

Amending Rules for Examination of Engineers.

Marine Department,
Wellington, 21st July, 1916.

WHEREAS by Warrant dated the 13th day of June, 1914, and published in the *New Zealand Gazette* No. 58, of the 18th day of the same month, rules were made governing the examination of candidates for certificates of competency as engineers:

And whereas it is desired to amend the said regulations in the manner hereinafter described:

Now, therefore, in pursuance and exercise of the power and authority conferred upon me by section 23 of the Shipping and Seamen Act, 1908, and of all other powers and authorities enabling me in that behalf, I do hereby make the following regulations amending the hereinbefore-recited regulations; and I do hereby order that they shall come into force on the 1st day of January, 1917.

ROBERT McNAB.

REGULATIONS.

SECOND-CLASS ENGINEER.

CLAUSE 47 (Second-class Engineer) is hereby amended as follows:—

Paragraphs (b) to (m), inclusive, are revoked, and the following substituted in lieu thereof:—

- (b.) He must write a legible hand, and have a good knowledge of arithmetic up to and including vulgar and decimal fractions and square root. He must also be able to apply these rules to questions relating to safety valves, coal consumption, consumption of stores, capacities of tanks, bunkers, &c., and other similar problems; and be able to calculate the suitable working-pressure for a steam boiler of given dimensions, and the stress per square inch on crank and tunnel shafts and other parts of the machinery when the necessary data are furnished.
- (c.) He must be able to pass a creditable examination as to the various designs of paddle and screw engines in general use, including turbines; as to the details of the different working parts, external and internal, and the use of each part.
- (d.) He must have a satisfactory knowledge of the methods of construction of engines and boilers as used in the workshop, and of the attention required by the different parts of the machinery on board ship.
- (e.) He must be able to give a satisfactory description of boilers, and the methods of staying them, together with the use and management of the different valves, cocks, pipes, and connections.
- (f.) He must understand the precautions necessary to be taken when raising steam in boilers and when opening stop-valves to admit steam to pipes, &c.
- (g.) He must understand how to make good the results of ordinary wear-and-tear to the machinery, how to correct defects from accident, decay, &c., and how a temporary or permanent repair could be effected in case of derangement or total breakdown.
- (h.) He must understand the use of the water-gauge, pressure-gauge, barometer, thermometer, and salinometer, and the principles on which they are constructed.
- (i.) He must be able to state the causes, effects, and usual remedies for incrustation and corrosion.
- (j.) He must be able to explain the methods of testing and altering the setting of the slide-valves, and methods of testing the fairness of shafts and adjusting them.
- (k.) He must understand the construction and working of evaporators, feed filters, and feed heaters.
- (l.) He must understand the construction and working of centrifugal, bucket, and plunger pumps, and the principles on which they act.
- (m.) He must understand the construction and working of steering-engines, electric-light engines and dynamos, electric motors, refrigerating machinery, hydraulic machinery, and such internal-combustion engines as are used to drive ships' launches, emergency and auxiliary machinery on board ship.
- (n.) He must possess a creditable knowledge of the prominent facts relating to combustion, heat, and steam.
- (o.) He must be able to take off and calculate indicator diagrams, and understand the distribution of the steam in the cylinder as shown thereby.
- (p.) He must be able to make a dimensioned working sketch or drawing of some simple part of the machinery.

FIRST-CLASS ENGINEER.

Clauses 48 and 49 are hereby revoked, and the following regulations made in lieu thereof:—

48. *First-class Engineer.*—A candidate for a first-class engineer's certificate must be not less than twenty-two and a half years of age.

49. A more extended knowledge of the subjects named in paragraph 47 will be required, and in addition to the qualifications specified for a second-class engineer—

(a.) He must—

(1.) Have served at sea for eighteen months, with a second-class certificate of competency or service, on regular watch on the main engines or boilers of a foreign-going steamship of not less than 99 nominal horse-power, as senior engineer in charge of the whole watch (see paragraph 37 of the regulations); or

(2.) Have served at sea for two years and three months, with a second-class certificate of competency or service, as first engineer of a home-trade steamer of not less than 99 nominal horse-power; or three years with a second-class certificate of competency or service as second engineer of a home-trade steamer of not less than 99 nominal horse-power; or

(3.) Have served three years and nine months with a second-class certificate of competency or service as third or fourth engineer of a home-trade steamer of not less than 99 nominal horse-power, and during the entire period have been the senior engineer in charge of the whole of a watch on the main engines and boilers (see also paragraphs 27, 28, 29, and 59 of the regulations); or

(4.) Possess or be entitled to a first-class certificate of service.

- (b.) His knowledge of arithmetic must include the mensuration of superficies and solids and the extraction of square and cube roots, and the application of these rules to questions relating to the power, duty, and economy of engines and boilers, and to the stresses in rods, shafts, and levers of the engine. He should also be able to calculate the effect of the application of the lever, pulley, inclined plane, and other mechanical powers.
- (c.) He will be required to make an intelligible hand sketch, or a working drawing, of one or more of the principal parts of a steam-engine or boiler, and to mark upon it all the necessary dimensions in figures, so that the sketch or drawing could be worked from (see Appendix C of the regulations).
- (d.) He must be able to take off and calculate indicator diagrams, and to recognize and know how to correct defects in the distribution of the steam as shown thereby.
- (e.) He must be able to calculate safety-valve pressures and the strength of the boiler shell and riveting, and of the furnaces, flat surfaces, and stays.
- (f.) He must be able to state the general proportions borne by the principal parts of the machinery to each other, and to calculate the direct stress, the torsional stress, and the bending stress in round bars, and the direct stress and the bending stress in rectangular bars with given loads.
- (g.) He must be able to explain the method of testing and altering the setting of the slide-valves, and to sketch approximately the difference any alteration in the slide-valve will make in the indicator diagram.
- (h.) He must be conversant with surface condensation, superheating, and the working of steam expansively.
- (i.) He must understand the construction and working of and be able to maintain in working condition the auxiliary machinery which is placed under his charge—viz., refrigerating machinery, electric-light engines and dynamos, electric motors, hydraulic machinery, the various descriptions of steering-engines, and internal-combustion engines as used in launches and for auxiliary and emergency machinery on board ship, &c.
- (j.) He must know how to provide against defects and breakdowns of the machinery, and be able to direct and carry out any ordinary repairs that may be required either to the engines or the boilers.

Sea Service.—It is desirable that the whole of the candidate's sea service should be covered by testimonials certifying to his sobriety, experience, ability, and general good conduct, but in future the usual testimonials will be required for at least the last eighteen months at sea preceding the date of the application to be examined.

All candidates, including those for first class who have not been in charge of the whole of a watch but qualify under paragraph 37 of the regulations as the second or third senior of the watch and have been in charge of a section of the machinery only, will be required to have served at sea on regular watch on both the main engines and the boilers, not less than six months being spent on each.

The service described in paragraphs 27, 28, 29, and 59 of the regulations may as heretofore be accepted as qualifying for examination in accordance with the conditions specified in those paragraphs.

Elementary Questions.—In future, the elementary questions, referred to in paragraph 76 of the regulations, will not necessarily be taken from Appendix B, but may be new questions somewhat similar in form and covering much the same ground.