NEBRASKA ADMINISTRATIVE CODE

TITLE 229 - DEPARTMENT OF LABOR

CHAPTER 21 - POWER BOILERS - EXISTING INSTALLATIONS

001. This chapter is adopted pursuant to *Neb. Rev. Stat.* §48-727 and applies to all existing installation power boilers.

002. The maximum allowable working pressure on the shell or drum of a power boiler shall be determined by the strength of the weakest area of the boiler as computed by the principles of the ASME code, Section I (1971 Edition).

A. Boilers which are reinstalled of lap riveted construction or seams of butt and double strap riveted construction shall use the ASME code, Section I (1971 Edition).

B. A boiler constructed with fusion-welded seams and not x-rayed and stress relieved during construction, shall not be operated at a pressure in excess of fifteen pounds per square inch.

C. The factor of safety shall be increased by the inspector if the conditions and safety of the boiler demand it.

003. The maximum allowable working pressure on a water tube boiler, the tubes of which are secured in cast iron or malleable iron headers or which have cast iron mud drums, shall not exceed one hundred sixty pounds per square inch gauge or a temperature of 250 degrees Fahrenheit.

004. Maximum steam pressure on any boiler in which steam is generated, if constructed of cast iron, shall be fifteen pounds per square inch gauge.

005. When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross-sectional area of rivets, after driving, shall be selected from the ASME code, Section I (1971 Edition).

006. The use of weighted-lever safety valves or safety valves having either the seat or disk made of cast iron is prohibited. All power boilers shall have direct spring-loaded, pop-type safety valves that conform to the requirements of the ASME code, Section I (1971 Edition).

007. Each power boiler shall have at least one (1) safety valve. All power boilers with more than five hundred square feet of water heating surface or an electric power input of more than eleven hundred kilowatts shall have two (2) or more safety valves.

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PETE RICKETTS
GOVERNOR

FILED

AUG - 2 2016

BY SECRETARY OF STATE

APPROVED
DOUGLAS J. PETERSON
ATTORNEY GENERAL

JUL 11 2016

BY
ASSISTANT ATTORNEY GENERAL

AUG 0 2 2016

008. The safety valve or valves shall be connected to the power boiler independent of any other steam connection and attached as close as possible to the boiler without unnecessary intervening pipe or fittings.

009. No valves of any type shall be placed between the safety valve and the boiler. If a discharge pipe is used, no valve shall be placed on the discharge pipe between the safety valve and the atmosphere. The discharge pipe shall be at least the full size of the safety-valve discharge and fitted with an open drain to prevent water lodging in the upper part of the safety valve or discharge pipe. The discharge pipe shall be as short and straight as possible and so arranged as to avoid undue stress on the valve or valves. All safety valve discharges shall be so located or piped as to be carried away from walkways or platforms.

010. 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 maximum allowable working pressure.

011. One or more safety valves on every power 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 setting of all the safety valves on a boiler shall not exceed ten percent of the highest pressure at which any valve is set.

012. When two (2) or more power boilers operating at different pressures and safety-valve settings are interconnected, the lowest pressure boilers or interconnected piping shall be equipped with safety valves of sufficient capacity to prevent over-pressure, considering the maximum generating capacity of all boilers.

013. The minimum safety valve or safety-relief relieving capacity shall be determined on the basis of maximum designed steaming capacity determined by the boiler manufacturer or by the pounds of steam generated per hour per square foot of boiler heating surface and water-wall heating surface as given in Table A. This method shall not be used on electric boilers, waste heat boilers, or forced-flow steam generators without a fixed steam and water line.

Minimum Pounds of Steam Per Hour,
Per Square Foot of Heating Surface

Boiler Heating Surfaces		
	Firetube Boilers:	Watertube Boilers:
Hand Fired	5	6
Stoker Fired	7	8
Oil, Gas or Pulverized Fuel Fired	8	10

Water Wall Heating Surfaces		
	Firetube Boilers:	Watertube Boilers:
Hand Fired	8	8
Stoker Fired	10	12
Oil, Gas or Pulverized Fuel Fired	14	16

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014. The minimum safety valve or safety-relief valve relieving capacity for electric power boilers shall be three and one-half pounds per hour per kilowatt input.

015. For heating surface determination, see ASME code, Section I (1971 Edition).

016. Each power boiler shall have a feed supply which will permit it to be fed at any time while under pressure.

017. A power boiler having more than five hundred square feet of water-heating surface shall have at least two (2) means of feeding. Each source of feed water shall be capable of supplying water to the boiler at a pressure of three (3) percent higher than the highest setting of any safety valve on the boiler.

018. Power boilers 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 immediate shutoff of heat input prior to the water level reaching the lowest permissible level. The feed-water shall be introduced into the boiler in such a manner that it will not be discharged close to riveted joints of furnace sheets directly against surfaces exposed to products of combustion, or directed to surfaces subject to radiation from the fire. The feed piping to the power boiler shall be provided with a check valve near the power boiler and a stop valve between the check valve and the boiler.

019. When two (2) or more power boilers are fed from a common source, there shall also be a valve on the branch to each boiler between the check valve and source of supply. Whenever a globe valve is used on feed piping, the inlet shall be under the disk of the valve.

020. In all cases where returns are fed back to the boiler by gravity, there shall be a check valve and stop valve in each return line, the stop valve be placed between the power boiler and the check valve, and both shall be located as close to the power boiler as is practicable.

021. Where deaerating heaters are net employed, it is recommended that the temperature of the feed_water be not less 120 degrees Fahrenheit to avoid the possibility of setting up localized stress. Where deaerating heaters are employed, it is recommended that the minimum feedwater temperature be not less than 215 degrees Fahrenheit so that dissolved gases may be thoroughly released.

022. Except for damper regulator, feed_water regulator, low-water fuel cutout, drains, steam gauges or such apparatus that does not permit the escape of an appreciable amount of steam or water therefrom, outlet connections shall not be placed on the piping that connects the water column to the power boiler. The water column shall be provided with a valved drain of at least three-fourths inch piping size. The drain shall be piped to a safe location.

023. Each power boiler shall have the required water level indicating devices of the original code of construction.

024. Each boiler shall have a pressure gauge so located that is readable. The pressure gauge shall be installed so that it shall at all times indicate the pressure in the boiler.

025. Each steam boiler shall have the pressure gauge connected to the steam space, or to the water column, or its steam connection. A valve or cock shall be placed in the gauge connection adjacent to the gauge. An additional valve or cock may be located near the boiler, provided it is locked or sealed in the open position. No other shut off valve shall be located between the gauge and the boiler.

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026. The pipe connections shall be of ample size and arranged so that it may be cleared by blowing out. For a steam boiler, the gauge or connections shall contain a siphon or equivalent device which will develop and maintain a water seal that will prevent steam from entering the gauge tube.

027. Pressure gauge connections shall be suitable for the maximum allowable working pressure and temperature, but if the temperature exceeds 406 degrees Fahrenheit, brass or copper pipe or tubing shall not be used. The connection to the power boiler, except the siphon, if used, shall not be less than one-fourth inch NPS. Where steel or wrought iron pipe or tubing is used, they shall not be less than one-half inch inside diameter. The dial of the pressure gauge shall be graduated to approximately double the pressure at which the safety valve is set, but in no case to less than one and one-half times this pressure.

028. Each steam outlet from a boiler, except safety valve and water column connections, shall be fitted with a stop valve located as close as practicable to the power 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 power boiler or its setting.

029. When power boilers provided with manholes are connected to a common steam main, the steam connection from each boiler shall be fitted with two (2) stop valves having an ample free-blowing drain between them. The discharge of the drain shall be piped clear of the boiler setting. The stop valve shall consist of one automatic non-return valve next to the boiler and second valve of the outside screw and yoke type.

030. Each power boiler shall have a blow-off pipe fitted with valve or cock, in direct connection with the lowest water space practicable.

031. When the maximum allowable working pressure exceeds one hundred twenty-five pounds per square inch, the blow-off pipe shall be at least extra heavy from the boiler to the valve or valves, and shall run full size without reducers or bushings; and galvanized shall not be used.

032. All fittings between the power boiler and valve shall be steel or at least fittings of bronze, brass, malleable iron, or cast iron, all of which shall be suitable for the pressure and temperature. In case of replacement of pipe or fittings in the blow-off lines, as specified in this paragraph, they shall be installed in accordance with the rules of new installations given in 229 NAC 20, 229 NAC 22 and 229 NAC 24.

033. When the maximum allowable working pressure exceeds one hundred twenty-five psig, each bottom blow-off pipe shall be fitted with at least two (2) 150 psig standard valves or a valve cock and a valve.

034. A bottom blow-off pipe when exposed to direct furnace heat shall be protected by fire-brick or other heat resisting material so arranged that the pipe may be inspected.

035. An opening in the power boiler setting for a blow-off pipe shall be arranged to provide for free expansion and contraction.

036. Each steam boiler shall have a steam gauge connected to the steam space or to the steam connection to the water column. The steam gauge shall be connected to a siphon or equivalent device of sufficient capacity to keep the gauge tube filled with water. The gauge shall be arranged so that it cannot be shut off from the boiler except by a cock placed near the gauge. A tee or lever handle shall be parallel to the pipe in which it is located when the cock is open.

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037. Each power boiler shall be provided with a valve connection at least ¼ inch NPS for exclusive purpose of attaching a test gauge when the power boiler is in service so that the accuracy of the boiler pressure gauge can be ascertained.

038. All repairs and alterations to power boilers must comply with the rules as defined in 229 NAC 15.

APPROVED

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PETE RICKETTS
GOVERNOR

FILED

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APPROVED
DOUGLAS J. PETERSON
ATTORNEY GENERAL

JUL 1 1 2016

BY
ASSISTANT ATTORNEY GENERAL

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