

FUNCTION 4B – Marine Engineering at Operational Level (Main Engine & Auxiliaries)

Q1.

Question: What are your immediate actions if the main engine fails to start on a loaded tanker?

 Accepted Answer:

First check control air pressure, then fuel rack movement and indicator cocks. Verify starting air bottle pressure (~30 bar) and air distributor operation. Confirm turning gear is out and interlocks are clear. If still not starting – check FO temp/viscosity, purge line air, and confirm maneuvering lever feedback. Always log the failure and report.

Reference: MAN B&W ME manual, ISM Code Ch.10.

 Rejected Answer:

“I’ll just try starting again... maybe the fuel isn’t reaching. I’ll open the indicator cock and see smoke... then probably call the duty officer. Could be fuel problem or air pressure but usually it starts after few tries.”

Q2.

Question: How do you check main engine crankcase for scavenge fire risk during watch?

✅ Accepted Answer:

During round, check scavenge drains for excessive oil, high exhaust temps on one unit, or crankcase mist detector alarms. Feel casing for hot spots, listen for knocking. If abnormal, slow down engine, inform bridge, isolate fuel to unit, and monitor.

Reference: SOLAS Ch.II-2 Reg.4, MAN B&W troubleshooting guide.

✗ Rejected Answer:

“I’ll just look at the gauge glass and drains... if oil is there then it might be a fire... I’ll keep watching and later tell senior. Anyway alarms will come if it’s serious.”

Q3.

Question: Why do we blow through the main engine before starting?

 Accepted Answer:

To ensure no liquid in cylinders, prevent hydraulic lock, and purge any combustible vapors. Air is passed with indicator cocks open until clear. SOLAS requires for >200 mm bore. Reference: SOLAS Ch.II-1 Reg.26, MAN B&W ME guide.

 Rejected Answer:

“Because there might be some water inside... also it cleans the cylinder... and it’s a normal practice before starting every time.”

Q4.

Question: Main engine exhaust temp high on one unit – actions?

✅ Accepted Answer:

Reduce load, check injector condition, verify fuel rack movement, and check scavenge air temp/pressure. Inspect turbocharger filters and air cooler fouling. If localized, cut out suspect cylinder.

Reference: MAN B&W MC Operation Manual, TEAP troubleshooting.

✗ Rejected Answer:

“I’ll slow down and maybe reduce the engine load. Could be dirty turbocharger. Later we’ll clean when anchored.”

Trap follow-up question:

How do you isolate one unit on MC engine?

Q5.

Question: What is turning gear interlock?

 Accepted Answer:

Mechanical/electrical device preventing start air admission when gear engaged. Also prevents gear engagement when engine turning. Ensures no simultaneous start and maintenance rotation.

Reference: Class rules IACS UR M53.

 Rejected Answer:

“It stops the engine from starting when gear is engaged... basically it is a safety switch so nothing happens.”

Q6.

Question: What is cylinder liner wear down limit on MAN B&W S50MC-C?

 Accepted Answer:

Max wear down 0.6% of bore or 0.5 mm, whichever earlier, before renewal as per maker. Regularly measured with bore gauge at TDC/BDC, port side.

Reference: MAN B&W Service Instruction 502.

 Rejected Answer:

“We normally check the wear but I don’t remember exact figure... maybe 1 mm or something... we replace when it’s too worn.”

Q7.

Question: What happens if starting air distributor is leaking?

 Accepted Answer:

Engine may misfire, backfiring in receiver, starting air bottle pressure drops, risk of explosion. Immediate action – shut starting air isolating valve, stop attempts, vent system, repair.
Reference: SOLAS II-1/29, MAN B&W.

 Rejected Answer:

“Engine may not start... air keeps going inside. We can try more times or increase air pressure.”

Q8.

Question: Explain main engine slow turning device.

✓ Accepted Answer:

After prolonged stop, actuator allows small volumes of start air admitted to each cylinder in sequence at low RPM (2–3 rev/min). Prevents hydraulic lock and loosens deposits.

Reference: MAN B&W instruction book, TEAP.

✗ Rejected Answer:

“It just turns the engine slowly before starting... so that everything is free and moving nicely.”

Q9.

Question: Actions on finding turbocharger surging?

 Accepted Answer:

Immediately reduce load, check scavenge filter and air cooler fouling, FO quality, exhaust valve timing. Inspect for water washing residue. Resume load gradually.

Reference: MAN B&W MC maintenance guide.

 Rejected Answer:

"I'll reduce speed and see if sound stops. Surging happens due to dirty turbo. I'll inform C/E and later we clean."

Q10.

Question: What checks before changing over fuel oil (HFO ↔ MGO)?

✅ Accepted Answer:

Check viscosity/temperature difference, ensure heating/cooling gradient ≤ 2 °C/min to avoid thermal shock. Monitor differential pressure across filters. Drain settling/service tanks as per MARPOL VI.

Reference: MARPOL Annex VI Reg.14, TEAP fuel handling.

✗ Rejected Answer:

"I'll just open the valves and change... need to reduce the temp... slowly cool down the fuel. Then use MGO."

Q11.

Question: Why do we need indicator diagrams?

 Accepted Answer:

To check power balance, compression, and combustion quality. Helps detect leaking valves, worn piston rings, and fuel issues. Essential for load distribution.

Reference: MAN B&W Manual, Class survey requirements.

 Rejected Answer:

“It is used to see the pressure of cylinder... we can calculate power sometimes. Mostly done during survey.”

Q12.

Question: What is tie-bolt stretch test?

✅ Accepted Answer:

Hydraulic jack applied to check elongation of tie rods. Compared to maker's figure (~0.3 mm). Ensures proper pre-tension, prevents fretting and cracks.

Reference: MAN B&W Service Manual, IACS UR M53.

✗ Rejected Answer:

"It is to see if tie rod is tight. We use hydraulic jack to tighten it again when loose."

FUNCTION 6 – Maintenance & Repair at Operational Level

Q1.

Question: How do you repair a leaking cylinder head gasket at sea?

 Accepted Answer:

Reduce load, isolate cylinder by shutting FO and cooling water. Vent, cool, drain. Remove cylinder cover using hydraulic jack, renew gasket, check mating surface with straight edge. Reassemble with proper torque and re-tighten after warm running.

Reference: MAN B&W maintenance manual, ISM safe working procedures.

 Rejected Answer:

“I’ll just stop fuel to that unit and tighten the head bolts more. If still leaking, we’ll replace when in port.”

Q2.

Question: Procedure for overhauling a fuel pump plunger/ barrel.

✔ Accepted Answer:

Mark timing, remove pump top cover, disconnect fuel pipe, lift plunger carefully. Check for scoring and clearance. Lap if minor, otherwise renew set. Ensure barrel alignment pin.

Reset timing, test for leakage with hand pump.

Reference: MAN B&W pump maintenance guide.

✘ Rejected Answer:

“I’ll remove the pump and clean the plunger. If scratched, I’ll polish with emery and put it back. Timing is checked later.”

Q3.

Question: How do you detect crankshaft deflection, and why is it important?

✔ Accepted Answer:

Use dial gauge on webs, measure sag/top at each throw. Record and compare with baseline. Excess deflection means bearing wear or misalignment, risk of crank failure.

Reference: Class rules, MAN B&W manual.

✗ Rejected Answer:

“We check deflection with gauge sometimes during drydock. If too much, crank may break, so we keep record.”

Q4.

Question: Steps to change a leaking stern tube seal.

 Accepted Answer:

Inform class and company. Rig stern tube seal repair kit. Depressurize system, blank off, use hydraulic tool to withdraw seal rings. Renew as per maker. Pressure test before sailing. Follow ISM hot/cold work permits.

Reference: SKF/MODEL stern tube seal manual, Class survey req.

 Rejected Answer:

“I’ll stop the shaft and just change the seal by pulling it out. New seal will be fitted and then restart.”

Q5.

Question: How do you align a pump after motor replacement?

 Accepted Answer:

Rough align with straight edge/feeler gauge, final align with dial indicator. Record vertical/horizontal offset and correct with shims. Tolerance <0.05 mm. Lock bolts and recheck after running.

Reference: TEAP alignment procedure.

 Rejected Answer:

“Normally we just check with straight edge... if it looks good then tighten bolts. If vibration comes, then adjust again.”

Q6.

Question: Actions when lube oil cooler tube bundle is leaking?

 Accepted Answer:

By-pass cooler if stand-by available. If seawater side leak — isolate, blank leaking tubes with plugs, flush and renew gasket. Maintain LO temp 45–55 °C. Log defect for repair at port.

Reference: ISM planned maintenance, TEAP troubleshooting.

 Rejected Answer:

“I’ll close the cooler and keep running. Later we’ll check tubes and maybe clean them.”

Q7.

Question: Explain procedure for piston overhaul at sea.

✅ Accepted Answer:

Shut FO and cooling, open cylinder cover, lift piston with lifting tool, bring to workshop. Check crown, rings, skirt. Renew rings if stuck or worn. Measure clearance with feeler. Reassemble with new gasket, hydraulic tighten nuts. Reference: MAN B&W overhaul procedure.

✗ Rejected Answer:

“We take out the piston and check the rings... if okay we put back. If damaged we change. It’s normal routine.”

Q8.

Question: How do you carry out boiler water test and treatment onboard?

✅ Accepted Answer:

Draw sample, cool to 25 °C. Test pH, P-alkalinity, Cl-content, phosphate.

Maintain pH ~10.5, phosphate 20–40 ppm. Add chemicals accordingly.

Daily record in log, comply with ISM.

Reference: TEAP boiler treatment guide, DNV rules.

✗ Rejected Answer:

“I’ll check water in boiler with kit... if low chemicals then I add. If water looks clear then it’s okay.”

Q9.

Question: Procedure to renew a leaking auxiliary engine cylinder liner.

✅ Accepted Answer:

Drain cooling water, remove head and piston, pull liner with hydraulic jack. Clean bore, check landing surface. Fit new liner with proper O-rings and lubrication. Pressure test water space.

Reference: Maker's AE manual, ISM work permit.

✗ Rejected Answer:

"Take out piston and change liner with crane. Fit new one and tighten. Then run engine again."

Q10.

Question: How do you check insulation resistance of ship's motor?

 Accepted Answer:

Shut off supply, discharge windings. Use 500V megger for <500V motor, 1000V for >500V. Minimum IR 1 MΩ per kV +1 MΩ. Record trend in log.

Reference: IEEE Std.43, TEAP electrical guide.

 Rejected Answer:

"We check with megger... if it shows infinity then motor is good. If low, then motor is bad."

Q11.

Question: What steps to take for cracked cylinder liner found during voyage?

 Accepted Answer:

Isolate cooling, cut out cylinder, blank cooling water. Reduce load. Maintain safe operation until port. Report to class and company.

Reference: ISM defect reporting, MAN B&W guide.

 Rejected Answer:

“Just keep engine running slowly. Inform C/E. If crack is small, continue voyage.”

Q12.

Question: How do you overhaul a centrifugal pump onboard?

✔ Accepted Answer:

Isolate suction/discharge, drain. Remove casing bolts, lift cover. Take out impeller, check wear rings, clearances. Renew bearings if worn. Reassemble with new gasket. Align with motor.

Reference: TEAP pump overhaul manual.

✘ Rejected Answer:

“Open the pump, clean impeller, put back. If worn then change. Normally it’s easy job.”

A Note of Thanks

I sincerely thank all the senior Marine Engineers who have generously shared their knowledge, experience, and guidance in preparing this document.

Your practical insights from shipboard operations and years of mentoring have shaped the accepted answers here into a reliable resource for MEO Class IV candidates.

This compilation would not have been possible without your support and encouragement. On behalf of MarineMonks and every aspiring engineer who benefits from these notes - thank you for guiding us on the right path.

- MarineMonks Team