

FIRST-CLASS CERTIFICATE : SYLLABUS OF EXAMINATION.

53. A candidate for a first-class certificate is required to exhibit a superior knowledge of all the subjects specified in Rule 49, and in either Rule 50 or Rule 51, as the case may be ; and also—

- (a) To show that he understands how to maintain in good working-order any machinery or other appliances which may be placed in his charge ; how to provide against derangement and breakdown of the machinery ; and also to demonstrate that he is competent to execute or direct any ordinary repairs or renewals that may be required :
- (b) To be able to recognize from indicator diagrams any irregularity in the working of the engines which they may reveal ; to understand how this might be corrected ; and to be able to portray approximately the changes any readjustment of the principal working-parts, or alteration in the working of the valves, would produce in the diagrams :
- (c) To understand how to apply the torsion-meter ; and to be able to calculate shaft horse-power ;
- (d) To possess a knowledge of the construction of an ordinary steel ship ; and to understand how to preserve in good condition the structural parts in way of the machinery spaces, with special reference to the engine and boiler seatings, and the double-bottom tank, bunker, and bilge members :
- (e) To have a knowledge of the elements of ship-stability ; and to be familiar with the general requirements concerning water-ballasting, and the storage and transfer of liquid fuel :
- (f) To be able to make a satisfactory working drawing of one or more of the principal parts of the machinery with which he ought to be familiar, or to complete and develop a given example ; and supply the dimensions and other particulars necessary for the construction of the part or parts shown.

A candidate for a first-class ordinary certificate is also required—

- (g) To understand thoroughly the working of steam expansively ; also to have a satisfactory knowledge of the economical and efficient use of coal and oil fuel :
- (h) To be thoroughly conversant with the principles and practice of surface condensation and superheating ; and to understand the requirements concerning the generation and use of high-pressure steam on board ship.

For a first-class motor certificate the candidate is also required—

- (i) To have a thorough knowledge of the systems of lubrication usually adopted for marine internal-combustion engines and air-compressors, and the methods of purifying and preserving the fuel and lubricating oils generally used in motor-ships :
- (j) To understand the construction of the apparatus used by engineers on board ship for ascertaining the physical properties of the fuel and lubricating oils ; and to be capable of determining, by means of the appropriate instruments, the flash-point, specific gravity, and viscosity of an oil.

ENDORSEMENT OF CERTIFICATES.

54. The holder of an ordinary certificate may have it endorsed to the effect that he is competent for service in the appropriate capacity in motor-ships, provided that he produces proof of at least nine months' qualifying service in the foreign or intercolonial trade, or thirteen and a half months' service in a qualifying capacity in the home trade, in motor-ships of horse-power not less than that required by these rules, and passes the appropriate examination.

The holder of a motor certificate may have it endorsed for service in steamships, provided that he proves at least twelve months' service in a qualifying capacity in the foreign or intercolonial trade, or eighteen months' qualifying service in the home trade, in steamships of horse-power not less than that required by these rules, and passes the appropriate examination.

Sea service in charge of a watch in vessels of the required horse-power performed by the holder of a second-class certificate, either ordinary or motor, whilst in possession thereof will be accepted as qualifying for first-class endorsement of either denomination, provided that in the case of an ordinary endorsement the necessary experience has been gained on both main engines and boilers of a steamship. (See Rule 60.)