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| **Information about maintenance** |
| **Owner Manual KDW 502 | 702 | 1003 | 1404 - K-HEM 1003 (Rev. 00)** |



**Registration of modifications to the document**

Any modifications to this document must be registered by the drafting body, by completing the following table.

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**Translated from the original manual in Italian language**

Data reported in this issue can be modified at any time by KOHLER.

Sommario

[1. TITOLO 1 2](#_Toc495648770)

[1.1. Asdfsdfsdf 2](#_Toc495648771)

[1.2. Asdfsdfsdfggg 2](#_Toc495648772)

# Information about maintenance

## Pre-start check

* Read carefully the following pages and carry out the operations described below in accordance with the instructions specified.

Z_importante.jpg **Important**

* Non compliance with the operations described in the following pages involves the risk of damages to the engine and vehicle on which it is installed as well as personal and/or property damage.
* Increase the frequency of maintenance operations in heavy working conditions (engine starts but stops, very dusty and hot environments, etc..).

## Running-in period

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| **NOTE: For the first 50 hours of engine operation, it is advisable not to exceed 75% of the maximum power supplied.** |

## Starting and turning off

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| **4.3.1 Starting**   1. Check the level of the engine oil, fuel and coolant and fill if necessary ( **Par.** **4.5 - 4.6 - 4.7** ). 2. Put the ignition key in the ignition switch (if supplied). 3. Tun the key to  **ON**  position. 4. Turn the key beyond the  **ON**  position and release it when the engine starts (the key will return into  **ON**  position automatically).   Z_importante.jpg **Important**         * At the first fuelling or if the tank was empty filling the fuel system ( **Par. 4.9** from point 4 to point 6). * Do not actuate the starter for more than 15 seconds at a time. If the engine does not start, wait for one minute before repeating attempt. * If engine does not start after two attempts see  **Tab. 5.2**  to found the cause. | |
| Cap_4_01.png | |
| Panel **P** can be assembled on the engine or machine. In  **Tab. 4.1**  are described the main functions are illustrated.  **4.1**   |  |  | | --- | --- | | **POS.** | **DESCRIPTION** | | **H** | Hour-meter indicator | | **R** | engine RPM indicator | | **S** | Control switch to start the engine | | **W1** | Warning Light - fuel below MIN level | | **W2** | No fault indicator | | **W3** | Warning Light - engine oil not pressurised | | **W4** | Warning Light - high coolant temperature | | **W5** | Warning Light - battery not charging | | **W6** | Warning Light - machine alarm indicator | | **W7** | Warning Light - glow plugs/heater ignition | | **W8** | Warning Light - alarm general indicator | | **W9** | Warning Light - air cleaner clogged | | |
| **4.3.2**   **After starting**  Z_Avvertenza.jpg **Warning**       * Make sure that all the warning lights on the control panel are off when the engine is running. * Run at minimum speed for a few minutes according to table (except constant speed engine).  |  |  | | --- | --- | | **AMBIENT TEMPERATURE** | **TIME** | | ≤-20°C | **2 minutes** | | from -20°C a -10°C | **1 minutes** | | from -10°C a -5°C | **30 seconds** | | from -5°C a 5°C | **20 seconds** | | ≥ 5°C | **15 seconds** | | |
| **4.3.3**   **Turning off**   1. Do not turn off the engine when it is running at the maximum rotation speed (except constant speed engine). 2. Before turning it off, keep it idle at minimum speed for about 1 minute. 3. Turn the key to  **OFF**  position. | |

## Periodic maintenance

* This chapter shows all operations described in the  **Tab. 4.2, 4.3** . if you have the skills appropriate may be directly carried out by the user.
* Periodic inspection and maintenance operations must be carried out as indicated in this manual and are the responsability of the user.
* Failure to comply with these service and maintenance intervals increases the risk of technical damage to the engine. Any non compliance makes the warranty become null and void.
* In order to prevent personal and property damage read carefully the instructions listed below before proceeding with any operation of the engine.

Z_Avvertenza.jpg **Warning**

* Inspections must be made when the engine is off and cold.
* Place engine on level sur face to ensure accurate measurement of oil level.
* Before starting, to avoid spillages of oil make sure that:  
  - the oil dipstick is inserted correctly;
* also check that: - oil drain plug and

- oil filler cap are tightened firmly.

Z_importante.jpg **Important**

* Before proceeding with operation, read  **Par. 3.2.2** .

Z_Pericolo.jpg    **Danger**

* For safety precautions see  **Chap. 3** .

The intervals of preventive maintenance in  **Tab.** **4.2** and **Tab.** **4.3** refer to the engine operating under normal operating conditions with fuel and oil meeting the approved specifications.

**4.2**

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| **CHECKING** | | |
| **OPERATION DESCRIPTION** | **PERIOD (HOURS)** | |
| **10** | **200** |
| Engine oil level |  |  |
| Coolant level |  |  |
| Cartridge dry-type air filter (3) |  |  |
| Radiator heat-exchange surface and Intercooler |  |  |
| Standard alternator belt (1) |  |  |
| Rubber hose (intake air / coolant) |  |  |
| Fuel hose (1) |  |  |

**4.3**

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| --- | --- | --- | --- | --- | --- |
| **REPLACEMENT** | | | | | |
| **OPERATION DESCRIPTION** | | **PERIOD (HOURS)** | | | |
| **125** | **200** | **500** | **1000** |
| Engine oil (1) | |  |  |  |  |
| Oil filter cartrige (1) | |  |  |  |  |
| Cartridge dry-type air filter (2)(3) | |  |  |  |  |
| Fuel filter (1) | |  |  |  |  |
| Standard alternator belt (2)(4) | |  |  |  |  |
| Intake manifold hose (air filter - intake manifold) (2)(3)(4) | |  |  |  |  |
| Coolant hoses (2)(3)(4) | |  |  |  |  |
| Fuel line hose (2)(3)(4) | |  |  |  |  |
| Coolant (2)(4) | |  |  |  |  |

(1) - In case of low use: 12 months.

(2) - In case of low use: 24 months.

(3) - The period of time that must elapse before checking the filter element depends on the environment in which the engine operates.

(4) - Contact authorized  **KOHLER**  workshops.

## Refuelling

Z_importante.jpg **Important**

* Before proceeding with operation, read  **Par. 3.2.2** .

Z_Pericolo.jpg    **Danger**

* Fill the engine off.
* The only approved fuels are those listed in  **Tab. 2.3** .
* In those countries where fuel has a high sulphur content, its is advisable to lubricate the engine with a high alkaline oil or alternatively to replace the lubricating oil approved by  **KOHLER**  more frequently.
* To avoid explosions or fire outbreaks, do not smoke or use open flames during the operations.
* Fuel vapours are highly toxic.Only carry out the operations outdoors or in a well ventilated place.
* Keep your face well away from the fuel fill to prevent harmful vapours from being inhaled.
* Dispose of fuel in the correct way and do not litter as it is highly polluting.
* When refuelling, it is advisable to use a funnel to prevent fuel from spilling out.The fuel should also be filtered to prevent dust or dirt from entering the tank.

Do not overfill the fuel tank. Leave room for the fuel to expand.

## Engine oil and oil filter - filling/checking/replacement

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| --- | --- |
| Z_importante.jpg **Important**       * For safety precautions see **Par. 2.4** . * Before proceeding with operation, read  **Par. 3.2.2** . * Do not use the engine with the oil level below the **MIN** . * Do not exceed the **MAX** level on the dipstick. | |
| **Filling**   1. Loosen the oil filler cap **A** . 2. Add the oil of type recommended ( **Tab. 2.2** ). | Cap_4_02.png  Cap_4_03.png |
| 1. Before checking oil engine needs to be level. 2. Remove the oil dipstick **B** and check that the level is up to but does not exceed the **MAX** . 3. If level is not at the **MAX** . level, add additional oil. 4. Re-tighten the cap **A,** **C** . | Cap_4_04a_Tavola_disegno_1.png Cap_4_04b_Tavola_disegno_1.png |
| **Oil level check**    Perform the operations from point 3 to 6. |  |
| **Oil replacement**  **NOTE** : Perform this operation with warm engine, to get a better fluidity of the oil and get a full discharge of oil and impurities contained in it.     1. Loosen the oil filler cap **A** . | Cap_4_02.png |
| 1. Unscrew the oil filter **F** with appropriate wrench. 2. Assembly and tighten the new oil filter cartridge **F** (torque to **15 Nm** ). | Cap_4_05.png  Cap_4_06.png |
| 1. Remove the oil dipstick **B** . 2. Remove the oil drain plug **D** and the gasket **E** (the oil drain plug is on both sides of the oil sump). 3. Drain oil in an appropriate container. 4. Replace gasket **E** . 5. Tighten the drain oil plug **D** (tightening torque at **35 Nm** ). | Cap_4_04a_Tavola_disegno_1.png   Cap_4_07_Tavola_disegno_1.png  Cap_4_08_Tavola_disegno_1.png   Cap_4_09_Tavola_disegno_1.png |
| 1. Add the type of oil approved ( **Tab. 2.2** ). 2. Fit and remove the oil dipstick **B** to check the level. Pour in fluid until reaching the **MAX** level mark. 3. Upon completion, reinstall the oil dipstick **B** completely. 4. Tighten the cap **A,** **C** . | Cap_4_03.png  Cap_4_04a_Tavola_disegno_1.png   Cap_4_04b_Tavola_disegno_1.png |

## Coolant - fill / check / replacement

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| Z_importante.jpg **Important**       * Before proceeding with operation, read  **Par. 3.2.2** .   **NOTE** : Before proceeding with any operation on the engine, stop it and allow it to cool.      Z_Avvertenza.jpg    **Warning**       * Presence of steam pressurized coolant danger of burn. * The freezing point of the refrigerant mixture depends on the amount concentration in water. * As well as lowering the freezing point, the antifreeze also raises the boiling point. * A 50% mixture is recommended to ensure a general level at protection prevents the formation of rust, galvanic currents and calcium deposits.   **NOTE** : Component not necessarily supplied by  **KOHLER** . | |
| **FILLING**   1. Loosen the cap  **A**  and fill the radiator with coolant composed of: 50% ANTIFREEZE and 50% decalcified water. 2. Top liquid up until the pipes inside the radiator are covered by about 5 mm. Do not overfill the radiator, but leave room for the coolant to expand. 3. For engines equipped with expansion tank, pour in fluid until reaching the max level mark. 4. Re-tighten the cap  **A** . 5. Keep it running at idle speed until the cooling liquid level goes down and becomes steady (the waiting times varies according to the ambient temperature). 6. Stop the engine and allow it to cool. 7. If there is an expansion tank ( **C** ) top liquid up to the mark  **MAX** . 8. Without expansion tank top liquid up until the pipes inside the radiator are covered by 5 mm. Do not overfill the radiator, but leave room for the coolant to expand. 9. Tighten the radiator cap  **A**  or the expansion tank ( **C** ) cap  **B** .     Z_Avvertenza.jpg **Warning**       * Before starting make sure that the radiator cap and expansion tank cap, if present, are installed correctly to avoid spillage of liquid or vapour at high temperatures. * After a few hours of operation stop the engine and allow it to cool. Check and top up the coolant liquid.   **CHECK**   1. Perform the operations from point 2 to 9. | Cap_4_10.png  Cap_4_11.png  5.8.jpg |
| **REPLACEMENT**     1. Undo the cap  **A**  carefully (circuit under pressure). 2. Loosen clamp **D** and disengage tube **E** from radiator, drain all coolant in radiatorinto a suitable container and refer to  **Par. 3.6** . 3. Undo cap  **F** , remove gasket  **H** , to drain all liquid from the system contained in the engine crankcase ducts into an appropriate container ( **Par. 3.6** ). 4. Replace gasket  **H** . 5. Tighten the drain oil plug  **F** (tightening torque at **35 Nm** ). 6. Fasten tube **E** on the radiator using clamp **D** . 7. Fill the radiator. | Cap_4_10.png  Cap_4_12.pngCap_4_13.png  Cap_4_14.png  Cap_4_15.png |

## Air filter cartridge - replacement

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| Z_importante.jpg **Importante**       * Before proceeding with operation, read  **Par. 3.2.2** .   **NOTE** : Components not necessarily supplied by  **KOHLER** . |

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| **REPLACEMENT**   1. Release the two fastenings  **F**  of the cover  **A** . 2. Remove the cartridge  **B** . 3. Clean the inside components  **A and D**  with a damp cloth. 4. Reinstall: - the new cartridge  **B** . -the cover  **A**  checking the right tightness of fastenings  **F** . | Cap_4_16.png  Cap_4_17.png |

## Fuel filter cartridge - check/replacement

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| **Check**      Z_importante.jpg **Important**       * Before proceeding with operation, read  **Par. 3.2.2** .     Z_Pericolo.jpg   **Danger**       * For safety precautions see **Chap. 3.**  1. Gently loosen the water drain plug **A** without removing it. 2. Spill out the water if present. 3. Re-tighten the water drain plug **A** as soon as the fuel spills. | Cap_4_12.png |
| **Replacement**      Z_importante.jpg **Important**     * Do not fill the new cartridge **B** with fuel.  1. Procure a suitable container to collect the fuel. 2. Loosen and remove cartridge **B** . 3. Lubricate the gasket **C** . Tighten the new cartridge **B** onto support **D** (tighten manually). | Cap_4_13.png  Cap_4_14.png |
| Replace the prefilter **H** if present. | Cap_4_15.png |
| If the engine is equipped with an electric fuel pump **G** :   1. Turn the key on the control panel to the **ON** position. The electric pump **G** sends fuel to the filter **B** and then the injection pump. 2. Loosen the air bleeding screw **F** on fuel filter bracket **B** . The air inside the circuit and the filter will begin to escape from the screw **F** . 3. Tighten the bleeding screw **F** (tightening torque of **1.5 Nm** ) when the fuel begins to flow. | Cap_4_22.png  Cap_4_21.png |

## Check of the radiator heat - exchanger surface

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| Z_Pericolo.jpg    **Danger**       * For safety precautions see  **Chap. 3 .**   **NOTE:**  Component not necessarily supplied by  **KOHLER** .    Z_importante.jpg **Important**       * Before proceeding with operation, read  **Par. 3.2.2** . * Wear safety goggles when using compressed air. * The radiator heat-exchange surface must be cleaned on both.      1. Check the radiator heat-exchange surface  **A** . 2. Clean the surface with a brush soaked in special detergent if it is clogged. | Cap_4_18.png |

## Rubber hoses check

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| Pericolo.png  **Danger**   * For safety precautions see  **Cap. 3.**     The check is carried out by exerting a slight deflection or bending along the pipe and near the hose clamps. Components must be replaced if they have clear signs of cracks, tears, cuts, leaks and do not retain a certain degree of elasticity.      Importante.png  **Important**   * Before proceeding with operation, read  **Par. 3.2.2** . * If hoses are damaged contact an authorized KOHLER workshop. * For other pipes not illustrated refer to the technical documentation of the vehicle. | Cap_4_21.png |
| 1. Check the integrity of the pipes and hoses  **A** . | Cap_4_22.png |

## Alternator standard belt - check/setting/replacement

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| Z_importante.jpg  **Important**       * Before proceeding with operation, read  **Par. 3.2.2.** | |
| **CHECK**   * 1. Check the belt  **A**  condition, if worn out or deteriorated, replace it.   2. The belt tension can be checked by applying a force of approx' **10kg** on the point **P** . When correctly tensioned the belt must show a movement of less than **10 mm** .   If not adjust it.  **SETTING**   * 1. Loosen the fastening bolts  **B e C** .   2. Pull the alternator outwards to tension the belt **A** .   3. Tension the belt **A** , screw the bolts  **B** , **C** .   4. Tighten bolts **C** , **B** in sequence (tightening torque **45 Nm [thread M10] - 25 Nm [thread M8]** ).   5. The belt tension can be checked by applying a force of approx' **10kg** on the point **P** . When correctly tensioned the belt must show a movement of less than **10 mm** .   6. Let the engine run for some minutes, then let it cool down at ambient temperature and repeat the operations **of SETTING** in case the belt tension results out of the above mentioned values. | Cap_4_23.pngCap_4_24.png |
| **REPLACEMENT**   * 1. Loosen the fastening bolts  **B e C** .   2. Replace the belt **A** .   3. Pull the alternator outwards to tension the belt **A** .   4. Tension the belt **A** , screw the bolts  **B** , **C** .   5. Tighten bolts  **C** ,  **B**  in sequence (tightening torque  **45 Nm [thread M10] - 25 Nm [thread M8]** ).   6. The belt tension can be checked by applying a force of approx' **10kg** on the point **P** . When correctly tensioned the belt must show a movement of less than **10 mm** .   7. Let the engine run for some minutes, then let it cool down at ambient temperature and repeat the operations **of SETTING** in case the belt tension results out of the above mentioned values. | Cap_4_24.png  Cap_4_25.png  Cap_4_23.png |

## Product preservation

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| Importante.png  **Important:**   * If the engines are not to be used for 6 months, they must be protected by carrying out the operations described in Engine storage (up to 6 months) ( **Par.** **4.14** ). * If the engine is still not in use after the first 6 months, it is necessary to carry out a further operation to extend the protection period (more than 6 months) ( **Par.** **4.15** ). * If the engine is not to be used for an extended period, the protective treatment procedure must be repeated within 24 months of the previous one. |

## Engine storage (up to 6 months)

**Before storing the engine check that:**

* The environments are not humid or exposed to bad weather. Cover the engine with a proper protective sheet against dampness and atmospheric contaminants.
* The place is not near electric panel.
* Avoid storing the engine in direct contact with the ground.

## Engine storage over 6 months

**Follow the steps described in** **Par. 4.14 .**

1. Engine oil replacement.
2. Refuel with fuel additives for long storage.
3. With expansion tank:  
   make sure that the coolant is up to the maximum level.
4. Without expansion tank: Top liquid up until the pipes inside the radiator are covered by about 5 mm.

Do not overfill the radiator, but leave room for the fuel to expand.

1. Start the engine and keep it idle at minimum speed for 2 minutes.
2. Bring the engine to 3/4 of the maximum speed for 5÷10 minutes.
3. Turn off the engine.
4. Completely empty the fuel tank.
5. Spray SAE 10W-40 on the exhaust and intake manifolds.
6. Seal the exhaust and intake ducts to prevent foreign bodies from entering.
7. When cleaning the engine, if using a pressure washer or steam cleaning device, avoid directing the nozzle on electrical components, cable connections and sealed rings (oil seals etc).  
   If cleaning engine with a pressure washer or steam cleaner, it is important to maintain a minimum distance of at least 200mm between the surface to be washed and the nozzle - avoiding absolutely electrical components such as alternators, starter motors and engine control units (ECU).
8. Treat non-painted parts with protective products.

If the engine protection is performed according to the suggestions indicated no corrosion damage should occur.

## Engine starting after storage

1. Remove the protective sheet.
2. Use a cloth soaked in degreasing product to remove the protective treatment from the external parts.
3. Inject lubricating oil (no more than 2 cm 3 ) into the intake ducts.
4. Refill the tank with fresh fuel.
5. Make sure that the oil and the coolant are up to the **MAX** level.
6. Start the engine and keep it idle at minimum speed for a two about minutes.
7. Bring the engine to 75% of **MAX** rated speed for 5 to 10 minutes.
8. Stop the engine while the oil is still hot, discharge the protective oil in a suitable container.

Z_Avvertenza.jpg **Warning**

* + Over time, lubricants and filters lose their properties, so it is important consider whether they need replacing, also based on the criteria described in  **Par.** **4.3** .

1. Replace the filters (air, oil, fuel) with original spare parts.
2. Pour new oil up to the **MAX** level *.*
3. Empty the cooling circuit completely and pour in the new coolant up to the **MAX** level.

## Disposal and scrapping

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| * In case of scrapping, the engine shall be disposed of in appropriate locations, in conformity with the law in force. * Before scrapping, it is necessary to separate the rubber or plastic parts from the rest of the components. * The parts only composed of plastic material, aluminium and steel can be recycled if collected by the appropriate centers. * Waste oil must properly be recycled and disposed of in the correct way to safeguard the environment. According to the laws in force, it is classified as hazardous waste, therefore it must be collected by the appropriate centers. |

## Unused machine

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| --- | --- |
| If the machine is not used for a certain amount of time, follow the operations below:  **4.18.1** **Operations for the engine** | |
| |  |  |  | | --- | --- | --- | | **POINT** | **OPERATION** | | | **1** | Unused machine up to 2 months | * The place must be dry and fresh throughout the period in which the machine is not used. * Consult the machine’s manual to disconnect the battery (before disconnecting the battery, wait for minimum 5 mins after turning off the engine). * Make sure the engine is not exposed to direct sunlight. * Make sure the engine is not near any heat sources. | | Starting | * Before starting the engine, check Par. 4.4 for maintenance operations. * Consult the machine’s manual to connect the battery and start the engine. | | **2** | Unused machine from 2 to 9 months | * Perform the operations related to unused machine described in point 1. * Perform the operations described in Par. 4.11. * Start the engine at least every 4 months as per operations described in point 1: * Avoid sudden accelerations for the first few minutes. * Bring the engine to the working temperature by pressing the accelerator 3/4 from MAX. * Leave the engine running at minimum speed for a few minutes and turning off the engine. | | * Starting | * Before starting the engine, check Par. 4.4 for maintenance operations. * Consult the machine’s manual to connect the battery and start the engine. * Avoid sudden accelerations for the first few minutes. | | **3** | Unused machine over 9 months | * Perform the operations related to unused machine described in point 1 and 2. | | Starting | * Before starting the engine, check Par. 4.4 for maintenance operations. * Check the quality of coolant from the relative testing strips. * Consult the machine’s manual to connect the battery and start the engine. * Avoid sudden accelerations for the first few minutes. | | |

