

## Checks during Standstill Periods

<i>Contents</i>	<i>Page</i>
<b>1. General</b>	702.01
<b>A. Regular Checks at Engine Standstill during Normal Service</b>	702.01
A1. Oil Flow	702.01
A2. Oil Pan, and Bearing Clearances	702.01
A3. Filters	702.02
A4. Scavenge Port Inspection	702.02
A5. Exhaust Receiver	702.02
A6. Crankshaft	702.02
A7. Circulating Oil Samples	702.02
A8. Turbocharger	702.02
A9. Manoeuvring Gear	702.02
<b>B. Checks at Engine Standstill during Repairs</b>	702.02
B1. Bolts, Studs and Nuts	702.02
B2. Chain Casing	702.03
B3. Leakages and Drains	702.03
B4. Pneumatic Valves in Control Air System	702.03
B5. Bottom Tank	702.03
<b>C. Checks at Engine Standstill after Repairs</b>	702.03
C1. Flushing	702.03
C2. Piston Rods	702.03
C3. Turning	702.03
C4. Turbocharger	702.03
C5. Cylinder Lubricators	702.03
C6. Manoeuvring Gear	702.03
C7. Air Cooler	702.04
<b>D. Laid-up Vessels</b>	702.04

## Checks during Standstill Periods

### 1. General

The present chapter describes how to check up on the condition of the engine while it is at a standstill.

To keep the engine-room staff well informed regarding the operational condition, we recommend recording the results of the inspections in writing.

The checks mentioned below follow a sequence which is suited to a forthcoming period of major repairs.

- A. Checks A1-A9 should be made regularly at engine standstill during normal service.

Checks A1 to A9 should be coordinated and evaluated together with the measurements described in *Chapter 706, 'Engine Synopsis'*.

- B. Checks B1-B5 should be made at engine standstill during the repairs.

- C. Checks C1-C7 should be made at engine standstill after the repairs.

If repair or alignment of bearings, crankshaft, camshaft or pistons has been carried out, repeat checks A1, A2 and A6.

Checks to be made just before starting the engine are mentioned in *Chapter 703*.

#### A. Regular Checks at Engine Standstill during Normal Service

The work should be adapted to the sailing schedule of the ship, such that it can be carried out at suitable intervals – for instance as suggested in Vol. II Introduction 'Checking and Maintenance Programme'.

The maintenance intervals stated therein are normal for sound machinery. If, however, a period of operational disturbances occurs, or if the condition is unknown due to repairs or alterations, the relevant inspections should be repeated more frequently.

Based upon the results of Checks A1-A9, combined with performance observations, it is determined if extra maintenance work (other than that scheduled) is necessary.

#### Check A1: Oil Flow

While the circulating oil pump is still running and the oil is warm, open up the crankcase and check that the oil is flowing freely from all crosshead, crankpin and main bearings.

The oil jets from the axial oil grooves in the crosshead bearing lower shells should be of uniform thickness and direction. Deviations may be a sign of "squeezed white-metal" or clogged-up grooves, *see also Chapter 708, Item 7.1*.

Check also that oil is flowing freely from bearings, spray pipes and spray nozzles in the chain drive.

By means of the sight glasses at the piston cooling oil outlets, check that the oil is passing through the pistons.

Check also the thrust bearing and camshaft lubrication.

**NB:** After a major overhaul of pistons, bearings, etc., this check should be repeated before starting the engine.

#### Check A2: Oil Pan, and Bearing Clearances

After stopping the circulating oil pump, check the bottom of the oil pan for fragments of white metal from the bearings.

Check crosshead, crankpin, main bearing and thrust bearing clearances with a feeler gauge, and note down the values, as described in *Chapter 708, Item 7.12*.

*Refer to Chapter 708, Item 7.1 for further information.*

#### **Check A3: Filters**

Open up all filters, (also automatic filters), to check that the wire gauze and/or other filtering material is intact, and that no foreign bodies are found, which could indicate a failure elsewhere.

#### **Check A4: Scavenge Port Inspection**

Inspect the condition of the piston rings, cylinder liners, pistons, and piston rods, as detailed in *Chapter 707, Item 3*.

Note down the conditions as described in *Chapter 707, Item 3.2*.

During this inspection, circulate the cooling water and cooling oil through the engine so that leakages, if any, can be discovered.

Remove any coke and sludge from the scavenge air ports and boxes.

(In case of prolonged port calls or similar, follow the precautions mentioned in point C2).

#### **Check A5: Exhaust Receiver**

Open up the exhaust receiver and inspect for deposits and/or any metal fragments, (which could indicate a failure elsewhere). Examine also the gas grid to make sure that it is clean and undamaged.

#### **Check A6: Crankshaft**

Take deflection measurements as described in *Chapter: 708 'Alignment of main bearings'*.

#### **Check A7: Circulating Oil Samples**

Take an oil sample and send it to a laboratory for analysis and comments.

*(See Chapter 708 'Maintenance of the circulating oil').*

#### **Check A8: Turbocharger**

Unscrew the drain plugs or open the cocks at the bottom of the turbocharger housings. Also drain from the drain box/pipe in the exhaust gas uptake (also used when cleaning the exhaust gas evaporator).

This prevents the possible accumulation of rain water, which could cause corrosion in the gas ducts, and partial wash-off of soot deposits, which again may result in unbalance of the turbocharger rotor.

Open inspection covers (if fitted) or remove the gas inlet pipe on the turbine side of the charger, and check for deposits on the turbine wheel and nozzle ring.

*See also Check C4 regarding precautions to avoid turbocharger bearing damage during engine standstill.*

#### **Check A9: Manoeuvring Gear**

Frequently check the movability of the system.

Disconnect the governor from the regulating gear by means of the impact handwheel in the engine side control console. Move the rod connections by means of the regulating handle to check that the friction in the regulating gear is sufficiently low.

Lubricate the system (bearings and rod connections) at intervals of about 4000 hours.

Use grease of a good quality, and with a "melting" point of about 120°C.

For the governor, use an anti-corrosive oil, with additives against: foam, sludge formation, and damage to gaskets and paint.

The viscosity index should be high and the viscosity be in the range 22-68 cSt at 40°C.

Regarding check of the governor, see the producer's special instructions.

**Check A10: Timing Guide**

(Only for engines with VIT, Variable Injection Timing)

In order to keep the timing guide in an optimum service condition with regard to movability, we recommend that you twice a year apply diesel oil via the plug screw hole at the base of the fuel pump housings.

When the diesel oil has drained off, apply lube oil and reinstall the plug screw.

**B. Checks at Engine Standstill during Repairs****Check B1: Bolts, Studs and Nuts**

Check all bolts, studs and nuts in the crankcase and chain casing to make sure that they have not worked loose.

The same applies to the holding-down bolts in the bedplate. Check that side and end chocks are properly positioned, *see also Vol. II 'Maintenance', Chapter 912.* Check all locking devices.

**Check B2: Chain Casing**

Inspect the chains, wheels, bearings and rubber-bonded guide bars.

Check the hydraulic damper of the chain tightener, *see also Vol. II 'Maintenance', Chapter 906-2.1.*

**Check B3: Leakages and Drains**

Remedy any water or oil leakages. Clean drain and vent pipes of possible blockages by blowing-through.

**Check B4: Pneumatic Valves in the Control Air System**

Clean the filters.

**Check B5: Bottom Tank**

If not done within the previous year, pump the oil out of the bottom tank and remove the sludge.

After brushing the tank ceiling (to remove rust and scale), clean the tank and coat the ceiling with clean oil.

**C. Checks at Engine Standstill after Repairs**

If repair or alignment of bearings, crankshaft, camshaft or pistons has been carried out, repeat Checks A1, A2 and A6.

**Check C1: Flushing**

If during repairs (involving opening-up of the engine or circulating oil system) sand or other impurities could have entered the engine, flush the oil system while by-passing the bearings, as described in *Chapter 708.*

Continue the flushing until all dirt is removed.

**Check C2: Piston Rods**

If the engine is to be out of service for a prolonged period, or under adverse temperature and moisture conditions, coat the piston rods with clean oil, and turn the engine while the circulating oil pump is running.

Repeat this procedure regularly in order to prevent corrosion attack on piston rods and crankcase surfaces.

**Check C3: Turning**

After restoring normal oil circulation, check the movability of the engine by turning it one or more revolutions using the turning gear.

**Note:** Before leading oil to the exhaust valve actuators:

- Engines without Unilub:  
via the camshaft oil pump,
- Engines with Unilub:  
via the main lube oil pump,  
and camshaft booster pumps,

check that air supply is connected to the pneumatic pistons of the exhaust valves, and that the exhaust valves are closed.

*See also Chapter 703, page 703.01.*

**Check C4: Turbocharger**

Mount the drain plugs, (or close the cocks) and re-fit the inspection covers.

Make sure that the turbocharger shafts do not rotate during engine standstill, as the bearings may suffer damage if the shafts rotate while the lube oil supply is stopped.

**Check C5: Cylinder Lubricators**

*See also Plate 70716.*

**Mechanical Type**

Manually operate the "button pumps" until the cylinder oil is known for certain to be flowing from all the cylinder liner lubricating orifices:

Check that all steel balls are moving in the sight tubes, indicating oil flow.

Turn each main piston to BDC in turn, and check, via the scavenge ports, the lube oil flow to the cylinder liner. *See Plate 70701.*

Check that all pipe connections and valves are tight.

**Alpha Lubricator Type**

Press the PRE-LUBRICATION button on the HMI panel and inspect that all LED's for feedback indication on the intermediate boxes are flashing. This indicates that the lubricators are functioning correctly. If in doubt, dismantle the pipe at the cylinder liner to observe the oil flow.

**Check C6: Manoeuvring Gear**

*See Check A9, earlier in this Chapter.*

**Check C7: Air Cooler**

With the cooling water pump running, check if water can be seen through the drain system sight glass or at the small drain pipe from the water mist catcher.

If water is found, the cooler element is probably leaking. In that case the element should be changed or repaired.

**D. Laid-up Vessels**

During the lay-up period, and also when preparing the engine for a long time out at service, we recommend that our special instructions for preservation of the main engine are followed.