

Study Guide: Grade III Steam Engineer

Trade Licensing Program

Steam Engineer & Boiler Fireman License

The Applicant Should Be Familiar With The Information Recommended For The Lower (Boiler Fireman Grades Iv And V) As Well As The Following:

1. Sketch A Fire Tube Boiler. See Study Outline For Beginning Steam Fireman.
2. Sketch A Complete Heavy Grade Fuel Oil Burning System Including The Following:
 1. Tank
 2. Vent
 3. Tank Heater
 4. Return Line
 5. Full Flow Relief Valves
 6. Heater After Fuel Oil Pumps
 7. Fuel Control Valves
 8. Mechanical Atomizing Burners
 9. Steam Atomizing Burners
 10. A Constant Differential Pressure Valve
 11. Temperature Interlock
 12. Pressure Interlock
3. Sketch Complete Natural Gas Fuel Firing System To Include The Following:
 1. Gas Pressure Reducing Valve With Vent
 2. Hi-Gas Pressure Sensing And Interlock
 3. Low-Gas Pressure Sensing And Interlock
 4. Gas Quick Closing Valves
 5. Vent Line And Valve
 6. Cock Or Plug Valves
 7. Gas Burner
 8. Flame Failure Device
 9. Gas Fuel Control Valve
 10. Gas Control With Valve Closed Position Proving Micro Switch
4. Sketch A Feedwater System For Two Or More Boilers From Hot Well Or Source Of Supply To Boiler Showing Types Of Protective Valves And Means Of Water Level Control In The Boilers.
5. Describe Complete Operation Of The Following Steam Traps:
 1. The Inverted Bucket Trap And Explain How The Size Of The Discharge Orifice Is Related To The Trap Input Or Line Pressure
 2. Impulse Trap
 3. Bucket Trap
 4. Disc Trap
 5. Thermostatic Trap
 6. Float Operated Trap
6. Discuss The Difference Between Alternating Current, Direct Current And The Phases Of Alternating Current Used In The Boiler Room. Include The Voltages Involved With The Controls, Motors, And Spark Ignition Devices. Discuss Over-Current Or Electric Short Protection.
7. Describe Generally Accepted Current Feedwater Treatment Procedures For Control Of Scale Forming Water Hardness, Reduce Oxidation Or Rusting, Control Of Acidity Or Alkalinity, Control Of The Concentration Of Dissolved And Undissolved Solids In The Boiler Water, Helping Undissolved Material To Stay In Suspension, And A Means To Prevent Corrosion In The Heating System.
8. Discuss Means To Improve The Quality And Purity Of Steam. This Includes Dry Pipes, Dryers, Scrubbers, And Baffles In The Steam Drum.
9. Describe A Positive Displacement And A Centrifugal Pump And Where Each May Be Found In The Boiler Room.
10. Describe Procedure To Protect Water Side And Fire Side When Securing A Boiler For An Extended Period Of Time.

11. Discuss The Differences Between A Fire Tube And A Water Tube Boiler And Describe Briefly An Example Of Each. Include Construction Details, Means Of Support, Superheaters, Air Preheaters, And Economizers.
12. Explain The Differences Between A "Pop" Safety Valve, A Relief Valve, And A Rupture Disk To Include The Reason For The "Popping" Action Of The Pop Safety Valve And The Blow Down Reseating Of The Same Type Of Valve.
13. Describe The Importance Of Furnace Draft And Means Of Obtaining A Balanced Draft. Include The Difference Between A Negative And Positive Pressure Furnace.
14. Describe A Deaerating Feedwater Heater To Include Location With Respect To The Feedwater Pump, Need For Venting, Operation, How Fed, How Water Level Is Controlled, And Reason For Having A Vacuum Breaker.
15. Discuss Necessity For Soot Blowers, How Operated, How Installed, And Proper Alignment.
16. Discuss Class A, B, And C Fire Extinguishers And Types Of Fires That The Extinguishers Are Used For.
17. Describe The Combustion Process And What Is Meant By Fuel Air Ratio To Include What A Good Minimum Excess Air Percentage By Volume Is For Burning Natural Gas, Fuel Oil And Coal. Include The Means Used To Determine The Amount Of Excess Air.
18. Describe Procedures For Boiler/Furnace Maintenance To Include Cleaning Inside And Outside, Testing For Leaks, Examination Inside For Corrosion Inspection For Weakness, Feedwater Valves And Connections, Surface Blow Dry Pipes, Baffles, Water Column Lines, Safety Valves, Vent Valve Connection, Gage Connection, Cleaning Fireside Of Tubes And Tube Sheets , Fireside Corrosion, Pitting, Grooving, Fire Cracks, Bulging, Bagging, Blisters, Etc.
19. Discuss Proper Start-Up Of Auxiliary Steam Turbines And Describe Governing, Overspeed Trip, Types Of Bearings, Lubrication, Thrust Bearings, Governing When Used To Drive A Feedwater Pump, Etc. When Used To Drive A Centrifugal Feedwater Pump To A Battery Of Boilers And In Parallel With Other Feedwater Pumps, Discuss How The Turbine Driven Centrifugal Feedwater Pump Should Be Piped, How The Pump Is Brought On The Line And Precautions That Must Be Taken When Loading The Pumps And Running Them In Parallel.
20. Discuss Running Continuously Air Compressors To Include Starting, Means Of Unloading, Cooling Requirements, Water Traps, Intake Filters, Air Relief Valves, And Safety Alarm Devices.
21. Discuss Steam Tables Including A Comparison Of Steam And Water Density At Different Pressures Up To "Critical Pressure" And What Takes Place At That Point. Discuss The Difference In Volume Between One Pound Of Water And One Pound Of Steam From Atmospheric Pressure On Up. Know The Temperature And Pressure At Critical Pressure. Discuss The Enthalpy Of Water, The Enthalpy (Latent Heat) Of Evaporation, And The Temperature Of Saturated Steam At Various Gage Pressures From Atmospheric Pressure To Critical Pressure. Explain How These Characteristics Effect The Circulation And Generation Of Steam In The Boiler Up To And Past Critical Pressure. Discuss Superheat, Describing What It Is And Why It Is Used In A Power Plant. Describe What Happens To The Heat Stored In Water At The Boiling Point Temperature When The Boiler Pressure Is Reduced By An Additional Load Being Placed On The Boiler And There Is A Natural Lowering Of Boiling Point Temperature. Explain How This And The Lower Pressure On The Steam Bubbles Effects The Water Levels In The Boiler.

22. Knowledge Of The City Of Seattle "Steam Engineer And Boiler Fireman License Law." and the "Seattle Boiler and Pressure Vessel Code".

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6.420.030 Definitions

Words and phrases used in this chapter have the following meanings:

"Boiler" means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the direct application of heat. The term "boiler" also includes fired units for heating or vaporizing liquids other than water where these systems are complete within themselves.

"Boiler plant" means one or more boilers and connecting piping and vessels within the same premises.

"Boiler supervisor" means a steam engineer Grade I, II or III who has passed additional examinations as required by the Director pursuant to the provisions of this chapter.

"BHP" means brake horsepower.

"Certified automatic boiler" means a boiler equipped with certain controls and limit devices as required by the Seattle Boiler Code, and for which the Director has finalized an Automatic Certification Application Permit.

"Certified monitored boiler" is a certified automatic boiler that meets the requirements of Section 330 of the Seattle Boiler Code and for which the Director has finalized a Monitored Certification Application Permit.

"City Boiler Inspector" means a City of Seattle Boiler/Pressure Systems Inspector employed by the Department.

"Department" means the Department of Planning and Development.

"Director" means the Director of the Department of Planning and Development and authorized representatives.

"Hoist and portable boiler" means a boiler used to provide steam for the operation of various types of equipment such as floating cranes, piledrivers and other similar types of equipment used in the construction industry.

"Hot-water supply boiler" is a boiler having a volume exceeding 120 gallons, or a heat input exceeding 200,000 BTU per hour, or a water temperature exceeding 210 degrees Fahrenheit but not exceeding a temperature of 250 degrees Fahrenheit, or a pressure not exceeding 160 psi, that provides hot water to be used externally to itself.

"kBtuh" means thousand BTU per hour.

"Low-pressure hot-water heating boiler" is a boiler from which hot water is circulated for heating purposes at pressures not exceeding 160 psi and temperatures not exceeding 250 degrees Fahrenheit, that provides hot water to be used externally to itself.

"Low-pressure steam-heating boiler" is a boiler furnishing steam at pressures not exceeding 15 psi.

"Nonregenerative system" is a system in which the heat rejected by an engine is lost to the atmosphere.

"Out of service." A boiler is "out of service" if it is manually shut down for inspection, maintenance, or repair, except for limited repairs and adjustments as set forth in Section 6.420.150.

"Potable water heater" (fired, electric, solar, and indirect) is a closed vessel in which water is heated by the combustion of fuels, electricity, or any other source, and withdrawn for use external to the system. Potable water heaters do not exceed any of the following criteria or capacities: a nominal water-containing capacity of 120 gallons, a heat input of 200,000 BTU per hour, an operating temperature of 210 degrees Fahrenheit, and a pressure of 160 psi.

"Power hot-water boiler" (high-temperature water boiler) is a boiler used for heating water or liquid to a pressure exceeding 160 psi or to a temperature exceeding 250 degrees F.

"Power steam boiler" is a boiler in which steam or other vapor is generated at pressures exceeding 15 psi. For purposes of this chapter the term shall not include a small power boiler.

"psi" means pounds per square inch.

"Regenerative system" is a system in which the heat rejected by an engine is used in a boiler.

"Seattle Boiler Code" is the Seattle Boiler and Pressure Vessel Code (Title 22 Subtitle IVA of the Seattle Municipal Code).

"Small power boiler" is a power steam boiler with pressures not exceeding 150 psi and not exceeding 800,000 BTU per hour heat input.

"Steam engine" means all prime movers using vapors from a boiler for motive power, steam-driven compressors, and steam pumps except steam pumps and similar auxiliaries used only as appurtenances for the operation of a boiler.

6.420.050 Exemptions from license requirements

A steam engineer's or boiler fireman's license is not required of any person in charge of, or operating, the following:

- A.) Any boiler or steam engine subject to federal regulations;
- B.) Any boiler not subject to reinspection by the Seattle Boiler Code;
- C.) Low-pressure hot water, low-pressure steam and hot-water supply boiler plants having inputs of less than 2,500,000 BTU per hour;
- D.) Any boiler having an input of less than 100,000 BTU per hour and a maximum pressure of 100 pounds per square inch or less;
- E.) Potable water heaters;
- F.) Ancillary equipment that may be connected to the operation of a boiler or boiler system such as, but not limited to, pumps, filters, pre-heaters, heat exchangers, and related pressure vessels;
- G.) Non-regenerative gas turbines

6.420.070 Grades of licenses and limitations.

A.) The grades of steam engineers' and boiler firemen's licenses are as follows:

- Grade I Boiler Supervisor
- Grade II Boiler Supervisor
- Grade III Boiler Supervisor
- Grade I Steam Engineer
- Grade II Steam Engineer
- Grade III Steam Engineer
- Grade IV Boiler Fireman
- Small Power Boiler Fireman
- Grade V Boiler Fireman

B.) License Limitations. The Director may impose limitations on licenses restricting the licensee to the operation and maintenance of particular equipment at a stated location, or to the operation and maintenance of a certain class of boilers or steam engines, or to specified permitted services in connection with the operation and maintenance of boilers and steam engines. Limitations shall be based upon the applicant's qualifications and shall be reasonably related to the protection of the public in the safe operation and maintenance of boilers and steam engines. Limitations may include, but are not limited to the following:

- 1. Operation of boilers only
- 2. Operation of electric boilers only
- 3. Operation of hot water boilers only
- 4. Work at one address only

C.) Applicants for a license shall possess the minimum qualifications for each grade of license as specified in Table A

Table A—Qualifications for Steam Engineer and Boiler Fireman Licenses

<u>Grade of License applied for:</u>	<u>Minimum Qualifications</u>
Grade I Boiler Supervisor	At least one year of experience as a Grade I Steam Engineer pursuant to the provisions of this ordinance.
Grade II Boiler Supervisor	At least one year of experience as a Grade II Steam Engineer pursuant to the provisions of this ordinance.
Grade III Boiler Supervisor	At least one year of experience as a Grade III Steam Engineer pursuant to the provisions of this ordinance.
Grade I Steam Engineer	1. At least five years of employment in a position directly responsible for the operation of boilers, or 2. Educational substitution for experience as allowed by Section 6.420.080 item 1, plus three years of experience. Licenses shall be limited to boilers only unless the applicant proves at least one year of experience in the operation of steam engines.
Grade II Steam Engineer	1. At least four years of employment in a position directly responsible for the operation of boilers, or 2. Educational substitution for experience as allowed by Section 6.420.080 item 1, plus two years of experience. Licenses shall be limited to boilers only unless the applicant proves at least one year of experience in the operation of steam engines.
Grade III Steam Engineer	1. At least three years of employment in a position directly responsible for the operation of boilers, or 2. Educational substitution for experience as allowed by Section 6.420.080 item 1, plus one year of experience. Licenses shall be limited to boilers only unless the applicant proves at least one year of experience in the operation of steam engines.
Grade IV Boiler Fireman	1. At least one year of employment in a position directly responsible for the operation of boilers, or 2. Allowable educational substitution for experience as allowed by Section 6.420.080 item 1 or 2. Licenses shall be limited to boilers only unless the applicant proves at least one year of experience in the operation of steam engines.
Small Power Boiler Fireman	No previous experience required.
Grade V Boiler Fireman	No previous experience required.

6.420.180 Licenses to be posted or carried.

All licensed steam engineers and boiler firemen on duty shall display their licenses in a conspicuous place in the room where the boiler or steam engine is located. Licenses shall be effective only for the operation of the plant where they are displayed. When the posting of their licenses is not practicable, steam engineers and boiler firemen shall carry their licenses on their persons, and on demand shall exhibit the licenses. Boiler supervisors shall display legible copies of their licenses in the log book of each boiler they supervise, pursuant to the requirements of Section 6.420.120.

6.420.190 Posting of regulations.

A copy of this chapter or a condensed version thereof shall be posted by the employer in every boiler and engine room where licensed operators or boiler supervisors are required.

6.420.150 Reporting of defective boilers.

- A.) Before operating any boiler, steam engineers and boiler firemen shall examine the boiler permit issued for the boiler to see that the permit is in force. If the permit has expired the steam engineer or boiler fireman shall notify his/her employer. If the permit has been expired for more than 90 days, the steam engineer or boiler fireman shall also notify the City Boiler Inspector of the date of expiration. The steam engineer or boiler fireman shall note the pressure allowed by the permit and shall test the operation of the boiler and its control and safety devices for proper operation.
- B.) Whenever the steam engineer or boiler fireman believes any part of a boiler or steam engine to be in defective or potentially unsafe condition, the steam engineer or boiler fireman shall report the fact to his/her employer in writing. If immediate corrective action is not taken, the steam engineer or boiler fireman shall report such defective or potentially unsafe conditions to the City Boiler Inspector.
- C.) The City Boiler Inspector shall thereupon investigate the same, and report any lack of proper care on the part of any licensed person to the employer and the Director.
- D.) Steam engineers and boiler firemen shall report to their employers and to the City Boiler Inspector any damage or injury to any boiler or steam engine under their charge or care which affects the safe operation of the boiler or steam engine. The boiler and any parts thereof shall not be removed or disturbed before an inspection has been made by a department inspector unless for the purpose of saving life. Failure to make such reports shall be sufficient cause for the suspension or revocation of the license of the person in charge.
- E.) It is the duty of all licensed steam engineers and boiler firemen to report serious negligence in the care of boilers and steam engines to their employers and the City Boiler Inspector.

6.420.110 Duties of steam engineers and boiler firemen.

Licensed steam engineers and boiler firemen shall perform the following duties in connection with the operation and maintenance of boilers and steam engines:

- A.) Test the operation of the boiler and its control and safety devices periodically on a routine basis in accordance with nationally recognized standards and/or boiler and control manufacturer's written recommendations;

- B.) Maintain and operate the equipment in a safe manner and according to nationally recognized standards such as those recommended by the American Society of Mechanical Engineers for boilers and as adopted by the Director;
- C.) Prepare and maintain a boiler log book and record, at least daily or as otherwise required by this chapter, such pertinent boiler readings and data as may be recommended by the boiler manufacturer, nationally recognized standards, or required by the Boiler Inspector and/or the senior license holder or other authorized person in charge of the boiler operation. The boiler logbook shall be kept on the premises at all times and be available for inspection by the City Boiler Inspector.

6.420.120 Duties of boiler supervisors

Boiler supervisors shall perform the duties listed in this section in connection with the supervision of automatic and monitored boilers.

- A.) Prepare boiler logbooks with the name, telephone numbers, and home and business addressees of the boiler supervisor on the front cover. The boiler logbooks shall be kept on the premises and be available for inspection by the City Boiler Inspector.
- B.) Determine the proper light-off, operating, and shutdown procedures and clearly set forth such procedures in the inside front cover of the boiler logbooks. Determine proper firing rate and the set point or operating limits of all safety devices required on automatic or monitored boilers by the Seattle Boiler Code. Boiler supervisors shall clearly mark such set point or limits in the inside back cover of the boiler logbooks.
- C.) Determine the list of pertinent boiler data entries to be recorded in the boiler logbooks by the boiler owners or the owners' designated representatives and list such entries on the inside back cover. This list shall include such items as any unusual conditions observed, including safety shutdowns, repairs required, adjustments required and adjustments made. All entries shall be made in the boiler logbook and shall include the signature of the person making such readings, observations, or adjustments. It is lawful to cross out words or sentences which should be changed or corrected but erasures are prohibited. The boiler supervisor's written instructions shall include the above signature requirement and the prohibition of erasures.
- D.) Examine each boiler and boiler logbook in accordance with the frequency of examinations required by Section 6.420.100. Examination shall include the testing of all control devices required for automatic boilers by the Seattle Boiler Code and the testing of monitoring systems when used.
- E.) If a boiler is a certified monitored boiler as defined in Section 6.420.030:
 - 1. The boiler supervisor shall cause signals to be sent to the monitoring station to test the reliability of the monitoring equipment and the response of the monitoring station.
 - 2. The boiler supervisor shall report all failures of either the equipment or the response to the City Boiler Inspector within 24 hours. Such report shall be in writing.
- F.) Boiler supervisors shall inspect and test all other controls on the boiler and shall flush the low-water cutoffs, if applicable, to assure that all control devices are in safe and proper operation. They shall permit continued automatic boiler operation only if their examination, inspection and testing indicate that the boiler is in a safe operating condition.
- G.) No modification, revisions, or alterations to a boiler or its control devices shall be made except under a boiler supervisor's supervision except:

1. Restoration of control devices to original factory operating conditions at the set point or within the operating limits determined by the boiler supervisor as set forth in the boiler logbook, or
 2. Repair or adjustment of the burner system for viscosity changes or to correct fuel-air ratios to restore proper operation at the firing rate indicated in the boiler logbook by the boiler supervisor, or
 3. Repair or adjustment of any other system not directly related to the primary safety controls or to the pressure vessel to restore such systems to proper operating conditions. Entries of such repairs or adjustments shall be made in the boiler logbook and shall include the signature of those making such repairs or adjustments.
- H.) Attend all startups of an automatic boiler out of service after corrective work other than limited adjustments or repairs by others as set forth in subsection G has been performed on the boiler, its firing equipment, or its control and safety devices. The boiler supervisor shall remain in constant attendance until:
1. The boiler has reached its preset operating range of pressure, and
 2. The primary controls and safety devices have been proved, and
 3. The boiler is acceptable to him/her for continued operation.
- Boiler supervisors are not required to be in attendance during light-off of original boiler equipment being installed by and under the control of the boiler manufacturer or the manufacturer's representative, by a boiler installation contractor or boiler or burner installer making such installation under the manufacturer's written instructions and recommendations. Boiler supervisor are not required to be in attendance during light-off following adjustment or authorized boiler or burner manufacturer alterations made by the above representative, contractor or installer within the guarantee or warranty time period during which time the representative, contractor or installer is obligated to render such service. The representative, contractor or installer shall furnish the boiler supervisor with recommended set points or operating limits of all control devices and recommended firing rates as well as other pertinent data in writing. The representative, contractor or installer shall record all subsequent changes, adjustments, alterations or recommendations in the boiler logbook and shall sign the logbook.
- I.) Provide for a substitute boiler supervisor to attend to boilers in the boiler supervisor's charge when he/she is unable to respond to trouble calls. The boiler supervisor shall list the names, home and business telephone numbers and addresses of substitute boiler supervisors on the front of the boiler logbooks.
- J.) Respond to trouble calls in accordance with the following:
1. Make verbal contact with the licensed operator, boiler owner or the owner's representative within two hours of a trouble call from such person, and
 2. Have the capability of being present at a boiler site within four hours on a trouble call from that site.
- K.) A boiler supervisor may not act as both boiler supervisor and the licensed operator except when:
- a. The boiler supervisor is a full-time employee of the boiler owner/user or,
 - b. The licensed operator is unavailable due to vacation, illness or similar temporary circumstances.

6.420.100 Observation and inspection of boilers

- A.) The minimum requirements for operation and inspection of each type and capacity of equipment are as set forth in this Section and Tables B and C of this Section 6.420.100.
- B.) Constant attendance. When constant attendance is required by this chapter, the engineer or boiler fireman in charge of a boiler, boiler plant, or steam engine shall not leave the boiler room or engine room when the boiler or steam engine is being operated without first either stopping the steam engine and shutting off all sources of heat in the boiler, or being relieved by a person duly licensed under this chapter.
Exception: The steam engineer or boiler fireman may take an occasional break without stopping the engine, shutting down the boiler or being relieved. In no case may any break last more than 20 minutes.
- C.) Checked by boiler supervisor. When this chapter requires a boiler to be checked by a boiler supervisor, the boiler supervisor shall inspect all controls and safety devices pursuant to the requirements of Section 6.420.120 D, as a minimum.
- D.) Checked by licensed operator. When this chapter requires a boiler to be checked by a licensed operator, a person holding a license issued under this chapter shall perform a physical examination of the boiler or engine to ensure proper operation and maintenance pursuant to the requirements of Sections 6.420.110 and 6.420.150, as a minimum.
- E.) Twice daily check. When this chapter requires twice daily checks, the inspections that are required to be recorded in the boiler logbook by Section 6.420.110 shall be performed at least two times each day. The first check of the day shall be made not less than eight hours after the last recorded check of the previous day; the second check of the day shall be made at least six hours after the first recorded check of the day. Additional checks may be made to ensure safe operation of a boiler. Twice daily checks may not be performed by a Boiler Supervisor unless the Boiler Supervisor is a full time employee of the boiler owner.
- F.) Check once every two hours. When this chapter requires a check every two hours, a physical examination of the boiler or engine to ensure proper operation and maintenance pursuant to the requirements of Sections 6.420.110 and 6.420.150, as a minimum, shall be made at least once every two hours.
- G) For purposes of Tables B and C, the input ratings of boilers shall be computed as follows:
1. For gas, propane and similar burners, the rating shall be equal to the burner input as rated and labeled by the burner manufacturer. Where actual fuel flow during burner operation at the maximum firing rate can be reliably measured, the burner input may be computed by such method.
 2. For oil burners, the rating shall be equal to the gallons-per-hour rating of the fuel nozzle or nozzles.
 3. For electric boilers the rating shall be equal to the electrical input in KW as rated and labeled by the boiler manufacturer.
 4. In the case of multiple fuel burners, the rating shall be the greater of all computed inputs.

5. For boilers in battery (connected to a common header), the rating shall be the cumulative input, as measured in paragraphs 1, 2, 3, or 4 above. For boilers in battery wired so that only a single boiler can operate at a given time, the license requirement shall be determined by the most restrictive individual license requirement for any boiler in the battery.

6. For regenerative systems, the BHP of the prime mover (gas turbine, engine, etc.) will determine the grade for downstream recovery boilers and steam turbines.

H.) All checks of boilers pursuant to the requirements of this chapter shall be logged and recorded as set forth in Section 6.420.110

Table B License Requirements For Operation of Power Boilers and Steam Engines Type of Boiler	Minimum License Requirement
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A. All Boilers

0–100 psi and 0–100 kBtuh input	No license required
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B. Electric Boilers

Not exceeding 1.5 cu. ft. and not exceeding 100 psi	No license required
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C. All Boilers except Small Power Boilers

Less than 1,000 kBtuh input each; not certified as Automatic. No more than 2 steam boilers on same header. ¹	Check by a Grade IV Boiler Fireman once every two hours
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D. Small Power Boilers

Maximum 800 kBtuh input; not certified as Automatic. No more than 2 steam boilers on same header	Semiannual check by a Grade III Boiler Supervisor and twice daily checks by a Small Power Boiler Fireman; or a Small Power Boiler Fireman on premises
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E. Boilers certified as Automatic

1. Maximum 20,000 kBtuh input. No more than 2 steam boilers on same header with a combined capacity no more than 20,000 kBtuh ¹	Check by a Grade IV Boiler Fireman once every two hours
2. More than 20,000 to 50,000 kBtuh input	Check by a Grade III Steam Engineer once every two hours
3. More than 50,000 to 300,000 kBtuh input	Check by a Grade II Steam Engineer once every two hours
4. More than 300,000 kBtuh input	Check by a Grade I Steam Engineer once every two hours

F. Boilers certified as Monitored

1. Maximum 20,000 kBtuh input. No more than 2 steam boilers on same header with a combined capacity no more than 20,000 kBtuh ¹	Monthly checks by a Grade III Boiler Supervisor and twice daily checks by a Grade IV Boiler Fireman
2. More than 20,000 to 50,000 kBtuh input	Monthly checks by a Grade III Boiler Supervisor and twice daily checks by a Grade III Steam Engineer
3. More than 50,000 to 300,000 kBtuh input	Monthly checks by a Grade II Boiler Supervisor and twice daily checks by a Grade II Steam Engineer; or Weekly checks by a Grade II Boiler Supervisor and twice daily checks by a Grade III Steam Engineer.
4. More than 300,000 kBtuh input	Monthly checks by a Grade I Boiler Supervisor and twice daily checks by a Grade I Steam Engineer; or Weekly checks by a Grade I Boiler Supervisor and twice daily checks by a Grade II Steam Engineer.

G. All other boilers

1. Maximum 20,000 kBtuh input. No more than 2 steam boilers on same header with a combined capacity no more than 20,000 kBtuh ¹	Constant attendance by a Grade IV Boiler Fireman
2. More than 20,000 to 50,000 kBtuh input	Constant attendance by a Grade III Steam Engineer
3. More than 50,000 to 300,000 kBtuh input	Constant attendance by a Grade II Steam Engineer
4. More than 300,000 kBtuh input	Constant attendance by a Grade I Steam Engineer

H. Steam engines

1. Maximum 250 BHP	Constant attendance by a Grade III Steam Engineer or the same attendance requirements as the boiler serving the engine
2. More than 250 to 1,500 BHP	Constant attendance by a Grade II Steam Engineer or the same attendance requirements as the boiler serving the engine
3. More than 1,500 BHP	Constant attendance by a Grade I Steam Engineer or the same attendance requirements as the boiler serving the engine
4. More than 50,000 to 300,000 kBtuh max input.	Semiannual checks by a Grade II Boiler Supervisor and twice daily checks by a Grade II Steam Engineer; or Semiannual checks by a Grade II Boiler Supervisor and twice daily checks by a Grade III Steam Engineer.
5. Over 300,000 kBtuh max input.	Semiannual checks by a Grade I Boiler Supervisor and twice daily checks by a Grade I Steam Engineer; or Semiannual checks by a Grade I Boiler Supervisor and twice daily checks by a Grade II Steam Engineer.

Footnote to Tables B and C:

1. A Grade IV Boiler Fireman may operate more than two steam or vapor boilers with a greater combined capacity when the fireman is the head fireman on duty and under the direct on-site supervision of a licensed steam engineer for the purpose of training. The boilers shall not exceed the capacity permitted by the license of the supervising engineer.

6.420.190 Posting of regulations.

A copy of this chapter or a condensed version thereof shall be posted by the employer in every boiler and engine room where licensed operators or boiler supervisors are required.