MAINTENANCE CONTRACT

Water Cooled Generators

date	hours	comments	technician

Important instructions

1. To protect your rights and warranty claims, it is not allowed to remove the seal from the fuel injection pump.

2. When the seal of the fuel pump is removed, the manufacturer's warranty expires. 3. The fuel pump may not be dismantled by the user, if this happens, the manufacturer's warranty expires.

4. The turbocharger shaft is a precision-manufactured and high-speed rotating part. Disassembly is strictly prohibited.

5. The connecting rod cap bolts are disposable and should be replaced if they have become loose.

6. It is not allowed to loosen the bolts of the crankshaft and connecting rod bearings within the warranty period.

7. The cooling water level and the oil level should be checked each time before the diesel engine is started.

8. Setting the fuel injection advance affects performance and fuel consumption. The user of the motor should leave the setting of this torque to a specialist.

Points of attention

1. Read this manual carefully and follow the instructions in this manual.
2. Perform a fifty-hour test run during commissioning.
3. First warm up the engine at low speeds, gradually change from low to high speed. After a period of load, let the engine idle for five to ten minutes before shutting it off.

4. Use antifreeze in the cooling system to prevent freezing in winter.
5. Do not run the engine without an air filter.
6. Only use the specified lubricating oil.
7. Checking and making repairs to the electrical system should only be carried out by persons who are qualified to do so.

8. Regularly carry out an optical check.
9. The motor has been calibrated and set at the factory.
10. We expressly invite you to report findings and comments about the functioning and performance of the engine in general to us.
11. When parts for the engine are ordered for maintenance or repair, these must be parts that have been approved by Javac

Introduction

The diesel engines are produced under license by Javac. This diesel engine has various features, such as compact construction, reliability, very good power characteristics and low consumption, quick starting, easy to operate and easy to maintain. When the engine is (partially) disassembled for maintenance, it is recommended to keep the parts book “parts catalog for diesel engine” at hand. The engine is constantly being developed and improved, it is not possible to communicate all changes to the owners of these engines all the time. The engine has three different versions of intake types: ***Atmospheric aspirated, Turbocharged Turbocharged with intercooler.***

The engine is available in a 3, 4 or 6 cylinder version and is a four-stroke water-cooled in-line engine with direct injection. The speed in the different versions varies from 1500 to 2500 rpm. and the power ranges from 40kW – 300kW.

Commissioning of the engine

When the ambient temperature of the engine is higher than -15 C°, 15W40 multigrade oil should be used. For lower temperatures, 10W50 is the right choice.

Maintenance and repair

The following activities must be carried out once according to the schedule below.

Then per repetition

Table 1: Maintenance work

Activities	**Operating Hours Comments**		
Cylinder head bolts		250 Quarter turn loosen then tighten to 210Nm 250	
Check V-belt and tension if necessary 30		10-15mm play	
Replace engine oil and oil filter 30		250 15W40 oil Netherlands	
Check and adjust valve clearance	30	250 Inlet: 0.20mm Outlet: 0.30mm	

Table2: Maintenance work

Activities	**Each Hours of Operation Comments**			
	250 500 1000			
Cleaning air filter	X			More often in dusty environment
Check V-belt and tension if necessary X				
Replace engine oil and oil filter		X		
Check valve clearance		X		
Replace diesel oil filter		X		
Cleaning the crankcase breather	X			In case it is not connected to the inlet

Checks

The generator should be checked regularly for the following points.

1. Check the air and fuel filter and replace if necessary. 2. Check the coolant level and the amount of antifreeze. Check for leaks 3. Check oil level 4. Check fuel pump and regulator 5.
Check battery voltage and current output 6.
Check electrical and mechanical connections. Tighten if necessary.
7. Check the voltage and frequency regulator of the synchronous generator.

Table 3: Regular inspections

Element	**Items to check**	**Time interval**
Diesel engine	Oil level	Every 12 hours
	Fuel level in tank	Every 12 hours
	Coolant level	Every 12 hours
	Drain sediment in the tank	Every 100 hours
	Check and clean the radiator	Every 100 hours
	Check fuel system and cooling system leaks Every 100 hours	
	Check the air filter	Every 250 hours
	Check the fuel and oil filter	Every 250 hours
	Check V-belt tension	Every 250 hours
	Check antifreeze content in cooling system	Every 250 hours

	Replace lubricating oil	Every 250 hours
Start system Check	level of electrolyte in battery	Every 12 hours
	Check state of charge by hydrometer	Every 100 hours
	Check the battery contacts and lubricate with grease	Every 200 hours
Generator Clean	the grilles with compressed air	Every 200 hours
	Check the contacts, tighten if necessary	Every 12 hours
	Check the ventilation space, remove obstacles	Every 12 hours
	Replace bearing grease (if necessary)	Every 200 hours
Complete inspection Check	for loose parts	Every 200 hours
	Check the exhaust	Every 200 hours
	Remove dust from the generator	Every 200 hours

Table 4: Test run

Time	**Action**
Every month	Test run according to section „Test run of the diesel engine without loadÿ
6 months	After the diesel engine has been running for six months but the total number of operating hours is less than 500 hours, it is time for the 500 hour service.
12 months	After the engine has been running for 12 months but the total number of hours is less than 1000 hours, it is time for the 1000 hours service.

Major maintenance

Engine reliability is affected by wear and corrosion of parts. To ensure proper operation of the engine, it is recommended to carry out maintenance according to the following table. The first major maintenance should be done after 2000 hours or two years, if 2000 operating hours have not been made.

subject	**operating hours**
Check injectors	2000
Check compression	2000
Check water pump bearing play	5000
Check turbocharger	5000
Check fuel pump	5000
Check cylinder heads	5000
Check water-cooled manifolds for corrosion (if equipped)	10000
Check crankshaft and connecting rod bearings	10000
Check the pistons	10000
Check the crankshaft	10000
Check the camshaft	10000
Check secondary balancing mechanism	10000
Check the timing gears	10000
Overhaul of the fuel pump	10000
Replace water pump	10000
Replace front and rear crankshaft oil seal rings	10000
Check shock absorber (if equipped)	10000

The above checks and any repairs require specialist knowledge and must be carried out by suitably qualified persons

Cleaning dry air filter When the maintenance indicator is in the red area, the resistance of the air filter affects the performance of the diesel engine. As a result, the filter must be cleaned or replaced according to the following steps: 1. Remove the filter element 2. Place the filter element with the opening on the ground 3. Use compressed air (less than 500 kPa or 5 bar) and blow from the inside out 4 .Clean and replace the sealing ring if damaged or dry 5. Check the dust cover and orifice 6. Reinstall the filter. When the air filter is installed horizontally, make sure the opening of the dust cover points downwards.

Important: The filter element of the air filter should only be cleaned five times per year or used for 1 year. The filter should be replaced immediately if it is damaged. Make written notes of when filters are cleaned.

Tensioning the V-belt Tension the V-belt by loosening the alternator bolts and tightening the slotted strip first after tensioning.

Changing the engine oil

Start the engine and turn it off as soon as it reaches operating temperature. If a drain pump is fitted, drain the oil into a can and replace the engine oil. If a drain pump is not fitted, fit a new copper washer around the sump plug to prevent oil leakage.

to go.

Replacing the oil filter

Use filter pliers to loosen the oil filter and unscrew it. Before installing the new oil filter, oil the rubber ring. Tighten the new oil filter by hand and by hand, so without the use of tools. Check that the oil filter is tight in the next test run.

Checking and Adjusting Valve Clearance Remove the valve covers, and set the valves in the correct firing order. The valves can be set a quarter to a half turn after the inlet valve has closed. The direction of rotation of the motor is counterclockwise (seen on the flywheel). Use a feeler gauge to set the intake valve to 0.2mm and the exhaust valve to 0.3mm. Make sure that the rocker cover gasket is in place when installing.

Replacing the fuel filter 1. Close the shut-off valve in the fuel line 2. Loosen the fuel filter with filter pliers 3. Coat the rubber sealing ring of the fuel filter with oil and then tighten it again 4. Open the shut-off valve of the fuel line again 5. Bleed the fuel system 6. Check the tightness of the fuel filter

Cleaning the crankcase breather 1. Remove the breather unit from the engine 2. Disconnect the hose 3. Clean the crankcase breather unit in diesel oil 4. Install a new O-ring

Test run of the diesel engine (unloaded)

When a diesel engine is used as a standby application or emergency power application, it should be tested once a week according to the following schedule: 1 Check the instruments immediately after starting and bring the engine to 1/3 of the maximum speed 2
Increase the speed to 3/4 for about 10 minutes 3 Increase the speed to the maximum speed (1500 for generators) for about 10 minutes 4 Check the motor for tightness 5 Run the motor at 1/3 of the maximum speed for 10 minutes 6 Let the engine idle for 5 – 10 minutes and then turn it off

RATES OF THE MAINTENANCE CONTRACT:

Description service	**Maxim. labor hours period pricing** 1 x year 3.5 % list		
emergency power configuration	1 - 250	price + index 1-2 x year 6.0 % list price + index	
Small interval	251 – 500	3-4 x year 15 % list price + index 5-10 x 30 % list	
Normal Interval	501 – 1000	price + index	
Large interval	+1001 – 2000	year	
Continuous use	Cost price calculation per file 0.95		
Travel (car+hours)	euros/km		
What is covered by the maintenance contract: *timely replacement of all filters, oil, V-belts, generator repairs, free loan for long-term repairs of a similar generator, and warranty settlement (maximum 25,000 operating hours)* ***What is excluded:*** *short circuit of the alternator, misuse and vandalism, breakdowns due to fuel problems. Alienation of the equipment*			

Operating manual JAVAC genset

General information about the genset The Javac genset consists of a diesel engine, a generator and a measurement and control system. The diesel engine is connected to the generator via a bolt connection and mounted on a frame via vibration dampers. The generator can be used for continuous or temporary power supply. The diesel engine is a vertical, water-cooled, four-stroke direct injection in-line engine. The engine is equipped with electric start and mechanical or electronic speed control. The generator is a three-phase, continuous voltage and brushless synchronous generator. It delivers good performance, is reliable and easy to maintain. The generator is equipped with a trickle charger. When the mains is connected to the generator, the „charge on lampÿ lamp will light up and the batteries will be charged via the internal trickle charger. When the generator is started, the batteries will be charged via the generator of the generator.

Safe Operation 1. The person operating the generating set should be familiar with the procedures for commissioning, operating, adjusting and stopping the generating set. The person who operates the generator must also know which meters and liquid levels need to be checked and their significance.

2. Resources intended to combat calamities must be located near the generating set.

3. Smoking and open fire are prohibited in the vicinity of the generator.
4. The person operating the generator must wear hearing protection.
5. A fire extinguisher must be installed near the generating set.
6. The generator must be properly grounded.
7. The earthing must be in accordance with the regulations.

8. Be careful with battery acid that is in the batteries. Avoid sparks and fire near the battery, especially when the battery is being charged.
9. If the generating set is fitted with doors (silenced set), these must be closed when the generating set is running.
10. Avoid obstacles or dangerous items in the vicinity of the generating set.
11. Keep the floor dry and clean.
12. Devices that do not belong to the generator must not be located near or on the generator.

When performing maintenance, open the main switch (position „Off or „0) and switch off the ignition.

Make it clear by means of a sign or inscription that the generating set is being serviced.

Parameters

The voltage regulation can be regulated in no-load condition at 95% - 105% of the nominal voltage. The voltage and frequency drop from no load to full load, recovery time and fluctuation rate of the set shall not exceed the values in the table below

voltage	Normal voltage regulation	±4.75%
	Transition voltage regulation	+25 -20
	Recovery time	2.7s
	fluctuation	±1.35%
frequency	Normal speed control	±4.75%
	Transition speed control	±12%
	Recovery time	9s
	fluctuation	±1.35%

The set has a large number of protection functions, such as against overspeed, too low oil pressure, too high water temperature. The set has the ability to run continuously at 110% of rated power for 1 hour every 12 hours.

Installation and mounting - The
space around the genset should be at least 1 meter on all sides - The battery
cables should not be too long, no longer than 1.5m - The battery
cables should be made of multi-core copper wire with a minimum diameter of 70mm².

- Lightly sand the cable contacts before mounting and lubricate the battery terminals with acid-free grease.
- The generator set must be properly grounded.
- Set up the generator set horizontally.

Commissioning and testing

Precautions 1. Remove
all dust, water and oil stains, if any, from the outside of the generating set.
2. Check that the fixed and connected parts are not loose and that the rotating components can rotate freely.
3. Check that all connections are in good condition.
4. Check whether the starter batteries are in good condition with a battery short-circuit tester and whether they have sufficient voltage (min. 24V).
5. Check the oil level and the cooling water level and the fuel lines.
6. Check whether the main switch is in the 'off' position or '0' position.

Starting

1. Start the diesel engine having carried out the precautions.
2. Check that the knob is set to „Idleÿ, ie idle speed. Start the engine and check the oil pressure and water temperature. If anything unusual occurs, stop the generator immediately.

3. Turn the control knob to the „rateÿ position necessary to set the speed to 1500. Then adjust the voltage - if necessary - with the potentiometer. Check that the voltages of the three phases are the same.
4. When the generating set is running stably at the desired speed and voltage, switch on the main switch and load the generating set at 25% of the capacity. Check that the load on the three phases is the same. If all control panel readings are OK, increase the load when the water temperature has reached 40oC . Let the generator run and check whether the oil pressure, water temperature, amperage and frequency are in order.

Stopping

Gradually reduce the load, open the main switch (ie in the „offÿ or „0ÿ position) and allow the engine to idle for two to five minutes by turning the adjustment knob to „idleÿ. Then stop the generator.

Start stop cycle 1.

Check whether the genset is ready to start (see section „Set up and testÿ)
2. Check whether the main switch is in the „0ÿ position 3.
Start the generating set according to the steps described in the section „Setting up and testing“ 4. Allow the generating set to warm up as described in the section „Setting up and testing“.
5. Use the button on the control panel to switch to „rateÿ and adjust the voltage if necessary.
Switch on the main switch to load the generator.
6. Stop generating set: as described in the "Setup and test" section

Points of attention 1.

The supplied current of the generator may not exceed the nominal current, the supplied power may not exceed the load as stated in the paragraph „Parametersÿ.

2. To ensure a long service life of the generating set, the initial load should not exceed 90% of the nominal capacity. When used as an emergency power supply, it is recommended that the initial load does not exceed 50% of the rated power.
3. Regularly check the water temperature and oil pressure in accordance with the operation and maintenance manual of the diesel engine.
4. Check the voltage and current output of the battery regularly. 5.
Check the coolant level in the radiator regularly and top up if necessary.
6. When there is a leakage of oil, water or diesel, repair the pipes immediately.
7. The batteries cannot be replaced by a silicon rectifier type.
8. Always ensure that the frost protection of the antifreeze is sufficient.
9. Keep the generator clean