT RELATED TO CARB EXHAUST EMISSION REGULATIONS.

Parts which are mandatory for engine operation.

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

- Air cleaner housing
- Cold air duct
- Turbocharger (including wastegate), ducting
- Unit Injectors
- Oil filler cap
- PCV ('positive crankcase ventilation') connection assembly

- Exhaust manifold

- Emission Control Information Labels

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

UNUSUAL OPERATING CONDITIONS.

The engine must not be operated at a load factor less than 25 % for an extended period as such operation will cause the fuel injector to foul. If such a condition occurs, you should contact the nearest HATZ authorized Service Center for necessary repairs.

The engine is designed and adjusted to operate most efficiently at the following conditions:

- Air temperature of 25° C (77° F)

- Atmospheric pressure of 100 kPa (14.5 psi)

- Relative humidity of 30 %

Operation of the engine at conditions other than above will affect performance and exhaust emissions. Normally the equipment manufacturer takes this into account during the design of the machine and your equipment will perform within specifications over a wide range of climatic conditions. However if you must operate your equipment under very unusual climatic conditions, please contact your nearest Hatz distributor for advice.

MAINTENANCE SCHEDULE-CARB-RELATED PARTS.

The following minimum intervals are being adopted for adjustment, cleaning, repair, or replacement of following components:

At 1,500 hours, and 1,500 hours intervals thereafter:

- Fuel injector tips (cleaning only)

At 3,000 hours, and 3000 hours intervals thereafter:

- Fuel Injectors

The exhaust quality of engines can be influenced by the execution (the quality of execution) of above described maintenance work.

Therefore, the maintenance work has to be carried out by a qualified workshop.
Hatz authorised workshops, for example, are qualified workshops.
Hatz Diesel of America will give you respective addresses, if required.

EMISSION CONTROL SYSTEM AND ADJUSTMENTS.

The emission control system for this engine is EM (Engine Modification).
No adjustments are needed or possible.

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT.

YOUR WARRANTY RIGHTS AND OBLIGATIONS.

The **California Air Resources Board** and Motorenfabrik Hatz GmbH & Co. KG are pleased to explain the **emission control system warranty** on your **2008 and later** 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.

Your emission control system may include parts such as the fuel-injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

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 2008 and later heavy-duty off-road engines are warranted for **1500 hours of operation or two years of use, whichever first occurs.**
If any emission-related part on your engine is defective, the part will be repaired or replaced by Motorenfabrik Hatz GmbH & Co. KG.

OWNER´S WARRANTY RESPONSIBILITIES.

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

- As the heavy-duty off-road engine owner, you should however be aware that Motorenfabrik Hatz GmbH & Co. KG may deny you warranty coverage if your heavy-duty off-road engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

- Your engine is designed to operate on low sulfur diesel fuel or ultra-low sulfur diesel 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 initiating the warranty process. The ARB suggests that you present your heavy-duty off-road engine to a Motorenfabrik Hatz authorised dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact Hatz Diesel of America, Inc. at **(262)-544-0254**.

HATZ DIESEL SUPPLEMENTAL WARRANTY FOR 2008 AND LATER CALIFORNIA CERTIFIED HEAVY-DUTY OFF-ROAD ENGINES.

PARTS WITH SUPPLEMENTAL LIMITED WARRANTY.

The following limited warranty is supplemental to the standard HATZ DIESEL LIMITED ENGINE WARRANTY and covers 2008 and later California certified Heavy-Duty off-road engines and applies to the following exhaust emission-related components:

- Air cleaner housing
- Cold air duct
- Turbocharger (including wastegate), ducting
- Unit Injectors
- Oil filler cap
- PCV ('positive crankcase ventilation') connection assembly
- Exhaust manifold
- Emission Control Information Labels

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, for a period of twenty-four (24) months after the date of delivery to the original retail purchaser and Hatz will at their option, repair or replace at Hatz's sales headquaters, 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 within the original twenty-four (24) months time period.

- 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 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 these instructions 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.”

“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.”

EQUIPMENT-LABELLING REQUIREMENTS: FUEL LABEL (Chapter 3.5)

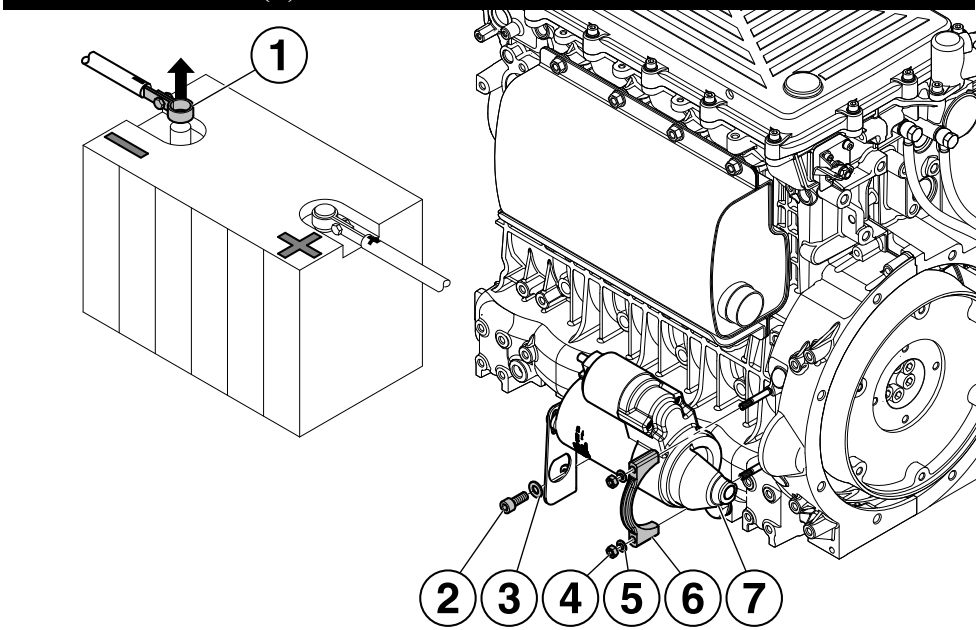
The fuel label has to be permanently attached to the equipment.
In case of an engine mounted fuel tank, every engine is equipped with an additional fuel label.
Otherwise, there are two loose fuel labels available with the engine.

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.

INSTRUCTIONS ON THE INSTALLATION OF THE EXHAUST SYSTEM

Following are the instructions to properly install the exhaust system and related components consistent with the EPA emission regulation requirements.

2W35 · 3W35 · 4W35 (T)



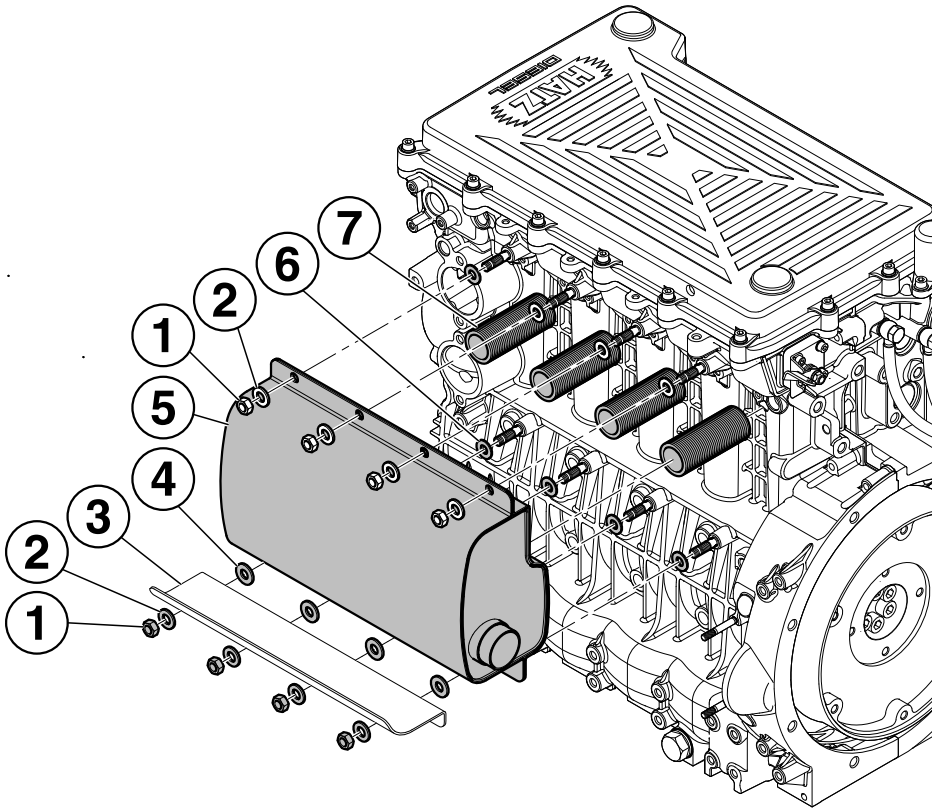
Electrical starter

The electrical starter is fitted in connection with washers, hex.-nuts and Allen screws.

Preparations:
- Disconnect the negative pole **1** of the battery.

Dismantling:
- Remove in numerical sequence **2...7**.

Assembly:
- Assemble in reverse sequence.



Exhaust-silencers

The exhaust silencer is fitted in connection with washers, hex.-nuts, metal bellows and a protection plate.

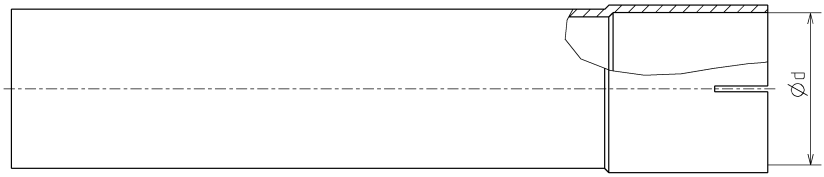
Dismantling:
- Remove in numerical sequence **1...7**.

Assembly:
- Assemble in reverse sequence.

SAMPLING OF EXHAUST EMISSIONS

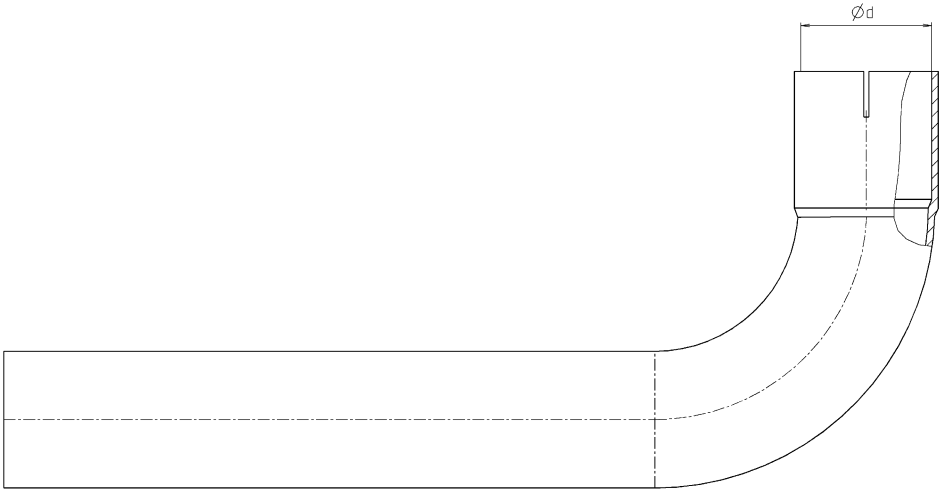
After the engine is installed in the equipment and placed in service, the sampling of exhaust emissions can be performed in a way that prevents diluting the exhaust sample with ambient air as follows:

Version 1



Specification 1: Adding a 20-centimeter linear extension to the exhaust pipe

Version 2



Specification 2: Adding a 20-centimeter bended extension to the exhaust pipe

Engine type	Ø d (mm)	Version 1 HATZ-Ident. Nr.	Version 2 HATZ-Ident. Nr.	Clamp HATZ-Ident. Nr.
2W35	38	830 857 000	830 858 00	037 409 00
3W35	38	830 857 000	830 858 00	037 409 00
4W35 (T)	38	830 857 000	830 858 00	037 409 00

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.