CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)

EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF THE
MARITIME AND COASTGUARD AGENCY

STCW 95 CHIEF ENGINEER (REG. III/3) – "YACHT 4"

057-02 OPERATIONAL PROCEDURES, BASIC HOTEL SERVICES AND SHIP CONSTRUCTION

FRIDAY, 13 FEBRUARY 2009

1400 - 1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Non-programmable calculators may be used. 2. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.

Materials to be supplied by examination centres

Candidate's examination workbook

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to biological sewage treatment plants, explain EACH of the following:

(a) why alarms fitted to air blower systems operate on sensing air pressure rather than motor failure; (2)

In case of blockage

(b) why the flame gauze on the vent pipe should be checked for cleanliness; (2)

so the vent dose not block & so the flame arrester can disapeate heat as effictivly as possible. A blockage can also create a backpressure of methane. (Airobic) (2)

(c) why adequate water seals must be present on lavatory pans, showers and washbasins;

To stop leaks and to stop fumes from rising up through the plumbing. A water seal also called a water trap and it collects water in a dip in the plumbing. (2)

(d) why the use of large quantities of disinfectant toilet cleaners should be avoided; (2)

only use approved for your system toilet cleaners so to avoid killing the floc in the tank

(e) why adequate air vents should be fitted to the piping network.

To allow any gases to escape from the holding tank or sewage treatment plant and allow draining of wash basens and WC.

2. With reference to low pressure distillation plants:

(a) state THREE advantages over a distillation plant operating at atmospheric pressure; (3)

- Waste heat energy is recovered so efficencies are achieved.
- fewer moving parts (2)
- cool main engine

(2)

(b) explain how the density of the water inside the plant is controlled;

regulating feed, through input of the system, shell temperature, vacuum levels, heat in, sea water temperature, ()3

Using a salinometer to measure the evaporator basin concentration which is then controlled by a three-way valve

(c) explain how salt water droplets are prevented from contaminating the distillate;

initally use of demisters and air ejectors – and then feed flow rates to avoid system priming. Ensuring that the level of salt water is maintained at the correct level to keep the salt water from splashing over, otherwise called “Priming”.

(d) describe how the purity of the distillate is measured and the measures to prevent contamination of the tanks should the purity of the water exceed the set limits.

Salinometer / Total Desolved Solids meter is connected to a three way valve which will alarm and divert the product water over board if the salt content / this content is above set paramters.

3. With reference to vapour compression refrigeration plants:

(a) state what is meant by the term *superheat*; (2)

To heat energy contained by a substance (steam or other vapor not in contact with its own liquid) beyond its saturation point at a given pressure. (2)

The process of superheating means to increase the temperature of a vapor above its saturated temperature while holding its pressure constant. (2)

(b) state where in the system the refrigerant would be superheated; (2)

Usually superheated refrigerant is found at the end of the evaporator plate and coming into the compressor. The refrigerant has boiled off completely in the evaporator though the (2)
compressor then passing though the expansion valve.

(c) explain how the degree of superheat referred to in Q3(b) would be established;

The degree of superheat is found by taking the temperature of the gas and comparing it to the calculated temp in which the super heated refrigerant would exist beyound a saturated state. This difference is the degree of superheat

(d) state what is meant by the term *subcooling*;

The cooling of a refrigerant to a state where it only exists in a liquid form. The temperature has been reduced (or pressure increased) to a point where it's only possible for the agent to exit as a liquid. No vapour or gas is present

(e) explain why the refrigerant is subcooled in the condenser.

The greater the heat transfer though the refridgerant though the condenser. To improve maxim heat transfer.The condenser changes the refrigerant first in to a vapor and then into a liquid by transfering the enthlpy of condesation from the refrigerant to the cooling water.

To increase energy transferred at the expansion phase. More efficent.

4. Describe, with the aid of a sketch, an air conditioning air supply system that uses recirculation of air to control the humidity. (10)

5. (a) Explain what is meant by emulsifying detergents and the problems they can cause. (4)

They mix oil and water causeing a eemulsion to form a stable liquid which can not be seperated in an reasonable amount of time. (usually 1 hour) This emulsified liquid can not be separated by use of an oily water separated. (6)

(b) Describe a test to establish whether or not the separation time of an emulsion is acceptable for use in an Oily Water Separator.

Take a liter and put in a glass jar at a set tempture (20C) and leave for 10 minutes to an hour – you can coompare with refrence sample to check quality of seperation.

Is

This emulsion can not be seperatred and it gets sent to the sludge tank.

6. (a) Define the term *bulkhead*. (2)

Bulkhead divides 2 spacesl into seperate compartmants. They can be placed either longitudinal or transversely. They provide extra strength and saftey with regards to (8)
flooding and fire. If they are classed as watertight bulkheads, then they provide independant spaces in which water cannot pass in the event of a collision or grounding in which the hull is compromised.

(b) List EIGHT functions of a bulkhead.

1. Prevent spread of fire
2. Retard Flooding
3. Divisions
4. Longingtudial Strength for hogging sagging
5. Transverse Strength for racking
6. Stability of the vessel Reduce free survace effect of liquids contained within a space
7. Subdivide compartments and working spaces
8. give support to decks , superstructure , deck machinery, cranes.

7. Sketch a sprinkler section valve, showing the alarm and testing arrangement, labelling the MAIN components. (10)

8. With reference to entry into confined spaces and the Code of Safe Working Practices for Seamen:

(a) state why the atmosphere in a confined space may be dangerous (3)
hazard gasses left over
lack of oxygen, oxygen displaced by gases (3)
flammable gases remainting inside a confined space.
(4)

(b) with reference to Q8(a), state the allowable limits for entry into an enclosed space;
greater than 20 % oxygen, fumes or vapours to be below threshold limits, well ventilated. The space should be certified 'gas free' by a marine chemist.

(c) list FOUR precautions before entering an enclosed space.
Have an assistent stand by with breathing equipment ready
Get a Permitt to work
Get a Risk assment
Have a Oxygen meter
Have a Explosion meter

9. With reference to the safe bunkering of marine gas oil fuel:

(a) list SIX actions that should be taken prior to and during the loading; (6)
Bunker check list should be completed. It should include all but not limited to the following information: (4)

1. Take fuel sample and analyze quality of bunker product
2. No Smoking signs on dock
3. Bravo Flag'
4. Have Fire Fighting Equipt ready
5. Have communication equpiment in place and tested
6. Check valves and tank levels; continuing to check lines as fuel bought on board
7. Block the scuppers
8. Make sure the IMO bunker note is correctly filled out & signed & kept on board
9. All valves and lines checked by second officer

10. Offside valve not bunkering to ensure cross-over of fuel not possible.
11. Oil spill kit ready.

(b) state FOUR contaminants for which the fuel should be tested.

1. Water
2. Dirt
3. Microbiological
4. Surficants (Detergents)
5 solids
6 catilic fines

10. With reference to the engine log books, explain the reasons for recording EACH of the following:

(a) running hours; (2)

how many hours the unit has been run so we know when maintaince is due. To enable a planned maintenance system to be put into effect . Which decreases downtime (2)

(b) lubricating oil consumption (2)

good measure of condition of piston rings & valve seals, also indication of leaks from oil coolers (2)

(c) fuel consumption (2)

good measure of the efficencey of the engine, know when to get more (saftey) range bunker requirement, injector tip break off etc. Total Fuel consumption can indicate possible engine issues. Some engine manufactures determine their planned maintenance schedules based off fuel consumption.

(d) salinity or chloride content of the engine jacket cooling water

salinty leaks, It provides information as to the quality of the cooling water and reduce down time.

(e) water content of lubricating oil

lets you know cracked head gasket , liner failure, cooler leak. This provides indication of the quality of the water jacket seals. Gives measure contition sealing of O rings on the system.