WEICHAI

Member of SDHI Group

Pocket Guide for

# SERVICE PERSONNEL/ TECHNICIANS/ CUSTOMERS

## Vision

Innovating to produce world-class products that bring value to our customers, as well as being socially and environmentally responsible.

## Mission

Our aim is to exceed customer expectations.

## Quality Policy

We, at SHIG India are committed to satisfy customer's needs through continual improvement in the products and services offered by following the quality management system and complying with applicable norms.

## Safety Information

Failure to follow the safety instructions in this manual or on the engine can lead to serious injury or engine failure. Keep this Operation and Maintenance Manual near the engine and accessible at all times. Most accidents can be avoided by following basic precautions and recognizing hazards, but no manual can cover every risk. Operators and maintenance staff must identify dangers and have the necessary skills, training, and tools to work safely.

## Symbols Used

Please follow all warnings and precautions in this manual to avoid unsafe conditions. The following symbols are used to highlight important safety information.

# Safety Symbols

| Symbols | Definition |
|---|---|
|  | Danger : live cables, electrical risks |
|  | Highly flammable products |
|  | Keep away from hanging loads |
|  | Risk of thermal burns |
|  | Risk of mechanical drive/rotating parts |
|  | Lifting is forbidden |
|  | Water drain valve |
|  | Keep an extinguisher close |
|  | Danger: battery acid |
|  | Wear hand protection |
|  | Wear ear protection |
|  | Wear eye protection |
|  | Wear head protection |
|  | Wear protective mask |
|  | Wear foot protection |
|  | Wear overalls |
|  | Avoid naked flames |
|  | Do not smoke |
|  | Do not use a mobile phone |

## 2. Pre-Start Checklist (Do Before Starting)

- Check all electrical and fuel circuits are clean
- Check fuel supply level
- Open raw water inlet valve
- Check coolant level and top up if required
- Check engine oil level and top up if required
- Check air filter clogging indicator
- Drain fuel pre-filters (daily)

### 2.1 ⚠ SAFETY WARNING

- Do NOT bypass or disable safety / automatic stop systems
- These systems protect personnel and prevent engine damage

## 3. Engine Starting Procedure

**a.** Switch ON instrument panel (Power switch)
**b.** Start engine
  - Maximum cranking time: 5-12 seconds
  - Maximum  cranking frequency: 3 times

**Confirm After Start**

- Oil pressure is normal
- Battery voltage during cranking ≥ 18 V DC
- Cooling water discharge visible

⚠ Do NOT crank continuously beyond recommended time

## 4. Operating Guidelines (During Running)

- Allow sufficient warm-up before loading
- Operate at recommended cruising RPM
- Avoid continuous over speed
- Avoid prolonged low-idle operation

## 5. Shutdown Procedure

- Reduce engine load gradually
- Idle engine for 3–5 minutes (turbocharger protection)
- Switch OFF engine

## 6. Cooling System Care (Marine – Critical)

### 6.1 Coolant (General)

- Protects against overheating, corrosion, cavitation, & scale
- Use coolant meeting **ASTM D6210**
- Coolant must **NOT** contain 2-ethylhexanoate
- Follow Weichai Fluids Manual

### Glycol Content

- Minimum: 45%
- Maximum: 60%

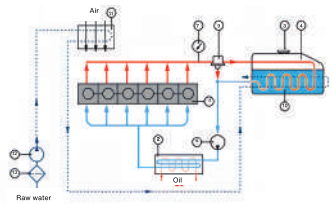



*Fig. Global cooling digram*

| Rep | Description |
|---|---|
| 1 | Danger : live cables, electrical risks |
| 2 | Engine oil cooler |
| 3 | Coolant filler pressurised cap |
| 4 | Expansion tank |
| 5 | Fresh water pump |
| 6 | Coolant temp. sending unit |
| 7 | Exhaust manifold |
| 8 | Thermostatic valve |
| 9 | Raw water / Coolant heat exchanger |
| 10 | Charger air cooler |
| 11 | Raw water pump |
| 12 | Raw water filter |

*Tab. Cooling system parts*

## 6.2 Coolant Draining

⚠ Engine must be cold

- Stop engine and disable starting
- Open coolant filling cap
- Connect drain hose to main drain valve
- Drain coolant completely
- Close drain valve and refit cap

## 6.3 Coolant Filling

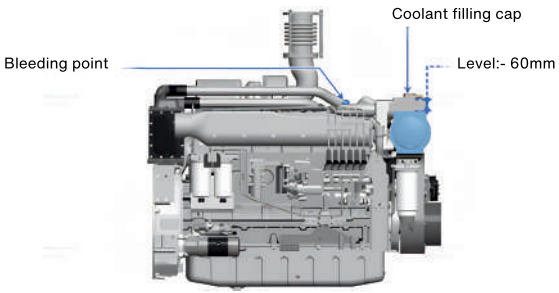



*Fig. Coolant filling area*

### Filling

- Fill through heat exchanger cap
- Coolant level (engine cold): 60 mm below filler neck

### Bleeding

- System is self-bleeding
- Refit coolant cap

### Check

- Run engine at slightly higher RPM for 5 minutes
- Stop engine and release pressure carefully
- Top up coolant if required
- Recheck level after long full-load operation

Never use fresh water instead of coolant

## 6.4 High-Temperature Cooling Circuit

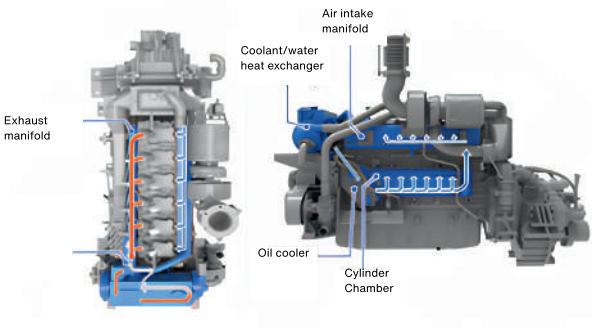



*Fig. High-temperature cooling circuit*

### Cools

- Cylinder block and cylinder head
- Exhaust manifold
- Engine oil (via oil cooler)

### Coolant Flow

- Pump at front of engine
- From oil cooler it goes to liners and cylinder head
- Thermostat controls flow to heat exchanger or back to engine

## 6.5 Low-Temperature Cooling Circuit

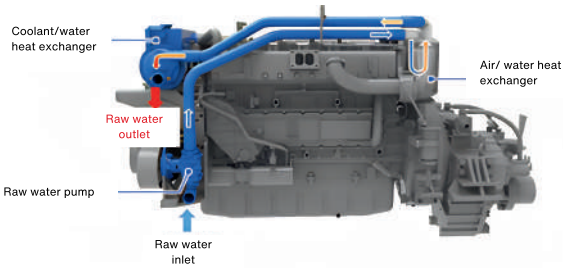



*Fig. Low-temperature cooling circuit*

### Cools

- Charged air
- Engine coolant
- Gearbox oil (if applicable)

### Warning signs:

- High temperature
- Low water discharge
- Salt deposits

# 7. Lubricating System Care

## 7.1 System Description

- Pressurized lubrication system
- Oil pump driven by timing gears
- Pistons cooled by oil spray jets

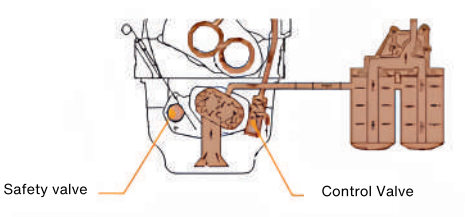



*Fig. Pressurized lubrication system*

## 7.2 Recommended Oil

- SAE 15W-40 _ API-CI-4+
- Operating range: –20°C to +40°C

## 7.3 Oil Filters

- Two full-flow filters with by-pass
- Replace during scheduled service

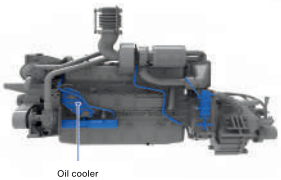



*Fig. Oil filter cartridges*

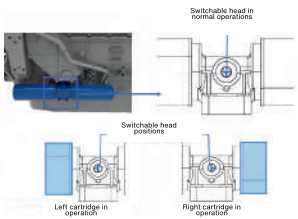



*Fig. 1*

### 7.4 Oil Cooler

- Located on starboard side
- Oil cooled by engine coolant

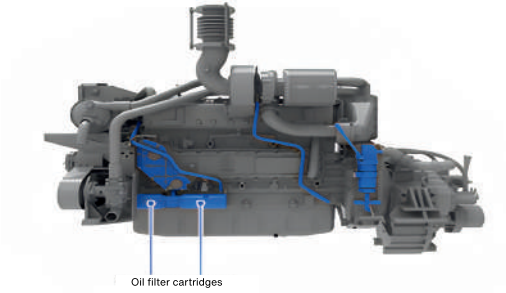



*Fig. Oil cooler*

## 8. Fuel System Care

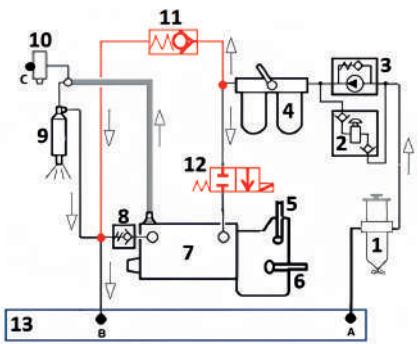



*Fig. Fuel system*

| Rep | Description |
|---|---|
| 1 | Fuel prefilter 30µm and water separator Injection pump |
| 2 | Priming hand pump |
| 3 | Feeding pump Check valve |
| 4 | Fuel duplex filter |
| 5 | Speed lever |
| 6 | Stop lever |
| 7 | Injection pump |
| 8 | Pump cold scavenging valve |
| 9 | Injector holder/injector |
| 10 | HP pipe fuel leakage switch |
| 11 | Overspeed overpressure valve IACS version only |
| 12 | Overspeed fuel valve IACS version only |
| 13 | Fuel connection bracket |
| A | Fuel inlet port |
| B | Fuel outlet port |
| C | HP pipe leakage switch connector |

*Tab. Fuel system parts*

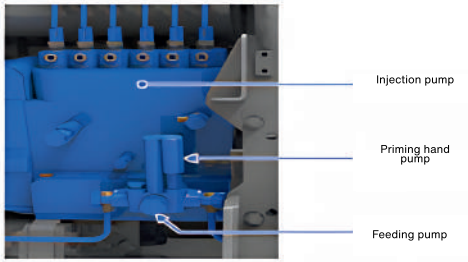



*Fig. Fuel priming*

## 8.2 Fuel Filter Replacement

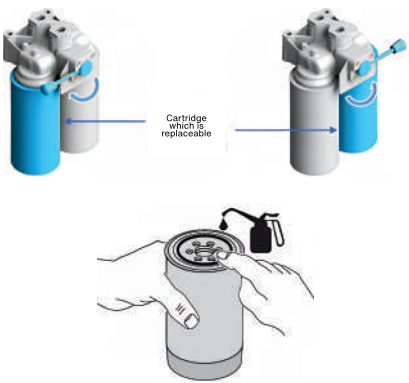



*Fig. Fuel filter replacement steps*

- Engine stopped (recommended)
- Optional: engine running at 1200 RPM (with caution)

### Steps

1. Select cartridge
2. Remove old filter
3. Clean sealing surface
4. Oil new seal
5. Tighten ¾ turn after contact
6. Bleed system and check leaks

⚠ Do NOT operate with lever in vertical position (both cartridges active)

## 8.3 Fuel Pre-Filter – Water Draining

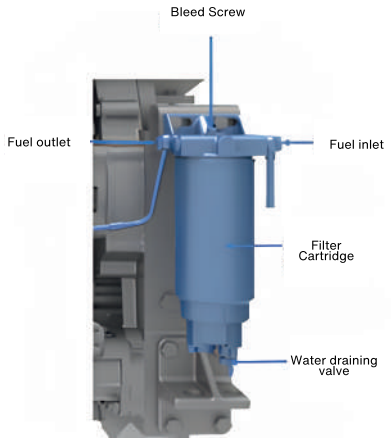



*Fig. Fuel pre-filter*

1. Stop the engine & disable engine start.
2. Connect a hose to the drain valve and place the other end into a container.
3. Open the bleed tap and drain water until clean fuel flows.
4. Close the bleed screw.
5. Check for fuel leaks.

### ⚠ IMPORTANT

If **Water in Fuel** alarm appears:
- **Stop the engine immediately**
- Drain water from the filter
- **Find and correct the cause** of water entry

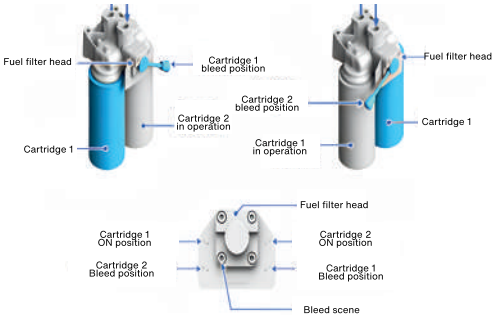
## 8.4 Fuel Pre-Filter – Cartridge Replacement

⚠ Engine must be **OFF** and **fuel supply closed**

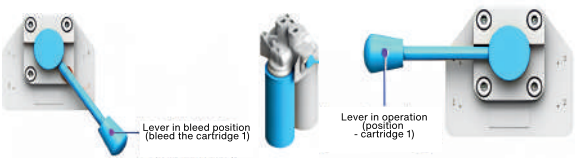
## 8.5 Replacement Steps

- Stop engine and disable starting. Close fuel supply valves.
- Clean the area around the filter and remove the cartridge using a proper filter wrench.
- Clean the seal seating surface.
- Apply engine oil to the new cartridge seal (never use grease).
- Install new cartridge by hand until seal contacts, then tighten maximum ¾ turn.
- Open fuel valves, bleed the filter, and check for leaks.

## 8.6 Fuel Filter bleeding




## 8.6.1 Bleeding Cartridge 1




## 8.6.2 Bleeding Cartridge 2

| Cartridge 1 (Right Side) | Cartridge 2 (Left Side) |
|---|---|
| Loosen 4 bleed screws on filter head | Loosen bleed screw on filter head |
| Move lever to Cartridge 1 – Bleed position | Move lever to Cartridge 2 – Bleed position |
| Use hand priming pump until fuel flows without air bubbles | Use hand priming pump until fuel flows without air bubbles |
| Tighten all bleed screws | Tighten bleed screw |
| Move lever to Operat – Cartridge 1 position | Move lever to Operate – Cartridge 2 position |
| Cartridge 1 ready for use | Cartridge 2 ready for use |

*Tab. for filter replacement*

Lever position is not to be used

**⚠ IMPORTANT**

Do NOT remove the filter when the lever is in vertical position (this runs both cartridges at the same time).

## 9. Air Intake System

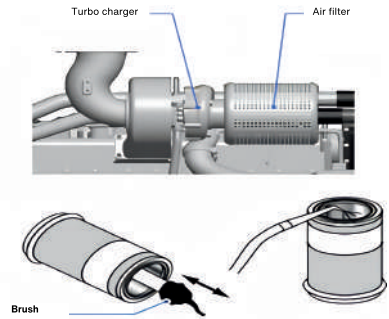



*Fig. Air filter location*

- Turbocharged air supplied via dry air filter
- Compressed air cooled by seawater intercooler
- Condensation drained automatically

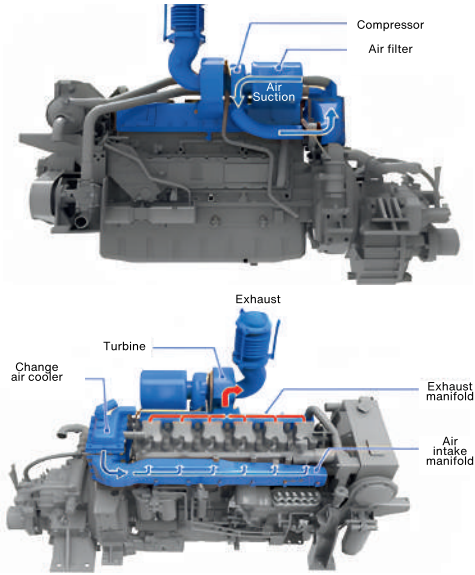


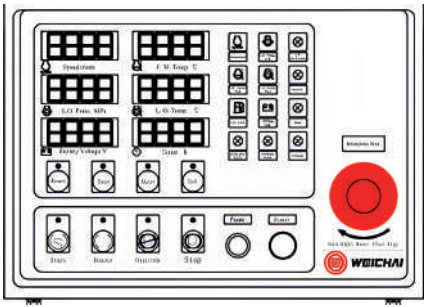

*Fig. Air system*

## 9.1 Air Filter Cleaning

- Stop engine and disable start
- Remove filter
- Wash with water and neutral soap
- Dry completely
- Refit and check sealing

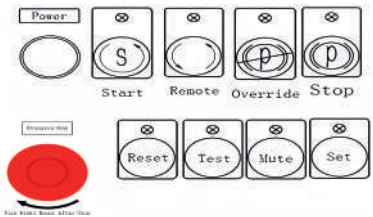
Do NOT clean with fuel or chemicals

# 10. Electronic Monitoring System



- Controls engine start, stop, and emergency shutdown
- Monitors RPM, oil pressure/temp, coolant temp, & battery voltage
- Provides visual and audible alarms
- Automatically shuts down engine during critical faults (except override mode)

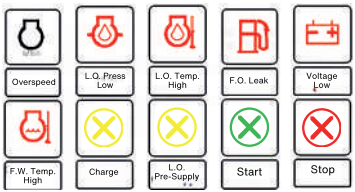
## 10.1 Buttons & Switches – Function Table



| Button / Switch | Function | Explanation |
|---|---|---|
| Power Switch | Turns instrument ON | Must be ON before engine start |
| Local / Remote Switch | Selects control mode | Local: start from panel<br>Remote: start from wheelhouse |
| Start Button | Starts engine | Activates lube pump → starter motor |
| Stop Button | Stops engine | Normal engine shutdown |
| Emergency Stop | Immediate engine stop | Cuts fuel instantly (twist to reset) |
| Reset Button | Clears lock-out alarms | Use after shutdown due to fault |
| Override Switch | Bypasses protections | Only overspeed shutdown remains active |
| Alarm Test Button | Tests alarms | Works only when engine stopped |
| Alarm Silence Button | Mutes buzzer | Alarm light remains ON |
| Set Button | Parameter setting | Used by authorized personnel |

*Tab. for buttons and switches*

## 10.2 Indicator Lamps – Meaning Table



| Indicator Lamp | Meaning |
|---|---|
| ⚠ Over speed | Engine speed too high |
| ⚠ Low Oil Pressure | Lube oil pressure low |
| ⚠ High Coolant Temp | Cooling water temperature high |
| ⚠ High Oil Temp | Lube oil temperature high |
| ⚠ Fuel Leakage | Fuel leak detected |
| ⚠ Low Battery Voltage | Below 19 VDC |
| Pre-lube ON | Lube pump running |
| Start Signal | Engine starting |
| Manual / Emergency Stop | Engine forced stop |
| Charging | Generator charging |

*Tab. for indicator lamps*

## 11. Common Problems – Quick Troubleshooting

| ⚠ Problem | Possible Cause | Method of Repair |
|---|---|---|
| No display / display dark / power light ON but no display | • Power wire broken<br>• Battery voltage low<br>• Fuse blown | • Reconnect power wire<br>• Check and recharge battery<br>• Replace fuse |
| Display partially visible or abnormal | • Instrument not working<br>• Battery voltage low<br>• Electrical interference | • Press Reset button<br>• Check or replace battery<br>• Remove interference |
| Oil pressure shows 0.000 or 1.xxx | • Oil pipe blocked<br>• Pressure sensor faulty<br>• Loose cable connection | • Clean oil pipe<br>• Replace pressure sensor<br>• Tighten and check cable |
| Temperature shows abnormal value | • Temperature sensor faulty<br>• Loose cable | • Replace temperature sensor<br>• Check and secure cable |
| Engine does not start properly | • Starter motor faulty<br>• Battery cable loose/oxidized<br>• Low battery voltage | • Check starter motor<br>• Clean & tighten battery cables<br>• Recharge battery |
| Charging indicator abnormal | • Alternator faulty<br>• Wiring loose/wrong<br>• Divider fuse open | • Replace alternator<br>• Check wiring<br>• Replace divider/fuse |
| Engine speed shows 0.000 or 1.xxx | • Speed sensor faulty<br>• Sensor loose or wrongly positioned<br>• Loose cable | • Replace sensor<br>• Set gap 0.3–1.0 mm<br>• Check cable connection |

## 12. Long-Term Storage (6+ Months)

⚠ Follow safety instructions and protect engine from freezing.

| System | Required Actions |
|---|---|
| Fuel System | • Drain water separator & tank low points<br>• Drain fuel before injection system<br>• Fill tank completely<br>• Add approved additive (CFB / ISO 4113)<br>• Pressurize to 1 bar (14.5 psi)<br>• Run engine at idle 2 minutes<br>• Do NOT run without fuel<br>• Replace fuel filters before restart |
| Engine Oil | • Drain old oil<br>• Refill with recommended grade<br>• Replace oil filter before recommissioning |
| Fresh Water Cooling | • Inspect hoses & clamps<br>• Replace if damaged<br>• Use recommended coolant only |
| Raw Water Cooling | • Close inlet valve<br>• Drain system completely<br>• Remove raw water pump drain plug<br>• If not fully drained, refill with approved coolant |

| | |
|---|---|
| Air Intake System | • Remove and store air filter safely<br>• Seal turbo inlet (plastic plug with small vent hole) |
| Exhaust System | • Remove flexible joint<br>• Seal engine-side exhaust (vented plug)<br>• Close outside exhaust outlet<br>• Do not reconnect during storage |
| Electrical System | • Disconnect batteries<br>• Place moisture absorbers in engine room<br>Apply light grease on pulleys<br>• Touch up paint to prevent rust |
| Generator / Auxiliary Equipment | Consult authorized service center (if no pre-lube system) |

## 13. Engine Preparation After Long-Term Storage (6 Months or More)

| System | Required Actions |
|---|---|
| Oil Circuit | • Fill engine with fresh oil<br>• Replace oil filters |
| Fuel Circuit | • Drain protective fluid before fuel filters<br>• Replace fuel filters |
| Coolant Circuit | • Drain old coolant<br>• Refill with recommended coolant<br>• Check thermostat valve operation |
| Mechanical Parts | • Remove all storage protections<br>• Clean components with fuel oil<br>• Refit and lubricate all parts |
| Propulsion System | Check alignment of propulsive unit |
| Electrical System | Remove dehydrating (silica gel) bags from electrical panels |
| Raw Water Circuit | Open raw water circuit before commissioning |

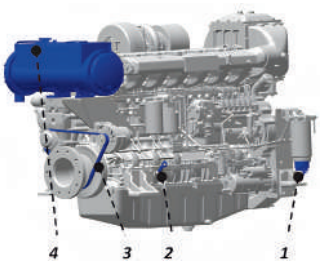
## 14. Do's & Don'ts

| DO'S | DON'TS |
|---|---|
| Read safety instructions and ensure guards are fitted | Start engine if someone is near moving parts or bypass safety protections |
| Use approved coolant ASTM D6210 (45–60% glycol) | Use ASTM D3306 coolant or exceed 60% glycol |
| Use SAE 15W-40 engine oil | Use incorrect oil grade |
| Check oil and coolant levels before start | Run engine with low oil or coolant |
| Open raw water inlet valve before starting | Run engine without cooling water |
| Use approved diesel fuel (≤ 8% FAME biodiesel) | Use unauthorized fuel, additives, or high biodiesel content |
| Drain water separator daily | Allow water in fuel system |
| Switch fuel filters daily and bleed after replacement | Operate with clogged filters or ignore fuel leaks |
| Ensure cranking voltage ≥ 18 V DC | Crank engine with low battery voltage |

| | |
|---|---|
| Inspect belts, hoses, and clamps regularly | Run engine with loose or damaged belts |
| Keep air filter and cooler drain clean | Operate with blocked air intake or condensation drain |
| Warm up engine before loading | Apply full load immediately |
| Cool down engine before shutdown | Stop engine suddenly at high load |
| Use genuine Weichai parts | Use non-genuine parts |
| Follow proper storage procedure and disconnect batteries for long storage | Leave engine unprotected or open cooling system when hot |

## 15. Maintenance Interval Summary

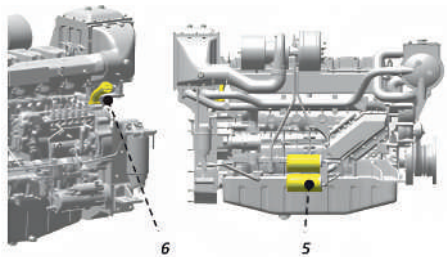
*DAILY CHECKS*



| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 1 | Water in water separator | Check | WD10, WD12, WP12, WP13 |
| 2 | Lube oil level | Check | All Models |
| 3 | Belt tension status | Check | All Models |
| 4 | Coolant level | Check | All Models |

*Tab. for daily checks*

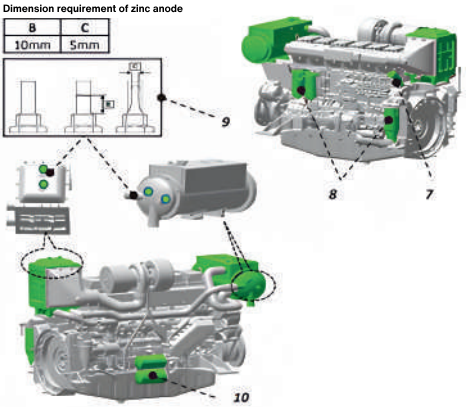
*FIRST 50 H*



| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 5 | Water in water separator | Replace | All Models |
| 6 | Lube oil level | Replace | All Models |

*Tab. for 50H*

## *EVERY 250H*

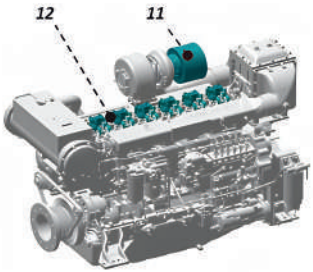


| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 7 | Lube oil | Replace | All Models |
| 8 | Fuel filters | Replace | All Models |
| 9 | Zinc anodes | Check | All Models |
| 10 | Lube oil filters | Replace | All Models |

*Tab. for 250H*

**Note:- The replacement interval of Zinc anodes shall be adjusted according to the water quality of different sea areas**

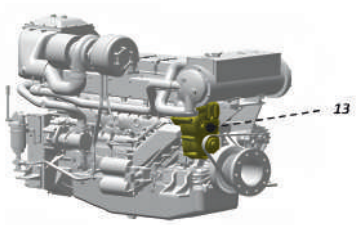
*EVERY 500H*



| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 11 | Air filter | Clean | All Models |
| 12 | Valve clearance | Adjust | All Models |

*Tab. for 500H*

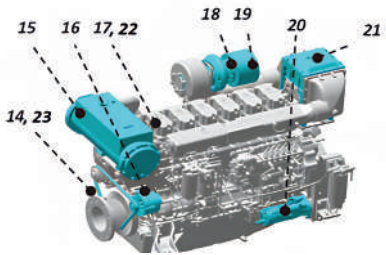
*EVERY 1000H*




| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 13 | Apply grease on coolant pump | Grease | All Models |

*Tab. for 1000H*

## *EVERY 3000H*




| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 14 | Belt | Replace | All Models |
| 15 | Heat exchanger element | Clean | All Models |
| 16 | Alternator | Check | WD10,WD12, WP12, WP13 |
| 17 | Breather | Clean | WD10,WD12, WP12, WP13 |
| 18 | Turbocharger(s) - axial and radial clearances | Check | All Models |
| 19 | Air filter | Replace | All Models |

| No. | Maintenance Items | Action | Engine Model |
|---|---|---|---|
| 20 | Starter | Check | All Models |
| 21 | Intercooler element | Clean | All Models |
| 22 | Injectors | Check | WP4, WP6 |
| 23 | Belt tensioner | Check | WD10, WD12 |

*Tab. for 3000H*

**Notice:**

- Refer the maintenance manual for detail description of complete items.
- If annual operation **≤ 500H, halve maintenance intervals**

**Note:- Pictures are for reference purposes only.**
**Part locations may vary for each engine model.**

**For any further queries, refer model specific operation manual.**

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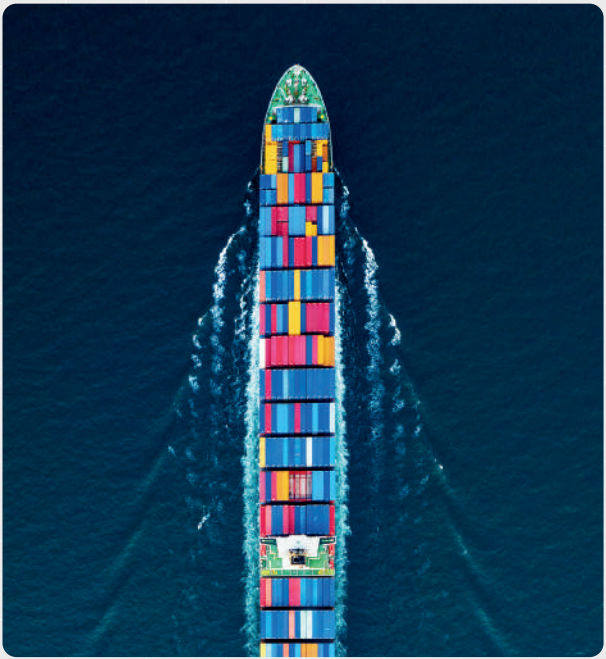


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**(A WEICHAI POWER COMPANY)**

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