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, 30 MAY 2008

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 risk assessment and the Code of Safe Working Practices for Merchant Seamen:

(a) explain the purpose of a risk assessment;

A risk assessment is performed to ensure the safety of personal and property during work conducted on board a vessel. It should identify the risks involved in work described within the Permit to Work issued by the chief or master.

(b) state the person responsible for carrying out the risk assessment;

In all cases, individual employers have the responsibilities for carrying out risk assessments for their workers and all workers who will be affected by the work conducted. The process of risk assessment should be carried out by suitably experienced personal, using specialist advice if appropriate

(c) explain what should be considered when carrying out a risk assessment.

Regulations require that suitable and sufficient assessments of risks to the health and safety of workers. The amount of effort that is put into a risk assessment should be proportional to the magnitude of the risk involved.

The main components of the risk assessment should include but not limited to:

- Classify of work activites
- Identification of hazards and personal risks
- Determine risks
- Decide is risk is acceptable
- Prepare action plan if necessary
- Review adequacy of action plan

2. List TEN common log entries, excluding machinery temperatures, pressures and other parameters. (10)

1. Employment of vessel whether at sea, anchor, or along side
2. The employment of personnel within the department
3. The embarkation of company representatives and contractors
4. Engine room staff on watch
5. All operations such as main and auxillary machinery for sea and start/stop times
6. Total hours in use
7. Time spent underway
8. Formal recording of testing and checking of safety devices, trips, alarms and fixed fire fighting equipment
9. All operations such as starting and stopping of machinery, pre sailing checks and tests of steering gear, nav lights
10. Record of groundings and collisions
11. Bunkering and transfer of fuel and pumping of ballasts and bilges
12. Times and details of accidents, fires or dangerous occurrences
13. The conduct of emergency procedures and fire drills
14. Recording of any running defects and major items of maintenance undertaken

3. With reference to Annex 5 of the MARPOL convention:

(a) list the THREE complementary techniques which are used to manage garbage; (3)

(b) compacking, recycling,reduction, burning,

(b) list the information to be entered in the Garbage Record Book when garbage is discharged into the sea; (5)

Date and Time of Discharge (1)
Position of Ship (Lat/Long)
Category of Garbage (1)
Estimated amount of Garbage
Size of garbage
Signature of officer in charge

(c) state the area in which no garbage whatsoever must be disposed of overboard;

Any designated special area,

(d) state which form of garbage is prohibited from disposal into the sea.

Any form of Plastics. Plastic Packaging, bottles, containers etc

4. With reference to bunkering procedures:

(a) explain how the quantity of fuel delivered is checked allowing for temperature and density; Take readings and record from shore base tank and readings from ships tank before you start bunkering. Then recheck and record at the end of bunkering from both tanks. There will be a small differenal between the two because of difference in shore base tank and ships tank temperature. (6) (4)

(b) state the procedure to be followed, in the case of dispute about the quantity of fuel delivered.

The bunkering officer should only sign a bunker receipt for the amount that that officer attests to have bunkered. A note of protest with the ships agent should be filed for the difference between what is claimed to have been delivered and what the bunkering agent acknowledges was taken.

5. Sketch an approved aerobic sewage treatment plant, describing how it operates. (10)

6. With reference to safe storage and handling of refrigerant:

(a) state where the refrigerant gas bottles should be stored; (2)

Storage bottles must be stored in a cool well ventilated area either in the refrigerating machinery spaces or adjacent compartment. The ventilation standard must be the same as (1)
the requirements for the machinery spaces, with forced supply and exhaust ventilation

(b) state the weakest part of the storage bottle; (1)

The valve is the most susceptible part of the storage bottle to incur damage.

(b) explain how it can be determined if refrigerant has been leaking from gas bottles; (4)

the valve will be cold,or the tank will be lighter.

The weight of a bottle of refrigerant is the best way to determine how much gas is contained within. If a slow leak is occurring on a bottle, it may not be detected by smell or (2)
hearing. A large leak on a bottle will usually frost around where the gas is evaporating from.

(d) state the TWO methods of recharging a refrigeration system, stating where the connection to the system should be made for EACH method;

Via Gas after the expatiation valve or Liquid before the expatiation valve

(e) state how excessive refrigerant should be removed from the system without infringing MARPOL regulations.

Refrigerant gas should be removed from a refrigeration system by the use of a gas recovery unit. The recovered gas is removed via a compressor that vacuums the gas out of the system lines.

7. List the important operations that should be included when organising fire drills. (10)

Contiune ring of the bell
Muster point
Start Fire Pump and check it's supplying water then stop
Insure all crew members know how to start fire pump
Fire teams should attend and suit up

1. Emergency Pump Situated Outside Machinery Spaces and started by all crew
2. Use adequate number of hoses for fighting fire. Hoses to be charged with fire
3. Testing of vent closing, fuel shutoff,
4. Test Fixed Fire Fighting Apparatuses
5. If possible 1Portable fire extinguisher should be demonstrated
6. Exercise water tight doors
7. Alarm System Testing
8. Change set-up of fire drills to vary responses and training
9. Change fire drills and do not make them the same everytime.

8. (a) Describe, with the aid of a sketch, a sprinkler head. (7)

(b) Explain how the sprinkler head sketched in Q8(a) operates. (3)

There is a quartz bulb that is placed in the middle of the sprinkler head cage. At the bottom of the sprinkler cage, is a deflecting shield that directs the flow of water should the valve be activated. The bulb is situated in the middle of the sprinkler house, with the bulb blocking the flow of water out of the valve. The bulb is constructed with a specific liquid and a calculated gaseous space inside. The liquid is calculated to expand when in contact with specific temperatures. When the rise of temperature in a compartment bursts the bulb,

water that is contained in the pressurized (above 4.8 bar) line will flow out the sprinkler fitting. This sudden drop in pressure in the line is connected to a fire alarm that signals throughout the vessel

9. With reference to air conditioning systems, state the meaning of EACH of the following terms:

(a) heating load; (1)

The amount of heat needed in relation to ambient temperatue to required temperature.

(b) cooling load; (1)

The quantity of heat per unit time that must be provided to maintain the temperature in a space at a given level (2)

(c) sensible heat;

The heat energy that is characterized by a change in temp and is perceptible to human senses (2)

(d) latent heat; (2)

The heat energy absorbed or liberated when a substance changes form to another form. from a liquid to a vapour to a gas (2)

(e) absolute humidity;

The grains of water in 1meter cubed of dry air

(f) specific humidity.

The mass of water moisture in a given amount of air compared to the saturated mass of moisture that that same amount of air can hold at a constant temp, given as a percentage.

10. With reference to the use of aluminium alloy in superstructures:

(a) describe the problem arising from bolting or riveting the aluminium superstructure to the steel hull, stating the method used to try and minimise the problem; (5)

When two dissimilar metals are in contact with one another in the presence of an electrolyte galvanic actions occurs. In the case of Aluminum and Steel, the Aluminum acts as a anode and gives up electrons to the steel. This causes the aluminium to deteriorate over time. By placing an insulation barrier between the two metals, the galvanic action can be almost eliminated. This insulation barrier usually involved a plastic/rubber gasket placed between the two metals, and a sleeved insert placed in the fastener holes to protect all metal surfaces. (5)

(b) describe the explosion method of bonding the aluminium superstructure to the steel hull.

Explosion bonding is a process of using controlled detonations to molecularly bond two dissimilar metals. The detonations accelerate one metal into the other, creating an atomic bond. It is considered a cold-welding process that allows metals to be joined without losing their pre-bonded properties. This process makes strips of metal that has aluminium on one side and steel on the other. These strips can now be welded to the steel hull and the superstructure welded to it.