

- (i) To understand the construction and working of steering-engines and gears, marine hydraulic and refrigerating machinery, and such internal-combustion engines as are used to drive ships' launches and emergency and auxiliary machinery :
- (j) To have a knowledge of the construction and working of main and auxiliary marine electric motors, dynamos, and control gears :
- (k) To understand how to maintain in safe and satisfactory working-order the main and auxiliary machinery of any vessel in which he may be employed :
- (l) To be able to make a dimensioned working drawing of some part of the machinery with which he ought to be familiar, or to complete and develop a given example.

50. For a second-class ordinary certificate the candidate is also required.

- (a) To have a good knowledge of the methods employed in the construction of marine steam engines and boilers in the workshops, the processes involved in the manufacture of the several parts, and the methods of fitting and securing the machinery on board ship :
- (b) To be familiar with the various designs of screw and paddle marine steam-engines (including turbines) now adopted ; also to understand the functions of each important part, and the attention required by the various parts of the machinery on board ship :
- (c) To understand the methods of testing and altering the setting of slide valves ; and the effect produced in the working of an engine by definite alteration of the setting of the valves :
- (d) To have a good knowledge of the construction of marine boilers of modern designs (including water-tube types) ; the manner of fitting them securely in place on board ship ; the general requirements in regard to their preservation and management ; also to be able to determine, by calculation, a suitable working-pressure for a boiler of given dimensions :
- (e) To understand thoroughly the use and management of marine boiler mountings and fittings, with special reference to the water-gauge (see Appendix C) and safety-valve ; and the precautions necessary to be taken when raising steam, and when admitting steam to steam-pipes, &c. :
- (f) To understand the construction and working of feed-heaters and feed-filters, evaporators, superheaters, air pre-heaters, and forced draught and oil-burning installations of the types commonly fitted on board ship, the attention they require when working, and the care necessary for their maintenance in satisfactory condition.

51. For a second-class motor certificate the candidate, in addition to compliance with Rule 49, is required—

- (a) To possess a good knowledge of the details of construction of the types of marine internal-combustion engines in general use ; to understand clearly the principles on which gas, oil, or other internal-combustion engines work ; and to be able to explain the difference between them :
- (b) To have a satisfactory knowledge of the methods employed in the workshops in the construction of marine internal-combustion engines ; the processes involved in the manufacture of the several parts ; and the methods of fitting and securing the machinery on board ship :
- (c) To understand the use and management of the various valves, pipes, and connections generally fitted in motor-vessels ; and to know what attention is required to be paid to the several parts of the machinery :
- (d) To be familiar with the various methods of supplying air and fuel to the cylinders of internal-combustion engines ; the construction and working of the apparatus for atomizing, carburetting, or vaporizing the fuel ; and the means of effecting the ignition of the fuel or gases in the cylinders :
- (e) To be familiar with the electrical systems of ignition in use in motor-vessels ; and to have a knowledge of the construction and arrangement of magnetos, primary and secondary batteries and induction coils, and the principles governing their action :