

## Safety guidelines / Accident prevention



- Please read and observe the information given in this Operation Manual. This will enable you to avoid accidents, preserve the manufacturer's warranty and maintain the engine in peak operating condition.
- This engine has been built exclusively for the application specified in the scope of supply, as described by the equipment manufacturer and is to be used only for the intended purpose. Any use exceeding that scope is considered to be contrary to the intended purpose. The manufacturer will not assume responsibility for any damage resulting therefrom. The risks involved are to be borne solely by the user.
- Use in accordance with the intended purpose also implies compliance with the conditions laid down by the manufacturer for operation, maintenance and servicing. The engine should only be operated by personnel trained in its use and the hazards involved.
- The relevant accident prevention guidelines and other generally accepted safety and industrial hygiene regulations must be observed.
- When the engine is running, there is a risk of injury through:
  - turning/hot components
  - engines with positive ignition
  - ignition systems (high electrical voltage)You must avoid contact at all times!
- Unauthorized engine modifications will invalidate any liability claims against the manufacturer for resultant damage. Manipulations of the injection and regulating system may also influence the performance of the engine, and its emissions. Adherence to legislation on pollution cannot be guaranteed under such conditions.
- Do not change, convert or adjust the cooling air intake area to the blower. The manufacturer shall not be held responsible for any damage which results from such work.
- When carrying out maintenance/repair operations on the engine, the use of DEUTZ original parts is prescribed. These are specially designed for your engine and guarantee perfect operation. Non-compliance results in the expiry of the warranty!
- Maintenance and cleaning of the engine should only be carried out when the engine is switched off and has cooled down. You must ensure that the electrical systems have been switched off and the ignition key has been removed. Accident prevention guidelines concerning electrical systems (e.g. VDE-0100/-0101/-0104/-0105 Electrical protective measures against dangerous touch voltage) are to be observed. When cleaning with fluids, all electrical components are to be covered impermeably.

**Engine  
Serial Number:**

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Please enter here the engine serial number. By quoting this number you will help to facilitate dealing with questions concerning Customer Service, Repairs and Spare Parts (see Section 2.1).

In view of continuous design improvements or changes, the technical specifications and the illustrations shown in this Operation Manual are subject to alteration. Reprinting and reproduction, in part or in whole, are subject to our written approval.



## Foreword

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Dear Customer,

Liquid-cooled DEUTZ engines are designed for a broad spectrum of applications. Consequently, a wide range of variants are offered to meet the specific requirements of each individual case.

Your engine is appropriately equipped for the installation concerned, which means that not all the components described in this Operation Manual are necessarily mounted to your engine.

We have endeavoured to highlight any differences so that you will be able to locate the operating and maintenance instructions relevant to your engine quickly and easily.

Please read this Manual before starting your engine, and always observe the operating and maintenance instructions.

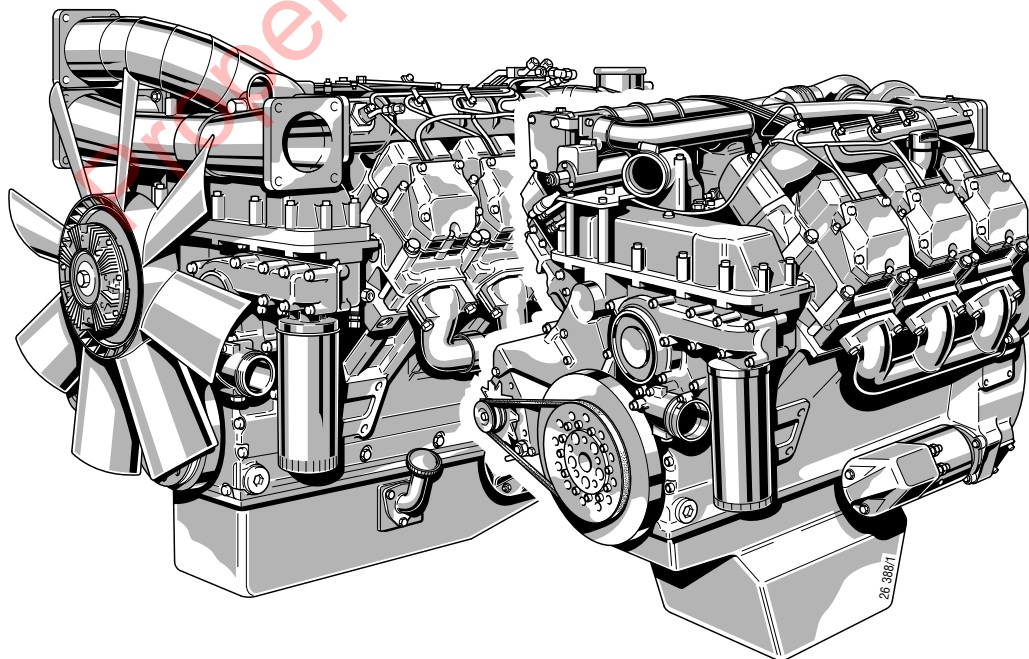
Should you have any inquiries we shall be pleased to provide advice.

Sincerely,

DEUTZ AG

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DEUTZ Diesel Engines

Care and Maintenance

Service

are the product of many years of research and development. The resulting know-how, coupled with stringent quality standards, guarantee their long service life, high reliability and low fuel consumption.  
It goes without saying that DEUTZ Diesel Engines meet the highest standards for environmental protection.

Sound care and maintenance practices will ensure that the engine continues to meet the requirements placed on it. Recommended service intervals must be observed and service and maintenance work carried out conscientiously.  
Special care should be taken under abnormally demanding operating conditions.

Please contact one of our authorized service representatives in the event of breakdowns or for spare parts inquiries. Our trained specialists will carry out repairs quickly and professionally, using only genuine spare parts.  
Original parts from DEUTZ AG are always produced in accordance with state-of-the-art technology. Please turn to the end of this manual for further service information.

Beware of Running Engine

Shut the engine down before carrying out maintenance or repair work. Ensure that the engine cannot be accidentally started. Risk of accidents.  
When the work is complete, be sure to refit any panels and guards that may have been removed. Never fill the fuel tank while the engine is running. Observe industrial safety regulations when running the engine in an enclosed space or underground.

Safety



This symbol is used for all safety warnings. Please follow them carefully. The attention of operating personnel should be drawn to these safety instructions. General safety and accident prevention regulations laid down by law must also be observed.

**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.

Asbestos



DEUTZ original parts are asbestos-free.

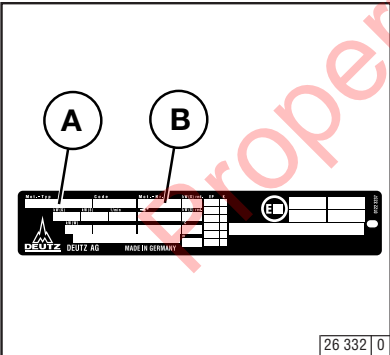
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- 2.2 Engine Illustrations
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Description of Engine

2.1 Model Designation

2

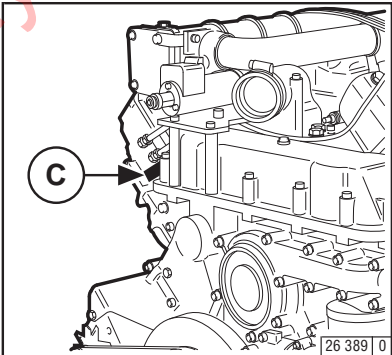
2.1.1 Rating Plate



The model designation **A**, the engine serial number **B** and the performance data are stamped on the rating plate.

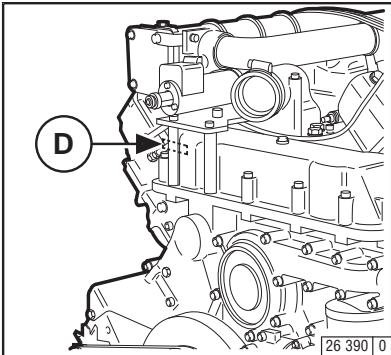
When ordering spare parts, it is essential to quote the model designation and the engine serial number.

2.1.2 Location of Rating Plate



The rating plate **C** is affixed to the crankcase.

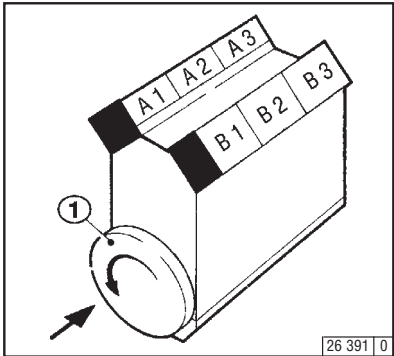
2.1.3 Engine Serial Number



The engine serial number is stamped on the crankcase iteself (arrow) and on the rating plate.

2.1.4 Numbering of Cylinders

2



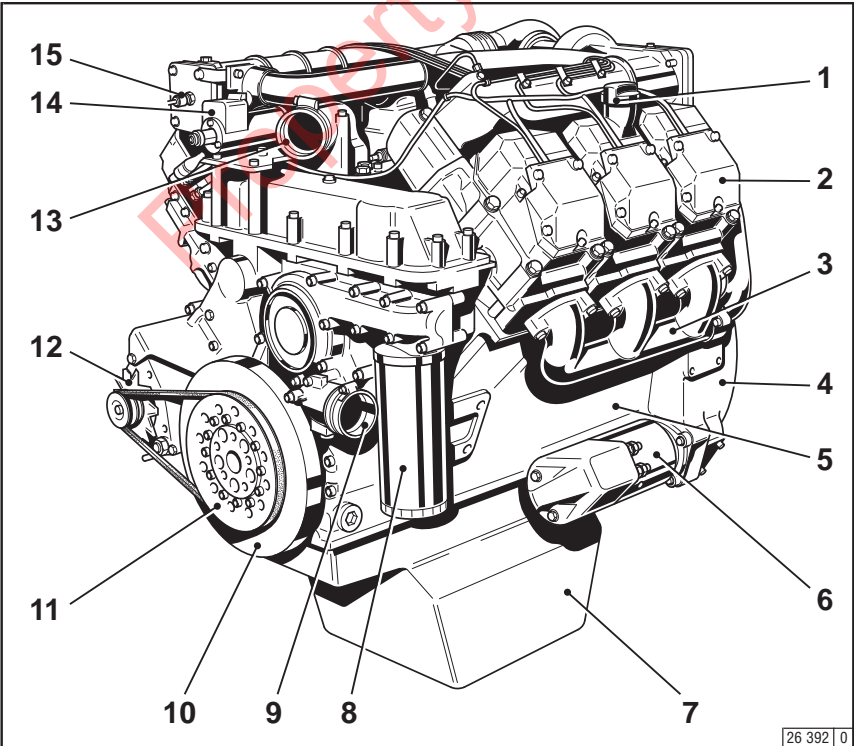
The cylinders are numbered consecutively for either cyl. bank A or B, beginning at flywheel end.

Description of Engine

2.2 Engine Illustration

2

2.2.1 Cyl. Bank A – BF6M 1015



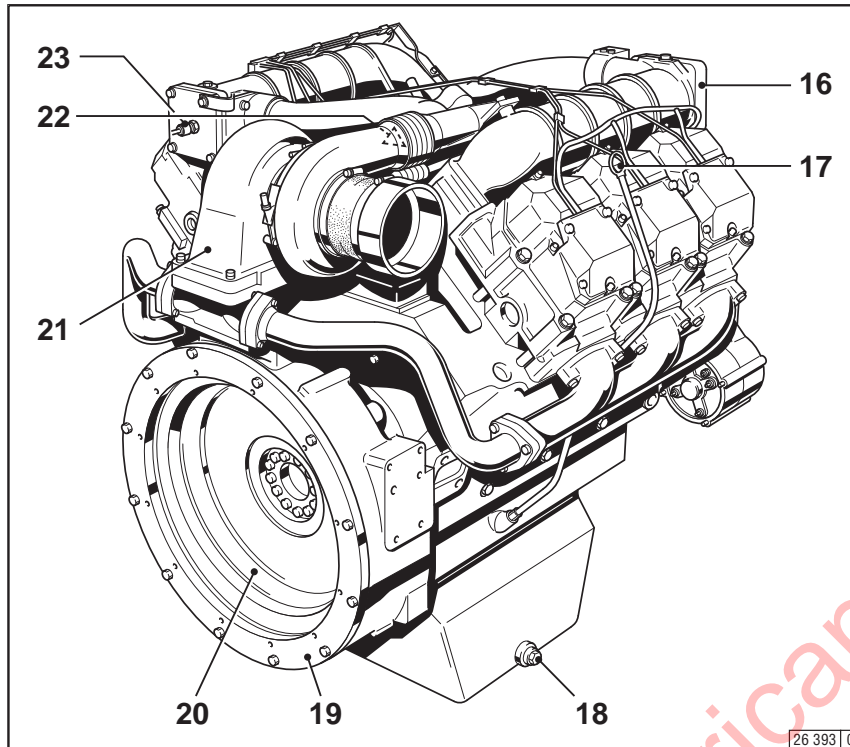
- 1 Oil filler neck
- 2 Cylinder head
- 3 Exhaust manifold
- 4 SAE housing
- 5 Crankcase
- 6 Starter
- 7 Oil pan
- 8 Oil filter
- 9 Coolant connection from heat exchanger to engine
- 10 Vibration damper
- 11 V-belt pulley
- 12 Alternator
- 13 Coolant connection to heat exchanger
- 14 Solenoid (shutdown solenoid)
- 15 Flame-type heater plug (B-side)

## 2.2 Engine Illustration

## Description of Engine

### 2.2.2 Cyl. Bank B – BF6M1015

2

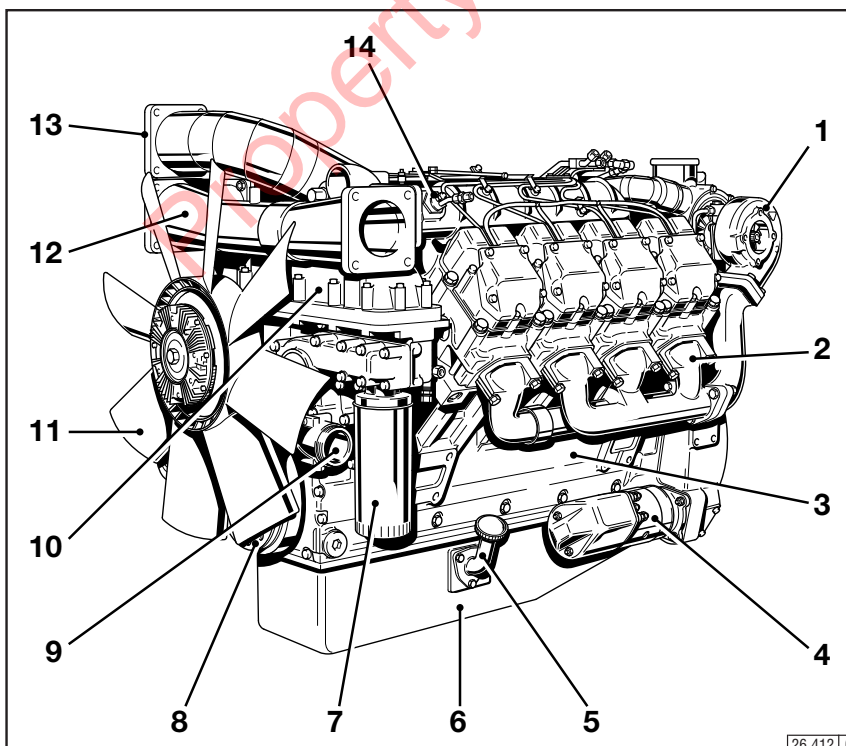


## Description of Engine

## 2.2 Engine Illustration

2

### 2.2.3 Cyl. Bank A – BF8M 1015



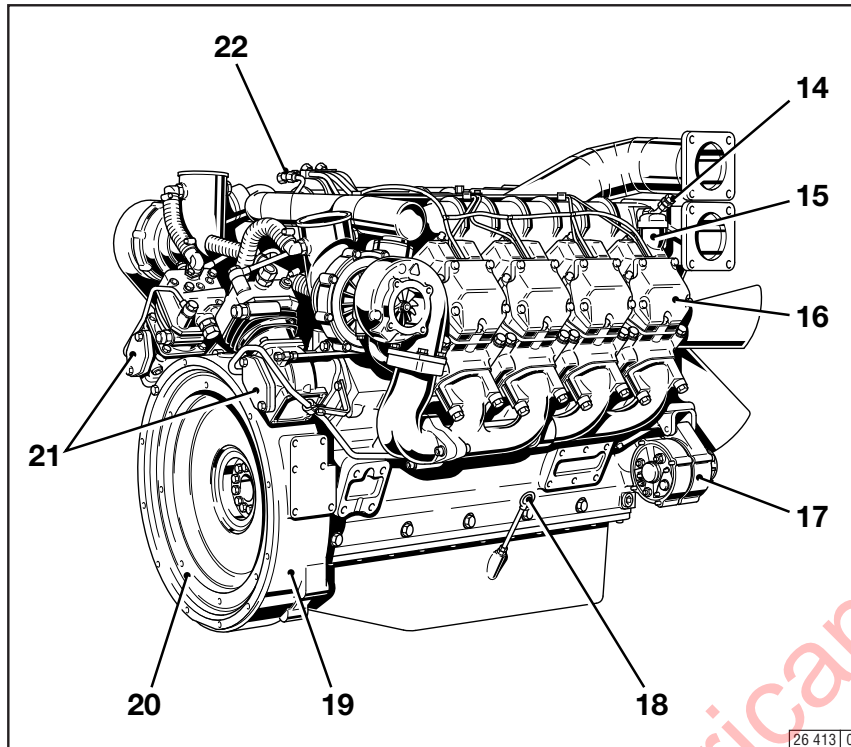


## 2.2 Engine Illustration

## Description of Engine

### 2.2.4 Cyl. Bank B – BF8M 1015

2



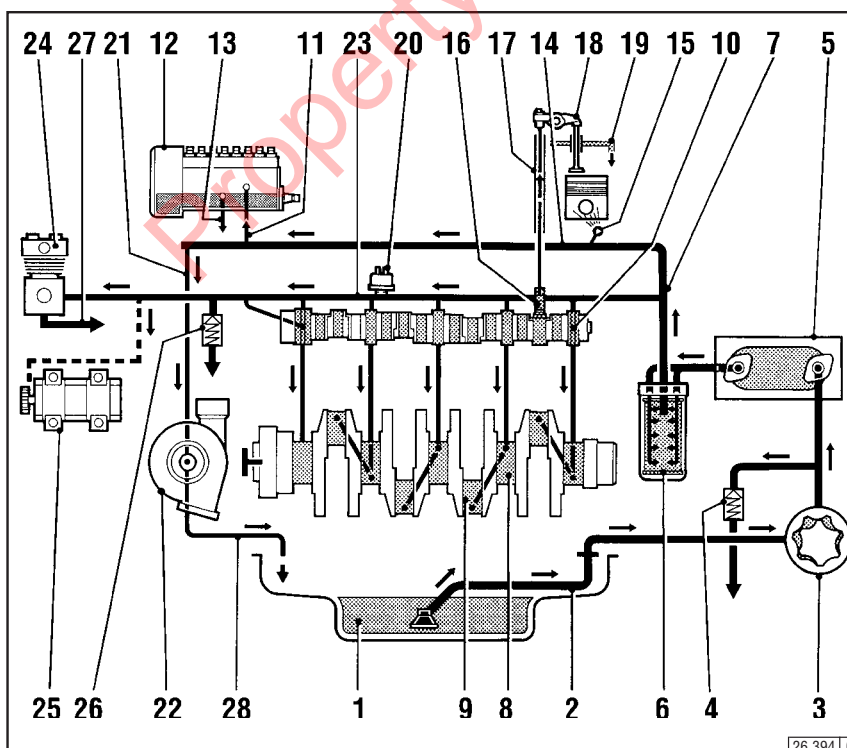
- 14 Flame-type heater plug system (A-side)
- 15 Oil filler neck
- 16 Cylinder head
- 17 Alternator
- 18 Oil dipstick
- 19 SAE housing
- 20 Flywheel
- 21 Compressor
- 22 Fuel connecting line

## Description of Engine

## 2.3 Lube Oil Circuit

2

### 2.3.1 Lube Oil Circuit Schematic 1015 Wet Sump Lubrication



- 1 Oil pan
- 2 Intake pipe
- 3 Oil pump
- 4 Overpressure relief valve
- 5 Oil cooler
- 6 Spin-on oil filter
- 7 Main oil bores
- 8 Main bearing
- 9 Big-end bearing
- 10 Camshaft bearing
- 11 Oil supply to injection pump
- 12 Injection pump
- 13 Return line from injection pump to crankcase
- 14 Line to spray nozzle
- 15 Spray nozzle with pressure-holding valve for piston cooling
- 16 Tappet with control groove for pulse lubrication of rocker arms
- 17 Pushrod, oil supply to rocker arm lubrication
- 18 Rocker arm
- 19 Oil return bore in cylinder head to crankcase.
- 20 Oil pressure sensor / oil pressure switch
- 21 Oil line to exhaust turbocharger
- 22 Exhaust turbocharger
- 23 Oil line to compressor (hydr. pump)
- 24 Compressor
- 25 Hydraulic pump
- 26 Pressure-holding valve (adjustable)
- 27 Oil return line from compressor (hydr. pump) to crankcase
- 28 Oil return line from turbocharger to crankcase



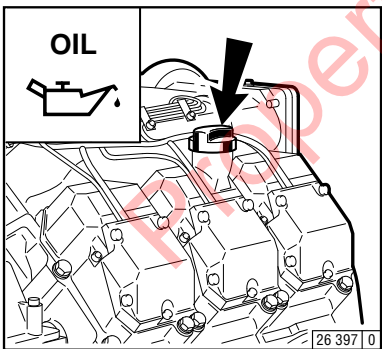
- 3.1 Commissioning
- 3.2 Starting
- 3.3 Monitoring Systems
- 3.4 Stopping
- 3.5 Operating Conditions

Engine Operation

3.1 Commissioning

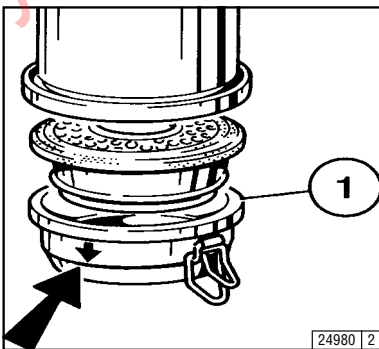
3

3.1.1 Filling in Engine Oil



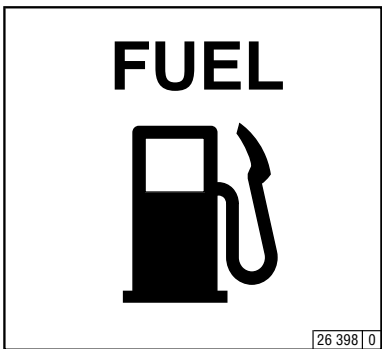
As a rule, the engines are delivered without oil filling.  
Fill in lube oil through the oil filler neck (arrow).  
For oil filling volume, see 9.1.  
For oil quality grade and oil viscosity, see 4.1.

3.1.2 Filling Oil Bath Air Cleaner with Engine Oil



Fill engine oil into bowl 1 of oil bath air cleaner (if fitted) up to the arrow mark.  
For oil quality grade and oil viscosity, see 4.1.

3.1.3 Filling the Fuel Tank



Use only commercial-grade diesel fuel. For fuel quality grade, see 4.2.  
Use summer- or winter-grade fuel, depending on the ambient temperature.

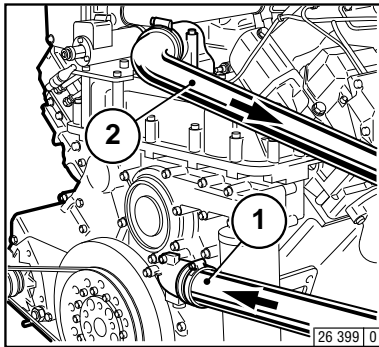


Never fill oil into the precleaner's dust collector, if provided.



Stop engine before filling the fuel tank!  
Observe strict cleanliness! Do not spill any fuel!

### 3.1.4 Filling/Bleeding Cooling System 1015



- Connect coolant inlet 1 and coolant outlet 2 to external coolant tank.
- Fill in coolant into cooling system.
- Start engine and run up to normal operating temperature until thermostat opens (line 2 warms up).
- Check coolant level in external cooling system, top up coolant if necessary.

### 3.1.5 Other Preparations

- Check battery and battery cable connections, see 6.7.1.

#### ● Trial run

- Upon completing the preparations run the engine for a short trial run of about 10 minutes under low load.

#### During and after trial run

- Check the engine for leaks.

#### After the engine has been stopped

- Check oil level and top up if necessary, see 6.1.2
- Retension V-belts, see 6.5.

#### ● Breaking-in

During the breaking-in phase, it is recommended to check the oil level twice a day. After the breaking-in phase, checking once a day will be sufficient.

## Engine Operation

## 3.2 Starting

### 3

### 3.2.1 Electric Starting



Before starting, make sure that nobody is standing in the immediate vicinity of the engine or driven machine.

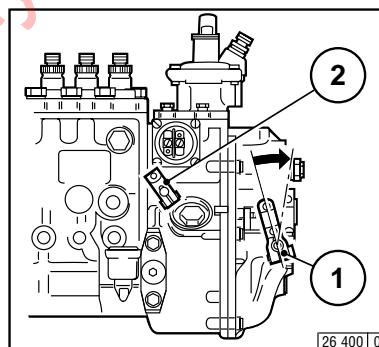
After repair work :

Check whether all removed guards are put back in place and all tools are removed from the engine.

When starting with flame-type heater plugs, do not use any other additional starting aids (e.g. injection with start pilot). Accident hazard!

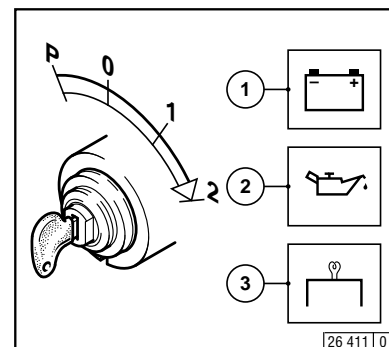
**Important: Never start the engine with speed governor removed.**

**Disconnect battery!**



- Disengage the clutch to separate the engine from the driven equipment.
- Move speed control lever 1 in direction of arrow at least to middle speed position.
- Move shutdown lever 2 to „Run“ position (opposite direction of arrow, item.1).

#### without Cold-Starting Aid

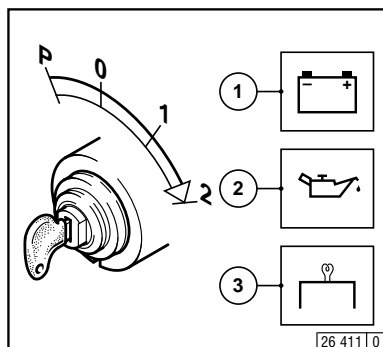


- Insert key.
  - Position 0 = no operating voltage.
- Turn key clockwise.
  - Position 1 = operating voltage, Pilot lamps light up.
- Turn key further clockwise against spring action.
  - Position 2 = starting.
- Release key as soon as the engine starts firing.
  - Pilot lamps go out.

Do not actuate the starter for more than 20 seconds at a time. If the engine does not start, wait one minute before repeating the attempt.

If the engine does not start after two attempts, trace the cause with the aid of the Diagnosis Chart (see 7.1).

### with Cold-Starting Aid Flame-Type Heater Plug System



- Insert key.
  - Position 0 = no operating voltage.
- Turn key clockwise.
  - Position 1 = operating voltage,
  - Pilot lamps 1+2+3 light up.
  - Preheat until heater plug indicator 3 blinks, max. 30 seconds.
  - Engine is ready for operation.
- Turn key further clockwise against spring action to
  - Position 2 = starting
- Release key as soon as the engine starts firing.
  - Pilot lamps go out.



Important: The starting process must be carried out within the 30 seconds, otherwise repeat starting attempt.

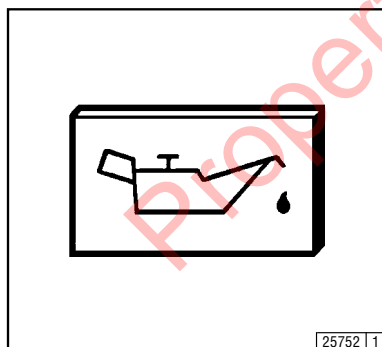
## Engine Operation

## 3.3 Monitoring Systems

## 3

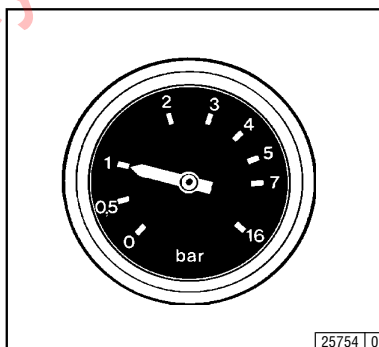
### 3.3.1 Engine Oil Pressure

#### Oil Pressure Pilot Lamp



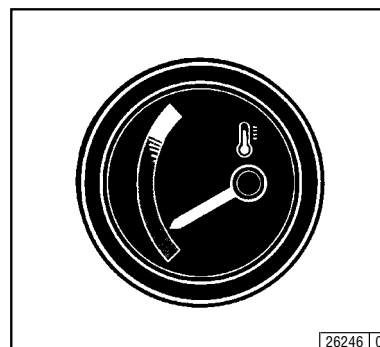
- The oil pressure pilot lamp lights up with operating voltage applied and engine shut off.
- The oil pressure pilot lamp must go out when the engine is running.

#### Oil Pressure Gauge



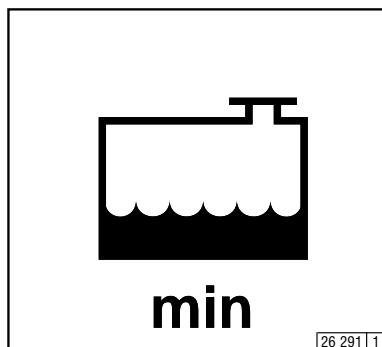
- The pointer of the oil pressure gauge must indicate the minimum oil pressure (see 9.1).

### 3.3.2 Coolant Temperature



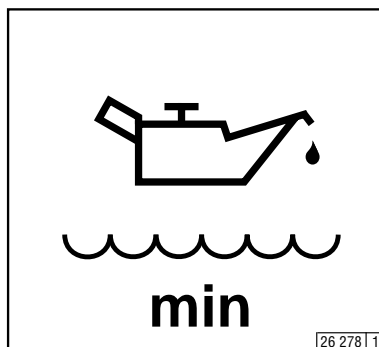
- The pointer of the temperature indicator should remain in the green sector and enter the yellow-green sector only in exceptional cases. If the pointer enters the orange sector, the engine is overheating. Turn it off and establish the cause from the Diagnosis Chart (see 7.1).

### 3.3.3 Coolant Level



- Lamp of coolant level indicator lights up (contact via float switch/level sensor when min. coolant level has been reached):  
Turn engine off and establish cause from the Diagnosis Chart (see 7.1)
- Functional check of coolant level:  
Insert key in position 1 or 2  
(Float switch or level sensor)  
Pilot lamp lights up for about 2 seconds
  - Coolant level o.k.: lamp goes out
  - Coolant level not o.k.: lamp does not go out.

### 3.3.4 Lube Oil Level



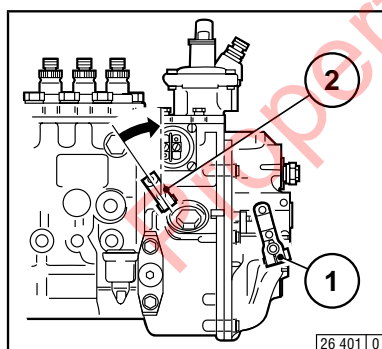
- Lamp of lube oil level indicator lights up (contact via float switch/level sensor when min. lube oil level has been reached):  
Turn engine off and establish cause from the Diagnosis Chart (see 7.1)
- Functional check of lube oil level:  
Insert key in position 1 or 2  
(Float switch or level sensor)  
Pilot lamp lights up for about 2 seconds
  - Lube oil level o.k.: lamp goes out
  - Lube oil level not o.k.: lamp does not go out.

## Engine Operation

## 3.4 Starting

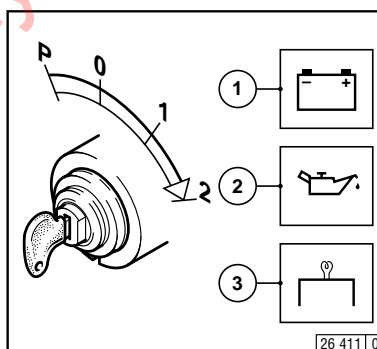
# 3

### 3.4.1 Mechanical Shutdown



- Set speed control lever 1 to low speed position.
- Actuate shutdown lever 2 until engine comes to standstill. Charging-current and oil pressure pilot lamps light up when engine has come to standstill.

### 3.4.2 Electric Shutdown



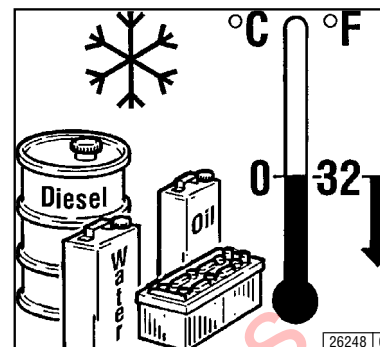
- Turn key counter-clockwise (to position 0) and pull off. Pilot lamps go out.

### 3.5.1 Winter Operation

- **Lube Oil Viscosity**
  - Select the oil viscosity (SAE grade) according to the ambient temperature prevailing at the time when the engine is started 4.1.2.
  - Keep shorter periods between oil changes when operating at temperatures below  $-10^{\circ}\text{C}$  ( $+14^{\circ}\text{F}$ ), see 6.1.1.
- **Diesel Fuel**
  - Use winter-grade diesel fuel for operation below  $0^{\circ}\text{C}$  ( $+32^{\circ}\text{F}$ ), see 4.2.2.
- **Coolant**
  - Set the water / antifreeze mix to suit the lowest temperature likely to occur (max.  $-35^{\circ}\text{C}$  /  $-31^{\circ}\text{F}$ ), see 4.3.1.
- **Additional Maintenance Jobs**
  - Drain the sludge from the fuel tank once a week (by undoing the sludge drain plug).
  - Adjust the oil filling in the oil bath air cleaner (if fitted) to the prevailing ambient temperature as in the case of engine oil.
  - At temperatures below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) lubricate the flywheel ring gear with low-temperature grease, e.g. Bosch FT 1 V31,

from time to time through the pinion hole (if necessary remove starter).

- **Cold-Starting Aids**
  - At temperatures near or below freezing point start with flame-type heater plug, see 3.2.1. This not only lowers the starting limit temperature, but proves also useful at temperatures normally not requiring a starting aid.
- **Battery**
  - Cold starting requires a good state of charge of the battery, see 6.7.1.
  - The starting limit temperature can be lowered by  $4-5^{\circ}\text{C}$  by heating the battery up to  $+20^{\circ}\text{C}$  ( $+65^{\circ}\text{F}$ ). To do so, remove the battery and store in a warm place.



## Engine Operation

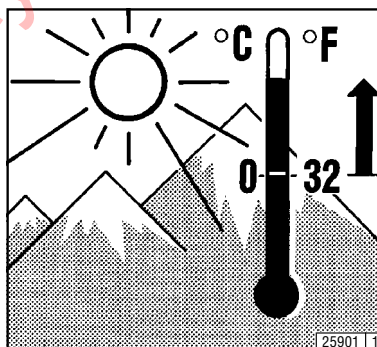
## 3.5 Operating Conditions

### 3.5.2 High Ambient Temperature, High Altitude

- With increasing altitude and rising ambient temperatures the density of the air tends to decrease, which affects the maximum power output, the exhaust gas quality, the temperature level and in extreme cases, the starting behaviour. Under transient running conditions, operation is permissible at altitudes up to 1000 meters at ambient temperatures up to  $30^{\circ}\text{C}$  ( $86^{\circ}\text{F}$ ).

If an engine is operated under more severe conditions (at higher altitudes or ambient temperatures) it will be necessary to reduce the injected fuel quantity and thus engine power.

- In case of doubt concerning such engine applications, ask your engine or equipment supplier whether, in the interest of operational reliability, service life and exhaust gas quality (smoke!), an engine derating had been considered necessary, or simply contact your service representative.



## 4.1 Lube Oil

## 4.2 Fuel

## 4.3 Coolant

## Operating Media

## 4.1 Lube Oil

## 4

## 4.1.1 Quality Grade

The lube oil quality grade is defined by specifications. The following lube oil specifications are approved:

lube oil quality class:

classification/specification

DEUTZ-	DQC I	DQC II	DQC III
ACEA-	E2-96	E3-96/E5-02	E4-99
API-	CF/CF-4	CG-4/CH-4	-
Worldwide	-	DHD-1	-

If in doubt, contact your service representative

## 4.1.2 Viscosity

Generally, multi-grade oils shall be used. In closed heated rooms at temperatures  $>5^{\circ}\text{C}$ , also single-grade oils can be used. The indicated lube oil grades must, of course, also be observed for single-grade oils.

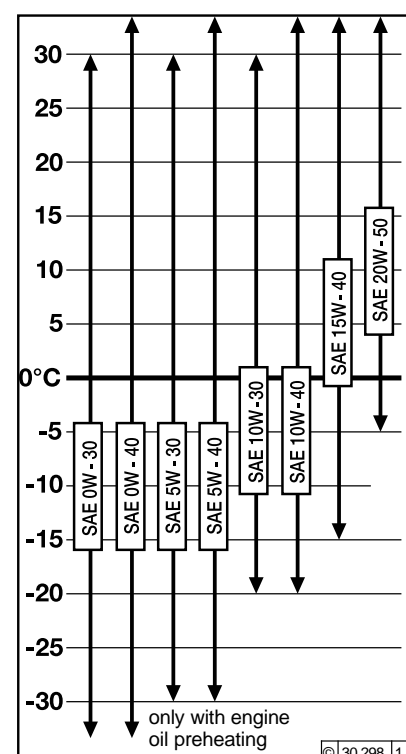
As the viscosity of lube oil is dependent on temperature, the choice of SAE grade should be governed by the ambient temperature prevailing at the engine operating site.

Optimum operating behaviour will be attained if you take the accompanying oil viscosity diagram as a guide.

Should the temperature fall temporarily below the limits of the SAE grade selected, cold starting may be affected but the engine will not be damaged.

In order to keep wear to a minimum, do not exceed application limits for extended periods of time.

Oil changes dictated by the seasons can be avoided by using multi-grade lube oils. Multi-grade oils - particularly low-friction oils - also reduce fuel consumption.





#### 4.1.2.1 Specific lube oil definitions

Turbocharged engines with uprated power and engines with high loading

The oils listed in enclosure 1 are to be used for the following engines and applications:

- 1015 CP
- all engines in CHP plants
- all engines in gensets operating in parallel with the mains/with each other
- engines in combines with:

These are high-grade oils according to ACEA or API. In addition most of these oils are partly synthetic, some even fully synthetic (5W-40) and thus achieve the thermal stability required for the relevant application and are distinguished by a low tendency to cause deposits in the turbocharger and in the charge air pipes with closed-circuit crankcase breather

Exhaust emission-optimized engines for commercial vehicles as from EURO II and mobile machinery as from level 2. For exhaust emission-optimized engines of all DEUTZ series which meet the following exhaust emission requirements:

- as from EURO II the requirements of 88/77/EEC and 91/542/EEC for commercial vehicles in Europe,
- as from level 2 the requirements of 97/68/EC, for mobile machinery in Europe
- as from level 2 the requirements for US nonroad engines the following oil grades will be permissible:
  - ACEA E3-96 and E4-98 for requirements a) and b)
  - API CG-4 and CH-4 for application c)

#### Lube oils for engines with uprated power and engines with high loading

Producer	Type of lube oil	SAE class	Availability
DEUTZ	Deutz ÖI TLX	10W-40FE	Europa
GIP	Agip Sigma Ultra TFE	10W-40	worldwide
AGIP	Autol Valve Ultra FE	10W-40	Germany
ARAL GmbH	Aral MegaTurboral	10W-40	worldwide
ARAL GmbH	Aral SuperTurboral	5W-30	worldwide
BAYWA	BayWa Super Truck 1040 MC	10W-40	South Germany
BAYWA	BayWa Turbo 4000	10W-40	South Germany
Castrol GmbH	Castrol SYNTRUCK	5W-40	Europe, North America, Brazil, Argentina, Australia, South Africa
Castrol GmbH	Castrol DYNAMAX	7,5W-40	Europe, North America, Brazil, Argentina, Australia, South Africa
CHEVRON	Chevron Delo 400 Synthetic	5W-40	North America
ESSO	Essolube XTS 501	10W-40	Europe
FINA	FINA KAPPA FIRST	5W-30	Europe
FINA	FINA KAPPA ULTRA	10W-40	Europe
FUCHS DEA	DEA Cronos Synth	5W-40	Germany, Europe
FUCHS DEA	DEA Cronos Premium LD	10W-40	Germany, Europe
FUCHS DEA	Fuchs Titan Cargo MC	10W-40	worldwide
FUCHS DEA	Deutz Oel TLL 10W-40 MB	10W-40	Germany
FUCHS DEA	DEA Cronos Premium FX	10W-40	Europe
FUCHS DEA	Fuchs Titan Unic Plus MC	10W-40	worldwide
MOBIL OIL	Mobil Delvac 1 SHC	5W-40	Europe, SE Asia, Africa
MOBIL OIL	Mobil Delvac 1	5W-40	worldwide
MOBIL OIL	Mobil Delvac XHP Extra	10W-40	Europe, SE Asia
BP OIL International	BP Vanellus HT Extra	10W-40	Europe
Shell International	Shell Myrina TX /	5W-30	Europe, different
	Shell Rimula Ultra		description in some country
Shell International	Shell Myrina TX /	10W-40	Europe, different
	Shell Rimula Ultra		description in some country
TOTAL	TOTAL RUBIA TIR 86000	10W-40	worldwide
Schmierölraffinerie Salzbergen GmbH	Wintershall TFG	10W-40	Europe

The table will be extended as and when required.

## Operating Media

## 4.2 Fuel

## 4

### 4.2.1 Quality Grade

Use commercial brands of diesel fuel with a sulfur content of less than 0.5%. If the sulfur content is higher than 0.5%, oil change intervals should be reduced, see 6.1.1.

The following specifications / standards are approved:

- CEN EN 590 or DIN/EN 590
- DIN 51 601 (Feb.1986)
- BS 2869 (1988): A1 and A2
- ASTM D975-88: 1-D and 2-D
- NATO Code F-54 and F-75

The exhaust emission levels determined during certification always refer to the reference fuel specified by the supervising authorities for such certification.

### 4.2.2 Winter-Grade Fuel

At low temperatures, waxing may occur and clog the fuel system, causing operational trouble. In case of sub-zero (+32 °F) ambient temperatures it is recommended to use winter-grade diesel fuel (down to -15 °C = +5 °F). Normally, such fuel is offered at the filling stations in good time before the cold season starts. Diesel fuel containing additives („Super Diesel“) is frequently also on sale for use at temperatures down to -20 °C (-4 °F).

- At temperatures below -15 °C (+5 °F) or -20 °C (-4 °F), kerosene should be added to the diesel fuel. The relevant percentages are given in the diagram at the right.

If summer-grade diesel fuel has to be used at temperatures below zero (+32 °F), up to 60% kerosene may be added (see diagram at the right).

In most cases, adequate resistance to cold is also attained by adding a flow improver (fuel additive). Ask your service representative for this.

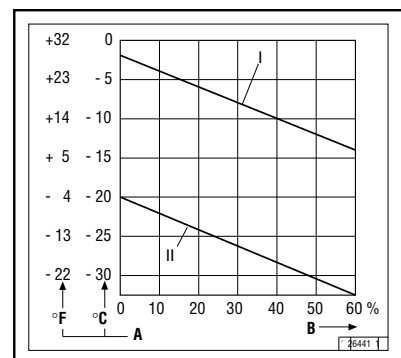


Illustration legend:

I	Summer diesel fuel
II	Winter diesel fuel
A	Ambient temperature
B	Percentage of kerosene added



Diesel fuels must never be mixed with petrol (normal and super grade petrol)!



Mix in tank only! Fill in the appropriate amount of kerosene first, then add the diesel fuel.

4.3.1 Quality of water for coolant in the recirculating water system

The values listed below must not be exceeded. In order to examine the quality of your water, a test case can be ordered from DEUTZ under Order No. 1213 0382.

Water quality	min	max
ph value at 20 °C /68° F	6.5	8.5
Chloride ion content [mg/dm3]	-	100
Sulphate ion content [mg/dm3]	-	100
Total hardness [°dGH]	3	20

4.3.2 Coolant treatment

In the case of liquid-cooled engines, special attention must be paid to the treatment and control of the coolant, as the engine may otherwise become damaged as a result of corrosion, cavitation and freezing. The treatment of the coolant is carried out by adding a cooling system protectant to the cooling water. The cooling system must be continuously monitored, see 5.1. In addition to checking the coolant level, this also involves checking the concentration of the cooling system protectant. The cooling system protectant concentration can be checked with commercially available testers (example: gefo glycomat®).

4.3.3 Cooling system protectants

DEUTZ cooling system protectants must be purchased in drums under Order No. 01011490 (5 litres) or 1221 1500 (210 litres). These are nitrite, amine and phosphate-free, and provide effective protection against corrosion, cavitation and freezing. If the above mentioned cooling system protectant is unavailable, the following products may be used in exceptional cases.

Manufacturer	Product designation
AVIA	AVIA Antifreeze Extra
ARAL	Antifreeze Extra
BASF	Glysantin G 48
DEA	DEA kylarfrostsskydd
SHELL	SHELL GlycoShell

The cooling system protectant in the coolant should not fall below or exceed the following concentration:

Cooling system protectant	Water
max. 45 Vol.%	55%
min. 35 Vol.%	65%

Filling volume, see Chapter 9.1. The use of other cooling system protectants, e.g. chemical anti-corrosion agents, is possible in exceptional cases. Consult DEUTZ Service. The use of anti-corrosion oils is not permitted.



If nitrite-based cooling system protectants are mixed with amine-based agents, dangerous nitrosamines are formed.



Cooling system protectants must be disposed of in an environmentally-friendly manner.

Cooling System Protection

Protective agent [% by vol.]	Protection against freezing to [°C]	Cooling system capacity *) [Liters]							
		18	20	22	25	27	30	32	35
		Protective agent [Liters]							
35	−22	6,3	7,0	7,7	8,75	9,5	10,5	11,2	12,3
40	−28	7,2	8,0	8,8	10	10,8	12	12,8	14
45	−35	8,1	9,0	9,9	11,3	12,2	13,5	14,4	15,8
50	−45	9,0	10	11	12,5	13,5	15	16	17,5

\*) For coolant capacity of your engine, see Section 9.1. Note: Consult head-office regarding figures in the grey field.

## 5.1 Maintenance Schedule

## 5.2 Maintenance Chart

## 5.3 Completed Maintenance Jobs

### Routine maintenance

### 5.1 Maintenance schedule

5

check = ●    adjust = ○    clean = ▲    replace = ■										Industrial engines  The specified engine maintenance values are permissible recommended maximums. Depending on usage, reduced maintenance intervals may be necessary; comply with the unit manufacturer's operating instructions. #Maintenance must only be carried out by authorised service personnel.	
check 2x daily before or during 1st trial run, during running- In period or when commissioning new or overhauled engines											
every 10 OH or daily											
E10	E20	in operating hours (OH) every:					Years				
		E30	E30	E40	E60	E70	1	2			
		250	500	1000	6000	12000					
●	●								Operation	Section	
		■	■						Lube oil level, top up if necessary	6.1.2/3.3.4	
			■						Lube oil (oil change int. depending on engine app.), see TR 0199-99-3002	6.1.1/6.1.2	
				■					Oil filter cartridge	6.1.3	
					■				Fuel filter cartridge	6.2.1	
							■		Fuel leakage lines (should be replaced in there entirety)	6.2.2	
					■				Injection valve	#	
●				▲					Fuel pre-cleaner	4.2	
●			●				■		Coolant (additive concentration)	4.3.1/2/3	
●					■				Coolant pump	—	
			●						Coolant level	—	
●	●			■					Intake air cleaner (if available, maintain according to maintenance indicator)	6.4.3/6.4.4	
●				●				▲	Intercooler (drain lube oil/condensation)	—	
				●					Battery and cable connectors	6.7.1	
●				●					Engine monitoring system, Warning system	3.3#	
				○					Valve clearance (adjust if necessary)	6.6.1	
●				●			■		V-belts (retension if necessary, replaced if damaged)	6.5.1	
					■				Crankcase pressure-relief valve/injection valve	#	
				●	■				Crankcase pressure vent valve	#	
●	●								Check engine for leaks (visual inspection)	—	
●			▲						Draining bores between cylinder banks, engine cleaning	6.3.1/6.3.4	
●				●					Engine mount (replaced if damaged)	9.2	
●				●					Fasteners, hose connections/clips	—	
						■			General overhaul	#	

check = +    adjust = ○    clean = ▲    replace = ■											
check 2x daily before or during 1st trial run, during running- In period or when commissioning new or overhauled engines											
every 10 OH or daily											
in operating hours (OH) every:											
E10	E20	E30		E40		E70		Years		Operation	
		250	500	1000	4000	6000	12000	1	2		
●			■							Lube oil (oil change int. depending on engine app.), see TR 0199-99-3002	6.1.1/6.1.2
					■					Injection valve	#
			●		▲					Intercooler (drain lube oil/condensation)	#
			●		▲					Intercooler inlet, clean as necessary	—
			●		■					Crankcase pressure vent valve	#
					▲					Exhaust Turbo-Charger outlet, clean as necessary	—

### Additions and modifications for engines with EPA approval

The specified engine maintenance values are permissible recommended maximums. Depending on usage, reduced maintenance intervals may be necessary; comply with the unit manufacturer's operating instructions. # Maintenance must only be carried out by authorised service personnel.

check = ●    adjust = ○    clean = ▲    replace = ■											
check 2x daily before or during 1st trial run, during running- In period or when commissioning new or overhauled engines											
every 200 km or daily											
E10	E20	Kilometrage (km) every:					Service groupe	Annual kilometrage (km)	average speed approx. approx. km/h		
		E30	E30	E40	E60	E70					
		5000	10000	20000	120000	240000	I	< 30 000	20		
		Service group I					II	> 30 bis 100 000	40		
							III	> 100 000	60		
Years											
1    2											
Operation											
Section											
●	●							Lube oil level, top up if necessary	6.1.2/3.3.4		
		■	■					Lube oil (oil change int. depending on engine app.), see TR 0199-99-3002	6.1.1/6.1.2		
			■					Oil filter cartridge	6.1.3		
			■					Fuel filter cartridge	6.2.1		
			●				■	Fuel leakage lines (should be replaced in there entirety)	6.2.2		
					■			Injection valve	#		
			▲					Fuel pre-cleaner	4.2		
			●				■	Coolant (additive concentration)	4.3.1/2/3		
					■			Coolant pump	-		
●			●					Coolant level	4.3.2/4.3.3		
●	●			■				Intake air cleaner (if available, maintain according to maintenance indicator)	6.4.3/6.4.4		
●				●			▲	Intercooler (drain lube oil/condensation)	#		
				●				Battery and cable connectors	6.7.1		
●				●				Engine monitoring system	3.3		
				○				Valve clearance (adjust if necessary)	6.6.1		
●				●			■	V-belts (retension if necessary, replaced if damaged)	6.5.1		
					■			Crankcase pressure-relief valve/injection valve	#		
				●	■			Crankcase pressure vent valve	#		
●		●						Check engine for leaks (visual inspection)	-		
			▲					Draining bores between cylinder banks, engine cleaning	6.3.1/6.3.4		
●				●				Engine mount (replaced if damaged)	9.2		
●				●				Fasteners, hose connections/clips	-		
					■			General overhaul	#		

## Vehicle engines

The specified engine maintenance values are permissible recommended maximums. Depending on usage, reduced maintenance intervals may be necessary; comply with the unit manufacturer's operating instructions. # Maintenance must only be carried out by authorised service personnel.

check = ● adjust = ○ clean = ▲ replace = ■										Vehicle engines	
check 2x daily before or during 1st trial run, during running- In period or when commissioning new or overhauled engines										The specified engine maintenance values are permissible recommended maximums. Depending on usage, reduced maintenance intervals may be necessary; comply with the unit manufacturer's operating instructions. # Maintenance must only be carried out by authorised service personnel.	
every 200 km or daily											
Kilometrage (km) every: Service group II											
E10	E20	E30	E30	E40	E60	E70	Years		Service groupe	Annual kilometrage (km)	average speed approx. approx. km/h
		10000	20000	40000	240000	480000	1	2	I	< 30 000	20
									II	> 30 bis 100 000	40
									III	> 100 000	60
Operation										Section	
●	●								Lube oil level, top up if necessary	6.1.2/3.3.4	
		■	■						Lube oil (oil change int. depending on engine app.), see TR 0199-99-3002	6.1.1/6.1.2	
			■						Oil filter cartridge	6.1.3	
			■						Fuel filter cartridge	6.2.1	
			●				■		Fuel leakage lines (should be replaced in there entirety)	6.2.2	
					■				Injection valve	#	
			▲						Fuel pre-cleaner	4.2	
			●				■		Coolant (additive concentration)	4.3.1/2/3	
					■				Coolant pump	—	
●			●						Coolant level	—	
●	●			■					Intake air cleaner (if available, maintain according to maintenance indicator)	6.4.3/6.4.4	
●				●			▲		Intercooler (drain lube oil/condensation)	#	
				●					Battery and cable connectors	6.7.1	
●				●					Engine monitoring system	#3.3	
				○					Valve clearance (adjust if necessary)	6.6.1	
●				●			■		V-belts (retension if necessary, replaced if damaged)	6.5.1	
					■				Crankcase pressure-relief valve/injection valve	#	
				●	■				Crankcase pressure vent valve	#	
●		●							Check engine for leaks (visual inspection)	—	
			▲						Draining bores between cylinder banks, engine cleaning	6.3.1/6.3.4	
●				●					Engine mount (replaced if damaged)	9.2	
●				●					Fasteners, hose connections/clips	—	
						■			General overhaul	#	

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## Routine maintenance

## 5.1 Maintenance schedule

check = ● adjust = ○ clean = ▲ replace = ■										Vehicle engines	
check 2x daily before or during 1st trial run, during running- In period or when commissioning new or overhauled engines										The specified engine maintenance values are permissible recommended maximums. Depending on usage, reduced maintenance intervals may be necessary; comply with the unit manufacturer's operating instructions. # Maintenance must only be carried out by authorised service personnel.	
every 200 km or daily											
Kilometrage (km) every: Service group III											
E10	E20	E30	E30	E40	E60	E70	Years	Service groupe	Annual kilometrage (km)	average speed approx. approx. km/h	
		30.000	60.000	120.000	360.000	1.000.000	1 2	I	< 30 000	20	
								II	> 30 bis 100 000	40	
								III	> 100 000	60	
Operation										Section	
●	●								Lube oil level, top up if necessary	6.1.2/3.3.4	
		■	■						Lube oil (oil change int. depending on engine app.), see TR 0199-99-3002	6.1.1/6.1.2	
			■						Oil filter cartridge	6.1.3	
									Fuel filter cartridge	6.2.1	
			●				■		Fuel leakage lines (should be replaced in there entirety)	6.2.2	
					■				Injection valve	#	
				▲					Fuel pre-cleaner	4.2	
			●				■		Coolant (additive concentration)	4.3.1/2/3	
					■				Coolant pump	—	
●			●						Coolant level	—	
●	●			■					Intake air cleaner (if available, maintain according to maintenance indicator)	6.4.3/6.4.4	
●				●			▲		Intercooler (drain lube oil/condensation)	#	
				●					Battery and cable connectors	6.7.1	
●				●					Engine monotoring system	3.3	
				○					Valve clearance (adjust if necessary)	6.6.1	
●				●			■		V-belts (retension if necessary, replaced if damaged)	6.5.1	
					■				Crankcase pressure-relief valve/injection valve	#	
				●	■				Crankcase pressure vent valve	#	
●		●							Check engine for leaks (visual inspection)	—	
			▲						Draining bores between cylinder banks, engine cleaning	6.3.1/6.3.4	
●				●					Engine mount (replaced if damaged)	9.2	
●				●					Fasteners, hose connections/clips	—	
						■			General overhaul	#	

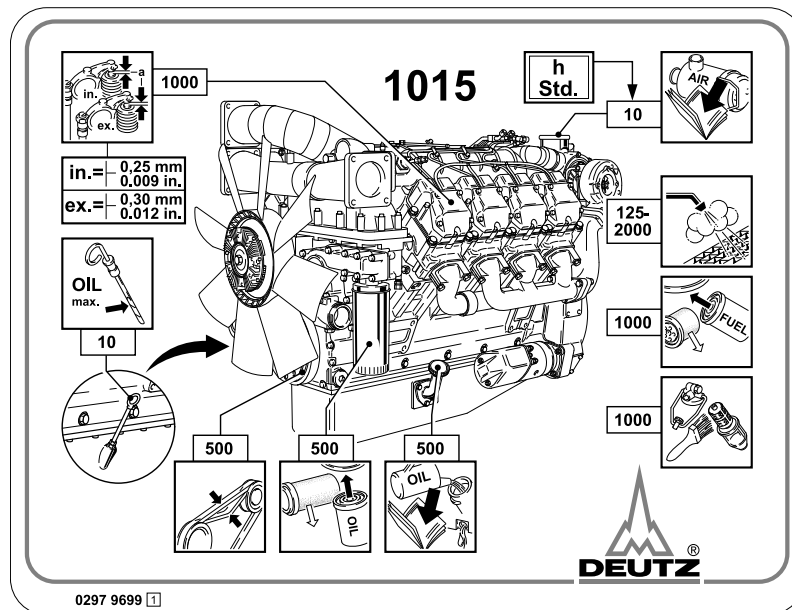
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## 5.2 Maintenance Chart

## Routine Maintenance

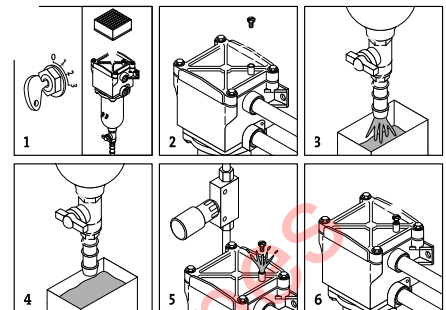
5

The maintenance charts shown here are supplied as self-adhesive label with each engine. It should be affixed where it can be clearly seen on the engine or driven equipment. Check that this is the case! If necessary, ask your engine or equipment supplier for a fresh supply of labels! Routine maintenance work should be carried out according to the schedule in 5.1.



**Kraftstoff-Vorfilter**  
**Fuel prefilter**  
**Préfiltre combust.**  
**Prefiltro combust.**

**Wartung**  
**Maintenance**  
**Entretien**  
**Manenimiento**



Filterelement mindestens  
jährlich wechseln!  
Change filter element at  
least once a year!  
Remplacer l'élément filtrant  
au moins une fois par an.  
Cambiar el elemento filtrante  
por lo menos una vez al año.

Wasser nach Aufleuchten der  
Kontrollleuchte ablassen.  
Drain water when pilot lamp  
lights up.  
Vidanger l'eau lorsque la lampe  
témoin s'allume.  
Evacuar el agua al encenderse  
la luz testigo.

We move your world.  
www.deutz.de

DEUTZ



Stop the engine before  
carrying out any maintenance  
work.

## Routine Maintenance

## 5.3 Completed Maintenance Jobs

5

Running hours	Date	Signature / Stamp	Running hours	Date	Signature / Stamp
50-150*			—		
125			250		
375			500		
625			750		
875			1000		
1125			1250		
1375			1500		
1625			1750		
1875			2000		
2115			2250		
2375			2500		
2625			2750		

\* after commissioning of new and overhauled engines

Duly completed maintenance jobs can be recorded and signed off in the above table.



### 5.3 Completed Maintenance Jobs

### Routine Maintenance

5

Running hours	Date	Signature / Stamp	Running hours	Date	Signature / Stamp
2875			3000		
3125			3250		
3375			3500		
3625			3750		
3875			4000		
4125			4250		
4375			4500		
4625			4750		
4875			5000		
5125			5250		
5375			5500		
5625			5750		
Duly completed maintenance jobs can be recorded and signed off in the above table.					

### Routine Maintenance

### 5.3 Completed Maintenance Jobs

5

Running hours	Date	Signature / Stamp	Running hours	Date	Signature / Stamp
5875			6000		
6125			6250		
6375			6500		
6625			6750		
6875			7000		
7125			7250		
7375			7500		
7625			7750		
7825			8000		
8125			8250		
8375			8500		
8625			8750		
Duly completed maintenance jobs can be recorded and signed off in the above table.					

### 5.3 Completed Maintenance Jobs

### Routine Maintenance

5

Running hours	Date	Signature / Stamp	Running hours	Date	Signature / Stamp
8875			9000		
8125			8250		
8375			8500		
8625			8750		
8875			9000		
9125			9250		
9375			9500		
9625			9750		
9825			10000		
10125			10250		
10375			10500		
10625			10750		
Duly completed maintenance jobs can be recorded and signed off in the above table.					

### Routine Maintenance

### 5.3 Completed Maintenance Jobs

5

Running hours	Date	Signature / Stamp	Running hours	Date	Signature / Stamp
10875			11000		
11125			11250		
11375			11500		
11625			11750		
11875			12000		
12125			12250		
12375			12500		
12625			12750		
12825			13000		
13125			13250		
13375			13500		
13625			13750		
Duly completed maintenance jobs can be recorded and signed off in the above table.					

Running hours	Date	Signature / Stamp	Running hours	Date	Signature / Stamp
13875			14000		
14125			14250		
14375			14500		
14625			14750		
14875			15000		
15125			15250		
15375			15500		
15625			15750		
15825			16000		
16125			16250		
16375			16500		
16625			16750		
Duly completed maintenance jobs can be recorded and signed off in the above table.					

- 6.1 Lubrication System**
- 6.2 Fuel System**
- 6.3 Cooling System**
- 6.4 Combustion Air Cleaner**
- 6.5 Belt Drives**
- 6.6 Adjustments**
- 6.7 Accessories**

## Service and Maintenance

### 6.1 Lubrication System

**6**

#### 6.1.1 Oil Change Intervals

- The first oil change after commissioning or recommissioning following repair work is carried out after 50 running hours.
- The oil change intervals are dependent on :
  - Lube oil quality
  - Sulfur content in the fuel
  - Engine application
- Should, within a year, the engine run less than the hours stated in the table, the oil must be changed at least once a year.
- The table refers to the following conditions:
  - For diesel fuel max. sulfur content > 0.5 % by wt.
  - Continuous ambient temperature down to  $-10^{\circ}\text{C}$  ( $+14^{\circ}\text{F}$ )
- If the sulfur content is > 0.5 to > 1 % or the continuous ambient temperature below  $-10^{\circ}\text{C}$  ( $+14^{\circ}\text{F}$ ), the intervals between the oil changes should be halved.
- In the case of fuels containing sulfur > 1 % , ask your service representative.
- If, for vehicle engines, lube oil change intervals are determined by operating hours, the lube oil change intervals indicated in table 6.1.1.1. for "Oil use under normal duty" will apply.

Change the oil with the engine off but still warm (lube oil temperature approx.  $80^{\circ}\text{C}$  /  $176^{\circ}\text{F}$ ).

6.1.1.1 Lube oil change intervals for industrial and marine engines

		Lube oil grade					
Deutz lube oil quality class		DQC I		DQC II		DQC III	
ACEA-specification		E2-96		E3-96/E5-02		E4-99	
API-specification		CF/CF-4		CG-4/CH-4		-	
Worldwide specification		-		DHD-1		-	
special DEUTZ release list		-		-		siehe Kap.4.1.2.1	
Standard lube oil code for building equipment and nonraod vehicles		EO.. EO...A, EO...B		EO...C		-	
Engine series	Engine version	Lube oil change intervals in op. hours					
		Oil use		Oil use		Oil use	
		normal	high	normal	high	normal	high
1015	All engines except for:	250	125	500	250	500	250
	1015C from Nonroad Stufe II	-	-	500	250	500	250
	1015CP	-	-	-	-	500	250
	BF6M1015MC P ≤ 300 kW	-	-	500	250	500	250
	BF8M1015MC P ≤ 400 kW	-	-	500	250	500	250
	BF6M1015MC P > 300 kW	-	-	-	-	500	250
	BF8M1015MC P > 400 kW	-	-	-	-	500	250

\* Gensets as referred to here are units operating in parallel with the mains / with each other.  
Emergency power units are dealt with in TC 0199-99-1126.

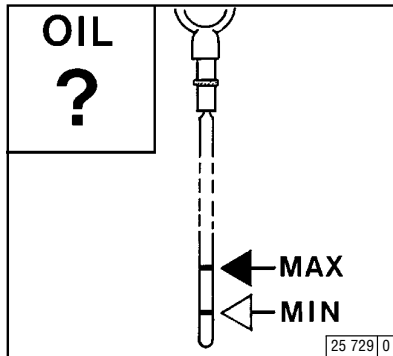
6.1.1.2Oil change intervals for vehicle engines

Deutz lube oil quality class			Lubeoil-quality		
			DQC I	DQC II	DQC III
ACEA-specification			E2-96	E3-96/E5-02	E4-99
API-specification			CF/CF-4	CG-4/CH-4	-
worldwide specification			-	DHD-1	-
special DEUTZ release			-	-	Enclosure 4.1.2.1
Application	Engine version	Lube oil change intervals in km			
Site vehicles/ city busses	25 1015	Euro I, except for	-	15 000	20 000
	1015CP	Euro II	-	-	20 000
Local traffic	40 1015	Euro I, except for	-	20 000	30 000
	1015CP	Euro II	-	-	30 000
Long distance traffic	60 1015	Euro I, except for	-	50 000	40 000
	1015CP	Euro II	-	-	60 000

If, for vehicle engines, lube oil change intervals are determined by operating hours, the lube oil change intervals indicated in table 4.1. for "Oil use under normal duty" will apply.

## 6.1.2 Checking Oil Level / Changing Engine Oil

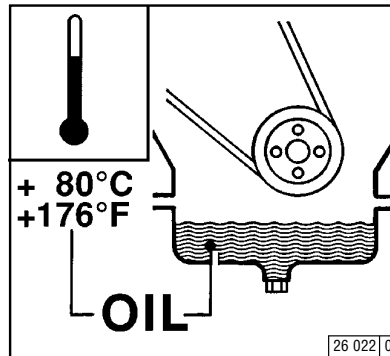
## 6.1.2.1 Checking Oil Level



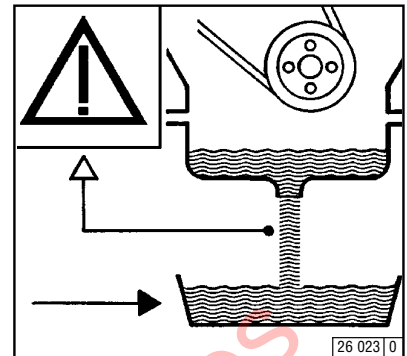
- Ensure that the engine or vehicle is on a level surface.
- Immediately before the oil level is measured, the engine should be driven at low idling speed for approx. 2 minutes.
- Switch off the engine.
- Pull out the oil dipstick.
- Wipe off with a non-fibrous, clean cloth.
- Insert up to the stop and pull out again.
- Check the oil level and if necessary fill up to the "MAX" level.
  - If the oil level is just above the "MIN" marking, extra oil must be added.

The oil level must not fall below the "MIN" marking.

## 6.1.2.2 Engine Oil Change



- Ensure that the engine or vehicle is on a level surface.
- Allow the engine to warm up
  - Lube oil temperature approx. 80°C.
- Switch off the engine.



- Place oil tray under the engine.
- Unscrew drain plug.
- Drain oil.
- Fit oil drain plug, with the new gasket and tighten firmly (for torque, see 9.2).
- Fill with lube oil.
  - For grade / viscosity, see 4.1
  - For quantity, see 9.1
- Check oil level, see 6.1.2.1

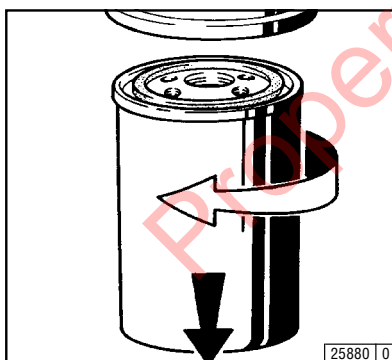


Be careful when draining hot oil – danger of scalds! Do not let used oil run into the soil but catch it in a container ready for

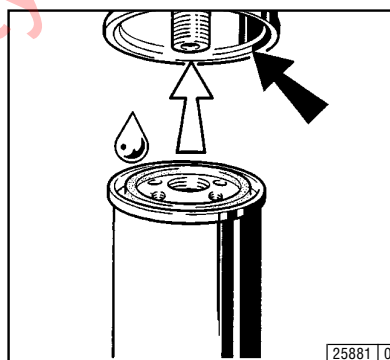
## Service and Maintenance

## 6.1 Lubrication System

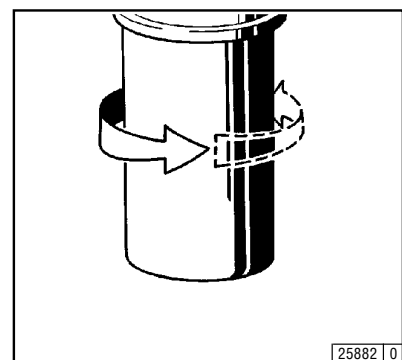
## 6.1.3 Renewing Oil Filter



- With fitted torsion lock: Loosen screws and slide clamps downwards.
- Undo the oil filter cartridge with commercial tool and spin off.
- Catch any escaping oil.



- Clean sealing surface of the filter carrier if necessary.
- Lightly oil the rubber gasket of the new oil filter cartridge.
- Screw in the new cartridge finger tight against the gasket.



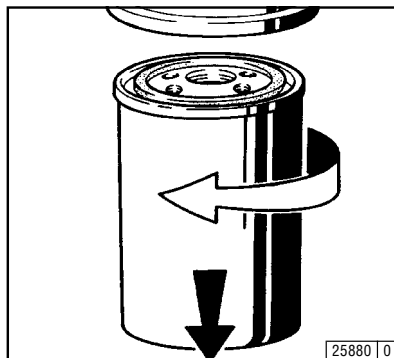
- Tighten oil filter cartridge tightly by giving a final half turn.
- If a torsion lock is fitted, slide clamps up into position and tighten screws.
- Check oil level, see 6.1.2.
- Check oil pressure, see 3.3.1.
- Check sealing of oil filter cartridge for leaks.



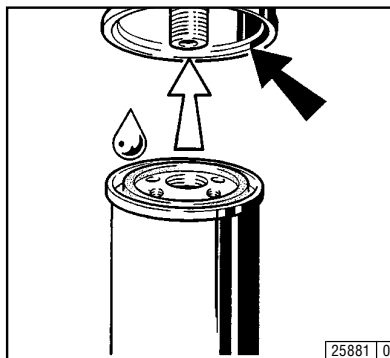
Beware of hot oil:  
Danger of scalding!



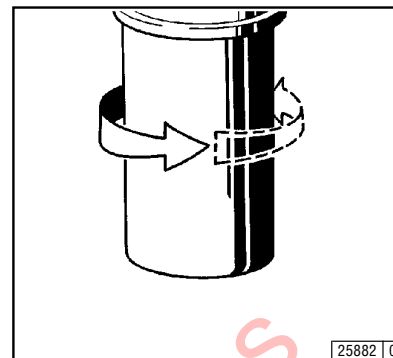
## 6.2.1 Renewing Fuel Filter



- Close fuel stopcock.
- Undo fuel filter cartridge with commercial tool and spin off.
- Catch any escaping fuel.



- Clean sealing surface of filter carrier if necessary.
- Apply light film of oil or diesel fuel to rubber gasket of new fuel filter cartridge.
- Screw in the cartridge finger tight against the gasket.



- Tighten fuel filter cartridge firmly.
- Open fuel stopcock.
- Check for leaks.



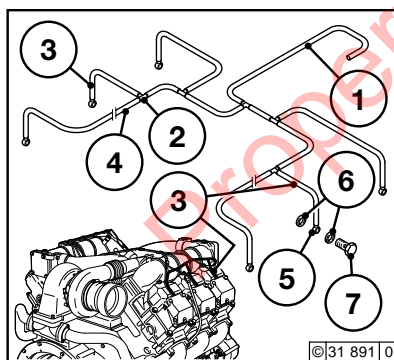
When working on the fuel system, keep open flames away!  
Do not smoke!

Bleeding of the fuel system is not necessary.

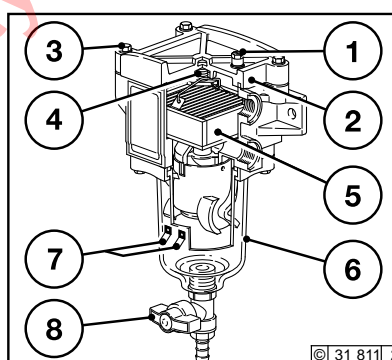
## Service and Maintenance

## 6.2 Fuel System

## 6.2.2 Replace fuel oil leak line



- Close the fuel shut-off valve.
- Remove valve cover.
- Loosen and remove banjo bolts 7.
- Remove rubber hoses 1, 3, 4, unions 2 and O-rings 6 and dispose of in accordance with environmental regulations; banjo union 5 and banjo bolt 7 can be re-used.
- Connect new oil leak line (complete) with banjo union 5 to rubber hoses. Fasten oil leak line using existing banjo bolt 7 and two new O-rings 6.
- Re-fit valve cover.
- Open fuel shut-off valve.
- Check for leaks after start-up.

6.2.3 Fuel Pre-filter Element  
Clean/Replace if necessary

## Clean (purge) - remove water:

- Turn off engine or, in the case of a change-over filter, switch over to the other filter.
- Close the fuel stopcock or supply. (if available)
- Open the bleed screw 1 on the cover 2
- Place the fuel collector underneath the fuel pre-filter.
- Empty water and dirt from the bowl 6 by opening (press in and turn slightly without using force) the drain cock 8 and close the drain cock 8 again
- Close the bleed screw 1 on the cover 2 again
- Bleed the fuel pipe according to instructions, see 6.2.5 opposite

## Changing the filter element 5:

Change at least once a year or as required (drop in performance also after purging)

- Turn off the engine or switch to other filter in case of changeover filter
- Close the fuel stopcock or supply (if available)
- Loosen the cover screws 3 diagonally
- Remove the cover 2
- Remove the spring cassette 4
- Remove the filter element 5 from the bracket
- Insert new filter element 5
- Place spring cassette 4 on the element
- Check that the cover seal is fit properly in the cover 2 and check for damage (change if necessary)
- Tighten the cover 2 with the screws 3 diagonally (torque 6 Nm)
- Check the cover 2 for proper fit and leaks
- Bleed the fuel system, see 6.2.3.



The connection of a warning system (lamp/horn) via contacts 7 is specified. Immediate maintenance is necessary when the warning system is triggered.



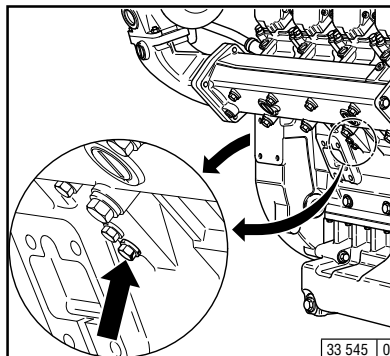
Naked flames are prohibited when working on the fuel system! Do not smoke! Dispose of old fuel in an environmentally friendly way!

## 6.3.1 Cleaning Intervals

- The degree of soiling of the cooler units is dependent on the type of engine application.
- The danger of soiling is increased due to residues of oil and fuel on the engine. Check extra carefully, therefore, for leakages when applications involve high dust fallout.
- More severe soiling can occur, e.g. in the case of:
  - Construction site application due to heavily dust-laden air.
- In view of the varying conditions of application, the cleaning intervals must be determined from case to case. The cleaning intervals stated in the table can be taken as guide values.

Checking / Cleaning Intervals	
Guide Values (RH)	Engine Application
2000	Ships, gensets in enclosed spaces, pumps
1000	Vehicles on paved roads
500	Mobile gensets
250	Vehicles on construction sites and unpaved roads, Construction equipment, compressors, underground mining equipment
125	Farm equipment

## 6.3.2 Draining Cooling System



- Place tray under drain plug 1.
- Remove drain plug 1 and sealing ring below coolant inlet.
- Drain coolant.
- Filling / bleeding as under 6.3.3
- Screw on drain plug 1 with new sealing ring and tighten (see 9.2).
- Check for leaks.



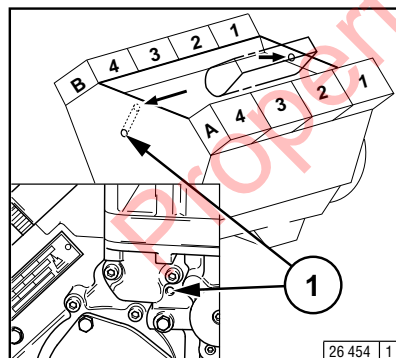
Be careful when draining hot coolant. Danger of scalding! Catch drained coolant and dispose of in accordance with anti-pollution regulations!

## 6.3.3 Filling / Bleeding Cooling System

- Fill with coolant and bleed cooling system according to manufacturer's instructions.

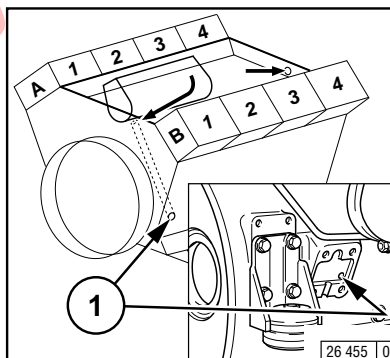
## 6.3 Cooling System

## Service and Maintenance

6.3.4 Cleaning engine  
- with compressed air

- Blow compressed air onto engine. Wash out loosened dirt particles from V-space with water jet.
- Make sure that drain holes 1 of V-space are free.

## - with cold cleaning agent



- Spray engine with commercial cold cleansing agent and let stand for about 10 min.
- Then spray clean with strong water jet (do not spray water directly onto sensitive components such as alternator, starter, wiring, electronic components).
- Make sure that drain holes 1 of V-space are free.

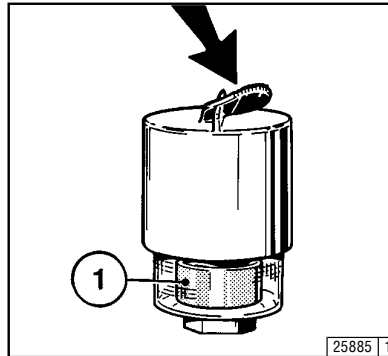
- Let engine run up to operating temperature after each wet-cleaning procedure allowing any remaining water to evaporate, thus avoiding corrosion.



Clean only with engine stationary

#### 6.4.1 Cleaning Intervals

- The degree of soiling of the combustion air cleaner depends on the amount of dust contained in the air and the size of the filter used. If very dusty air is to be expected, a cyclone-type precleaner can be fitted to the air cleaner.
- Consequently, the cleaning intervals cannot be fixed generally, but have to be determined from case to case.
- When a dry-type air cleaner is used, when indicated by the service indicator or switch.
- Air cleaner servicing is needed when :
  - **Service Indicator**  
the red sector 1 is fully visible when the engine is off.
  - **Service Switch**  
the yellow pilot light comes on when the engine is running.
- After having carried out service work, reset the signal by pressing the button of the service indicator. The service indicator is ready to resume its function.

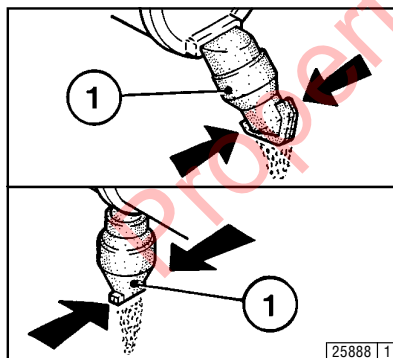


## 6.4 Combustion Air Cleaner

## Service and Maintenance

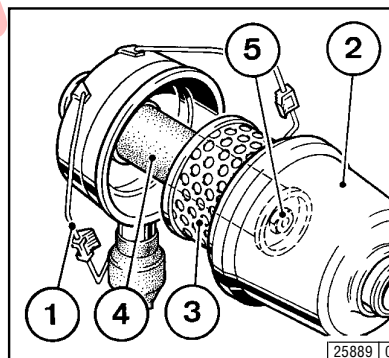
#### 6.4.2 Dry-Type Air Cleaner

##### Dust Discharge Valve



- Empty dust discharge valve 1 by pressing apart lips of discharge slot as indicated by the arrows.
- Clean discharge slot from time to time.
- Remove any caked dirt by pressing together the upper section of the valve.

##### Filter Cartridge



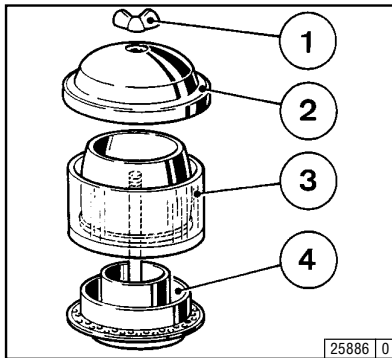
- Release fastening clamps 1.
- Take off hood 2 and remove cartridge 3.
- Clean cartridge, replace at least once a year.
- Clean cartridge 3:
  - blow through with dry compressed air (max. 5 bar) from inside to outside, or
  - in difficult cases, tap out, taking care not to damage the cartridge, or
  - wash out according to manufacturer's instructions.

- Check cartridge for damage to filter paper (by shining the paper through with a light), and inspect sealing element. Renew if necessary.
- After having serviced the filter cartridge five times, or after two years at the latest, renew safety cartridge 4 (never clean!).  
To do this, proceed as follows:
  - Undo hex. nut 5 and remove cartridge 4.
  - Insert new cartridge, insert and tighten hex. nut.
- Install cartridge 3, place hood 2 back in position and secure fastening clamps 1.



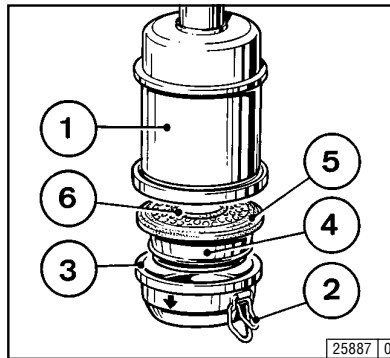
Never clean filter cartridge with petrol (gasoline) or hot liquids!

### 6.4.3 Emptying Cyclone-Type Precleaner



- Undo wing nut 1 and remove cover 2.
- Remove collector bowl 3 from lower section 4 and empty. Remove leaves, straw and other foreign matter from lower section of pre-cleaner.
- Reposition collector bowl 3 onto lower section 4, fasten cover 2 in place by tightening wing nut 1.

### 6.4.4 Cleaning Oil Bath Air Cleaner



- Turn engine off and wait about 10 minutes for the oil to drain from filter housing 1.
- Release snap clips 2 and remove oil cup 3 together with filter element 4. If necessary, press element out with a screwdriver, taking care not to damage rubber gasket 5.
- Remove dirty oil and sludge. Clean oil cup.
- Clean filter element 4 in diesel fuel and allow to drip-dry.
- Clean filter housing 1 if very dirty.
- Inspect and replace rubber gaskets 5 and 6 if necessary.

- Fill oil cup with engine oil up to the mark (arrow) (for viscosity, see 4.1.2).
- Refit oil cup and element to filter housing and secure with snap clips.



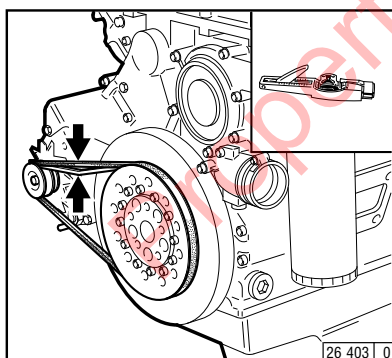
Never clean air cleaner with petrol (gasoline)!

Dispose of old oil in accordance with anti-pollution regulations!

## 6.5 Belt Drives

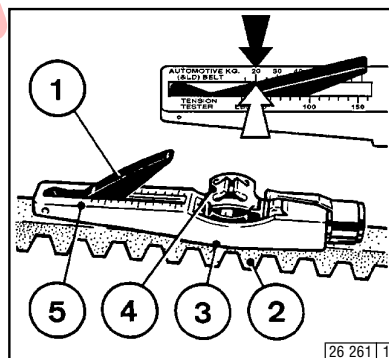
## Service and Maintenance

### 6.5.1 Checking Alternator V-Belt



#### Checking

- Inspect entire V-belt for damage
- Renew damaged V-belts.
- After installing new belts, run engine for 15 minutes, then check belt tension.
- Use a belt tension gauge (see 9.3) to check belt tension.
  - Place indicator arm 1 into gauge.
  - Position gauge on V-belt 2, midway between the pulleys, with flange 3 on bottom of gauge against the edge of belt.

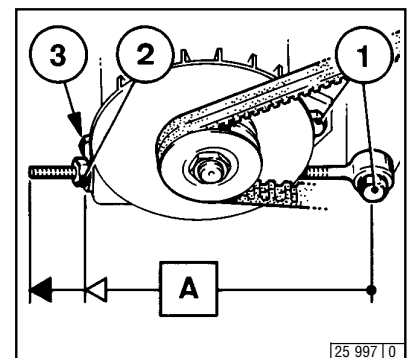


- Press slowly on the black pad 4 at right angles to belt 2 until the spring is heard or felt to trigger.
- Carefully remove the gauge without altering the position of the indicator arm 1.
- Read off the value: Turn the gauge sideways to see the exact spot where the top of the black indicator arm 1 intersects scale 5 (arrow). For settings, see 9.1.
- If necessary, retension belt and measure again.



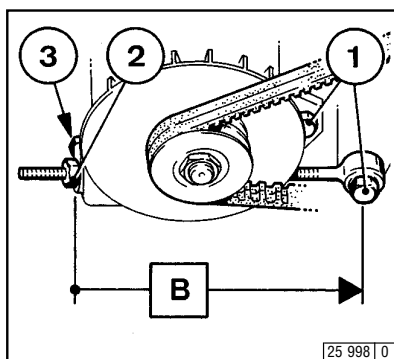
Check / retension and renew V-belts only with the engine off. Refit belt guard, if provided.

### 6.5.2 Retensioning / Renewing Alternator V-Belt



#### Retensioning

- Slacken hex. bolts 1, 2 and 3.
- Turn lock nut 2 in direction A until correct V-belt tension is attained.
- Tighten bolts 1, 2 and 3.



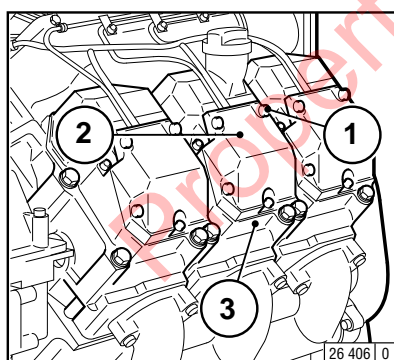
#### Renewing

- Slacken hex. bolts 1, 2 and 3.
- Turn lock nut 2 in direction B as far as it will go. Now the new V-belt can be easily placed in position.
- Tighten bolts 1, 2 and 3 until correct V-belt tension is attained (see Section 6.5.1).

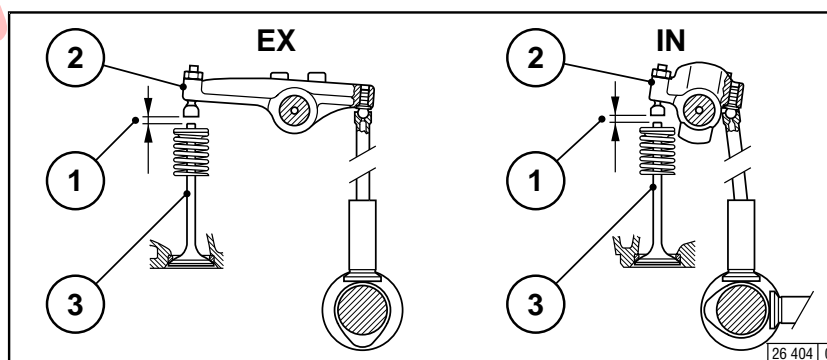
## 6.6 Adjustments

## Service and Maintenance

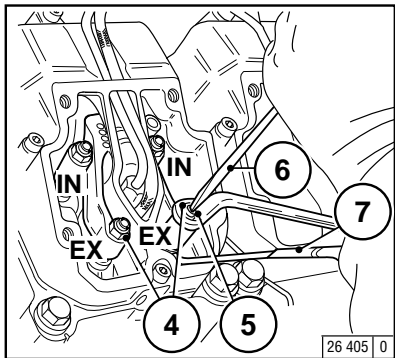
### 6.6.1 Checking / Adjusting Valve Clearances



- Before adjusting valve clearance, allow engine to cool down for at least 30 minutes. The oil temperature should be below 80 °C (176 °F).
- Position crankshaft as per schematic, see 6.6.1.1.
- Slacken bolts 1.
- Remove rocker cover 2 together with gasket 3.



- Check valve clearance 1 between rocker arm/tappet contact face 2 and valve stem 3 with feeler gauge (there should only be a slight resistance when feeler blade is inserted). For permissible valve clearance, see 9.1.



- If necessary, adjust valve clearance as follows:
  - Loosen lock nut 4 using wrench 7.
  - Adjust set screw 5 by means of screwdriver 6 in such a manner that with lock nut 4 tightened (wrench), the correct valve clearance 1 is attained.
- Check the valve clearances at each of the remaining cylinders and adjust if necessary.
- Refit rocker cover (together with new gasket if necessary).

6.6 Adjustments

Service and Maintenance

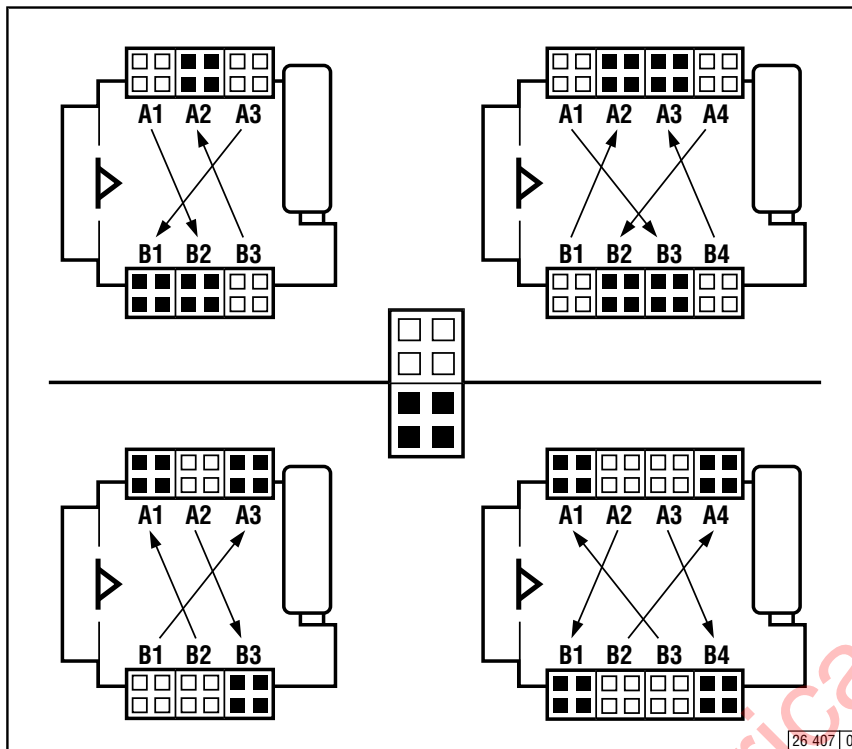
6.6.1.1 Valve Clearance Adjustment Schematic

Firing Order BF6M 1015:  
A1 – B3 – A3 – B2 – A2 – B1

Firing Order BF8M 1015:  
A1 – B4 – A4 – B1 – B3 – A3 – B2 – A2

Sequence	1	2	3	4	5	6		1	2	3	4	5	6	7	8
Valve overlap	A1	B3	A3	B2	A2	B1	<div><div></div><div></div><div></div><div></div></div>	A1	B4	A4	B1	B3	A3	B2	A2
Adjusting	B2	A2	B1	A1	B3	A3	<div><div></div><div></div><div></div><div></div></div>	B3	A3	B2	A2	A1	B4	A4	B1





### ● Adjustment

Turn crankshaft according to sequence shown in the diagram (starting with cyl. 1).

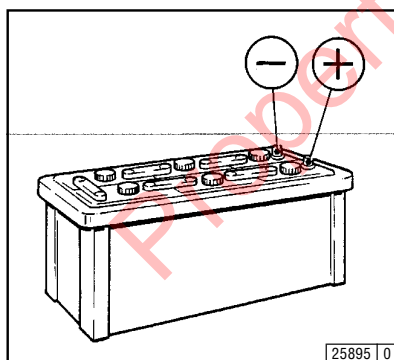
The valves of the relevant cylinder overlap, **marked in white**, (exhaust valves about to close, inlet valves about to open). Adjust clearance of valves, **marked in black**, according to schematic. Mark the respective rocker arm with chalk to show that the adjustment has been done.

## 6.7 Accessories

## Service and Maintenance

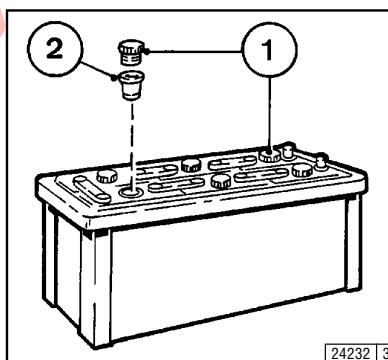
### 6.7.1 Battery

#### 6.7.1.1 Checking Battery and Cable Connections



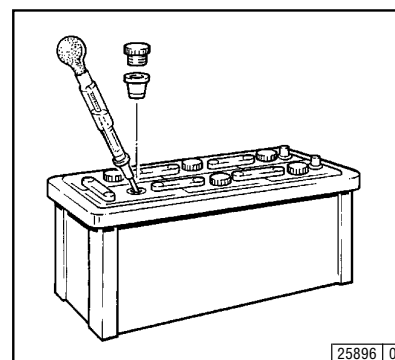
- Keep battery clean and dry.
- Undo soiled terminals.
- Clean battery plus and minus poles and terminals and apply a film of acid-free and acid-resistant grease.
- When reconnecting, ensure good contact of terminals. Fasten clamping bolts finger tight.

#### 6.7.1.2 Checking Electrolyte Level



- Remove cell caps 1.
- If electrolyte test elements 2 are fitted:  
The level should be high enough to wet the bottom of these.
- If no such elements are provided :  
Check to make sure that the level is 10-15 mm above the top edge of the plates.
- Top up with distilled water if necessary.
- Fit cell caps back in position.

#### 6.7.1.3 Checking Specific Gravity of Electrolyte



- Measure the specific gravity of the individual cells with a commercial hydrometer.  
The measured values (see adjacent table) indicate the state of charge of the battery. During the measurement, the temperature of the electrolyte should preferably read 20 °C.

Specific Gravity				
in [kg/l]		in [°Bé (degrees Baumé) *]		State of Charge
Normal	Tropics	Normal	Tropics	
1.28	1.23	32	27	Fully charged
1.20	1.12	24	16	Half charged, recharge
1.12	1.08	16	11	Discharged, charge up immediately

\* Measurement of the specific gravity in °Bé (degrees Baumé) is obsolete and rarely used today.



The gases emitted by the battery are explosive! Avoid formation of sparks in the vicinity of battery, keep away any open flames! Do not allow acid to come into contact with skin or clothing!

Wear protective goggles!  
Do not place tools on battery!

## 6.7 Accessories

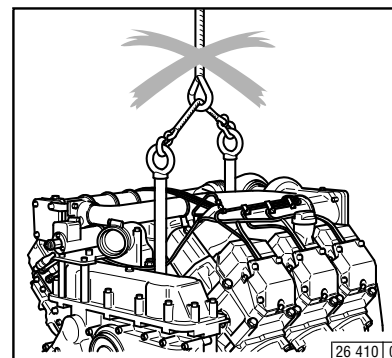
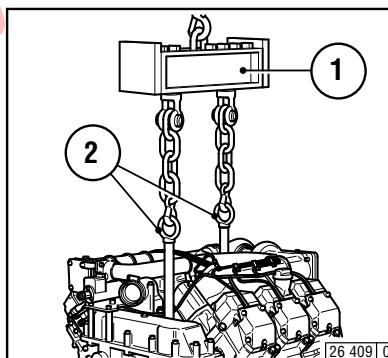
## Service and Maintenance

### 6.7.2 Three-Phase Alternator

#### Notes on the three-phase system:

- When the engine is running, never disconnect the cables between battery, alternator and regulator.
- Where it is, however, necessary, to start and operate the engine without battery, disconnect the regulator from the alternator before starting.
- Be sure not to confuse the battery terminals.
- Renew a defective charging pilot light bulb immediately.
- Engine cleaning: Do not spray with water/steam jet directly against alternator!  
Warm up engine to allow water residues to evaporate.
- Do not loosen connecting cable between battery and alternator during engine operation.
- The habit of touching a lead against frame to check whether it is live must under no circumstances be applied with a three-phase electric system.
- In case of electric welding, connect the earth terminal of the welding unit direct to the part to be welded.

### 6.7.3 Lifting Tackle



- For transporting the engine, always use the proper lifting tackle.
- Remove lifting tackle.
  - Do not start engine with lifting tackle fitted.



Always use the proper lifting tackle!

## 7.1 Diagnosis Chart

- 

After repairs :

**Important: Never start engine with the speed governor removed.**  
**Disconnect battery terminals!**

## Troubleshooting

\* LDA = manifold pressure compensator

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Troubles													Remedial Measure		
	Engine fails (or difficult) to start												Check	P	
	Engine starts, but runs unevenly or stalls												Adjust	E	
	Engine becomes too hot, temperature monitor gives warning												Renew	W	
	Engine gives poor performance												Clean	R	
	Engine not working on all cylinders												Top up	A	
	Engine has little or no oil pressure												Lower Level	S	
	Engine oil consumption excessive												Bleed	L	
	Engine smokes – blue														
	– white														
	– black														
													Causes	Section	
●													Cable connection to starter loose or oxidized	Electrics	P
●													Starter defective or pinion does not engage		P
●	●		●	●				●	●				Incorrect valve clearance	Engine	E
●	●		●	●									Leaking injection line		P
		●											Vent pipe clogged (coolant heat exchanger)		P / R
●								●					Flame-type heater plug system defective		P
●	●	●	●	●				●	●				Injector defective		P / W
●	●		●	●									Air in fuel system (lack of fuel)		P / L
●	●		●	●									Fuel filter / prefilter contaminate		P/R/W
●							●						Incorrect lube oil SAE class or quality grade	Operating Media	W
●	●		●						●				Fuel quality grade not corresponding to specification under 4.2.1		P / W
		●											Lack of coolant		P / A

## Engine Preservation

8

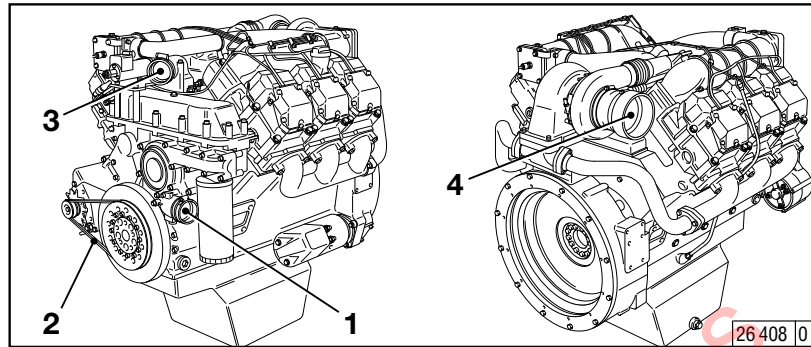
### 8.1 Preservation

If the engine is to be shut down for an extended period, it is necessary to take preservation measures to prevent rust formation. The preservation measures described here will protect the engine for a period of up to about 6 months. Before reusing the engine, the preservatives must be removed.

- Anti-corrosion oils to Specification:
  - MIL-L 21260B
  - TL 9150-037/2
  - Nato Code C 640 / 642
- Recommended cleansing agent for removing preservatives:
  - Petroleum benzine (hazardous materials class A3)

#### Preserving the Engine:

- Clean engine (in case of need with cold cleansing agent).
- Clean cooling system according to manufacturer's instructions.
- Run engine until warm and stop.
- Drain engine oil, see 6.1.2, and fill in anti-corrosion oil.
- Drain coolant, see 6.3.3.
- Fill in anti-corrosion agent, see 4.3.3.
- Clean oil bath air cleaner, if provided, see 6.4.3, and fill in anti-corrosion oil.
- Drain fuel from tank.
- Prepare a mixture of 90% diesel fuel and 10% anti-corrosion oil and fill up tank.



- Run engine for about 10 minutes.
- Stop engine.
- Turn engine several times by hand. When turning engine with starter, move shutdown lever to stop position.
- Remove V-belt 2 and store in wrapped condition.
- Spray grooves of V-belt pulleys with anti-corrosion agent.
- Close coolant inlet and outlet openings 3 and air intake opening 4.
- Close exhaust discharge opening.

- Drain off anti-corrosion agent, see 6.3.3.

#### Removing Engine Preservatives:

- Remove anti-corrosion agent from the grooves of the V-belt pulleys.
- Fit V-belt 2. Retension, if necessary, after short period of operation, see 6.5.
- Remove plugs 1, 3 and 4 and plug from exhaust discharge opening.
- Fill in coolant according to instructions of radiator manufacturer.
- Start up engine.

## Specification Data

### 9.1 Engine Specifications and Settings

### 9.2 Torque Wrench Settings

### 9.3 Tools

# Specification Data

## 9.1 Engine Specifications and Settings

9

Model 1015 BF6M 1015 BF8M 1015 BF6M 1015 C/ CP BF8M 1015 C/ CP

Number of cylinders		6	8	6	8
Cylinder arrangement		90° Vee-angle			
Bore	[mm]	132			
Stroke	[mm]	145			
Total displacement	[cm³]	11906	15874	11906	15874
Compression ratio	[ε]	17			
Working cycle / combustion system		4-stroke TC engine/direct injection			
Direction of rotation		counter-clockwise			
Weight incl. cooling system	[approx. kg]	Consult headquarters			
Weight w/o cooling system acc. to DIN 70020-A	[approx. kg]	830	1060	830	1060
Engine power	[kW]	190-240 <sup>1)</sup>	250-320 <sup>1)</sup>	228-300 <sup>1)</sup>	304-400 <sup>1)</sup>
Speed	[rpm]	1)			
Valve clearance, engine cold <sup>5)</sup>	[mm]	inlet 0.25 <sup>+0.1</sup> / exhaust 0.3 <sup>+0.1</sup>			
Injector opening pressure	[bar]	290 bar			
Commencement of delivery	[°CA BTDC]	1)			
Firing order		1-6-3-5-2-4 A1-B3-A3-B2-A2-B1	1-8-4-5-7-3-6-2 A1-B4-A4-B1-B3-A3-B2-A2	1-6-3-5-2-4 A1-B3-A3-B2-A2-B1	1-8-4-5-7-3-6-2 A1-B4-A4-B1-B3-A3-B2-A2
V-belt tension:		tension / retension <sup>2)</sup>			
Alternator 55 amperes	[N]	450 / 200-350 <sup>±50</sup>			
Alternator 120 amperes	[N]	550 / 300-450 <sup>±50</sup>			

<sup>1)</sup> Engine power, speed, commencement of delivery, etc. are stamped on the rating plate, see 2.1.

<sup>2)</sup> Retension after running for 15 minutes under load.

## 9.1 Engine Specifications and Settings

## Specification Data

Model 1015 BF6M 1015 BF8M 1015 BF6M 1015 C/ CP# BF8M 1015 C// CP#

9

Cooling system		liquid-cooled / cooling system protection			
Coolant quantity	[approx. lit.]	17 + MFK*	21 + MFK*	17 + MFK*	21 + MFK*
Perm. cont. coolant temperature engine outlet	[°C]	max.103			
Temperature difference between coolant inlet / outlet	[°C]	max.5			
Thermostat starts opening at	[°C]	87 <sup>±2</sup>			
Thermostat fully open from	[°C]	102			
Coolant pump		4)			
Delivery pressure in	[bar]	22,5 <sup>4)</sup>			
Delivery rate in	[m³/h]	30 <sup>4)</sup>	22,5 <sup>4)</sup>	30 <sup>4)</sup>	22,5 <sup>4)</sup>
Lubrication		forced-feed lubrication			
SAE oil (see 4.1)		15 W 40			
Min. oil pressure with engine warm (120 °C) at low idle / rated speed	[bar]	1,0			
Oil capacity (initial filling) without filter	[approx. lit.]	34 <sup>3)</sup>	45 <sup>3)</sup>	34 <sup>3)</sup>	45 <sup>3)</sup>
Oil capacity (initial filling) engine-mounted filter	[approx. lit.]	36* <sup>3)</sup>	47* <sup>3)</sup>	36* <sup>3)</sup>	47* <sup>3)</sup>
Oil capacity (initial filling), separate filter	[approx. lit.]	38 <sup>3)</sup>	50 <sup>3)</sup>	38 <sup>3)</sup>	50 <sup>3)</sup>

<sup>3)</sup> Approximate figures can vary depending on the design. **Decisive is always the upper dipstick mark.**

<sup>4)</sup> 3 bar at engine speed n = 2100 rpm <sup>-1</sup>

<sup>5)</sup> see 6.1.1 (# only synthetic lube oil, see.4.1.2.1)

\* MFK Engine radiator

## Specification Data

## 9.2 Torque Wrench Settings

9

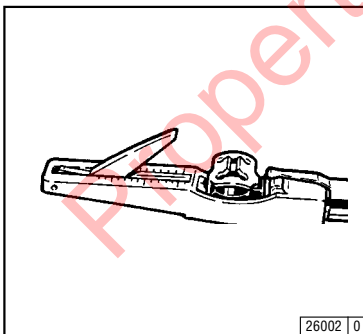
Location	Preloading [Nm]			Tightening [° deg.]				Total [Nm]	Notes
	1st Stage	2nd Stage	3rd Stage	1st Stage	2nd Stage	3rd Stage	4th Stage		
Rocker cover								22	
Inspection Cover								22	
Rocker arm setscrew								20	
Mount	rigid mounting	30		45					
	flexible mounting							106	
Air intake manifold								21	
Exhaust manifold								61	
Oil drain plug								100	
Injector mounting								60	
Injection line mounting								25	
Oil pan								24	
Oil filter cartridge								27	engine mounted or separate
Coolant drain plug								38	
Pin-type heater plugs / pipe union								4	

## 9.3 Tools

## Specification Data

### V-belt Tension Gauge

9



The V-belt tension gauge can be obtained under order number **8115 + 8120** from:

Fa. WILBÄR  
Postfach 14 05 80  
D-42826 Remscheid



# Notes

## Warnings to Place on Equipment

### 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.

## Warning in the Manual

### 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.

or

### 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.

# Notes

## CALIFORNIA PROPOSITION 65 INFORMATION

### TO CALIFORNIA CUSTOMERS AND TO CUSTOMERS SELLING DIESEL ENGINE EQUIPMENT INTO OR FOR USE IN CALIFORNIA.

Proposition 65, a California law, requires warnings on products which expose individuals in California to chemicals listed under that law, including certain chemicals in diesel engine exhaust.

**Obligations of Manufacturers of Diesel-Powered Off-Road Equipment.** The California Superior Court has approved either of the following two methods of compliance with Proposition 65 requirements by manufacturers of off-road equipment containing diesel engines. (The court order containing these provisions is attached.)

1. **On-Equipment Warning.** Place the warning pictured in attachment 1 on all equipment shipped by you into or for sale in California after January 1, 1996. The warning must be in a location where it is easily visible to the operator of the equipment when (s)he is operating the equipment. The warning must be secured to the equipment. If warnings or operating instructions are provided through a digital display, you may use that method of providing warning.
2. **Operator Manual Warning.** When the operator manual is next revised or by December 31, 1995 whichever is earlier, place the warning in attachment 2 in the operator manual. The warning may be either printed in the manual or on a sticker.

The warning must appear in one of the following locations:

- Inside The front cover
- Inside the back cover
- Outside the front cover
- Outside the back cover
- As the first page of text

Under either alternative, the warning must appear in the same size, print and format as the attachment selected or be of an equally conspicuous size and format. If the warning is provided in an on-screen display, the warning must contain the language in the attachment and must be provided at the time of or in connection with ignition in the same manner as other safety warnings electronically communicated on screen.

**Obligation of Resellers of Diesel Engines.** This letter must accompany any loose diesel engine sold in California. Should you have any questions, please call Deutz Corporation Product Support Department.

### Knowing it's DEUTZ

DEUTZ has always stood for excellence in motor construction, pioneering many developments in the industry. As an independent motor manufacturer, we offer — worldwide — a comprehensive range of diesel and gas motors spanning from 4kW to 7,400kW. Our products are perfectly tailored to meet our customers' individual requirements.

Over 1.4 million DEUTZ motors do their job reliably all over the world. We are determined to preserve the high standard of performance and dependability of our motors, thus keeping our customers satisfied at all times. Therefore we are represented worldwide through a network of highly competent service partners who will meet the needs of our customers, wherever they are.

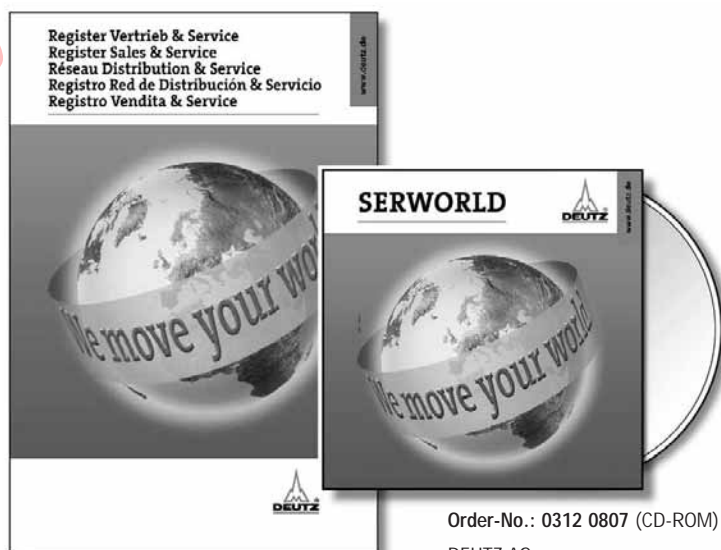
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The Index is constantly updated. Please ask your DEUTZ service partner for the latest edition.

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