WEST VIRGINIA LEGISLATIVE RULES
DEPARTMENT OF LABOR
CHAPTER 21-3
SERIES III

Title: Steam Boiler Inspection

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Section 1. General

1.1 Scope - Legislative rules and regulations are promulgated for the enforcement of §21-3-7 relating to Steam Boilers under authorization that same section of the West Virginia Code.

1.2 Autority - W. Va. Code 21-3-7.

1.3 Filing Date - December 31, 1982

1.4 Effective Date - July 1, 1945

Section 2. Boilers of All Types

2.1 On and after July 1, 1945 all boilers operating in the State of West Virginia, except boilers on railroad locomotives subject to inspection under Federal laws; portable boilers used for agricultural purposes; boilers on automobiles; boiler of steam fire engines brought into the State for temporary use in times of emergency for the purpose of checking configurations; boilers used in private residences which are solely for residential purposes; sectional boilers; small portable boilers commonly used in the oil and gas industry about their wells and tool houses; boilers carrying not more than fifteen pounds pressure per square inch, which are equipped with safety devices approved by the Commissioner of Labor, and boilers under the jurisdiction of the United States; are subject to an internal inspection annually while not under pressure, and externally with at least the same frequency, and are required to have an annual certificate to operate.

Insurance inspector's reports on insured boilers will be accepted in lieu of inspection reports by an inspector of the Department of Labor.

In case a boiler, subject to the provisions of this rule, is moved from one location to another, notice shall be given the Department of Labor of such removal and of the new location in which the boiler is to be set up.

The provisions of this rule do not apply to boilers exempt from inspection by the Commissioner of Labor under Section 7, Article 3, Chapter 21, of the Code of West Virginia, 1931, amended 1937 and 1945.

2.2 After July 1, 1937, each steam boiler used or proposed to be used within the State, except boilers exempt from inspection under Section 7, Article 3, Chapter 21, of the Code of West Virginia, shall be thoroughly inspected internally and externally while not under pressure by an inspector of the Department of Labor, or by Special Inspectors provided for herein, as to its design, construction, installation, condition and operation; and if it shall be found to

be suitable and to conform to the rules of the Department of Labor, the Commissioner of Labor shall issue to such owner or user a Permit to Operate for each such boiler. Permits to operate shall specify the maximum pressure that the boiler inspected be allowed to carry. Certificates of inspection will be issued by the Commissioner of Labor and will be valid for a period of twelve months from the date of issuance thereof. Requests for an extension, not to exceed sixty days beyond the expiration date of the certificate, may be considered where there are unusual circumstances or conditions, provided, however, that such request has the approval of the insurance company carrying the risk, in the case of insured boilers, and/or the approval of the State Inspector in the area in which the boilers are in operation, in the case of state inspected boilers. No request will be considered unless such approval in writing accompanies the request for extension of time. The certificate shall be posted under glass in the engine or boiler room containing such boiler or an engine operated by it, or, in the case of portable boiler, in the office of the plant where it is located for the time being. The Commissioner of Labor, or his authorized representative, may at any time suspend a Permit to Operate when, in their opinion, the boiler for which it was issued may not continue to be operated without menace to the public safety, or when the boiler is found not to comply with the rules herein provided for, and a Special Inspector shall have corresponding powers with respect to Permits to Operate for boilers insured by the company employing him. Such suspension of a Permit to Operate shall continue in effect until said boiler shall have been made to conform to the rules of the Department of Labor and until said Permit to Operate shall have been reinstated by a State Inspector, if the Permit to Operate was suspended by a State Inspector, or by a Special Inspector if it was suspended by a Special Inspector. Each such boiler shall also be inspected externally while under pressure with at least the same frequency and at no greater intervals.

2.3 All boilers shall be stamped with a West Virginia serial number, thus: W000W, at the first convenient opportunity after July 1st, 1937, and not later than the first internal inspection. The numbers and letters to be not less than 5/16" high.

The stamps shall be placed in the location as determined by the rules of the American Society of Mechanical Engineers' Boiler Code.

The stamping shall not be covered by insulating or other material.

No steam boiler that has been condemned for further use in this or any other State by an authorized boiler inspector shall be operated in this State.

Every steam boiler so condemned in this State shall be stamped in the following manner, "WXXXW" placed on condemned boilers shall be made across the registration mark or number, a stamp shall be placed in the location of this mark as determined by the rules of the American Society of Mechanical Engineers' Boiler Code.

The stamping shall be done with individual letters, driven into the plate so far as to thoroughly cancel any previous registration and shall be made with letters at least 5/16" high.

2.4 In addition to any boiler inspectors of the Department of Labor, the Commissioner of Labor shall, upon the request of any company authorized to insure against loss from explosion of steam boilers in this State, issue to the boiler inspectors of such company certificates or authority shall pass satisfactorily the examination provided for in Section 2.10 or, in lieu of such examination, shall hold a certificate as an inspector of steam boilers for a state that has a standard of examination equal to that of the State of West Virginia or a certificate from the National Board of Boiler and Pressure Vessel Inspectors. Such Special Inspectors shall receive no salary from, nor shall any of their expenses be paid by the State, and the continuance of a Special Inspector's certificate shall be conditioned upon his continuing in the employ of a boiler inspection and insurance company imposed by their respective companies.

2.5 In case an insurance company cancels insurance upon any steam boiler carrying more than 15-lbs. guage pressure, or of more than 3-H.P., or the policy expires and is not renewed, notice shall immediately be given the Department of Labor. They shall likewise notify said Department immediately upon the placing of insurance on such boiler.

If a Special Inspector, upon the first inspection of a new risk finds that the boiler or any of the appurtenances are in such condition that his company refuses insurance on the same, the company shall immediately notify the Department of Labor of that fact together with a list of the defects.

2.6 Examination for Inspectors of the Department of Labor and Special Inspectors shall be given by the Commissioner of labor, or by at least two examiners to be appointed by said Commissioner of Labor. Such examinations must be written or part written and part oral, recorded in writing, and must be confined to questions the anwsers of which will aid in determining the fitness and competency of the applicant for the intended service and must be of uniform grade throughout the State. In case an applicant for an inspector's certificate of compentency fails to pass this examination, he may appeal to the Commissioner of Labor for a second examination, which shall be given by the Commissioner of Labor, or, by examiners other than those by whom the first examination was given and these examiners shall be appointed forthwith to give said second examination. Upon the result of this examination, on appeal, the Commissioner shall determine whether the applicant be qualified.

The record of an applicant's examination, whether original or on appeal, shall be accessible to him and to his employer. A certificate of compentency may be revoked by the Commissioner of Labor for the incompentency or untrustworthiness of the holder thereof or for wilful falsifiction of any matter or statement contained in his application or in a report of any inspection. A person whose

certificate is revoked may appeal from the revocation to a board of hearing, said board to consist of three or more members to be appointed by the Commissioner, which shall hear the appeal and either set aside or affirm the revocation and its decision shall be final. The person whose certificate has been revoked shall be entitled to be present in person or by counsel on the hearing of the appeal. If a certificate is lost or destroyed a new certificate shall be issued in its place without another examination. A person who has failed to pass the examination or whose certificates of competency has been revoked, shall be entitled to apply for a new examination and certificate after 90 days from such failure or revocation.

2.7 On and after July 1, 1937, the first internal inspection of each insured boiler shall be reported on the A.S.M.E. "First Internal Inspection Report", and annually thereafter inspections shall be reported on A.S.M.E. "Internal Reinspection Report." Copies of internal inspection reports shall be forwarded to the Commissioner of Labor on A.S.M.E. report forms. Not more than twelve months shall elaspe between internal inspection unless request for extensions are granted. Reports of external inspections are not required unless there are violations or dangerous conditions.

2.8 No used steam boiler or boilers for use under pressure shall be brought into this State after July 1, 1937, except boiler exempt under Section 7, Article 3, Chapter 21 of the Code of West Virginia, unless the same comply with Section 2 of these Rules for New Instalation.

2.9 Following internal inspection, if the condition of the boiler warrants, an Annual Certificate shall be issued by the Commissioner of Labor without charge.

No certificate to operate, issued on an insured boiler, shall be valid after the boiler for which it was issued shall cease to be insured by a duly authorized insurance company. Such case the owners or operater shall promptly notify the West Virginia Department of Labor.

2.10 The Commissioner of Labor has adopted the 1936 A.S.M.E. Boiler Construction Code, Amendments, and Interpretations thereto, made and approved by the Council of the Society, for both new and existing installations as the rules for the guidance of inspectors in the State of West Virginia.

2.11 The Commissioner of Labor shall have free access for himself, his authorized inspectors, and special inspectors, during reasonable hours, to any premises in the State where a steam boiler is built or where a steam boiler or power plant apparatus is being installed or operated, for the purpose of ascertaining whether such boiler is built, installed and operated in accordance with the provisions of Section 7, Article 3, of Chapter 21 of the Code of West Virginia, 1931, amended 1937 and 1945.

2.12 All boilers used for generating steam which carry a guage pressure of fifteen pounds per square inch or over or more than 3-H.P., and subject to regular inspections shall be prepared for such inspections when the owners or users are notified by either the Department of Labor, or any authorized insurance company for such inspections or hydrostatic test, if necessary.

2.13 The owner or user of the boiler or boilers herein required to be inspected annually on a date specified by the Commissioner of Labor or by Special Inspectors of any authorized insurance company, which date shall not be less than seven days after date of such notice, unless by consent of the owner, shall prepare the boiler for internal inspection, or hydrostatic pressure test when necessary.

2.14 To prepare a boiler for internal inspection, the water shall be drawn off and the boiler thoroughly washed. All manhole and handhole plates and washout plugs in boilers and plugs in water column connection, if any, shall be removed and the furnace and combustion chambers thoroughly cooled and cleaned. All grates of internally fired boilers shall be removed. Also enough of the brick work or insulating material of any type of boiler shall be removed to determine the condition of the boiler, furnace, mud drum heads, or other parts at each annual inspection when necessary. The steam guage shall be removed for testing.

2.15 If a boiler has not been properly prepared for internal inspection as provided for in this section, the inspector may decline to make such inspection and Permit to Operate shall be withheld until the boiler has been properly prepared and inspected.

When inspecting a boiler under these rules (State or Insurance Insector) the inspector shall observe if any appurtances are connected to the boiler which are not a part of boiler proper but which may be subjected to boiler pressure - such vessel may be a condensate return tank of blow-off tank. The inspector shall report to this office any defects or sub-standard conditions he may note on appurtances connected to the boiler.

All automatically gas or oil fired boilers which comes under these rules shall be equipped with a manual reset gas trip valve which will function in case of safety pilot light failure or the operation of the low water fuel cutout. This apparatus shall be so designed that the flow of gas or oil cannot be resumed without the service of the attendant.

All gas or oil fired boilers that comes under these rules which are equipped with a stack damper shall have such damper arranged so that it cannot be closed tight. It should have at least 20 percent opening at all times, if necessary a section of damper blade should be cut out to provide this minimum amount of opening to permit escape of any possible gas accumulation.

If it is found that steam or hot water is leaking into the boiler, the source of such leakage shall be disconnected, if necessary, so as to cut out such steam or hot water from the boiler to be inspected.

2.16 If, upon inspection, a boiler or boilers are found to be in such condition that they are unsafe to operate, they shall be condemned. However, the owner or user may immediately appeal to the Commissioner of Labor, if he so desires, before the boiler is stamped as provided in Section 2.6. If appeal is made, the boiler shall not be operated pending the decision of the Commissioner of Labor.

2.17 The shell or drum of a boiler in which a typical "lap seam crack" is discovered along a longitudinal riveted joint for either butt strap or lap joint shall be permanently discontinued for use under steam pressure. 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.

2.18 When the boiler is stamped with the condemned mark, the inspector shall put underneath such mark the identification mark furnished his company, if an insurance company, or that provided by the Commissioner of Labor, if condemned by the State, it being understood that identification marks shall be provided to all companies, insuring boilers within the State, by the Department of Labor.

2.19 When insulating a boiler, provision shall be made so that the insulation covering the longitudinal seam may be removed, or a space not less than ten inches wide shall be provided with removable insulation for taking measurements or inspection of the joint and shell. This also applies to portable boilers which are jacketed with steel over the insulation.

When a boiler is covered with insulating materials, such materials shall be kept not less than two inches away from edges of all hand hole and man hole openings - and not less than one inch away from threaded pipe connection to boiler.

If the boiler is jacketed so that the longitudinal seams of shells, drums, or domes cannot be seen, and if it cannot otherwise be determined, enough of the jacketing, setting wall or other covering shall be removed so that the size and pitch of the rivets and such other data as may be necessary can be determined when, in the opinion of the inspector, it is necessary to determine the safety of the boiler or inspector, it is necessary to determine the safety of the boiler or appliance.

2.20 All appliances required for electric steam generators shall be attached in accordance with the following rules:

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 generators and shall be grounded in an approved manner.

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 accidentally come in contact with the high tension circuits. 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. A switch or circuit breaker of suitable rupturing capacity shall be installed in the power circuit together with disconnecting switches so that the power circuit may be opened and prevented from being accidentally closed during repairs to the boiler. One switch to be located near the boiler.

2.21 In all cases where no mechanical feed is attached to a boiler the safety valve shall be set at not less than 6% below the pressure of the main source of supply feeding the boiler. A return trap shall not be considerer as a mechanical feeding device. A boiler having more than 500 sq. ft. of water heating surface shall have at least two means of feeding, one of which shall be a pump, inspirator or injector. Where a source of feed is available at a sufficient pressure to feed the boiler against a pressure of 6% higher than that at which the safety valve is set to blow, this may be considered one of the meanings. Where possible feed water should have a temperature of not less than 120° Fahrenheit.

2.22 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 as to 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.

2.23 By "fusion welding" is meant a process of welding metals in a molten, or molten and vaporous state without the application of mechanical pressure or blows. Such welding may be accomplished by the oxy-acetylene or oxy-hydrogen flame or by the electric arc. Thermit welding is also classed as fusion welding.

2.24 A major repair by fusion welding, such as the repair or making of a new seam, the insertion of nozzles, or any repair involving the safety of a boiler should be made in accordance with the section of A.S.M.E. code governing the particular kind of vessel or kind of work to be done.

2.25 No repairs (including welding) shall be made without the approval of an authorized inspector and method of such repair sanctioned by said inspector. If, in the opinion of the inspector, a hydrostatic test is necessary such test shall be applied when the work is completed.

2.26 Fusion welding on boilers by unqualified welding operators will not be acceptable except in the cases specified herein where the safety of the boiler does not depend upon the weld.

(a) Fusion welds not exceeding three feet in length will be permitted in a staybolted surface or one adequately stayed by other means so that, should the weld fail, the parts would be held together by the stays.

(b) Cracks in girth seams extending from the edge of the plate to the rivet hole may be fusion welded. All cracks that may be welded shall be properly prepared to permit fusion through the entire thickness of the plate. Similar cracks in a longitudinal direction and located between the rivet holes may also be fusion welded, provided the cracks do not extend more than 3 inches beyond the edge of the lap of the inner plate. Cracks extending from rivet hole to rivet hole or girth seams shall not be welded.

(c) Calking edges of girth seams may be built up by fusion welding under the following conditions: The thickness of the original metal between rivet holes and calking edge to be built up shall not be less than 1/4 of the diameter of the rivet hole and the portion of the calking edge to be replaced shall not exceed 30 inches in length in a girthwise direction.

(d) Prior to making any repairs to girth seams by fusion welding the rivets shall be removed over the portions to be welded and for a distance of at least 6 inches beyond each such portion. After repairs are made the rivet holes shall be reamed before the rivets are redriven.

(e) When external corrosion has reduced the thickness of plate around handholes to an extent of not more than 40% of the original thickness and for a distance not exceeding 2 inches from the edge of the hole, the plate may be built up by fusion welding.

(f) Stayed sheets which have corroded to a depth of not more than 40% of their original thickness may be reinforced or built up by fusion welding. In such cases the stays and staybolts shall come completely through the reinforcing metal and the original ends of the staybolts shall be plainly visable to the inspector. When necessary to replace stays and staybolts, they shall comply with the requirements of the A.S.M.E. Code.

(g) In fire tube boilers where tubes enter flat surfaces and the tube sheets have been corroded or where cracks exist in the ligaments, fusion welding may be used to reinforce or repair such defects. The ends of such tubes may be fusion welded to the tube sheets and the welding in of tubes of the sheets shall not be permitted where such sheets form the shell or drum of a water tube boiler.

(h) Unreinforced openings in the shells or drums of boilers provided they do not exceed in diameter the sizes of unreinforced openings permitted by the A.S.M.E. Code (Par. P-268a) may be closed by the use of a patch or plate, at least 2 inches larger in diameter than the hole, placed on the inside of the drum or shell and sealed against leakage by fusion welding, preferably on both

the inside and outside edges. Such patches shall not be set in the shell flush with the surrounding plate.

(i) Tubes of fire tube boilers may be re-ended or pierced by the fusion welding process provided such tubes are well distributed and their number does not exceed 50% of the total and further that there are no more than two circumferential welds in any one tube. PROVIDED, however, that in fire tube boilers tubes that have been re-ended by the fusion welding process may be used in excess of 50% of the full number of tubes provided such re-ended tubes have been welded by operators who have demonstrated their ability to obtain sound and ductile welds. Satisfactory evidence of a welding operator's ability in this connection shall be obtained by having the welding operator make several sample welds between two peices of boiler tubing, the welding to be done under the same conditions and by the same process as will be the case in the actual safe-ending to tubes. After such samples have been welded they shall be cut into longitudinal strips about 1 inch wide, the reinforcement of the weld on the outside, if any, ground off and the specimens then broken at the weld. This method of examination may be accomplished by gripping the specimen at the weld, in a vice, and the extended section driven backward with a hammer so that the weld will be opened at the root. To be satisfactory, welds broken in this manner shall be clean and properly fused through at least 90% of the tickness of the tube.

If more than 50% re-ended tubes are found in a boiler and it is impossible to have the welding operator who did the work make some sample welds for test, three tubes at varios locations shall be removed from the boiler and the welds shall be subjected to the above test.

2.27 The repairing of tubes or headers in water tube boilers shall be governed by rules of the National Board of Fusion Welding. Any variation of the National Board rules shall be taken up with this Department for approval. All welding mechanics performing welding repair work on steam boilers in West Virginia in accordance with paragraph P 112 of the A.S.M.E. Code, must be qualified by an authorized inspector and the qualification test records submitted to this Department for approval.

2.28 Cracks in the shells or drums of power boilers, except as otherwise specified herein, shall not be welded.

2.29 The building up of grooved or corroded areas of unstayed internal surfaces, other than widely scattered pitholes, by means of deposited metal will not be permitted.

2.30 Leakage at riveted joints or connections must be carefully investigated to determine the cause of such leakage.

2.31 Where boilers are patched and the patch affects the structure of the boiler, requiring a reduction of pressure in same, the inspector shall forward to the Department of Labor a new long form data report together with a sketch of the patch on the back of the report.

2.32 The maximum allowable working pressure of steam heating boilers shall not exceed 15-lbs. per square inch on a boiler built or used exclusively for low-pressure steam heating. The maximum steam pressure on any boiler in which steam is generated, if constructed of cast iron, shall be 15 lbs. per square inch.

2.33 The Commissioner of Labor or his authorized representative or Special Inspectors may at any time call for an accumulative test to determine if a steam heating boiler is subject to or operated at a pressure in excess of 15-lbs.

Section 3 - New Installations

3.1 All new steam boilers installed in this State after January 1, 1938, except boilers exempt from inspection under Section 7, Article 3, of Chapter 21 of the Code of West Virginia, 1931, amended 1937 and 1945, shall be constructed and installed in accordance with the rules and regulations of the Power Boiler Code of the American Society of Mechanical Engineers, together with the Appendix and any amendments thereto. Also said boilers must be inspected by a qualified inspector, holding a boiler inspector's commission, issued by the Commissioner of Labor, or issued by a state having rules and regulations the equivalent of the State of West Virginia or issued by the National Board of Boiler and Pressure Vessel Inspectors, and stamped as provided in Paragraph 332 of the Power Boilers Code of the American Society of Mechanical Engineers, said letters and figures to be not less than 5/16" in height. Boiler or boilers having a standard stamping of a state requiring a standard of construction equivalent to the established standard of West Virginia may be accepted by this Department, provided however, that the party or parties desiring to install such boiler or boilers in this State, shall file with his application to this Department manufacturer's data report covering the construction of the boiler or boilers in question.

Section 4 - Existing Installations

4.1 The following rules and regulations, formulated by the Commissioner of Labor, in accordance with Section 7, Article 3 of Chapter 21 of the Code of West Virginia, 1931, amended 1937 and 1945, shall apply to boilers installed previous to January 1, 1938: Form 104, "Affirmation of Previous Installation," must be used to prove that a boiler which does not bear proper stamping was installed in West Virginia prior to that time.

4.2 The maximum allowabe working pressure on the shell of a boiler or drum shall be determined by the strenght of the weakest section of the boiler, computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint, or the tube ligament, the inside diameter of the course and the factor of safety allowed by these rules.

$$\frac{TS \times t \times E}{R \times FS} = \text{maximum allowble working pressure, lbs. per square inch}$$

Where
TS = ultimate tensile strenght of shell plates, lbs. per. sq. in.
t = minimum thickness of shell plate, in weakest course, in.
E = efficiency of longitudinal joint, method of determining which is given in Par. P-181, Page 27, ASME Code Book. See note.
E for seamless boilers shall be 100%
E for tube ligaments between openings shall be calculated by the rules given in Par. P-192 and P-193, ASME Boiler Code.
R = inside radious of the weakest course of the shell or drum, inches.
FS = factor of safety allowed by these rules.

Note: To be used as given above for longitudinal joints, riveted construction or if for fusion welded joints, E shall be taken as per efficiency specified in Par. P-102, A.S.M.E. Boiler Code.

In any case wherein there are both riveted joints and tube ligaments to consider, the weaker of these shall be used for E.

4.3 Boilers of butt strap longitudinal seam construction in service when these rules become effective shall be operated with a factor of safety of at least 4.5. The above factor of safety may be increased by the inspector if the condition and safety of the boiler demands such action.

Ten years after these rules become effective the factor of safety shall be at least 5.

Boilers of lap seam longitudinal construction in service when these rules become effective shall be operated with a factor of safety of at least 5.

Five years after these rules become effective the factor of safety shall be 5.5. After ten years it shall be 5.75, and after fifteen years it shall be not less than 6. This does not apply to boilers constructed in conformity with the A.S.M.E. Code and are so stamped.

In no case shall the maximum allowable working pressure on old boilers be increased, unless they are being operated at a lesser pressure than would be allowable for new boilers, in which case the changed pressure shall not exceed that allowable for new boilers of the same construction. The above factor of safety may be increased by the inspector if the condition and safety of the boiler demands such action.

4.4 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.

4.5 Strength of rivets in shear. In computing the ultimate strength of rivets in shear the following values in pounds per square in. 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

The cross-sectional area used in the computations shall be that of the rivet shank after driving.

4.6 Crushing strength of mild steel. The resistance to crushing of mild steel shall be taken at 95,000 lbs. per sq. in. of cross-sectional area.

4.7 Rivets. 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, may be taken from the following table or ascertained by cutting out one rivet in the body of the joint.

Table - 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"	1-1/16"	1-1/16"	

4.8 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 6 percent above the maximum allowable working pressure or more than 6 percent above the highest pressure to which any valve is set.

4.9 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 3 percent above the maximum allowable working pressure, but the range of setting of all the valves on a boiler shall not exceed 10 percent of the highest pressure to which any valve is set. No valve of any description shall be placed between 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. 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. Safety valves having either the seat or disc of cast iron shall not be used. Dead weight or lever weighted safety valves are prohibited after January 1, 1938.

4.10 All stationary reinstalled boilers with ownership not changed shall be inspected and subjected to hydrostatic test before being placed in operation and shall be equipped with appurtenances conforming to the A.S.M.E. Boiler Code applying to new installations.

4.11 The factor of safety for re-installation shall be in accordance with the requirements of Section 4.3 except that a factor of safety of not less than 5.5 shall be used when the boiler is of the lap seam type and a factor of safety of not less than 5 shall be used when the boiler is of butt and double strap construction.

4.12 Second-hand boilers by which are meant boilers where both the ownership and location are changed, which are not constructed in accordance with the Code, and which have been installed or in use in this State previous to January 1, 1938, shall be inspected and subjected to hydrostatic test and the factor of safety of not less than 5.5 shall be used.

4.13 (Eliminated entirely.) The National Board regulations have been adopted as the standard of this Department.

4.14 Any boiler having a continuous lap seam more than 12 feet in length and a diameter over 36 inches when removed from an existing setting shall not be reinstalled to operate at a pressure in excess of fifteen pounds per square inch.

4.15 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 160 lbs. per square inch.

4.16 Fire-actuated fusible plugs, when used shall conform to the rules and regulations of the Boiler Code Committee of the American Society of Mechanical Engineers, and shall be renewed when requested by the Commissioner of Labor or inspectors.

4.17 The least diameter of fusible metal in a fire-actuated plug shall be not less than 1/2", except for maximum allowable working pressures of over

175 lbs. per sq. in., or when it is necessary to place a fire-actuated fusible plug in a tube, in which case the least diameter of fusible metal shall be not less than 3/8". (For dimensions refer to Figure A-10 A.S.M.E. Code Book.) If a fire-actuated fusible plug is inserted in a tube, the tube wall shall be not less than 0.22 inch thick or sufficient to give four threads.

4.18. Steam-actuated fusible plugs, if used, shall be so located that they will operate when the water level is at the point where a fire-actuated fusible plug would be located if installed under these rules. Fire-actuated fusible plugs, if used, shall be located at the lowest permissible water level for different types of boilers as specified by the A.S.M.E. Code.

4.19. Water glasses and guage cocks. Each steam boiler shall have at least one water glass, the lowest visible part of which shall be not less than 2 in. above the lowest permissible water level.

Each boiler shall have three or more guage cocks, located within the range of the visible length of the water glass, when the maximum allowable working pressures exceeds 15 lbs. per sq. inch, except when such boiler has two water glasses with independent connections to the boiler, located on the same horizontal line and not less than 2 ft. apart.

Locomotive-type boilers not over 36 inches in diameter, or any firebox or water leg boiler in which the heating surface does not exceed 50 sq. ft., need have but two guage cocks.

The water column shall be fitted with a drain cock or drain valve with a suitable connection to the ashpit, or other safe point of waste and if the water connection thereto has a rising bend or pocket, which cannot be drained by means of the water column drain, an additional drain shall be placed on this connection in order that it may be blown off to clear any sediment from the pipe. The water column blow off pipe shall be at least 3/4 inch pipe size.

4.20. No outlet connections, except for damper regulator, feed-water regulator, low water cut-outs, drains or steam gauges, shall be placed on the pipes connecting a water column to a power boiler.

When water level controls or low water cutouts are installed, the piping to such controls shall be independent of the regular water column piping.

The pipe connections to such apparatus shall be provided at each right angle turn with a cross fitting with a readily removable plug to permit inspection and cleaning in both directions.

4.21. Steam gauges. Each boiler shall have a steam gauge connection to the steam space or to the water column or to its steam connection graduated to not less than one and one-half times the safe working pressure of the boiler. The steam gauge shall be connected to a siphon or equivalent device of sufficient

capacity to keep the gauge tube filled with water and so arranged that the gauge cannot be shut off from the boiler except by a cock placed near the gauge 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. Where the pipe may be subject to freezing, a shut off cock may be placed close to the boiler for removal or draining. Connections to gauges shall be of brass, copper or bronze composition. One-fourth inch Inspector's test gauge connection shall be fitted so that the gauge can be tested while the boiler is in operation.

Where the use of a pipe longer than 10 feet becomes necessary, an exception may be made to the rule that the gauge must be arranged so that it cannot be shut off except by a cock placed near the guage. A shutoff valve or cock arranged so that it can be locked or sealed open may be used near the boiler. Such a pipe shall be of ample size and arranged so that it may be cleared by blowing out.

4.22. Stop valves. Each steam outlet from a power boiler (except safety valve connections) shall be fitted with a stop valve located as close as practicable to the boiler.

When a stop valve is so located that water can accumulate, ample drains shall be provided.

An ordinary cast pipe plug is not considered to be readily removable. A suggested improvement would be a plug made of a nipple and pipe can or blind nipple.

4.23. Bottom blow-off pipes. Each boiler shall have a blow-off pipe fitted with a valve or cock in direct connection with the lowest water space practicable. When cocks are used they shall be of the gland or guard type and suitable for the pressure allowed. Such boilers, carrying over 100 lbs. steam pressure shall have two valves or a valve and cock on the blow-off line.

The bottom blow-off of every traction and/or portable boiler shall have at least one blow-off valve, conforming to the requirements of the A.S.M.E. Code for the pressure allowed.

4.24. When any changes or repairs are made in the blow-off pipe for existing installations:

The blow-off valve or valves and the pipe between them and the boiler shall be of the same size except where a larger pipe for the return of condensate is used.

All fittings between the boiler and valves shall be steel for pressure over 100 lbs.

When the pressure does not exceed 100 lbs. per sq. inch the valves and fittings shall be equal at least to the requirements of the American Standards for 125 lbs. per sq. inch.

For pressures exceeding 100 lbs. per sq. inch the valves, pipe and fittings shall be equal at least to the requirements of the American Standards for 250 lbs. per square inch.

For pressures over 250 lbs. per sq. inch the valves or cocks shall be of steel construction equal at least to the requirements of the A.S.M.E. Code.

Interpretation for Sections 4.23 and 4.24

It is the interpretation of the Commissioner of Labor that the requirements called for in Sections 4.23 and 4.24 shall apply only when repairs become necessary unless apparatus or fittings in present use are dangerous in the opinion of the inspector.

4.25. 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.

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

4.26. Feed piping. The feed pipe of a steam boiler operated at more than 15 lbs. per sq. inch maximum allowable working pressure, shall be provided with a check valve near the boiler and a valve or cock between the check valve and boiler, and when two or more boilers are fed from a common source, there shall also be a stop valve on the branch to each boiler, between the check valve and the source of supply. When a globe valve is used on a feed pipe, the inlet shall be under the disc of the valve.

4.27. Water fronts. Each boiler fitted with a water-jacket boiler furnace mouth protector, or similar appliance having valves on the pipes connecting them to the boiler, shall have these valves locked or sealed open. Such valves, when used, shall be of the straightway type. Suitable means should be provided for blowing out this equipment.

4.28. Test pressure. When a hydrostatic test is applied the required test pressure shall be 1-1/2 times the maximum allowable working pressure.

During a hydrostatic test of a boiler, suitable provisions shall be made so that it will not be necessary to screw down the compression screw upon the spring of the safety valve. The temperature of water used during hydrostatic test shall not exceed 150 degrees Fahrenheit.

4.29. Where repairs are necessary which in any way affect the working pressure or safety of a boiler, a certified inspector shall be called for consultation and advice as to the best method of making such repairs; after such repairs are made they shall be subject to the approval of a certified inspector.

When repairs or changes are ordered by an inspector and a Form 101, "Boiler Repair Report" is issued to the owner, the Annual Inspection Certificate will be withheld until the Form 101, completed by the owner, is received by the Department of Labor showing that the repairs have been completed as ordered. Repairs to all boilers and their appurtenances shall conform to the requirements of the A.S.M.E. Boiler Code.

4.30. A boiler, except self contained portable boilers used for purposes other than operating ground saw-mills, cannot be moved from one location to another and legally operated at the new location until it has been inspected internally by an authorized inspector and an Annual Inspection Certificate issued by the Commissioner of Labor.