

- (f) To understand the general requirements in regard to the supply and storage of compressed air on board ship; to have a good knowledge of the construction and working of the types of air-compressors generally adopted; and to be familiar with the use and management of the various valves, connections, and safety devices employed:
- (g) To be familiar with the methods of cooling the cylinders, pistons, &c., of marine internal-combustion engines; and to understand the precautions to be taken against overheating and fracture of the various water-cooled parts:
- (h) To have a good knowledge of the mechanisms of the controlling arrangements of marine internal-combustion engines, and understand how to deal with any defects arising therein; also to be able to explain the chief causes of and the remedies for faults and irregularities incident to the starting and working of the engines:
- (i) To be familiar with the nature and properties of the fuel and lubricating oils generally used in internal-combustion engines; and to have a knowledge of the principal physical tests to which they are subjected:
- (j) To understand what is meant by "flash-point," and to be familiar with the conditions which promote the formation of explosive mixtures of oil-vapour or gas and air in the machinery spaces and oil-tanks; to have a sound knowledge of the precautions to be taken against fire or explosion from gas or oil-vapour, and the action of wire gauze when employed for this purpose; to understand how to deal with an outbreak of fire; and to have a satisfactory knowledge of the construction and working of the types of fire-extinguishing apparatus usually fitted in motor-ships:
- (k) To possess a good working knowledge of the construction and management of auxiliary steam boilers and machinery.

## FIRST-CLASS ENGINEER.

*(a) Age.*

52. A candidate for a first-class engineer's certificate, whether ordinary or motor, must be not less than twenty-two and a half years of age.

*(b) Sea Service.*

The candidate must—

- (1) Have served at sea for eighteen months in foreign-going or intercolonial steamships of not less than 99 nominal horse-power and/or foreign-going or intercolonial motor-ships of not less than 560 brake horse-power, on regular watch on the main propelling machinery, as senior engineer in charge of the whole watch (see also Rule 60); or
- (2) Have served at sea, in home-trade steamships of not less than 99 nominal horse-power and/or home-trade motor-ships of not less than 560 brake horse-power, for two years and three months as first or second engineer; or three years as third or fourth engineer, being senior engineer in charge of the whole watch on the main propelling machinery.
- (3) Possess, or be entitled to, a first-class certificate of service.

*(c) Each Candidate must possess a Second-class Certificate.*

The candidate must have performed the whole of the required period of service while in possession of a second-class certificate of the same description (ordinary or motor) as that for which he desires to be examined.

At least two-thirds of the required service must have been in ships of the type (steam or motor) to which the desired certificate relates. The remainder of the service may have been in either steam or motor-ships.