SECOND CLASS FIREMAN

Types, purpose, operation, of the following: Fire Tube boilers, water tube boilers, package boilers, forced-flow steam generators, steam drum internals, water column, gauge glass, try cocks, safety valves, check valves, relief valves, valves, gauges, soot blowers, dampers, superheaters, economizers and air preheaters. Fundamentals of heat transfer and circulation of water in various boiler types; including the properties of steam. Arrangement of blowoff piping in various boilers. Blowoff valve sequencing in various boilers. Purpose for boiler blow down. Purpose of steam traps. Proper operation of valves for opening and closing. Proper procedure for establishing boiler water level, light-off and going on line with other boilers on a header system. Proper procedure for boiler out of service operation such as: shutdown, draining, isolation, cleaning. The preparation of a boiler for inspection. Proper procedure for startup of boiler auxiliaries such as: motor-driven boiler feed pumps, reciprocating steam pumps, draft fans, etc. and their normal operation. Purpose and operation of safety valves. Procedure for removing and installing manhole and handhole plates. On line operation for abnormal conditions such as: oil in boiler, low water, high water, water carryover, leaks, etc. Types and operation of oil and gas burners as used in H.P. boilers. A basic knowledge of combustion flame safety equipment. Understanding of the principals of combustion. Operation and testing of low water cutoff. Ability to do simple math. Knowledge of first duties on taking over a shift; including State operators logbook. Knowledge of opacity restrictions and smoke density devices required by 310 CMR 7.00. Understanding of lockout / tag out procedures. Understanding of MSDS. Confined space entry. Knowledge of ASME Code Section VII. Knowledge of the license permits them do. This information is contained in Chapter 146 of the General Laws and in 522 CMR 2.00. Understanding ASME Section 7

Questions concerning the plant in which the applicant is presently employed or where they have been employed in the past may be asked during the oral portion of the examination.

FIRST CLASS FIREMAN

All of that pertaining to the foregoing grade. A knowledge of low-pressure steam and vacuum heating systems, feedwater heaters including deaerators and single feedwater control level systems, as well as feedwater treatment and testing. Boiler water sampling, testing and treatment as well as control of steam contamination. Operation & knowledge of small non-condensing turbines. Proper procedure for replacing packing on valves and pumps. Knowledge of the effects of foaming, priming, scale, oil, etc. on the operation of boilers. Laying up of boilers, both wet and dry. Lubricants and lubrication methods for various types of lubricators and their uses on various boiler auxiliaries. Knowledge of the various types of safety valves and relief valves. Safe operating procedures for boilers and auxiliaries covering startup, normal operation, emergency conditions and shutdown. Knowledge of automatic boiler operating controls including safety devices required by 522 CMR 16.00. Knowledge of combustion and combustion by-products. A knowledge of fuel and their proper storage. Types and testing of steam traps. Knowledge of licensing and inspection laws in Massachusetts including Section 46. Boiler horsepower determination using Chapter 146. Knowledge of steam tables. Knowledge of CMR’s 522. Knowledge of CMR’s 310. Operation & regeneration of Water softeners, knowledge of steam reducing valves and flue gas analysis equipment. Operation of reciprocating pumps. Operation & maintenance of centrifugal pumps. Knowledge of what the license permits them do. This information is contained in Chapter 146 of the General Laws and in 522 CMR 2.00

Questions concerning the plant in which the applicant is presently employed or where they have been employed in the past may be asked during the oral portion of the exam.
THIRD CLASS ENGINEER

All of that pertaining foregoing grades: Types, purpose, operation of the following: Non-condensing steam turbines, impulse blading, reaction blading, velocity-compounding, pressure compounding, journal bearings, forced feed lubrication, reduction gears, shaft seals, throttle-trip valves, emergency governors, overpressure protection devices. Understanding of causes of vibrations and critical speeds in turbines. Turbine horsepower determination as per Chapter 146.

Knowledge of direct acting centrifugal and electronic type speed governors. A knowledge of water treatment. The effect of scale, sludge and other contaminants in boilers. An understanding of water side and fire side corrosion and its prevention. A thorough knowledge of positive and non-positive displacement pumps. A knowledge of heating systems using outside air admission. Methods of removing scale and oil from boilers. Knowledge of boiler safety valve code requirements; including capacity determination, permissible mountings, set pressures, stamping, etc. Ability to order a safety valve and checking safety valve capacity three ways. A knowledge of gagging a safety valve. A knowledge of power plant repairs, including the procedure for making welded and mechanical repairs in accordance with state laws. A thorough knowledge of boilers, boiler control systems both combustion and feedwater. Understanding of code jurisdictional limits for piping drum type boilers as required by ASME Code, Section I PG-58.


Questions concerning the plant in which the applicant is presently employed or where they have been employed in the past may be asked during the oral portion of the exam.
SECOND CLASS ENGINEER


Questions concerning the plant in which the applicant is presently employed or where they have been employed in the past may be asked during the oral portion of the exam.

FIRST CLASS ENGINEER

A more advanced knowledge of that pertaining to the foregoing grades, including steam and gas turbine repairs. Types, purpose, calculation of the following: power plant cycles, thermodynamic and mechanical losses in steam turbines, etc. Ability to supervise repairs on all plant machinery. Knowledge of power plant efficiencies. A knowledge of power plant physics and chemistry of combustion. A knowledge of automatic control systems for plant systems. Knowledge of polishing effluents from plant, as well as environmental laws. A thorough knowledge of power plant emissions monitoring and control. A knowledge of power plant environmental regulations including wastewater treatment and solid waste handling. A knowledge of basic knowledge of metallurgy and nondestructive examination. A knowledge of the installation, operation, maintenance and repair of turbines, condensers, boilers, and related auxiliaries including oil purification systems. Basic operation of a generator and plant electric systems. Familiarity with psychometric charts.

Questions concerning the plant in which the applicant is presently employed or where they have been employed in the past may be asked during the oral portion of the exam.