

GUIDANCE NOTE NO: 53/2000

REVISION NO: 4

Particular Requirements for a Certificate of Competency as Marine Engineer Class 3

ACCEPTABLE QUALIFICATION FOR:

Taking charge of the propulsion machinery on a seagoing vessel of:

1. less than 3000 kw (refer to Note 8(c)) operating out to Australian Near Coastal Limits (200 Nautical Miles); or
2. less than 1500 kw operating out to Australian Coastal Limits (600 Nautical Miles).

For the requirements to serve in a vessel operating outside Australian Near Coastal Limits (200 Nautical Miles) the certificate holder should contact AMSA (Australian Maritime Safety Authority).

PREREQUISITES:

Prior to sitting any examinations, an Applicant must:-

1. Have attained the age of 20 years;
2. Provided an application form completed and signed;
3. Provided proof of identification;
4. Provide documentary evidence of approved service in an engineering capacity on vessels of not less than 400 kw propulsion power as detailed hereunder:

Marine Engine Driver Grade 1 18 months;
(service to be while acting in a capacity normally requiring possession of the certificate).

OR

Marine Fitter Diesel Mechanic 12 months;

Applicants who do not have the required sea service may sit the written examinations only if they have obtained more than half the sea service requirements and satisfy all other prerequisites.

Note: Approved service shall be counted as follows:

- On vessels engaged in Inshore Operations - two third rate.
 - On vessels engaged in Harbour Operations - half rate. Not less than 6 months qualifying service must be performed on vessels propelled by machinery of the type for which the certificate is valid.
5. Satisfactorily pass an eyesight test with an optometrist. An eyesight test form can be obtained from this office and must be returned to this office when completed. Note: Eyesight tests are valid for 2 years;
 6. Pass a medical examination and provide a copy to this office. Medical forms are available from the Marine Safety Branch office. Note: Medical examinations are valid for 2 years;
 7. Pay fees of \$358 (comprising of an application fee of \$30, examination fees of \$308 (\$77 for each of the written and oral examinations), plus \$20 for the issue of the certificate). Note: A fee of \$77 is applicable for the resit of any examination and fees include GST where applicable.
 8. Have satisfactorily attended the following short courses and provided copies to the Marine Safety Branch:
 - (A) Elements of Shipboard Safety.

Please note:

 1. That the fire-fighting and sea survival elements of a Shipboard Safety course must have been completed within the **5** years prior to the issue of a seafarers' first Certificate of Competency.
 2. First aid Certificates must be valid at the time of issue of any Certificates of Competency.
 3. If a Shipboard Safety Certificate is more than **10** years old, Seafarers must resit the Fire-fighting and Sea survival elements prior to the issue of a new Certificate of Competency. (this is not applicable for replacement certificates).
 4. For the issue of the second or third etc. Certificate of Competency, if a Shipboard Safety Certificate is between 5 and 10 years old, the Marine Safety Branch will determine the validity of the Fire-fighting element.
 5. Exemptions may only be granted if the training/experience has been obtained within the 5 years prior to the issue of the first Certificate of Competency. Exemptions are valid for a maximum of 5 years.
 - (B) Proficiency in Rendering First Aid to the Injured.
 - (C) Prevention and Control of Fires Onboard Ship. Until this course has been attended Certificates of Competency shall be endorsed "Restricted to Vessels of Less than 1500 kw" (in any capacity).

EXAMINATION:

The examination will be based on the syllabus and will comprise:-

PRACTICAL MATHEMATICS	3 Hours
ENGINEERING KNOWLEDGE (MOTOR OR STEAM)	3 Hours
ELECTRICAL KNOWLEDGE	1 Hour
ENGINEERING AND ELECTRICAL KNOWLEDGE (Oral)	

Note 1: The written and oral examination for an additional endorsement (motor or steam) of a valid Marine Engineer Class 3 Certificate of Competency shall be limited to Engineering Knowledge - 1 hour (motor or steam as appropriate).

Note 2: The holder of a valid Marine Engineer Watchkeeper Certificate of Competency need only pass the Engineering Knowledge (oral) as appropriate.

VALIDITY OF EXAMINATION RESULTS

Note: **Passes in the oral and engineering knowledge examinations are valid for one (1) year and passes in the other written examinations are valid for five (5) years.** If you have not completed the requirements for the issue of the certificate within the validity dates you may be required to re-sit the examinations.

NOTES:

1. Candidates with at least 50% approved sea service in an engineering capacity may apply for a Restricted Marine Engineer Class 3 Certificate of Competency.
2. Each application will be assessed on a case by case basis and candidate may be granted a Restricted Certificate of Certificate of Competency endorsed for use on a particular vessel, class of vessel, vessel power, area of operation etc.

SAFETY MANNING REQUIREMENTS - ENGINEERING QUALIFICATIONS

Fishing Vessels – refer to Guidance Note: 28/96.

Trading Vessels are subject to determination by the Manning Committee.

Marine Engineer Class 3 - Syllabus

Practical Mathematics

- (a) Application of areas and volumes to problems such as the weight of engine parts;
- (b) Force as a vector, triangle of forces;
- (c) Coefficient of friction, friction losses in simple slides;
- (d) Velocity ratio, mechanical advantage and efficiency of simple machines, levers, rope blocks, screw and hydraulic jacks;
- (e) Direct stress, shear stress, elasticity, working stress, factor of safety;

- (f) Circumferential and longitudinal stress in thin cylinders and spherical shells;
- (g) Equilibrium of floating bodies;
- (h) Linear expansion;
- (i) Heat units, specific heat capacity;
- (j) Engine power and torque;
- (k) Heat value of fuel, fuel consumption and engine power;
- (l) Relationship between vessels speed and fuel consumption, assuming resistance varies as speed squared;

Engineering Knowledge

- (a) Properties of common marine engineering materials and methods of joining. Manufacture of simple components. Simple heat treatment;
- (b) Properties of liquids and gases commonly used aboard vessels;
- (c) Precautions against fire or explosion. Dangers of oil or gas leakage into bilge or enclosed spaces. Action of wire gauze diaphragms;
- (d) Methods of dealing with fire aboard vessels. Construction, testing, and use of the various portable and fixed fire extinguishers and installations. Remote shut-offs and closing appliances;
- (e) Precautions before entering tanks or enclosed spaces;
- (f) Common shipbuilding terms. Simple details of rudders, propellers, stern tubes, underwater fittings, tank management and effect on ship stability;
- (g) Elementary principles and care and management of auxiliary power sources steam and motor, including boilers and their fittings. Proper use of gauge glasses and blowdown valves. Dangers of water hammer;
- (h) Elementary principles and care and management of the various types of auxiliary pumps and pumping and piping systems, refrigerators and other shipboard auxiliaries;
- (i) Alignment of machinery and machinery parts;
- (j) Construction and use of the various types of gauges and meters;
- (k) Administrative responsibilities. Oil pollution;
- (l) Use of lifesaving appliances;
- (m) (Motor only) Simple constructional details and the care and management of two stroke and four stroke cycle main propulsion internal combustion engines, with particular reference to safety devices. Preparing for sea. Starting and reversing. Detection of defects;
- (n) (Motor only) Engine cooling, fuel, and lubricating systems;
- (o) (Motor only) Care and attention required in the use of air compressors;
- (p) (Steam only) Simple constructional details and the care and management of main propulsion steam and engines and boilers, their fittings and mountings, with particular reference to safety devices. Preparing for sea. Detection of defects;
- (q) (Steam only) Causes and effects of boiler water contamination. Detection and remedial action;

- (r) (Steam only) Care and management of boiler fuel, air and feed water systems;
- (s) Refrigeration. The candidate may be required to show a knowledge of the following items:
 - Principles of refrigeration;
 - Properties of common refrigerants; Dangers associated with leakage;
 - Operating temperatures and pressures. Methods of temperature control.
 - Care and management of refrigeration equipment, recognition of defects.

Electrical Knowledge

- (a) SI Units Amperes, Volts, Ohms;
- (b) Electrical circuit Ohms law, resistance in series and parallel, batteries in series and parallel;
- (c) Heating effect of electric current;
- (d) Calculation of electrical power given a network of resistance and applied voltage;
- (e) Electrical safety;
- (f) Colour coding;
- (g) Motor starters, overload and under voltage protection;
- (h) AC and DC generators, voltage control and load sharing;
- (i) Accumulators and care and maintenance;
- (j) Power and lighting distribution systems 3 phase and single phase. Use of fuses and circuit breakers; use of earth lamps.

Syllabus - Engineering Knowledge Endorsement

For the Steam Endorsement of a certificate limited to motor only;

- (a) Simple constructional details and the care and management of main propulsion steam engines and boilers, their fittings and mountings, with particular reference to safety devices. Preparing for sea. Detection of defects;
- (b) Causes and effects of boiler water contamination. Detection and remedial action;
- (c) Care and management of boiler fuel, air and feed water systems.

For the motor endorsement of a certificate limited to steam only;

- (a) Simple constructional details and the care and management of two stroke and four stroke cycle main propulsion internal combustion engines, with particular reference to safety devices. Preparing for sea. Starting and reversing. Detection of defects;
- (b) Engine cooling, fuel, and lubricating systems;
- (c) Care and attention required in the use of air compressors.

Propulsion Power

For purposes of engineer qualifications and manning PROPULSION POWER means:

- I. In the case of a multiscrew vessel of less than 35 metres in length for use in sheltered waters, inshore, restricted offshore or offshore operations, propulsion power means the maximum continuous rated power in kilowatts of the larger engine provided for the propulsion of the vessel; and
- II. In the case of a vessel not included in (I) above, means the total maximum continuous rated power in kilowatts of all the machinery provided for propulsion of the vessel.

Signed by: Sri Srinivas

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