

CHAPTER II. — QUALIFICATIONS REQUIRED FOR THIRD-CLASS, SECOND-CLASS, AND FIRST-CLASS (ORDINARY AND MOTOR), AND EXTRA FIRST-CLASS CERTIFICATES OF COMPETENCY.

THIRD-CLASS ENGINEER.

(a) Age.

46. A candidate for a third-class engineer's certificate must be at least twenty years of age.

(b) Workshop Service.

A candidate should have served for a period of not less than five years as apprentice engineer at the making or repairing of steam or internal-combustion engines, or similar machinery, such as would be recognized as affording useful training for a marine engineer.

At least two and a half years of this period should have been devoted to fitting, erecting, or repairing such machinery, and the remaining two and a half years may have been spent on work of this nature or on work in other branches of the trade performed in connection with machinery of the nature indicated above, subject to the time allowances specified in Rule 56. Time spent at an approved technical school may be accepted in lieu of not more than two years of the latter period of workshop service, subject to the conditions specified in Rule 59. In the event of the total qualifying period of an applicant's apprenticeship, as computed by Rule 56 being less than five years, the deficiency may be made up by service as journeyman on qualifying work. No time served before the age of fifteen will be accepted.

(c) Testimonial as to Character and Sobriety.

In addition to references to his workshop service a candidate must produce a testimonial as to character and sobriety covering a period of at least a year immediately prior to the date of his application to be examined.

THIRD-CLASS CERTIFICATE: SYLLABUS OF EXAMINATION.

47. A candidate for a third-class certificate is required—

- (a) To be able to express himself in creditable English; and to possess sufficient knowledge of practical mathematics to enable him to work simple problems in mechanics, heat, and hydrostatics, and in other subjects related thereto:
- (b) To be conversant with the use of logarithms; and to have a knowledge of elementary trigonometry, mensuration, and algebra, and the metric system:
- (c) To possess a fair knowledge of the construction and management of the types of marine engines (steam and internal combustion) and boilers now adopted; and to understand the functions of each important part of the machinery:
- (d) To understand the use and management of marine-boiler mountings and fittings; and to be familiar with the use of the ship's slide valves usually fitted in way of the machinery spaces:
- (e) To be able to explain the action of the slide valve; and to have a knowledge of the working of steam expansively:
- (f) To understand the construction of force, bucket, and centrifugal pumps and the principles on which they act:
- (g) To understand the construction and use of the meters commonly used by engineers on board ship, with special reference to the pressure gauge, thermometer, barometer, hydrometer, voltmeter, and ammeter, and also to have a knowledge of the principles governing their action:
- (h) To have a knowledge of the nature and properties of the fuels and lubricants used in steam and motor vessels.
- (i) To have a knowledge of the working of marine auxiliary machinery, with special reference to boiler-feed pumps, bilge, ballast, and circulating pumps, air pumps and compressors, steering engines and gears, and electric motors and generators:
- (j) To have sufficient knowledge of the elements of machine drawing and projection to enable him to make a dimensioned drawing of some simple part of the machinery, or to complete and develop a given example.