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Boiler Design, Construction, Installation, Repair, Use and Operation

Acknowledgement Sections 29-232-93 through 29-232-110, inclusive are taken from Section IV, Article 6, 1986 Boiler Code of the American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, and are transcribed herein with permission.

Sec. 29-232-1. Definitions

Unless otherwise expressly stated, the following terms shall have these meanings:

(a) ''Alteration'' means any change in a boiler or appurtenance to a boiler concerning or affecting the pressure containing capability of the boiler such that the boiler or appurtenance no longer fits the description on the original manufacturer's data report. The term ''alteration'' shall apply to physical changes in the boiler or the appurtenance and to operating changes such as an increase in the internal or external maximum allowable working pressure or design temperature of a boiler. A reduction in minimum temperature such that additional mechanical tests are required shall also be considered an alteration.

(b) ''Approved'' means approved by the commissioner.

(c) ''A.S.M.E. Boiler Construction Code,'' otherwise known as the boiler & pressure vessel code, means the boiler construction code of the American Society of Mechanical Engineers, sections I, II, III, IV, V, VI, VII and IX made, approved and adopted by the Society, whose headquarters is at 345 East 47th Street, New York, New York 10017 and from whom copies of the code may be obtained.

(d) ''Boiler'' means a closed vessel intended:

(1) For use in heating water or other liquids;

(2) For generating steam or other vapors under pressure or vacuum by the direct applications of heat from combustible fuels, electricity, or nuclear energy.

(e) ''Certificate inspection'' means an inspection, the report of which is used by the commissioner as justification for issuing, withholding or revoking the inspection certificate. This certificate inspection shall be an internal inspection when required; otherwise, it shall be as complete an inspection as possible.

(f) ''Certificate of competency'' means a certificate issued to a person who has passed an examination prescribed by the law qualifying him as an inspector.

(g) ''Commissioner'' means the department of public safety commissioner or his authorized representative.

(h) ''Condemned boiler'' means a boiler that has been inspected and declared unsafe for further operation.

(i) ''Connecticut serial number'' means the number assigned by the commissioner and stamped or affixed by an inspector to each boiler subject to the provisions of Chapter 540 of the Connecticut General Statutes for the purpose of permanent identification of such boiler. The serial number shall in every instance contain the letters CONN followed by the assigned number, and both the letters and figures shall be no less than five-sixteenths of an inch in height.

(j) ''Department'' means the department of public safety of the State of Connecticut.

(k) ''Boiler inspector'' means any inspector of boilers appointed by the department of public safety commissioner under the provisions of Chapter 67 of the Connecticut General Statutes.

(*l*) ''Existing installations'' means and includes any boiler constructed, installed, placed in operation or ''contracted for'' before January 1, 1986.

(m) ''External inspection'' means an inspection made preferably when a boiler is in operation.

(n) ''Fusion welding'' means a process of welding metals in a molten or molten and vaporous state, without the application of mechanical pressure or blows.

(o) ''Hot water heating boiler'' means a boiler used for heating purposes operating at pressures not exceeding one hundred sixty psig and temperatures not exceeding 250 degrees F.

(p) ''Hot water supply boiler'' means a boiler furnishing hot water to be used externally to the system at pressures not exceeding one hundred sixty psig and/or temperatures not exceeding 250 degrees F; however, it shall not include any units when none of the following limitations is exceeded:

(1) Heat input of 200,000 BTU per hour

(2) Water temperature of 210 degrees F

(3) Nominal water containing capacity of 120 gallons.

Electrically heated vessels may be constructed to either Section I, IV or VIII of the A.S.M.E. Code.

(q) ''Hot water heater'' means a closed vessel in which water is heated by the combustion of fuels, electricity, or any other source and withdrawn for external use to the system at pressures not exceeding 160 psig (1100 Kpa gage) and shall include the apparatus by which heat is generated and all controls and devices necessary to prevent water temperatures from exceeding 210 degrees F. (99 degrees C.).

(r) ''Inspector'' means any deputy inspector or any special inspector.

(s) ''Internal inspection'' means an inspection made when a boiler is shut down and handholes or manholes are opened for inspection of the interior.

(t) ''Locomotive boiler'' means a boiler mounted on a self-propelled track locomotive and used to furnish motivating power for traveling on rails. It does not include locomotive cranes, tractors or other self-propelled apparatus.

(u) ''Low pressure heating boiler'' means a boiler operated at pressures not exceeding fifteen psig steam or at water pressures not exceeding one hundred sixty psig and temperatures not exceeding 250 degrees F.

(v) ''Major repair'' means a repair upon which the strength of a boiler would depend.

(w) ''Miniature boiler'' means any boiler which does not exceed any of the following limits: sixteen inches inside diameter of shell; five cubic feet gross volume exclusive of casing and insulation, twenty square feet of water heating surface, one hundred psig allowable working pressure.

(x) ''National Board'' means the National Board of Boiler and Pressure Vessel Inspectors whose headquarters is 1055 Crupper Avenue, Columbus, Ohio 43229.

(y) ''New boiler installations'' means and includes all boilers constructed, installed, placed in operation or ''contracted for'' on or after January 1, 1986.

(z) ''Nonstandard boiler'' means a boiler that does not bear the state stamp, the A.S.M.E. stamp, the National Board stamp, or the stamp of any state or political subdivision which has adopted a standard of construction equivalent to that prescribed by these regulations.

(aa) ''Owner or user'' means any person, firm or corporation owning or operating any boiler within this state.

(bb) ''Portable boiler'' means a boiler, the construction and usage of which is obviously portable.

(cc) ''Power boiler'' means a closed vessel in which steam or other vapor (to be used externally to itself) is generated at a pressure of more than fifteen psig by the direct application of heat.

(dd) ''Psig'' means pounds per square inch gage.

(ee) ''Reinstalled boiler'' means a boiler removed from its original setting or location and re-erected at the same location or erected at a new location without change of ownership.

(ff) ''Second-hand boiler'' means a boiler of which both the location and ownership have been changed after primary use.

(gg) ''Special inspector'' means an inspector holding a Connecticut commission, and who is regularly employed by an insurance company authorized to insure against loss from explosion of boilers in this state.

(hh) ''Standard boiler'' means a boiler which bears the State of Connecticut, the A.S.M.E. stamp or the stamp of another state political subdivision which has adopted a standard of construction equivalent to that required by these regulations.

(ii) ''High pressure, high temperature hot water boiler'' means a boiler operating at pressures exceeding one hundred sixty psig and/or temperatures exceeding 250 degrees F.

(jj) ''Repair—Boiler or Pressure Vessel'' means the work necessary to restore a boiler to a safe and satisfactory condition, provided there is no deviation from the original design.

(kk) ''Repair—Pressure Relief Valve'' means the replacement, remachining, or cleaning of any critical part, lapping of seat, and disk or any other operation which may affect the flow passage, capacity function, or pressure retaining ability of the valve. Disassembly, reassembly and/or adjustments which affect the pressure relief valve function are also considered a repair.

(*ll*) ''Safety Valve'' means a pressure relief valve actuated by inlet static pressure and characterized by rapid opening or pop action.

(mm) ''Safety Relief Valve'' means a pressure relief valve characterized by rapid opening or pop action, or by opening in proportion to the increase in pressure over opening pressure, depending on application.

(nn) ''Relief Valve'' means a pressure relief valve actuated by inlet static pressure having a gradual lift generally proportional to the increase in pressure over opening pressure. It may be provided with an enclosed spring housing suitable for closed discharge system application and is primarily used for liquid service.

(Effective May 14, 1992; amended November 29, 1996, October 30, 1998)

General Requirements

Sec. 29-232-2. Manufacturers' reports

Any new boiler (except cast iron or pressure vessel) installed in Connecticut after January 1, 1986, must be properly registered with National Board of Boiler and Pressure Vessel Inspectors. This requirement ensures that manufacturers of boilers and pressure vessels shall file manufacturers' data reports with the National Board of Boiler and Pressure Vessel Inspectors before the manufacturer's boiler or pressure vessel may be operated in Connecticut.

(Effective August 25, 1987)

Sec. 29-232-3. Registration of boilers

All boilers except those exempted by section 29-231 of the general statutes, shall be registered by the installer with the department on forms supplied by the department, giving the location, name of business, type, capacity, age and date of installation of boiler or pressure vessel.

(Effective August 25, 1987)

Sec. 29-232-4. Inspection of boilers

(a)(1) Power boilers, except those power boilers referenced in subdivision (2) of this section, and high-pressure, high temperature water boilers shall receive a certificate of inspection annually, which shall be an internal inspection where construction of such boilers permits; otherwise, it shall be as complete an inspection as possible. Such boilers shall also be inspected annually while under normal operating conditions, if possible.

(2) Power boilers that operate with internal water treatment under the direct supervision of a qualified engineer shall be inspected as provided in section 29-237 of the Connecticut General Statutes.

(3) Low pressure steam, hot water heating, hot water supply boilers and approved water heaters shall receive a certificate of inspection biennially.

(A) Steam or vapor boilers shall have an internal inspection every four (4) years.

(B) Hot water heating and hot water supply boilers shall have an external inspection biennially and, where construction permits, an internal inspection at the discretion of the inspector.

(C) Approved water heaters shall have an external inspection every two (2) years.

(b) Inspections may be delayed for up to two months after expiration of the certificate, where circumstances warrant. In instances where the inspection period is extended, the expiration date of the certificate shall remain the same.

(c) Any antique or model boiler, including but not limited to boilers used with traction engines that do not conform to the standards established under section 29-232 of the Connecticut General Statutes, may be operated under the following conditions: Antique or model boilers used in public, non-profit, engineering or scientific museums operated for educational, historical or exhibition purposes, shall be approved for operation in this state by a state boiler inspector of the department of public safety or by a special inspector employed by an insurance company. Approval for operations shall be given only after satisfactory review of drawings and calculations. Such antique or model boiler shall be subjected to a hydrostatic pressure test of one and one-half times maximum allowable working pressure (MAWP). Such boiler shall also be equipped with all safety devices required by sections 29-232-1 to 29-232-116, inclusive.

(Effective August 25, 1987; amended October 30, 1998, May 26, 2000)

Sec. 29-232-5. Notification of inspection

The owner or user shall prepare each boiler for internal inspection and shall prepare for and apply a hydrostatic pressure test when required on the date specified by an inspector, which date shall be not less than seven days after the date of notification.

(Effective August 25, 1987)

Sec. 29-232-6. Examination for inspector

Examinations for a certificate of competency as inspector of boilers may be held at the office of the commissioner or at any location to be selected by the commissioner on the first Wednesday of the month of March, June, September and December. Special examinations shall be held when considered necessary by the commissioner.

(Effective August 25, 1987)

Sec. 29-232-7. Applicants, requirements

Each applicant shall have education and experience equal to at least one of the following:

(a) A degree in mechanical engineering, plus one year of experience in the design, construction, operation or inspection of high pressure boilers and pressure vessels, or

(b) A degree in a branch of engineering other than mechanical engineering or an associate degree in mechanical technology, plus two years experience in design, construction, operation, or inspection of high pressure boilers and pressure vessels, or

(c) The equivalent of a high school education plus three years of experience in high pressure boiler and pressure vessel construction or repair, or as an operating engineer in charge of high pressure boiler operation, or as an inspector of high pressure boilers and pressure vessels.

(d) Application for examination for a certificate of competency shall be in writing upon a form to be furnished by the commissioner stating the school education of the applicant, a list of his employers, his period of employment and the position held with each employer. Willful falsification or untruthful statements on an application shall be cause to reject the application or to suspend a certificate issued as a result of such application. If the applicant's history and experience meet with the approval of the commissioner, he shall be given a written examination dealing with the construction, installation, operation, maintenance and repair of boilers and their appurtenances, and the applicant shall be accepted or rejected on the merits of this examination. If the applicant is successful in meeting the requirements of the commissioner, a certificate of competency shall be issued by the commissioner. After expiration of ninety days, an applicant who fails to pass the examination will be permitted to take another examination, and his acceptance or rejection will be determined by the commissioner on the basis of this examination.

(Effective August 25, 1987)

Sec. 29-232-8. Examination fees

A fee of twenty-five dollars shall be charged for each applicant taking the examination for a certificate of competency. If an applicant fails to pass the examination, this fee shall be good for a period of one year, during which a re-examination may be taken. Checks for examination fees shall be made payable to the Connecticut Department of Public Safety.

(Effective August 25, 1987)

Sec. 29-232-9. Commission as special inspector

Upon the request of a boiler insurance company authorized to do business in this state, a commission as a special inspector and an identifying commission card shall be issued by the commissioner to an inspector in the employ of such insurance company, provided the inspector has successfully passed the written examination and holds a certificate of competency as set forth in sections 29-232-6 and 29-232-7 or qualifies for a reciprocal commission as set forth in section 29-232-10. Commissions issued to inspectors in the employ of insurance companies shall be held at the home office of the employing company. The commission and the identifying commission card, shall be returned to the commissioner when the inspector to whom the commission was issued is no longer in its employ, or at the request of the commissioner. The Certificate of Competency and commission issued to such boiler inspector may be suspended by the commissioner and may be revoked upon ten days notice to the inspector and to the employer of such inspector, for incompetency or untrustworthiness, for willful falsification of any matter or statement contained in his application or in the report of any inspection, or for other sufficient reasons, but the holder of such certificate of competency shall be entitled to a hearing before the commissioner before the revocation of such certificate.

(Effective August 25, 1987)

Sec. 29-232-10. Reciprocal commissions

Upon the request of a boiler insurance company authorized to insure boilers in Connecticut, the commissioner shall issue to an inspector in the employ of such

insurance company a commission as special inspector, provided the employee has had the experience prescribed in section 29-232-7 and holds a certificate of competency or commission issued by a state which has similar standards of construction and inspection, and which holds a written examination similar to that required by the State of Connecticut, or who holds a commission as inspector of boilers from the National Board. Application for a reciprocal commission shall be made on a form to be furnished by the commissioner and shall be accompanied by a photostatic copy of the applicant's state commission or certificate of competency.
(Effective August 25, 1987)

Sec. 29-232-11. Conflicts of interests

Inspectors commissioned by the state of Connecticut shall not be engaged in the sale of any article or device that is related to boilers and shall devote their full time to inspection work.
(Effective August 25, 1987)

Sec. 29-232-12. Submission of inspection reports

Within thirty days of each certificate inspection, the insuring company shall submit to the commissioner a report of the inspection on form SP-897-C provided the insuring company shall submit an inspection report on forms approved by the commissioner when requested. External inspections shall be immediately reported on form SP-897-C in every instance when hazardous conditions affecting the safety of the boiler are found to exist. Forms other than those herein specified may not be used for report purposes under this regulation without prior approval of the commissioner.
(Effective August 25, 1987)

Sec. 29-232-13. Notification of commissioner of boilers newly insured, cancelled or suspended

All insurance companies shall notify the commissioner within thirty days of all boilers newly insured, cancelled, not renewed or suspended because of unsafe conditions.
(Effective August 25, 1987)

Sec. 29-232-14. Notification of commissioner of defective boilers

If a special inspector, upon the first inspection of a newly insured boiler, finds that the boiler or any of the appurtenances are in such condition that his company refuses to continue insurance, the company shall immediately notify the commissioner and submit a report of the defects.
(Effective August 25, 1987)

Sec. 29-232-15. External inspection. Disclosure of defects

If upon an external inspection there is evidence of a leak or crack, enough of the covering of the boiler shall be removed to satisfy the inspector in order that he may determine the safety of the boiler, or, if the covering cannot be removed at that time, he may order the operation of the boiler stopped until such time as the covering can be removed and proper examination made.
(Effective August 25, 1987)

Sec. 29-232-16. Owner or user to notify commissioner of accident

When an accident occurs which renders a boiler inoperative, the owner or user shall immediately notify the commissioner and submit a detailed report of the accident. In case of serious accident, such as explosion, notice shall be given to the

department immediately by telephone, telegraph or messenger and neither the boiler nor any of the parts thereof shall be removed or disturbed before an inspection has been made by an inspector, except for the purpose of saving human life.
(Effective August 25, 1987)

Sec. 29-232-17. Operating certificate

If a boiler shall, upon inspection by a special inspector, be found to be suitable and to conform to these regulations, the owner or user shall pay directly to the commissioner a fee of fifteen dollars for each boiler required to be inspected by chapter 540 of the General Statutes before an operating certificate shall be issued. If the owner or user of each boiler required to be inspected refuses to allow an inspection to be made or refuses to pay the above fee, the operating certificate shall be suspended by the commissioner until the owner or user complies with the requirements. The owner or user who causes or permits a boiler to be operated without possessing and displaying a valid operating certificate shall be subject to the penalty provided for in Section 29-243 of the General Statutes.
(Effective August 25, 1987)

Sec. 29-232-18. Validity of operating certificate

An operating certificate, issued in accordance with section 29-232-17 shall be valid until expiration unless some defect or condition affecting the safety of the boiler is disclosed, provided an operating certificate issued for a boiler inspected by a special inspector shall be valid for such period without inspection by the department only if the boiler for which it was issued continues to be insured by an authorized insurance company.
(Effective August 25, 1987)

Sec. 29-232-19. Assignment of serial numbers

The commissioner, upon request of a company authorized to insure boilers in Connecticut, shall assign to such company Connecticut serial numbers to be stamped or affixed to each boiler by a properly commissioned special inspector in the employ of such company upon the first internal inspection, provided such boiler shall not have been previously stamped with an assigned Connecticut serial number. Each such company shall account to the commissioner for all numbers so assigned and shall be responsible for the proper use of such serial numbers. Metal tags will be furnished by the commissioner for use when construction will not permit stamping of the Connecticut number directly on the boiler.
(Effective August 25, 1987)

Sec. 29-232-20. Restamping of boilers

When the stamping on a boiler becomes indistinct, the inspector shall instruct the owner or user to have it restamped. Request for permission to restamp the boiler shall be made to the commissioner and proof of the original stamping shall accompany the request for such permission. Restamping authorized by the commissioner shall be done only by an inspector, and shall be identical with the original stamping except that it will not be required to restamp the A. S. M. E. symbol. Notice of completion of such restamping shall be filed with the commissioner by the inspector who restamped the boiler, together with a facsimile of the stamping applied.
(Effective August 25, 1987)

Sec. 29-232-21. Condemned boilers. Stamping

Any boiler having been inspected and declared unsafe by an inspector shall be stamped by the inspector with an arrowhead stamp having an overall length of one-half inch and width of three-eighths inch on either side of the letters ''XX'' and

the letters ''CONN,'' as shown by the following facsimile, which will designate a condemned boiler:

———} XX CONN XX {———

Any person, firm, partnership or corporation using or offering for sale a condemned boiler for operation within this state shall be subject to the penalties provided for in section 29-243 of the general statutes.
(Effective August 25, 1987)

Sec. 29-232-22. Penalty for operation of unsafe boilers

If upon inspection a boiler is found to be in such condition that it is unsafe to operate, the operating certificate shall be suspended by the commissioner. Any person, firm, partnership or corporation causing or permitting such objects to be operated shall be subject to the penalty provided for in section 29-243 of the general statutes.
(Effective August 25, 1987)

Sec. 29-232-23. Reinstallation of used boilers removed from the state

If a standard boiler located in this state is moved to another state for any reason, application shall be made by the owner or user to the commissioner for permission to reinstall the boiler in Connecticut.
(Effective August 25, 1987)

Sec. 29-232-24. Reinstallation of nonstandard boilers

A nonstandard boiler in use in this state on January 1, 1954, if removed outside the boundaries of the state, shall not be brought in and reinstalled unless it has been made to comply with these regulations and permission for reinstallation has been obtained from the commissioner. Shipment of nonstandard boilers into this state, for use, is prohibited.
(Effective August 25, 1987)

Sec. 29-232-25. Installing used or second-hand boilers

Before a used or second-hand boiler can be reinstalled or shipped into this state, an inspection shall be made by a Connecticut inspector or by an inspector qualified by an examination of grade equal to that required by the state of Connecticut, and data submitted by him shall be filed by the owner or user of the boiler with the commissioner for his approval.
(Effective August 25, 1987)

Sec. 29-232-26. Reinstalled boilers

In any case where a stationary boiler is moved and reinstalled, it shall be subjected to a hydrostatic test witnessed by an inspector. All the fittings and appliances shall comply with the regulations for new installations.
(Effective August 25, 1987)

Sec. 29-232-27. Factors of safety for existing installations

An inspector shall increase the factor of safety if the condition of the boiler warrants it. If the owner or user does not concur with the inspector's decision, the owner or user may appeal to the commissioner who may order reinspection by a deputy inspector or special inspector or he may request joint inspections. Each inspector shall render his report separately to the commissioner who shall render the final decision based upon the data contained in all the inspectors' reports.
(Effective August 25, 1987)

Sec. 29-232-28. Inspection of drum heads

For new installations, provision shall be made to permit making inspections of the drum heads of all boilers. For existing installations, heads of drums shall be thoroughly examined at the annual inspection and either a sufficient amount of brickwork shall be removed or inspection doors provided to enable this examination to be made.

(Effective August 25, 1987)

Sec. 29-232-29. Major repairs and alterations to boilers and appurtenances thereof; fusion welding

(a) Where a major repair to a boiler, including but not limited to riveted-patches and repairs by fusion welding, is necessary, an inspector shall be called for consultation and advice as to the best method of making such repair before such repair is started. After the repair is completed, it shall be subject to inspection and approval by the inspector. Approval shall be conditioned upon adherence to generally accepted engineering practices and methods designed to assure restoration of the boiler to a condition which will permit safe operation at the approved pressure.

(An example of generally approved engineering practices and methods is contained in Chapter III of the National Board Inspection Code.)

(b) Where a repair or alteration to a boiler is made by means of fusion welding, the repair or alteration shall be accomplished by an organization in possession of a valid certificate of authorization for the use of the ''R'' (repair) stamp issued by the National Board or in possession of a valid A.S.M.E. certificate of authorization to repair or alter boilers, provided such repairs or alterations are within the scope of the organization's quality control system. Such repairs and alterations shall be made in accordance with the National Board Inspection Code ANSI/NB-23 NBIC 1998.

(Effective May 14, 1992; amended November 29, 1996, May 26, 2000)

Sec. 29-232-30. Removal of safety appliances

No person, except under the direction of an inspector, shall attempt to remove or shall do any work upon any safety appliance, prescribed by these regulations, while a boiler is in operation. If any of these appliances are removed or repaired during an outage of a boiler, they shall be reinstalled and in proper working order before the object is again placed in service. No person shall in any manner load the safety valve or valves to maintain a working pressure in excess of that stated on the operating certificate.

(Effective August 25, 1987)

Sec. 29-232-31. Inspection fees

Inspection fees are established in section 29-238 of the General Statutes.

(Effective August 25, 1987)

Sec. 29-232-32. Attendants of boilers

In the interest of safety all boilers in operation shall be under the supervision of and checked at suitable intervals by a competent attendant.

(Effective August 25, 1987)

Sec. 29-232-33. Preparation of boilers for inspection

All boilers, unless otherwise exempt by statute, which are subject to regular inspections, shall be prepared for such inspections or hydrostatic tests whenever necessary by the owner or user when notified by an inspector. The owner or user

shall prepare each boiler for internal inspection and shall prepare for and apply the hydrostatic test whenever necessary, on the date specified by an inspector, which date shall be not less than seven days after the date of notification.
(Effective August 25, 1987)

Sec. 29-232-34. Method of preparation for internal inspection

The owner or user shall prepare a boiler for internal inspection in the following manner:

(a) Water shall be drawn off and the boiler thoroughly washed;

(b) All manhole and handhole plates, washout plugs, and plugs in water column connections shall be removed and the furnace and combustion chambers thoroughly cooled and cleaned;

(c) All grates of internally fired boilers shall be removed;

(d) At each annual inspection, brickwork shall be removed as required by the inspector in order to determine the condition of the boiler, headers, furnace, supports or other parts;

(e) The steam gage shall be removed for testing at the discretion of the inspector;

(f) Any leakage of steam or hot water into the boiler shall be cut off by disconnecting the pipe or valve at the most convenient point.
(Effective August 25, 1987)

Sec. 29-232-35. Boilers improperly prepared for inspection

If a boiler has not been properly prepared for an internal inspection or the owner or user fails to comply with the requirements for hydrostatic tests as set forth in these regulations, the inspector may decline to make the inspection or witness the test and the operating certificate shall be withheld or withdrawn until the owner or user complies with the requirements.
(Effective August 25, 1987)

Sec. 29-232-36. Removal of covering to permit inspection

If the boiler is jacketed so that the longitudinal seams of shells, drums or domes cannot be seen, enough of the jacketing, setting wall or other form of casing or housing shall be removed so that the size of the rivets, pitch of the rivets and other data necessary to determine the safety of the boiler may be obtained, provided such information cannot be determined by other means.
(Effective August 25, 1987)

Sec. 29-232-37. Lap seam cracks

The shell or drum of a boiler in which a lap seam crack is discovered along a longitudinal riveted joint shall be immediately discontinued from use. If the boiler is not more than fifteen years of age, a complete new course of the original thickness may be installed at the discretion of the inspector. Patching is prohibited. (By ''lap seam crack'' is meant the typical crack frequently found in lap seams, extending parallel to the longitudinal joint and located either between or adjacent to rivet holes.)
(Effective August 25, 1987)

Sec. 29-232-38. Hydrostatic pressure tests

A hydrostatic pressure test, when applied to boilers of riveted or welded construction, except locomotive boilers, shall not exceed one and one-half times the maximum allowable working pressure. Hydrostatic pressure applied to locomotive boilers shall not exceed one and one-quarter times the maximum allowable working pressure. During the hydrostatic pressure test, the safety valve or valves shall be removed or

each valve disc shall be held down by means of a testing clamp and not by applying additional load to the spring with the compression screw. It is suggested that the minimum temperature of the water used to apply a hydrostatic test be not less than 70°F., but the maximum temperature shall not exceed 160°F. When a hydrostatic test is to be applied to existing installations, the pressure shall be as follows: (1) For all cases involving the question of tightness, the pressure shall be equal to the release pressure of the safety valve or valves having the lowest release setting; (2) for all cases involving the question of safety, the pressure shall be equal to one and one-half times the maximum allowable working pressure, except for locomotive boilers, in which case it shall be one and one-quarter times the maximum allowable working pressure.

(Effective August 25, 1987)

Sec. 29-232-39. Low water cut-offs

All automatically fired steam or vapor boilers, except boilers having a constant attendant who has no other duties while the boiler is in operation, shall be equipped with automatic low-water fuel cut-offs and so located as to automatically cut off the fuel supply when the surface of the water falls to the lowest safe water line. This point should not be lower than the bottom of the water glass. If a water feeding device is installed it shall be so constructed that the water inlet valve cannot feed water into the boiler through the float chamber and so located as to supply requisite feedwater. Such fuel or feedwater control device may be attached directly to a boiler or to the tapped openings provided for attaching a water glass directly to a boiler, provided such connections from the boiler are nonferrous t's or y's not less than one-half inch pipe size between the boiler and the water glass so that the water glass is attached directly and as close as possible to the boiler; the straightway tapping of the y or t to take the water glass fittings, the side outlet of the y or the t to take the fuel cut-off or water-feeding device. The ends of all nipples shall be reamed to full size diameter. Designs embodying a float and float bowl shall have a vertical straight-away valve drain pipe at the lowest point in the water equalizing pipe connection by which the bowl and the equalizing pipe can be flushed and the device tested.

(Effective August 25, 1987; amended October 30, 1998)

Sec. 29-232-40. Safety appliances

No person shall remove or tamper with any safety appliances prescribed by Sections 29-232-1 to 29-232-116, inclusive, except for the purpose of making repairs. The repair of pressure relief valves shall only be performed by the manufacturer of the valve or an organization which is the holder of a certificate of authorization, issued by the National Board of Boiler and Pressure Vessel Inspectors, to use the VR (valve repair) stamp. Such repairs and adjustments shall be made in accordance with the National Board Administration Rules and Procedures Publication No. NB 23-R-2200 1995 Edition.

(Effective August 25, 1987; amended October 30, 1998)

Sec. 29-232-41. Blow-off equipment

The blowdown from a boiler or boilers that enters a sanitary system of blowdown which is considered a hazard to life or property shall pass through some form of blowoff equipment that will reduce pressure and temperature as required hereinafter. The temperature of the water leaving the blowoff equipment shall not exceed 150°F. The pressure of the blowdown leaving any type of blowdown equipment shall not

exceed 5 psig. The blowoff piping and fitting between the boiler and the blowoff tank shall comply with paragraph PG-59 of the A.S.M.E. Code, Section I. All materials used in the fabrication of boiler blowoff equipment shall comply with Section II of the ASME Code. All blowoff equipment shall be equipped with openings to facilitate cleaning and inspection. Blowoff equipment shall conform to the provision set forth in the rules for National Board Boiler Blowoff Equipment.
(Effective August 25, 1987)

Sec. 29-232-42. Supports

Each boiler shall be supported by masonry or structural supports of sufficient strength and rigidity to safely support the boiler. There shall be no excessive vibration in either the boiler or its connecting piping.
(Effective August 25, 1987)

Sec. 29-232-43. Pressure reducing valves

Where pressure reducing valves are used, one or more relief or safety valves shall be provided on the low pressure side of the reducing valve in case the piping or equipment on the low pressure side does not meet the requirements for the full initial pressure. The relief or safety valves shall be located adjoining to or as close as possible to the reducing valve. Proper protection shall be provided to prevent injury or damage caused by the escaping steam from the discharge of relief or safety valves if vented to the atmosphere. The combined discharge capacity of the relief valves shall be such that the pressure rating of the lower pressure piping or equipment shall not be exceeded in case the reducing valve sticks open. The use of hand-controlled by-passes around reducing valves is permissible. The by-pass if used around a reducing valve shall not be greater in capacity than the reducing valve unless the piping or equipment is adequately protected by relief valves or meets the requirements of the high pressure system. A pressure gage shall be installed on the low pressure side of a reducing valve.
(Effective August 25, 1987)

Sec. 29-232-44. Electric steam generators

Electric boilers shall bear the Underwriters' Laboratories label on the completed unit or assembly by the manufacturer. This label shall be in addition to the code symbol requirements of the A.S.M.E. All appliances required for electric steam generators shall be attached in accordance with the following rules:

(a) A cable at least as large as one of the incoming power lines to the generator shall be provided for grounding the generator shell. This cable shall be permanently fastened on some part of the generator and shall be grounded in an approved manner.

(b) A suitable screen or guard shall be provided around high tension bushings and a sign posted warning of high voltage. This screen or guard shall be so located that it will be impossible for anyone working around the generator to accidently come in contact with the high tension circuits.

(c) When adjusting safety valves, the power circuit to the generator shall be open. The generator may be under steam pressure but the power line shall be open while the operator is making the necessary adjustments.

(d) The minimum safety valve or safety relief valve relieving capacity for electric boilers shall be three and one half lbs. per hour per kilowatt input.
(Effective August 25, 1987)

Sec. 29-232-45. Boiler door latches

A water tube boiler shall have the firing doors of the inward-opening type, unless such doors are provided with substantial and effective latching or fastening devices

or otherwise so constructed as to prevent them, when closed, from being blown open by pressure on the furnace side. These latches or fastenings shall be of the positive self-locking type. Friction contacts, latches or bolts actuated by springs shall not be used. The requirements in this section for latches or fastenings shall not apply to coal openings of down draft or similar furnaces. All other doors, except explosion doors, not used in the firing of the boiler, may be provided with bolts or fastenings in lieu of self-locking latching devices. Explosion doors, if used and if located in the setting walls, within seven feet of the firing floor or operation platform, shall be provided with substantial deflectors to divert the blast.
(Effective August 25, 1987)

Sec. 29-232-46. Clearance

All boilers shall be so located that adequate space will be provided for the proper operation of the boiler and its appurtenances, for the inspection of all surfaces, tubes, water walls, economizers, piping, valves and other equipment and for their necessary maintenance and repair.
(Effective August 25, 1987)

Sec. 29-232-47. Shop inspection

Any new boiler, except cast iron boilers, being constructed for installation in the State of Connecticut shall be shop inspected by an inspector holding a Connecticut commission, a National Board commission or a commission issued by a state that has adopted the A.S.M.E. Boiler Construction Code.
(Effective August 25, 1987)

Sec. 29-232-48. Inspection of second-hand equipment

Charges for inspection of second-hand equipment shall be at the rate provided by the Connecticut General Statutes.
(Effective August 25, 1987)

Sec. 29-232-49. Other conditions

Any condition not covered by these regulations which, in the opinion of the inspector, affects the continuing safety operation of the boiler shall be resolved by the commissioner who may require correction according to the requirements for new installation.
(Effective August 25, 1987)

New Power Boiler Installation

Sec. 29-232-50. New power boiler installations

(a) No power boiler, except reinstalled boilers and those exempted by statute, shall be installed in this state after November 15, 1957, unless it has been designed, constructed, inspected by a National Board commissioned inspector and stamped in conformity with the provisions of Section I of the latest edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, entitled ''Power Boilers'' and with addenda and amendments thereto, approved by the society and adopted by the commissioner as safe requirements for the construction, installation and inspection of boilers in the interest of public safety, as such rules, addenda or amendments thereto shall appear on file with the secretary of state.

(b) When a stationary power boiler is moved and reinstalled, the attached fitting and appliances shall comply with these rules and regulations for new installations.
(Effective August 25, 1987)

Sec. 29-232-51. Inspections

Each boiler subject to the provisions of section 29-232-50 shall upon completion of the installation be inspected by an authorized inspector before operation. At the time of this inspection, each boiler shall be stamped with a serial number of the state of Connecticut (preceded by the letters CONN, said letters and figures to be not less than five-sixteenths of an inch in height). The stamping shall not be concealed by lagging or paint and shall be exposed at all times.

(Effective August 25, 1987)

Sec. 29-232-52. Ladders and runways

Where necessary to afford safe access, a steel runway or platform at least eighteen inches wide and provided with standard hand rails and toe boards on either side shall be installed across the tops of adjacent boilers or at some other convenient level. All runways shall have at least two means of exit, each exit to be remotely located from the other and connected to a permanent stairway or inclined ladder leading to the floor level.

(Effective August 25, 1987)

Sec. 29-232-53. Exits

The number of doorways from boiler, incinerator or furnace rooms shall meet the requirements of the State Building Code, adopted under authority of Section 29-252 of the Connecticut General Statutes.

(Effective August 25, 1987; amended November 29, 1996, October 30, 1998)

Existing Installations — Power Boilers

Sec. 29-232-54. Age limit of existing boilers

(a) The age limit of any boiler of nonstandard construction, installed prior to the date the act became effective, shall be 30 years except that, after a thorough internal and external inspection, and when required by the inspector, a hydrostatic pressure test of one and one-half times the allowable working pressure and held for a period of at least 30 minutes, during which no distress or leakage develops, any boiler having other than a lap-riveted longitudinal joint may be continued in operation at the working pressure determined by Sec. 29-232-55. The age limit of any nonstandard boiler having lap-riveted longitudinal joints and operating at a pressure in excess of 50 psi shall be 30 years; this type of boiler, when removed from an existing setting, shall not be reinstalled for a pressure in excess of 15 psi reasonable time for replacement, not to exceed one year, may be given at the discretion of the chief inspector.

(b) **Maximum allowable working pressure of standard boilers.** The maximum allowable working pressure of standard boilers shall be determined by the applicable section of the code under which they were constructed and stamped.

(Effective August 25, 1987)

Sec. 29-232-55. Maximum allowable working pressure of nonstandard boilers

The maximum allowable working pressure of the shell or drum of a non standard boiler shall be determined by the strength of the weakest section of the structure, computed from the tensile strength of the plate, the thickness of the plate, the efficiency of the longitudinal joint or tube ligament, the inside diameter of the outside course and the factor of safety required by these regulations.

$\frac{TS \times t \times E}{R \times FS}$ = maximum allowable working pressure psig.

where:

TS = ultimate tensile strength of shell plates, lb/in^2.

t = minimum thickness of shell plate, in weakest course, in inches.

E = efficiency of longitudinal joint or tube ligament.

For riveted construction, E shall be determined by rules given in section I, part PR of the ''Rules of Construction of Power Boilers,'' 1971 edition. For tube ligaments, E shall be determined by rules in paragraph PG52 and PG53, section I, of the ''Rules of Construction of Power Boilers'' latest edition. For seamless construction, E shall be considered one hundred per cent.

R = one half of the inside diameter of the weakest course of shell or drum in inches.

FS = factor of safety permitted.

(a) **Tensile strength.** When the tensile strength of steel or wrought iron shell plates is not known it shall be taken as 55,000 lbs. per sq. in. for steel and 45,000 lbs. per sq. in. for wrought iron.

(b) **Crushing strength of mild steel.** The resistance of crushing of mild steel shall be taken at 95,000 lbs. per sq. in. of cross sectional area.

(c) **Strength of rivets in shear.** When computing the ultimate strength of rivets in shear, the following values in pounds per square inch of the cross sectional area of the rivet shank shall be used:

Iron rivets in single shear	38,000
Iron rivets in double shear	76,000
Steel rivets in single shear	44,000
Steel rivets in double shear	88,000

When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross sectional area of the rivets after driving may be selected from the following table or ascertained by cutting out one rivet in the body of the joint.

Table I

Sizes of Rivets Based on Plate Thickness

Thickness of plate:					
1/4″	9/32″	5/16″	11/32″	3/8″	13/32″
Diameter of rivet after driving:					
11/16″	11/16″	3/4″	3/4″	13/16″	13/16″
Thickness of plate:					
7/16″	15/32″	1/2″	9/16″	5/8″	
Diameter of rivet after driving:					
15/16″	15/16″	15/16″	17/16″	17/16″	

(d) The lowest factor of safety permissible on existing installations shall be five. For horizontal return tubular boilers having continuous lap seams more than twelve feet in length, the factor of safety shall be eight. When this latter type of boiler is removed from its existing setting, it shall not be reinstalled for pressures in excess of fifteen psig. Reinstalled or second hand boilers shall have a minimum factor of safety of six when the longitudinal seams are of lap riveted construction, and a

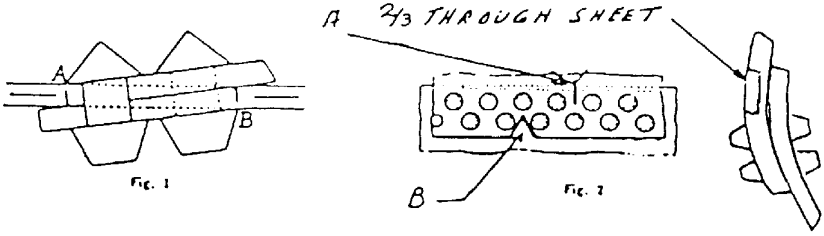
minimum factor of safety of five when the longitudinal seams are of butt and double strap construction.

(Effective August 25, 1987)

Sec. 29-232-56. Age limit of lap joint fire tube boilers

The age limit of a tubular, flue or cylinder boiler having a longitudinal lap joint and operating at a pressure in excess of fifty psig shall be thirty years. A reasonable time for replacement shall be given by the commissioner. All lap seam boilers in this state 30 years or older shall have the long seam exposed for annual examination for detection of a possible lap seam crack. A typical lap seam crack extends approximately parallel to the line of the rivet hold of a longitudinal seam, and near the edge of the rivet heads as shown in figure 1.

Figure 1.



To determine the existing condition of the riveted lap joint type seam, the seam should be notched and slotted. Figure 2-A illustrates a slot approximately 3/16 inch inside, extending 2/3 of the thickness of the plate in depth and about 1-1/2 inches in length, cut from the outer surface and so located that its center will be on a line with the edges of the rivet heads of the inner row. One quarter inch diameter holes drilled 2/3 through the plate, so a hole will be at each end of a slot, with the material between the holes removed with 3/16 inch cape chisel, forms a satisfactory procedure of cutting the slot, which, it will be noted upon referring to figures 1 and 2 will cross the path of a lap seam crack if one exists adjacent to that line of rivet holes. Generally, three slots per course are sufficient. One slot is cut at the center of the course and one on each side, midway between the center and the girth seams.

The application of a hydrostatic test not exceeding one hundred fifty percent (150%) of the safe working pressure will be sufficient to cause leakage at the slot if a lap seam crack has extended through 1/2 of the thickness of the plate. If there is a lap seam crack present, which has not developed through 1/3 the thickness of the plate, leakage will appear when the crack finally reaches the bottom of the slot; Therefore, the slot should not be closed or covered after the test.

The outside surface of the inside plate of the seam should be exposed for examination by cutting a ''V'' notch, as illustrated in figure 2-B. The removal of the small section of the outer plate at the caulking edge uncovers the plate underneath.

The notch should have an angle of 90°, or as near thereto as possible, while retaining the normal lap between the edge of rivet hole and the caulking edge of the plate. Care should be taken when cutting the V-notch to avoid tool marking the under plate of the seam, as that plate must be clean and polished to some extent for a thorough examination. A magnifying glass should be used for this purpose.

The boiler may be returned to service if no defect is found.
(Effective August 25, 1987)

Sec. 29-232-57. Pressure on old boilers

In no case shall the maximum working pressure of an old boiler be increased to a greater pressure than would be allowed for a new boiler of the same construction.

(a) Cast iron headers and mud drums: The maximum allowable working pressure on a water tube boiler, the tubes of which are secured to cast iron or malleable iron headers, or which have cast iron mud drums, shall not exceed one hundred sixty psig.

(b) Pressure on cast iron boilers. The maximum allowable working pressure for any cast iron boiler, except hot water boilers, shall be fifteen psig.
(Effective August 25, 1987)

Sec. 29-232-58. Safety valves

The use of weighted-lever safety valves is prohibited. Safety valves having either the seat or disc of cast iron, shall not be used. Each boiler shall have at least one safety valve and if it has more than five hundred sq. ft. of water heating surface, or if an electric boiler has a power input more than 500kw, it shall have two or more safety valves. The valve or valves shall be connected to the boiler, independent of any other steam connection, and attached as close as possible to the boiler, without unnecessary intervening pipe or fittings. No valve of any description shall be placed between the safety valve and the boiler nor on the escape pipe, (if used) between the safety valve and the atmosphere. When an escape pipe is used, it shall be full size and fitted with an open drain to prevent water lodging in the upper part of the safety valve or escape pipe. When an elbow is placed on a safety valve escape pipe, it shall be located close to the safety valve outlet or the escape pipe shall be securely anchored and supported. All safety valve discharges shall be so located or piped as to be carried clear from walkways or platforms used to control the main stop valves of boilers or steam headers. The safety valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than six percent above the highest pressure to which any valve is set and in no case to more than six percent above the maximum allowable working pressure. One or more safety valves on every boiler shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of three percent above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed ten percent of the highest pressure to which any valve is set.

When two or more boilers, operating at different pressures and safety valve settings, are interconnected, the lower pressure boilers or interconnected piping shall be equipped with safety valves of sufficient capacity to prevent over pressure, considering the generating capacity of all boilers. In those cases where the boiler is supplied with feed water directly from pressure mains without the use of feeding apparatus, not to include return traps, no safety valve shall be set at a pressure greater than ninety-four percent of the lowest pressure obtained in the supply main feeding the boiler. The relieving capacity of the safety valves on any boiler may be checked by one of the three following methods and, if found to be insufficient, additional valves shall be provided.

(a) By making the accumulation test, which consists of shutting off all other steam-discharge outlets from the boiler and forcing the fires to the maximum. The

safety valve capacity shall be sufficient to prevent a pressure in excess of six percent above the maximum allowable working pressure.

(b) By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity (steam generating capacity) upon the basis of the heating value of this fuel. These computations shall be made as outlined in the appendix of the A.S.M.E. Boiler Construction Code for Power Boilers, section I.

(c) By determining the maximum evaporative capacity by measuring the feed water.

When either of the methods outlined in (b) or (c) is employed, the sum of the safety valve capacities shall be equal to or greater than the maximum evaporative capacity (maximum steam generating capacity) of the boiler.

(Effective August 25, 1987)

Sec. 29-232-59. Boiler feeding and feed piping

All boilers shall have a feed supply which will permit the boilers being fed at any time while under pressure. A boiler having more than five hundred square feet of water heating surface shall have at least two means of feeding, one of which shall be an approved feed pump, injector or inspirator. Where a source of feed directly from pressure mains is available at sufficient pressure to feed the boiler against a pressure three percent greater than the release pressure of the safety valve with the highest release setting, this may be considered one of the means. For boilers that are fired with solid fuel not in suspension, and for boilers whose setting or heat source can continue to supply sufficient heat to cause damage to the boiler if the feed supply is interrupted, one such means of feeding shall be steam operated. A boiler fired by gaseous, liquid or solid fuel in suspension may be equipped with a single means of feeding water provided means are furnished for the shutting off of its heat input prior to the water level reaching the lowest permissible level established by the code. The feed water shall be introduced into the boiler in such manner that it will not be discharged close to riveted joints of shell or furnace sheets or directly against surfaces exposed to gases at high temperatures, or direct radiation from the fire.

The feed piping to the boiler shall be provided with a check valve near the boiler and a valve or cock between the check valve and the boiler. When two or more boilers are fed from a common source, there shall also be a valve on the branch to each boiler between the check valve and course of supply. Whenever a globe valve is used on feed piping, the inlet shall be under the disc of the valve. In all cases where returns are fed back to the boiler by gravity, there shall be a check valve and stop valve on each return line, the stop valve to be placed between the boiler and the check valve and both shall be located as close to the boiler as is practicable. Where deaerating heaters are not employed, it is recommended that the temperature of the feed water be not less than 120°F to avoid the possibility of setting up localized stress. Where deaerating heaters are employed, it is recommended that the minimum feed water temperature be not less than 215°F so that dissolved gases may be thoroughly released.

(Effective August 25, 1987)

Sec. 29-232-60. Fusible plugs

Fire-actuated fusible plugs, if used, shall conform to the requirements of the A.S.M.E. Boiler Construction Code for Power Boilers prescribed in section 29-232-50.

(Effective August 25, 1987)

Sec. 29-232-61. Water columns, gage glasses and gage cocks

No outlet connections, except for damper regulator, feedwater regulator, low water fuel cut-out, drains, steam gages, or such apparatus that does not permit the escape of an appreciable amount of steam or water therefrom, shall be placed on the piping that connects the water column to the boiler. The water column shall be provided with a valved drain of at least three-fourths of an inch pipe size, the drain to be piped to a safe location. Each boiler shall have three or more gage cocks, located within the range of the visible length of the water glass, except when such boiler has two water glasses with independent connections to the boiler, located on the same horizontal line. Boilers not over thirty-six inches in diameter in which the heating surface does not exceed 100 sq. ft. need have but two gage cocks. Electric boilers need not be fitted with gage cocks. The gage cock connections shall be not less than one-half inch pipe size. When the direct reading of gage glass water level is not readily visible to the operator in his working area, two dependable, indirect indications shall be provided, either by transmission of the gage glass image or by remote level indications.

(Effective August 25, 1987)

Sec. 29-232-62. Steam gages

Each steam boiler shall have a steam gage with the dial graduated to approximately double the pressure at which the safety valve is set but in no case to not less than one and one-half times this pressure, connected to the steam space or to the steam connection to the water column. The steam gage shall be connected to a siphon or equivalent device of sufficient capacity to keep the gage tube filled with water and so arranged that the gage cannot be shut off from the boiler except by a cock placed near the gage and provided with a tee or lever handle arranged to be parallel to the pipe in which it is located when the cock is open. An additional shut off valve or cock may be used near the boiler, provided the valve is locked open. The line shall be ample size with provision for free blowing. The connection to the boiler, except the siphon, shall not be less than one-quarter inch standard pipe size but where steel or wrought iron pipe or tubing is used, they shall not be less than one-half inch inside diameter. Each boiler shall be provided with a one-fourth of an inch nipple and globe valve connected to the steam space for the exclusive purpose of attaching a test gage when the boiler is in service so that the accuracy of the boiler steam gage may be ascertained.

(Effective August 25, 1987)

Sec. 29-232-63. Stop valves

Each steam outlet from a boiler, except safety valve connections, shall be fitted with a stop valve located as close as practicable to the boiler. When such outlets are over two inch pipe size, the valve or valves used on the connections shall be of the outside-screw-and-yoke rising-spindle type so as to indicate from a distance by the position of its spindle whether it is closed or open, and the wheel may be carried either on the yoke or attached to the spindle. In the case of a single boiler and prime mover installation, the stop valve required herein may be omitted provided the prime mover throttle valve is equipped with an indicator to show whether the valve is open or closed and is designed to withstand the required hydrostatic pressure test of the boiler. When a stop valve is so located that water can accumulate, ample drains shall be provided.

The drainage shall be piped to a safe location and shall not be discharged on the top of the boiler or its setting. When boilers provided with manholes are connected

to a common steam main, the steam connection from each boiler having a manhole opening shall be fitted with two stop valves having an ample free blow drain between them. The discharge of this drain shall be visible to the operator while manipulating the valves and shall be piped clear of the boiler setting. The stop valves shall consist preferably of one automatic non-return valve set next to the boiler and a second valve of the outside screw-and-yoke-type.
(Effective August 25, 1987)

Sec. 29-232-64. Blow-off piping

(a) The construction of the setting around each blow-off pipe shall permit free-expansion and contraction. Careful attention shall be given to the problem of sealing these setting openings without restricting the movement of the blow-off piping. All blow-off piping, when exposed to furnace heat, shall be protected by fire brick or other heat resisting material, so constructed that the piping may be readily inspected. Each boiler shall have a blow-off pipe, fitted with a manually operated valve or cock, in direct connection with the lowest water space. Cocks shall be of the gland or guard type and suitable for the pressure allowed. The use of globe valves or automatically controlled electric blow-off valves shall not be permitted. When the maximum allowable working pressure exceeds one hundred psig, each blow-off pipe shall be provided with two valves or a valve and cock, such valves and cocks to be of the extra heavy type, one of which shall be of the slow-opening type.

(b) On a boiler having multiple blow-off pipes, a single master valve may be placed on the common blow-off pipe from the boiler in which case only one valve on each individual blow-off is required. In this case either the master valve or the individual valves or cocks shall be of the slow-opening type. When the maximum allowable working pressure exceeds one hundred psig, blow-off piping shall be extra heavy from the boiler to the valve or valves, and shall be run full size without use of reducers or bushings. The piping shall be extra heavy wrought iron or steel and shall not be galvanized. All fittings between the boiler and blow-off valve shall be steel or extra heavy fittings or malleable iron. In case of renewal of blow-off pipe or fittings, they shall be installed in accordance with the regulations for new installations.
(Effective August 25, 1987)

Sec. 29-232-65. Repairs and renewals of boiler fittings and appliances

Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, the work shall comply with the requirements for new installations.
(Effective August 25, 1987)

Sec. 29-232-66. Ladders and runways

Where necessary for safety, there shall be a steel runway or platform of standard construction installed across the tops of adjacent boilers or at some other convenient level for the purpose of affording safe access. The inspector shall notify the commissioner as to which owners or users shall provide for these requirements and the commissioner shall give written notice to the owner or user that the installation be made. The owner or user shall be allowed one year from the date of the commissioner's notification in which to complete the work. All runways shall have at least two means of exit, each to be remotely located from the other.
(Effective August 25, 1987)

Sec. 29-232-67. Exits from boiler rooms

To lessen the hazard of being trapped within the boiler room, ash pit aisles or other locations, there shall be at least two means of exit. Each elevation shall be

provided with at least two means of egress, each to be remotely located from the other. All authorized inspectors shall notify the commissioner as to which owners or users shall provide for these requirements. The commissioner shall give written notice to the owner or user that the necessary work must be completed within six months from the date of notification.
(Effective August 25, 1987)

Sec. 29-232-68. Conditions not covered by regulations

All cases not specifically covered by these regulations shall be treated as new installations or may be referred to the commissioner for instructions concerning the requirements.
(Effective August 25, 1987)

New Boiler Installations — Miniature Boilers

Sec. 29-232-69. Requirements

(a) No miniature boiler, except reinstalled boilers and those exempted by statute shall be installed in this state after January 1, 1954 unless it has been designed, constructed, inspected and stamped in conformity with the provisions of section I, part PMB of the latest edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, entitled ''Power Boilers'' and with addenda or amendments thereto, approved by the society and adopted by the commissioner as safe requirements for the construction, installation and inspection of boilers in the interest of public safety, as such rules, addenda or amendments thereto shall appear on file with the secretary of state.

(b) Miniature boilers reinstalled after October 26, 1959 shall, if constructed after that date, conform to all of the requirements of subsection (a) above. Miniature boilers reinstalled after October 26, 1959, if constructed prior to that date, shall be installed in conformity with the provisions dealing with safety valves, water and steam gages, and fittings and appliances, which are part of the Power Boilers, part PMB referred to in subsection (a) above.
(Effective August 25, 1987)

Sec. 29-232-70. Inspections

Each boiler subject to the provisions of section 29-232-69 shall, upon completion of the installation, be inspected by a duly authorized inspector before operation. At the time of this inspection, each boiler shall be stamped with a serial number of the state of Connecticut preceded by the letters CONN, said letters and figures to be not less than five-sixteenths of an inch in height. The stamping shall not be concealed by lagging or paint and shall be exposed at all times.
(Effective August 25, 1987)

Existing Installations — Miniature Boilers

Sec. 29-232-71. General rules

Regulations adopted for power boilers as prescribed in sections 29-232-54 and 29-232-55, applying to strength of materials and calculations to determine maximum allowable working pressure, shall be used for miniature boilers unless a special rule is stated herein.
(Effective August 25, 1987)

Sec. 19-428-72. Construction

The construction of miniature boilers including factor of safety, except where otherwise specified, shall conform to that required for power boilers as prescribed in section 29-232-50.

(Effective August 25, 1987)

Sec. 29-232-73. Safety valve

(a) Each miniature boiler shall be equipped with a sealed, spring-loaded, pop type safety valve not less than one-half inch pipe size, connected directly to the boiler. The safety valve shall be plainly marked by the manufacturer showing name or identifying trade-mark, nominal diameter and pressure at which it is set to release.

(b) The safety valve relieving capacity of each boiler shall be such that it will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than six percent above the maximum allowable working pressure. In those cases where the boiler is supplied with feed water directly from a pressure main or system without the use of a mechanical feeding device, the safety valve shall be set to release at a pressure not in excess of ninety-four percent of the lowest pressure obtained in the supply main or system feeding the boiler. Return traps shall not be considered mechanical feeding devices.

(Effective August 25, 1987)

Sec. 29-232-74. Gage glass and water level indicator

Each miniature boiler shall be equipped with a water gage glass for determination of water level. The lowest permissible water level shall be at a point one-third of the height of the shell, except where the boiler is equipped with an internal furnace, in which case it shall not be less than one-third of the tube length above the top of the furnace. For small boilers where there is insufficient space for the usual type of gage glass, water level indicators of the glass bull's eye type may be used.

(Effective August 25, 1987)

Sec. 29-232-75. Feeding and feedwater piping

Every miniature boiler shall be provided with at least one feed pump or other mechanical feeding device except where the following conditions exist:

(1) Where the boiler is connected to a water main or system having sufficient pressure to feed the boiler at any time while under pressure;

(2) Where the boiler is operated without extraction of steam (closed system) in which case the boiler is filled, when cold, through the connection or opening provided in accordance with the following rule:

Each miniature boiler shall be fitted with a feedwater connection which shall not be less than one-half inch pipe size for iron or steel pipe and one quarter inch for brass or copper pipe. The feed piping shall be provided with a check valve near the boiler and a valve or cock between the check valve and the boiler. Feed water may be introduced through the blow-off connection if desired. Feed water shall not be introduced through the water column or gage glass connections while the boiler is under pressure.

(Effective August 25, 1987)

Sec. 29-232-76. Blow-off piping

Each miniature boiler shall be provided with a blow-off connection, not less than one-half inch iron pipe size, directly connected with the lowest water space. Blow-off piping shall not be galvanized and shall be provided with a valve or cock.

(Effective August 25, 1987)

Sec. 29-232-77. Steam gages

Each miniature boiler shall be equipped with a steam gage having a dial range not less than one and one-half times the maximum allowable working pressure. The gage shall be connected to the steam space or to the steam connection to the gage glass by a brass or bronze composition siphon tube, or equivalent device that will keep the gage tube filled with water.
(Effective August 25, 1987)

Sec. 29-232-78. Stop valves

The steam piping from a miniature boiler shall be provided with a stop valve located as close to the boiler shell or drum as is practicable, except in those cases where the boiler and steam receiver are operated as a closed system.
(Effective August 25, 1987)

Sec. 29-232-79. Flue connection

Each gas fired boiler shall be equipped with a four-inch vent pipe or flue extended to an approved location outside the building or connected to a chimney flue. Where the horizontal run is more than ten feet, the vent shall be increased to six inches. A draft hood of approved design shall be provided on each boiler.
(Effective August 25, 1987)

Sec. 29-232-80. Stamping of existing boilers

Each existing boiler shall be stamped with a serial number of the state of Connecticut (preceded by the letters CONN, said letters and figures to be not less than five-sixteenths of an inch in height). The stamping shall not be concealed by lagging or paint and shall be exposed at all times.
(Effective August 25, 1987)

New Installation — Low Pressure Heating Boilers

Sec. 29-232-81. Requirements

(a) No low pressure heating boiler, except reinstalled boilers and those exempted by statute, shall be installed in this state after October 26, 1959, unless it has been designed, constructed, inspected and stamped in conformity with the provisions of the latest edition of section IV of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, entitled ''Heating Boilers'' and with addenda or amendments thereto, approved by the society and adopted and recommended by the commissioner as safe requirements for the construction, installation and inspection of boilers in the interest of public safety, as such rules, addenda or amendments thereto shall appear on file with the secretary of state.

(b) When a low pressure heating boiler is moved and reinstalled, the attached fittings and appliances shall comply with these rules and regulations for new installations.
(Effective August 25, 1987)

Sec. 29-232-82. Inspections

Each boiler subject to the provisions of section 29-232-81 shall upon completion of the installation be inspected by a duly authorized inspector before operation. At the time of this inspection, all steel heating boilers shall be stamped with the serial number of the state of Connecticut, preceded by the letters CONN, said letters and figures to be not less than five-sixteenths of an inch in height. All cast iron heating boilers shall have securely attached to the front of the boiler a metal tag not less

than one inch in height which shall have the serial number of the state of Connecticut stamped thereon, preceded by the letters CONN.
(Effective August 25, 1987)

Sec. 29-232-83. Return water connections

The return water connections to all low pressure steam heating boilers supplying a gravity return heating system shall be so arranged as to form what is known as the ''water line return'' so that the water cannot be forced out of the boiler below the safety water level. A recommended connection is shown in figure HG 703.1, section IV, American Society of Mechanical Engineers Code.
(Effective August 25, 1987)

Existing Installations — Low Pressure Heating Boilers

Sec. 29-232-84. Standard boilers

The maximum allowable working pressure of a standard boiler shall in no case exceed the pressure indicated by the manufacturer's identification stamped or cast upon the boiler or upon a plate secured to it.
(Effective August 25, 1987)

Sec. 29-232-85. Nonstandard riveted boilers

The maximum allowable working pressure on the shell of a nonstandard riveted heating boiler shall be determined in accordance with requirements of section 29-232-55, except that in no case shall the maximum allowable working pressure of a steam heating boiler exceed fifteen, or a hot water boiler exceed one hundred sixty, psig at a temperature not exceeding 250°F.
(Effective August 25, 1987)

Sec. 29-232-86. Nonstandard welded boilers

The maximum allowable working pressure of a nonstandard steel or wrought iron heating boiler of welded construction shall not exceed fifteen psig for steam service or thirty psig for hot water heating service. For hot water supply service the maximum allowable working pressure shall be calculated in accordance with the requirements of section 29-232-81.
(Effective August 25, 1987)

Sec. 29-232-87. Nonstandard cast iron boilers

The maximum allowable working pressure of a nonstandard boiler composed principally of cast iron shall not exceed fifteen psig for steam service or thirty psig for hot water service. The maximum allowable working pressure of a nonstandard boiler having cast iron shell or heads and steel or wrought iron tubes shall not exceed fifteen psig for steam service or thirty psig for water service.
(Effective August 25, 1987)

Sec. 29-232-88. Fired radiators

A radiator in which steam pressure is generated at a pressure of fifteen psig or less is a low pressure boiler.
(Effective August 25, 1987)

Sec. 29-232-89. Unsafe boilers

If, in the judgment of the inspector, a low pressure heating boiler is unsafe for operation at the pressure previously approved, the pressure shall be reduced, proper repair made or the boiler retired from service.
(Effective August 25, 1987)

Sec. 29-232-90. Safety valves

(a) Each steam boiler shall have one or more ASME/National Board certified safety valves of the spring poptype adjusted and sealed to discharge at a pressure not to exceed 15 psi. Seals shall be attached in a manner to prevent the valve from being taken apart without breaking the seal. The safety valves shall be arranged so that they cannot be reset to relieve at a higher pressure than the maximum allowable working pressure of the boiler. A body drain connection below seat level shall be provided by the manufacturer and this drain shall not be plugged during or after field installation. For valves exceeding 2 in. pipe size, the drain hole or holes shall be tapped not less than 3/8 in. pipe size. For valves less than 2 in., the drain hole shall not be less than 1/4 in. in diameter.

(b) No safety valve for a steam boiler shall be smaller than 3/4 in. unless the boiler and radiating surfaces consist of a self-contained unit. No safety valve shall be larger than 4 1/2 in. The inlet opening shall have an inside diameter equal to, or greater than, the seat diameter.

(c) The minimum relieving capacity of the valve or valves shall be governed by the capacity marking on the boiler.

(d) The minimum valve capacity in pounds per hour shall be the greater of that determined by dividing the maximum BTU output at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1000, or shall be determined on the basis of the pounds of steam generated per hour per square foot of boiler heating surface as given in Table 2. In many cases a greater relieving capacity of valves than the minimum specified by these rules will have to be provided. In every case, the requirements of (e) shall be met.

Table 2

Minimum pound of steam per hour per square foot of heating surface.

	Firetube Boilers	*Watertube Boilers*
Boiler heating surface:		
Hand fired	5	6
Stoker fired	7	8
Oil, gas or pulverized fuel fired	8	10
Waterwall heating surface:		
Hand fired	8	8
Stoker fired	10	12
Oil, gas or pulverized fuel fired	14	16

NOTES: (1) When a boiler is fired only by a gas having a heat value not in excess of 200 BTU per cubic foot, the maximum safety valve or relief valve relieving capacity may be based on the values given for hand fired boilers above.

(2) The minimum safety valve or relief valve relieving capacity for electric boilers shall be three and one-half lbs. per hour per kilowatt input.

(3) For heating surface determination see A.S.M.E. Code, section IV, para. HG-403.

(e) The safety valve capacity for each steam boiler shall be such that with the fuel burning equipment installed, and operating at maximum capacity, the pressure cannot rise more than 5 psi above the maximum allowable working pressure.

(f) When operating conditions are changed, or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions and be in accordance with (e). When additional valves are required, they may be installed on the outlet piping provided there is no intervening valve.

(g) If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run. (See ASME Code, Section VI, Recommended Rules for Care and Operation of Heating Boilers.)

(h) No valve of any description shall be placed between the safety valve and the boiler, nor on the discharge pipe between the safety valve and the atmosphere. The discharge pipe shall be at least full size and be fitted with an open drain to prevent water lodging in the upper part of the safety valve or in the discharge pipe. When an elbow is placed on the safety valve discharge pipe, it shall be located close to the safety valve outlet or the discharge pipe shall be securely anchored and supported. All safety valve discharges shall be located or piped as not to endanger persons working in the area.

(Effective August 25, 1987)

Sec. 29-232-91. Safety relief valve requirements for hot water boilers

(a) Each hot water heating boiler shall have at least one ASME/National Board certified safety relief valve set to relieve at or below the maximum allowable working pressure of the boiler. Each hot water supply boiler shall have at least one ASME/ National Board certified safety relief valve of the automatic reseating type set to relieve at or below maximum allowable working pressure of the boiler. Safety relief valves ASME/National Board certified as to capacity shall have pop action when tested by steam. When more than one safety relief valve is used on either hot water heating or hot water supply boilers, the additional valve or valves shall be ASME rated and may be set within a range not to exceed 6 psig above the maximum allowable working pressure of the boiler up to and including 60 psig and 10 percent for those having a maximum allowable working pressure exceeding 60 psi. Safety relief valves shall be spring loaded. Safety relief valves shall be so arranged that they cannot be reset at a higher pressure than the maximum permitted by this paragraph.

(b) No materials liable to fail due to deterioration or vulcanization when subject to saturated steam temperature corresponding to capacity test pressure shall be used for any part.

(c) No safety relief valve shall be smaller than 3/4 in. nor larger than 4-1/2 in. standard pipe size, except that boilers having a heat input not greater than 15,000 BTU per hour may be equipped with a safety relief valve of 1/2 in. standard pipe size. The inlet opening shall have an inside diameter approximately equal to, or greater than, the seat diameter. In no case shall the minimum opening through any part of the valve be less than 1/2 in. in diameter or its equivalent area.

(d) The required steam relieving capacity, in pounds per hour, of the pressure relieving device or devices on a boiler shall be the greater of that determined by dividing the maximum output in BTU at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1,000 or shall be determined on the basis of pounds of steam generated per hour per square foot of boiler heating surfaces as given in Table 2. In many cases a greater relieving capacity of valves will have to be provided than the minimum specified by these rules. In every case, the requirements of (f) shall be met.

(e) When operating conditions are changed, or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions and shall be in accordance with (f). The additional valves required, on account of changed conditions, may be installed on the outlet piping provided there is no intervening valve.

(f) Safety relief valve capacity for each boiler shall be such that, with the fuel burning equipment installed and operated at maximum capacity, the pressure cannot

rise more than 6 psi above the maximum allowable working pressure for pressure up to and including 60 psi and 10 percent of maximum allowable working pressures over 60 psi.

(g) If there is any doubt as to the capacity of the safety relief valve, an accumulation test shall be run. (See ASME Code, Section VI, Recommended Rules for Care and Operation of Heating Boilers.)

(h) No valve of any description shall be placed between the safety relief valve and the boiler, nor on the discharge pipe between the safety relief valve and the atmosphere. The discharge pipe shall be at least full size and fitted with an open drain to prevent water lodging in the upper part of the safety relief valve or in the discharge pipe. When an elbow is placed on the safety relief valve discharge pipe, it shall be located close to the safety relief valve outlet or the discharge pipe shall be securely anchored and supported. All safety relief valve discharges shall be so located or piped as not to endanger persons working in the area.

(Effective August 25, 1987)

Sec. 29-232-92. Installation of safety and relief valves

(a) Safety valves shall be located in the top or side of boilers, with the spindle vertical, but in no case shall the valves be located below the lowest permissible water level. They shall be connected directly to a tapped or flanged opening in the boiler, to a fitting connected to the boiler by a close nipple, to a Y base, or to a valveless header connecting steam outlets on the same boiler.

(b) Relief valves shall be located in the top or side of boilers, with the spindle vertical, but in no case shall the valves be located below the lowest permissible water level. They shall be connected directly to a tapped or flanged opening in the boiler, to a fitting connected to the boiler by a close nipple, to a Y base, or to a valveless header connecting water outlets on the same boiler.

(c) When a Y base is used, the inlet area shall be not less than the combined outlet areas. When the size of the boiler requires a safety valve or relief valve larger than four and one-half inches in diameter, two or more valves having the required combined capacity shall be used. When two or more valves are used on a boiler, they may be single, directly attached, or mounted on a Y base.

(d) No shut-off of any description shall be placed between the safety or relief valve and the boiler, nor on discharge pipes between such valves and the atmosphere. Safety and relief valves shall not be connected to an internal piping in the boiler.

(e) When a discharge pipe is used, its area shall be not less than the area of the valve or aggregate area based on the nominal diameters of the valves with which it connects, and the discharge pipe shall be fitted with an open drain to prevent water from lodging in the upper part of the valve or in the pipe. When an elbow is placed on a safety or relief valve discharge pipe, it shall be located close to the valve outlet. If the discharge is piped outside, a tee shall be installed in the discharge line inside the building with at least a ten inch long nipple turned up so as to relieve the drain line pressure in case of outside stoppage. The pipe shall be supported so that no undue stress is placed on the valve body. The discharge from safety or relief valves shall be so arranged that there will be no danger of scalding attendants.

(Effective August 25, 1987)

Sec. 29-232-93. Pressure gages

(a) Each steam boiler shall have a steam pressure gage connected to the steam space of the boiler itself or to its water column or on steam pipe near the boiler.

The graduations of the steam gage shall not be less than thirty PSI nor more than sixty PSI.

(b) Each hot water boiler shall have a pressure or altitude gage connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or level handle placed on the pipe near the gage. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open. The scale on the dial of the pressure or altitude gage shall be graduated to not less than one and one-half nor more than three times the pressure at which the safety relief valve is set. Piping or tubing for pressure or altitude gage connections shall be of nonferrous metal when smaller than one inch pipe size.

(Effective August 25, 1987)

Sec. 29-232-94. Water column

The minimum size of ferrous or nonferrous pipes connecting a water column to a steam boiler shall be one inch. No outlet connections, except for damper regulator, feedwater regulator, steam gages, or apparatus which does not permit the escape of any steam or water except for manually operated blowdowns, shall be attached to a water column or the piping connecting a water column to a boiler. If the water column, gage glass, low-water fuel cutoff, or other water level control device is connected to the boiler by pipe and fitting, no shut off valves of any type shall be placed in such pipe, and a cross or equivalent fitting to which a drain valve and piping may be attached shall be placed in the water piping connection at every right angle turn to facilitate cleaning.

The water column drain pipe and valve shall be not less than 3/4 in. pipe size.

The steam connections to the water column of a horizontal firetube wrought iron boiler shall be taken from the top of the shell or the upper part of the head, and the water connection shall be taken from a point not above the center line of the shell. For a cast iron boiler, the steam connection to the water column shall be taken from the top of an end section or the top of the steam header, and the water connection shall be made on an end section not less than 6 in. below the bottom connection to the water gage glass.

(Effective August 25, 1987)

Sec. 29-232-95. Pressure control

Each automatically fired steam boiler shall be protected from overpressure by two pressure-operated controls.

Each individual automatically fired steam boiler shall have a safety limit control that will cut off the fuel supply to prevent steam pressure from exceeding the 15 psi maximum allowable working pressure of the boiler. Each control shall be constructed to prevent a pressure setting above 15 psi.

Shutoff valves of any type shall not be placed in the steam pressure connection between the boiler and the controls described above. These controls shall be protected with a syphon or equivalent means of maintaining a water seal that will prevent steam from entering the control. The connections to the boiler shall not be less than 1/4 in. standard pipe size, but where steel or wrought iron pipe or tubing is used, they shall not be less than 1/2 in. standard pipe size. The minimum size of a syphon shall be 1/4 in. standard pipe size or 3/8 in. O.D. nonferrous tubing.

(Effective August 25, 1987)

Sec. 29-232-96. Automatic low-water fuel cutoff and/or water feeding device

Each automatically fired steam or vapor-system boiler shall have an automatic low-water fuel cutoff so located as to automatically cut off the fuel supply when

the surface of the water falls to the lowest visible part of the water gage glass. If a water feeding device is installed, it shall be so constructed that the water inlet cannot feed water into the boiler through the float chamber and so located as to supply requisite feedwater.

Such a fuel cutoff of water feeding device may be attached directly to a boiler. A fuel cutoff of water feeding device may also be installed in the tapped openings available for attaching a water glass direct to a boiler, provided the connections are made to the boiler with nonferrous tees or Y's not less than 1/2 in. pipe size between the boiler and the water glass so that the water glass is attached directly and as close as possible to the boiler; the run of the tee or Y shall take the water glass fittings, and the side outlet or branch of the tee or Y shall take the fuel cutoff or water feeding device. The ends of all nipples shall be reamed to full-size diameter.

Fuel cutoffs and water feeding devices embodying a separate chamber shall have a vertical drain pipe and a blowoff valve not less than 3/4 in. pipe size, located at the lowest point in the water equalizing pipe connections so that the chamber and the equalizing pipe can be flushed and the device tested.

(Effective August 25, 1987)

Sec. 29-232-97. Hot water boilers pressure or altitude gages

Each hot water boiler shall have a pressure or altitude gage connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or lever handle, placed on the pipe near the gage. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

The scale on the dial of the pressure or altitude gage shall be graduated approximately to not less than 1-1/2 nor more than three times the pressure at which the safety relief valve is set.

Piping or tubing for pressure- or altitude-gage connections shall be of nonferrous metal when smaller than 1 in. pipe size.

(Effective August 25, 1987)

Sec. 29-232-98. Thermometers

Each hot water boiler shall have a thermometer so located and connected that it shall be easily readable when observing the water pressure of altitude. The thermometer shall be so located that it shall at all times indicate the temperature in degrees Fahrenheit of the water in the boiler at or near the outlet.

(Effective August 25, 1987)

Sec. 29-232-99. Temperature control

Each automatically fired hot water boiler shall be protected from over-temperature by two temperature-operated controls.

Each individual automatically fired hot water boiler shall have a safety limit control that will cut off the fuel supply to prevent water temperature from exceeding the maximum allowable temperature of 250°F at the boiler outlet. This water temperature safety control shall be constructed to prevent a temperature setting above 250°F.

Each individual hot water boiler or each system of commonly connected boilers without intervening valves shall have a control that will cut off the fuel supply when the water temperature reaches an operating limit, which shall be less than the maximum allowable temperature.

(Effective August 25, 1987)

Sec. 29-232-100. Low-water fuel cutoff

Each automatically fired hot water heating boiler with heat input greater than 400,000 BTU/HR shall have an automatic low-water fuel cutoff which has been designed for hot water service, and it shall be so located as to automatically cut off the fuel supply when the surface of the water falls to the level established below.

As there is no normal waterline to be maintained in a hot water heating boiler, any location of the low-water fuel cutoff above the lowest safe permissible water level established by the boiler manufacturer is satisfactory.

A coil-type boiler or a watertube boiler with heat input greater than 400,000 BTU/HR requiring forced circulation to prevent overheating of the coils or tubes shall have a flow-sensing device installed in the outlet piping in lieu of the low-water fuel cutoff required above to automatically cut off the fuel supply when the circulating flow is interrupted.

(Effective August 25, 1987)

Sec. 29-232-101. Instrument, fittings and control mounted inside boiler jackets

Any or all instruments, fittings, and controls required by these rules may be installed inside of boiler jackets provided the water gage on a steam boiler is accessible without the use of tools and provided the water gage and pressure gage on a steam boiler or the thermometer and pressure gage on a water boiler are visible through an opening or opening at all times.

(Effective August 25, 1987)

Electric Wiring

Sec. 29-232-102. Electrical Code compliance

All field wiring for controls, heat generating apparatus, and other appurtenances necessary for the operation of the boiler or boilers should be installed in accordance with the provisions of the National Electric Code and/or should comply with the applicable local electrical codes. All boilers supplied with factory mounted and wired controls, heat generating apparatus, and other appurtenances necessary for the operation of the boilers should be installed in accordance with the provisions of the nationally recognized standards.

(Effective August 25, 1987)

Sec. 29-232-103. Flame safeguard requirements

(a) Furnace explosions (combustion explosion) are caused by the sudden ignition of accumulated fuel and air in the firesides of the boiler. In order to reduce the chance of personal injury, damage to property, and loss of equipment from such explosions, the boiler shall be equipped with approved burners and controls, tested and maintained as recommended by a national recognized standard.

(b) Except as otherwise specifically provided, the provisions of this section apply to all gas, oil, pulverized coal, and combination gas and oil fired burners installed on boilers covered by these rules and regulations.

(c) The following nationally recognized standards, together with all addenda and amendments thereto, are adopted:

ANSI/ASME CSD-1-1998 Controls and safety devices for automatically fired boilers; and

ANSI/NB-23 NBIC 1998 National Board Inspection Code.

ASME American Society of Mechanical Engineers: United Engineering Center, 345 East 47th Street, New York, New York 10017.

NFPA National Fire Protection Association: Batterymarch Park, Quincy, Massachusetts 02269.

(d) The above standards represents basic standards for the safe and efficient performance and substantial and durable construction of equipment. Inspection of the flame safeguard equipment will be in conjunction with the regular inspections of boilers.

(Effective May 14, 1992; amended November 29, 1996, May 26, 2000)

Sec. 29-232-104. Shutdown switches and circuit breakers

A manually operated remote heating plant shutdown switch or circuit breaker should be located just outside the boiler room door and marked for easy identification. Consideration should also be given to the type and location of the switch to safeguard against tampering. If the boiler room door is on the building exterior the switch should be located just inside the door. If there is more than one door to the boiler room, there should be a switch located at each door.

(Effective August 25, 1987)

Sec. 29-232-105. Controls and heat generating apparatus

Oil and gas-fired and electrically heated boilers should be equipped with suitable primary (flame safeguards) safety controls, safety limit switches, and burners or electric elements as required by a nationally recognized standard.[1]

The symbol of the certifying organization[2] which has investigated such equipment as having complied with a nationally recognized standard shall be affixed to the equipment and shall be considered as evidence that the unit was manufactured in accordance with that standard.

(Effective August 25, 1987)

Sec. 29-232-106. Water gage glass and gage cocks

Each steam boiler shall have at least one water gage glass with the lowest visible part above the heating surfaces in the primary combustion chamber. When, in the judgment of an inspector, the heating surfaces above the low water line may be injured by contact with gases of high temperature, the water gage shall be raised until the lowest visible part of the gage glass is above such heating surface. Each steam boiler shall have two or more gage cocks located within the visible length of the water gage glass, except when such boiler is provided with two water gage glasses.

(Effective August 25, 1987)

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[1] Examples of these nationally recognized standards are:

American National Standards Z21.13.1, Central Heating Gas Appliances, Volume I, Steam and Hot Water Boilers.

American National Standards Z21.17, Domestic Gas Conversion Burners.

Underwriters' Laboratories, Inc., UL 296, Standards for Safety, Oil Burners.

Underwriters' Laboratories, Inc., UL 573, Electric Space Heating Equipment.

Underwriters' Laboratories, Inc., UL 726, Standards for Safety Oil Fired Boiler Assemblies.

Underwriters' Laboratories, Inc., UL 795, Standards for Safety Commercial—Industrial Gas-Heating Equipment.

[2] A certifying organization is one that provides uniform testing, examination, and listing procedures under established, nationally recognized standards and that is acceptable to the authorities having jurisdiction.

Sec. 29-232-107. Stop valves and check valves

If a boiler may be closed off from the heating system by closing a steam stop valve, there shall be a check valve in the condensate return line between the boiler and the system. If any part of a heating system may be closed off from the remainder of the system by closing a steam stop valve, there shall be a check valve in the condensate return pipe from that part of the system.
(Effective August 25, 1987)

Sec. 29-232-108. Feedwater connections

Feedwater connections shall be independent of any water column, gage glass or gage cock connections and shall be made to the condensate return pipe or reservoir of the condensate return pump, or direct to the boiler, but shall not discharge directly against surfaces exposed to the direct radiant heat of the fire. There shall be a stop and check valve in the feedwater line near the boiler.
(Effective August 25, 1987)

Sec. 29-232-109. Return pump

Each condensate return pump, where practicable, shall be provided with an automatic water level control set to maintain the water level within the limits of two gage cocks.
(Effective August 25, 1987)

Sec. 29-232-110. Repairs and renewal of fittings and appliances

Whenever repairs are made to fitting or appliances, or it becomes necessary to replace them, the work must comply with the requirements for new installations contained in section 29-232-81.
(Effective August 25, 1987)

Sec. 29-232-111. Separation clause

If any section, subsection, sentence, clause, phrase, provision or exemption of these regulations is declared unconstitutional or invalid for any reason, such invalidity shall not affect the remaining portion or provisions hereof.
(Effective August 25, 1987)

Sec. 29-232-112. Materials

No boilers shall be installed in the state unless they conform with the provisions of Section II of the latest edition of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code, entitled “Materials,” and with addenda and amendments thereto.
(Adopted effective November 29, 1996)

Sec. 29-232-113. Nondestructive examination

No boilers shall be installed in this state unless they conform with the provisions of Section V of the latest edition of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code, entitled “Nondestructive Examination,” and with addenda and amendments thereto.
(Adopted effective November 29, 1996)

Sec. 29-232-114. Recommended guidelines for the care of heating boilers

No boilers shall be installed in the state unless they conform with the provisions of Section VI of the latest edition of the American Society of Mechanical Engineers

Boiler & Pressure Vessel Code, entitled "Recommended Guidelines for the Care of Heating Boilers," and with addenda and amendments thereto.
(Adopted effective November 29, 1996)

Sec. 29-232-115. Recommended guidelines for the care of power boilers

No boilers shall be installed in the state unless they conform with the provisions of Section VII of the latest edition of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code, entitled "Recommended Guidelines for the Care of Power Boilers," and with addenda and amendments thereto.
(Adopted effective November 29, 1996)

Sec. 29-232-116. Welding and brazing qualifications

No boilers shall be installed in the state unless they conform with the provisions of Section IX of the latest edition of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code, entitled "Welding and Brazing Qualifications," and with addenda and amendments thereto.
(Adopted effective November 29, 1996)