



LAWS OF MALAYSIA

FACTORIES AND MACHINERY ACT 1967 [64 OF 1967]

P.U.(A) 5/70

FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL) REGULATIONS, 1970

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FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

Preamble

IN exercise of the powers conferred by section 56 (1) of the Factories and Machinery Act, 1967 [64 /1967], the Minister of Labour hereby makes the following regulations:

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FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970
INTRODUCTORY

Regulation 1. Citation and commencement.

These regulations may be cited as the **Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations, 1970**, and shall come into force on the 1st day of February, 1970.

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Regulation 2. Interpretation.

In these regulations, unless the context otherwise requires:

"air receiver" means an unfired pressure vessel used or intended to be used to contain compressed air and connected to an air compressing plant and includes a vessel used or intended to be used to contain compressed inert or exhaust gases and connected to an engine.

"authorised safe working pressure" means the maximum permissible pressure at which a steam boiler or unfired pressure vessel may be operated as assigned by the Chief Inspector and as stated on the current certificate of fitness relating to such steam boiler or unfired pressure vessel; "Chief Inspector" and "Inspector" mean the officers appointed under section 4 (1) of the Act.

"cubic capacity" means in respect of any unfired pressure vessel, the volumetric capacity measured in cubic feet;

"design pressure" means the maximum pressure at which the manufacturer of a steam boiler or unfired pressure vessel or any fittings or pipework associated therewith designed the same to operate;

"Inspecting Authority" means, in respect of any steam boiler or unfired pressure vessel, an Inspecting Authority named in the Third Schedule to these regulations;

"steam receiver" means an unfired pressure vessel used or intended to be used to contain steam.

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Regulation 3. Application.

These regulations shall apply to every steam boiler and every unfired pressure vessel to which an authorised safe working pressure has not been assigned by the Chief Inspector at the date of the coming into force of these regulations:

Provided that where the Chief Inspector is of the opinion that the application of these regulations or part thereof to any steam boiler or unfired pressure vessel to which an authorised safe working pressure had been assigned at the date of the coming into force of these regulations is necessary to ensure the safety of any person or property he may in writing order that these regulations or part thereof shall apply thereto.

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Regulation 4. Exemption.

Where the Chief Inspector is of the opinion that, on account of special circumstances, the application of these regulations or any part thereof to any steam boiler or unfired pressure vessel or to any class or type of steam boiler or unfired pressure vessel is not necessary or reasonable, he may by certificate in writing, which he may in his discretion revoke, exempt such steam boiler or unfired pressure vessel or such class or type of steam boiler or unfired pressure vessel from these regulations or part thereof subject to such conditions as he may specify in the certificate.

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Regulation 5. Manufacture of boilers and pressure vessels.

(1) No person shall manufacture or make or cause to be manufactured or made any steam boiler or unfired pressure vessel without the permission in writing of the Chief Inspector.

(2) Where the Chief Inspector is satisfied that an applicant for permission under paragraph (1) of this regulation has or has available to the applicant suitable equipment and persons adequately trained to design and construct acceptable steam boilers or unfired pressure vessels, as the case may be, the Chief Inspector may, by writing under his hand, grant such permission subject to such conditions relating to construction, methods of manufacture, materials, inspection during construction and testing as he may deem necessary.

(3) Every application to construct a steam boiler or an unfired pressure vessel shall be accompanied by-

(i) three copies of a drawing (to as large a scale as is reasonably practicable) showing the principal dimensions of the boiler or unfired pressure vessel, as the case may be, with a longitudinal section and an end view, details of materials, scantlings, riveting, welded joints and all data necessary to assign an authorised safe working pressure;

(ii) particulars of the code, rules, or specification to which the steam boiler or unfired pressure vessel is designed and details of the formulae and calculations of design pressure either separately or on the drawing; and

(iii) the prescribed fee for approval of design.

(4) A certificate of fitness shall not be issued in respect of any steam boiler or unfired pressure vessel made in the Federation unless the conditions of paragraphs (2) and (3) of this regulation have been satisfied and the Chief Inspector has assigned to the steam boiler or unfired pressure vessel an authorised safe working pressure.

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Regulation 6. Imported steam boiler and pressure vessel.

The owner or importer of every steam boiler or unfired pressure vessel imported into the Federation after the coming into force of these regulations, shall render to the Chief Inspector:

- (i) a certificate from the manufacturer or maker of the steam boiler or unfired pressure vessel describing the same and giving particulars of the materials used in its construction, the design pressure, the manufacturer's or maker's serial number and the hydrostatic test to which it has been subjected;
- (ii) three copies of drawing which shall comply with the provisions of sub-para. (i) of paragraph 3 of regulation 5;
- (iii) the particulars required in sub-paragraph (ii) of paragraph 3 of regulation 5; and
- (iv) details of the heating surface in square feet of the steam boiler and of any superheater or economiser, and in the case of a steam boiler other than one to be installed in a thermal power station, its maximum evaporative capacity from and at two hundred and twelve degrees Fahrenheit with fuel of stated calorific value.

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Regulation 7. Standard conditions.

(1) The Chief Inspector shall assign an authorised safe working pressure which shall be the manufacturer's or maker's design pressure, to any imported steam boiler or unfired pressure vessel as the case may be if such steam boiler or unfired pressure vessel satisfies the standard conditions in paragraph (2) of this regulation.

(2) The standard conditions in respect of any imported steam boiler and imported unfired pressure vessel shall be as follows:

- (i) it shall not have been in previous use or suffered deterioration from any cause;
- (ii) all the materials used in the construction shall, in respect of chemical composition, quality, process of manufacture, number and nature of tests, inspections and manufacturer's certificate, comply with the provisions of one of the codes, rules or specifications set out in the First Schedule to these regulations;
- (iii) in respect of design, method of construction workmanship and tests it shall comply with the provisions of one of the codes, rules or specifications set out in the Second or Third Schedule to these regulations as may be appropriate;
- (iv) during the period of construction it shall have been under the supervision of an authorised member of the Inspecting Authorities set out in the Fourth Schedule to these regulations; and
- (v) it shall be provided with fittings in accordance with the provisions of these regulations.

(3) A certificate from the Inspecting Authority substantially in the form shown in the Fifth Schedule to these regulations declaring that the provisions of sub-paragraphs (ii), (iii) and (iv) of paragraph (2) of this regulation have been satisfied shall be accepted by the Chief Inspector as satisfactory evidence thereof.

(4) Notwithstanding the provisions of this regulation, if, in respect of an imported unfired pressure vessel, the product of the internal diameter in inches and the design pressure in pounds per square inch of which is three thousand or less-

- (i) the provisions of sub-paragraph (iv) of paragraph (2) of this regulation shall not apply; and
- (ii) in lieu of the certificate prescribed in paragraph (3) of this regulation, a suitable certificate from the manufacturer or maker of the unfired pressure vessel shall be accepted.

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Regulation 8. Variation from the standard conditions.

Where any steam boiler or unfired pressure vessel imported into the Federation after the coming into force of these regulations does not comply with the standard conditions provided under regulation 7 the Chief Inspector shall assign an authorised safe working pressure thereto which shall be less than the manufacturer's or maker's design pressure by an amount which he, in his discretion, may deem appropriate in the circumstances.

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Regulation 9. Chief Inspector may refuse to assign a working pressure.

Notwithstanding the provisions of these regulations the Chief Inspector may refuse to assign an authorised safe working pressure to an imported steam boiler or unfired pressure vessel-

- (i) where he is not satisfied that any welded joint thereof is of a type that is suitable for the purpose;
- (ii) which is fabricated wholly or partially by welding and for which proof of inspection by an Inspecting Authority during construction is prescribed and there is no such proof;
- (iii) where he is not satisfied that there are sufficient handholes or sightholes for cleaning and inspection purposes;
- (iv) the fittings of which do not comply with these regulations; or
- (v) which is not elliptical cross section.

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PART II - STEAM BOILERS

Regulation 10. Essential fittings.

(1) Every steam boiler shall be provided with-

(i) two or more safety valves, at least one of which shall be of the direct spring-loaded type:

Provided that any steam boiler having a heating surface of one hundred square feet or less may have only one safety valve, in which case it shall be of the direct spring-loaded type;

(ii) two water gauges:

Provided that any steam boiler having an evaporative capacity of less than three hundred pounds of steam per hour from and at two hundred and twelve degrees Fahrenheit may have only one water gauge, in which case not less than two suitable test cocks shall be fitted in place of the second water gauge;

(iii) a steam pressure gauge;

(iv) a blown down valve or cock;

(v) two feed pumps or alternatively one feed pump and one injector:

Provided that any steam boiler having a heating surface of one hundred and fifty square feet or less or any steam boiler fitted with automatic controls which "fail to safety" may be fitted with one feed pump;

Provided further that where two or more steam boilers are coupled together the number of feed pumps or injectors required shall be as approved by the Chief Inspector;

(vi) a main steam stop valve;

(vii) a feed check valve;

(viii) an Inspector's test pressure gauge attachment;

(ix) a fusible plug in each furnace or combustion chamber:

Provided that any steam boiler fired with liquid or gaseous fuel shall not be required to have a fusible plug;

(x) a low-water alarm; except that a low water alarm shall not be required for any steam boiler which is fired with-

(a) solid fuel and generation steam at a pressure of 250 pounds per square inch or less; or

(b) liquid or gaseous fuel and fitted with a low water fuel cut-out.

(xi) a low-water fuel cut-out where such steam boiler is fired with liquid or gaseous fuel;

(xii) the manufacturer's or maker's name plate; and

(xiii) a registration plate.

(2) This regulation shall not apply to any economiser or any superheater.

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Regulation 11. Fittings-general provisions.

(1) All fittings for steam boilers shall comply with the following general provisions:

(i) cast iron shall not be used for-

(a) any fitting for service at a temperature greater than four hundred degrees Fahrenheit or at a steam pressure greater than one hundred and fifty pounds per square inch; or

(b) any blow-down fitting; or

(c) any feed valve or scum valve directly attached to the steam boiler shell for service at a pressure greater than one hundred and fifty pounds per square inch;

(ii) bronze or gun-metal shall not be used for any fitting for service at a temperature greater than four hundred and thirty-five degrees Fahrenheit;

(iii) the seat and valve head of every valve shall be made of metal resistant to corrosion and no such seat shall be made of cast iron;

(iv) every valve of one and one-half inch bore and over directly fitted to a steam boiler shell and every valve of two and one-half inch bore and over shall have its cover secured by bolts or studs;

(v) every screw-down valve fitted with a screwed cover and directly connected to a steam boiler shall be provided with a suitable cover locking device;

(vi) every valve for use with super-heated steam and valve of two and one-half inch bore and over and every valve of one and one-half inch bore and over directly connected to the steam boiler shell shall have an externally screwed spindle;

(vii) every valve having a separate valve seat shall have the same effectively secured;

(viii) every cock of one inch bore and over shall be packed with heat resisting material and shall have special provision, other than the gland, for securing the plug;

(ix) the body of every fitting shall have been satisfactorily hydrostatically tested at the manufacturer's or maker's works to a pressure not less than twice its design pressure; and after assembly every fitting shall be satisfactorily hydrostatically tested to a pressure not less than one and one-half times its design pressure;

(x) every fitting shall be secured to the steam boiler directly or indirectly, by a flanged joint:

Provided that a screwed connection not greater than one inch nominal bore may be provided for any steam boiler having a design pressure of one hundred and thirty pounds per square inch or less, the screwed part of such fitting being an integral part thereof. In such case not less than four full threads shall be engaged and where practicable a back nut shall be fitted. Where the shell thickness is insufficient for this purpose a suitable pad shall be provided.

(2) Where not otherwise provided in these regulations every steam boiler fitting shall be in accordance with the provision of British Standard Specification No. 759-Valves and Gauges for Land Boiler Installations.

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Regulation 12. Safety valves.

(1) Every safety valve fitted to a steam boiler shall-

(i) be so constructed and adjusted that it will open when the authorised safe working pressure of such steam boiler is reached. The area of such valve or valves shall be sufficient to ensure that the maximum peak load evaporation of the steam boiler is completely discharged with a rise in pressure of not more than ten per centum of such authorised safe working pressure:

Provided that an Inspector may in his discretion permit any safety valve to be adjusted so as to open at a pressure greater than the authorised safe working pressure by an amount not greater than five per centum thereof;

(ii) have a diameter of not less than-

(a) three quarters of one inch if the heating surface is thirty square feet or less, or

(b) one inch if the heating surface is greater than thirty square feet;

(iii) be so constructed that breakage of any part will not obstruct the free and full discharge of steam from the steam boiler;

(iv) have the lid and spindle effectively guided and means provided to prevent such lid and spindle lifting out of the guide;

(v) have no stuffing box fitted to the spindle;

(vi) in the case of the lever type safety valve, have either the pin or the bush of every bearing thereof made of a non-ferrous or corrosion resistant metal;

(vii) be fitted with a spring which shall be so constructed that-

(a) the unloaded length thereof shall not be greater than four times its external diameter;

(b) in the case of a compression spring the compression required to load the valve to the authorised safe working pressure of the steam boiler to which it is fitted shall not be less than one-quarter of the diameter of the valve, and the distance between the coils of such loaded spring when the valve is lifted one-quarter of its diameter shall not be less than one-sixteenth of an inch; or

(c) in the case of a tension spring the extension required to load the valve to the authorised safe working pressure of the steam boiler to which it is fitted shall not be less than one-quarter of the diameter of the valve, and provision shall be

made to prevent the extension of the spring beyond the amount corresponding to a valve lift of one-quarter of the diameter of the valve;

(viii) be mounted as close as practicable to the steam boiler shell and in a position where the steam shall have direct access to such safety valve without passing through any valve cock or internal pipe;

(ix) have its axis vertical;

(x) be provided with a device whereby the adjustment of the valve may be locked or sealed so that it is not possible to alter the setting of the valve except by unlocking or breaking the seal;

(xi) be so arranged that the valve can be lifted off its seat when under pressure by easing gear from a safe and convenient position; and

(xii) be clearly marked with the manufacturer's or maker's name, the diameter and designed lift in inches and the pressure to which the valve has been set.

(2) All the safety valves fitted to a steam boiler may be located in one chest but such chest shall be separate from any other valve chest or steam connection:

Provided that where the cylinder casting of an overhead engine is mounted directly on the steam boiler shell, such safety valve may be fitted to the cylinder casting.

(3) Every safety valve chest shall-

(i) be connected to the seating pad on the steam boiler by a strong branch, the passage through which shall have a cross-sectional area not less than the aggregate area of the safety valves;

(ii) where a waste steam pipe is fitted thereto, have the cross-sectional area of such pipe not less than the aggregate area of the safety valves:

Provided that where safety valves of the full-lift type are fitted, the area of such waste steam pipe shall be twice the aggregate area of such valves; and

(iii) be provided with means of drainage that cannot be closed.

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Regulation 13. Water gauges.

(1) Every water gauge fitted to a steam boiler shall-

(i) where practicable be fitted to the steam boiler end plate or shell. Where this is not practicable it shall be mounted on a column and there shall be no connecting passage between the top and bottom arms of such column unless valves or cocks are fitted as close as practicable to the steam boiler between such column and the steam boiler. Where the column is connected to the steam boiler by pipes there shall be no pocket or bend between the upper arm of the column and the steam boiler where water may accumulate and there shall be no outlet connections attached to such pipes except for damper regulators, feedwater regulators, drains, pressure gauges or apparatus of such nature as does not permit the escape of an appreciable amount of steam or water therefrom;

(ii) be so mounted that the lowest visible part of the gauge glass shall not be lower than the lowest safe working level;

(iii) be so arranged that the water level is visible from the firing floor and where necessary suitable means of illumination shall be provided for this purpose;

(iv) be fitted with cleaning plugs;

(v) if of the tubular type, be fitted with a glass having an external diameter not less than one-half of one inch and not more than three-quarters of one inch;

(vi) if of the tubular type, be provided with a substantial protector of toughened or splinter proof glass:

Provided that a slotted metal protector may be fitted to a small portable steam boiler except that no protector shall obstruct the reading of the gauge;

(vii) be fitted with a drain cock with a suitable discharge pipe. Such pipe shall be adequately supported and shall lead the discharge clear of any place where it would be likely to cause bodily injury to any person and where practicable the point of discharge shall be visible;

(viii) be fitted with a self-closing device in the bottom arm; and

(xi) be fitted with cocks which shall-

(a) be accessible from positions free from danger in the event of the gauge glass breaking;

(b) where directly operated have their handles arranged to lie parallel to the longitudinal centre line of the gauge when the cocks are in their normal working

positions. Where any cock handle is detachable the shank of the cock shall be marked to show the position of the port in the plug and arrangements shall be made to prevent such handle being incorrectly fitted;

(c) where integral with the water gauge, have the plug thereof held in place by a guard or gland; and

(d) where working at a pressure of one hundred pounds per square inch or over have the bodies thereof packed with heat resisting material.

(2) Notwithstanding the provisions of paragraph (1) of this regulation a globe-type screw down valve may be fitted to any water gauge mounted on a high duty steam boiler installed in a thermal power station.

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Regulation 14. Pressure gauge.

(1) Every pressure gauge fitted to a steam boiler shall-

(i) be connected to such steam boiler above the highest water level thereof with the dial of the gauge in the vertical plane so that it can be read from the firing position;

(ii) be provided with a syphon pipe and a cock integral with, or adjacent to, the gauge, so that the gauge may be shut off and removed while the steam boiler is under steam. The handle of such cock shall be parallel to the pipe to which it is connected when the cock is in the opening position and the shank thereof shall be marked to show the position of the port of the plug; and

(iii) have a dial which shall-

(a) not be less than six inches in diameter; and

(b) be graduated from zero to not less than one and one-third times and not more than twice the authorised safe working pressure of the steam boiler to which it is fitted; and

(c) have marked upon it in red the authorised safe working pressure of the steam boiler to which it is fitted;

(iv) be provided with a single stop pin at the zero graduation; and

(v) accurately show the pressure within a tolerance of plus or minus two per centum of the authorised safe working pressure of the steam boiler to which it is fitted.

(2) Notwithstanding the provisions of paragraph (1) of this regulation a globe-type screw-down valve may be fitted to the pressure gauge of a high-duty steam boiler installed in a thermal power station.

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Regulation 15. Blow-down valves and cocks.

- (1) Every blow-down valve or cock fitted to a steam boiler shall-
- (i) have a bore not less than one inch in diameter; and
 - (ii) be fitted with a device which shall indicate clearly the open and close positions.
- (2) Every blow-down cock shall be of the bolted cover or double gland type.
- (3) Every blow-down valve or cock fitted to a shell-type steam boiler shall be attached direct to the steam boiler shell as near as practicable to the lowest part thereof;

Provided that in the case of a horizontal cylindrical steam boiler it may be attached to a cast steel tapered elbow of substantial construction and adequate cross-section.

- (4) Where the blow-down pipes of two or more steam boilers are led into a common main, an isolating valve of the screw down non-return type shall be fitted between the blow-down valve or cock on every steam boiler and the common main. In such case only one operating key shall be provided for the blow-down valve or cocks.

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Regulation 16. Main stop valve.

(1) Every steam boiler main stop valve shall be fitted direct to its pad on the steam boiler shell except where a superheater forms an integral part of the steam boiler or where for the purpose of drainage it is necessary to interpose a stand pipe between the pad and the stop valve, in which case such stand pipe shall have a height not greater than five times its diameter.

(2) Where two or more steam boilers are connected to a common steam pipe every main stop valve shall be of the non-return or self-closing type unless a self-closing valve is interposed between each main stop valve and such common steam pipe.

(3) Every main stop valve shall bear the manufacturer's or maker's name, its design pressure and indicate the directions of flow and closing of the hand wheel.

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Regulation 17. Fusible plug.

Every fusible plug fitted to a steam boiler shall-

(i) be of such height and so located as to give early protection to every part of the steam boiler liable to damage by direct application of furnace heat in the event of shortage of water;

(ii) have a separate outer body of bronze or gunmetal with a central conical passage the least diameter of which shall not be greater than three-eighths of one inch:

Provided that for pressures of one hundred pounds per square inch or under such diameter may be one-half of one inch; and

(iii) have such passage closed by a plug secured by an annular lining of fusible alloy so arranged that such plug will drop clear when the lining melts. Such fusible alloy shall melt readily at a temperature not more than one hundred and fifty degrees Fahrenheit greater than the saturated steam temperature corresponding to the authorised safe working pressure of the steam boiler.

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Regulation 18. Feed check valve.

(1) Every steam boiler feed check valve shall be of the non-return regulating screw down type:

Provided that a non-return valve and a regulating screw down valve may be fitted separately instead of combined valve.

(2) Every feed regulating valve shall be fitted direct to the boiler shell or to a pad attached thereto.

(3) The discharge from the feed valve or from the internal feed pipe, where provided, shall be above low water level and clear of any riveted joint or of any surface which is exposed to direct radiation.

(4) Every feed valve shall be arranged so as to be operated satisfactorily from the firing floor or other convenient position.

(5) Where two means of supplying feed water to a steam boiler are provided, one check valve only may be fitted.

(6) Where two or more steam boilers are supplied from a common feed delivery pipe, an isolating valve shall be provided on the branch pipe to every steam boiler between the check valve and the source of supply.

(7) Where a steam boiler is supplied by a feed pump of the reciprocating type a suitable relief valve shall be fitted between the check valve and the pump.

(8) Every feed regulating valve and every combined regulating non-return feed valve shall be clearly marked with the direction of hand-wheel closure.

(9) Every non-return feed valve shall be clearly marked with the direction of flow.

(10) Every feed valve shall bear the manufacturer's or maker's name and design pressure.

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Regulation 19. Low-water fuel cut-out.

- (1) Every steam boiler low-water fuel cut-out shall be connected to the burner control system so that when the water falls below its safe working level such burner shall be shut down pending manual resetting.
- (2) Every low-water cut-out shall be so constructed as to be readily blown down, cleaned, inspected and tested.
- (3) The internal parts of every low-water cut-out shall be made of material resistant to corrosion.

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Regulation 20. Low-water alarm.

Every low-water alarm fitted to a steam boiler shall-

- (i) be so constructed that it may be adjusted after fitting; and
- (ii) be adjusted so that the alarm is sounded when the water level is visible in the gauge glass.

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Regulation 21. Inspector's test attachment.

(1) The attachment for an Inspector's test pressure gauge shall consist of a suitable valve or cock carrying in a vertical position a receiving socket fitted with a removable plug or cap.

(2) Except where such valve or cock is located in the pressure gauge connection it shall be mounted on the top of the steam boiler shell near the pressure gauge.

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Regulation 22. Nameplate.

Every steam boiler nameplate shall be located in a conspicuous position and have legibly and permanently marked thereon-

- (i) the manufacturer or maker's name and address;
- (ii) the manufacturer's or maker's serial number;
- (iii) the manufacturer's or maker's design pressure;
- (iv) the code, specification or rule to which the steam boiler is designed;
- (v) the hydrostatic test pressure; and
- (vi) the date of hydrostatic test.

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Regulation 23. Manhole door.

No manhole, handhole or sighthole door of any steam boiler shall be made of cast iron. The spigot part of any such door shall be maintained with a clearance not greater than one-sixteenth of an inch all round. Round sectioned packing shall not be used for the joint of any such door.

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Regulation 24. Superheaters.

(1) Any superheater fitted to a steam boiler shall comply in respect of design, materials, method of construction, workmanship and tests with the appropriate provisions of one of the codes, rules or specifications in the First, Second or Third Schedules to these regulations.

(2) Where any superheater can be isolated from its associated steam boiler a separate safety valve shall be provided which shall comply so far as it practicable with the provisions of regulation 12 relating to steam boiler safety valves.

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Regulation 25. Economiser fittings.

(1) Every non-steaming economiser shall be provided with-

- (i) an isolating valve and a non-return valve fitted between the economiser water outlet and its associated steam boiler;
- (ii) at least one safety valve having a diameter not less than two inches. Where such economiser is arranged in two or more sections and fitted with circulating devices at least one such safety valve shall be fitted in each section;
- (iii) a thermometer or other temperature indicating device at both the water inlet and outlet connections, so located as to be easily accessible and visible;
- (iv) a suitable pressure gauge, preferably located on the inlet manifold;
- (v) means for the release of any air which may accumulate therein;
- (vi) means for completely draining the water;
- (vii) where provided with means for heating the incoming feed water by mixing it with hot water from the economiser outlet, a non-return valve fitted in the hot water return line; and
- (viii) an alternative means of feeding the steam boiler, other than through such economiser.

(2) All economiser valves and fittings shall comply with the provisions of these regulations relating to steam boiler fittings which are appropriate.

(3) Every economiser shall be provided with a by-pass flue fitted with isolating dampers so that the flow of gases over the economiser may be cut off when necessary. The operating gear for such dampers shall be readily accessible and means shall be provided to indicate clearly the open and closed positions.

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Regulation 26. Foundations.

- (1) Where it is necessary to construct a concrete raft to support a steam boiler the thickness of such raft shall not be less than twelve inches and where the bearing capacity of the substrata is less than two tons per square foot adequate suitable reinforcement shall be provided.
- (2) Any raft supporting an economiser shall be constructed adjacent to but independent of the raft for its associated steam boiler and with suitable provision for expansion.
- (3) Any shims used to support a vertical steam boiler shall be of iron or steel and shall be securely grouted or otherwise fixed in position.
- (4) Every horizontal shell type steam boiler shall be so supported that the transverse centre line is horizontal, and so that such boiler is self-draining.
- (5) Every wet-bottom steam boiler shall be so installed that there is a clear space not less than twelve inches between it and the floor.
- (6) Every vertical steam boiler shall be installed on a plinth or over a pit so that there is a distance of not less than fourteen inches between the foundation ring of such boiler and the firing floor or the pit floor respectively, for access to the furnace.

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Regulation 27. Brickwork settings.

(1) The brickwork setting of every shell type steam boiler and economiser shall comply in respect of the materials used in its construction with the requirements of British Standard Specification No. 1614 - Brickwork settings for cylindrical boilers.

(2) Every such setting shall have at least one access door of area not less than one hundred and ninety-two square inches and the minimum dimension of which in any direction is not less than eleven inches.

(3) Every flue in any steam boiler setting shall be large enough to permit a man to pass through.

(4) Means shall be provided to prevent the accumulation of water between any steam boiler shell and its seating blocks.

(5) Every riveted joint shall so far as practicable be kept clear of any brickwork.

(6) Where a blow-down recess is provided it shall be of sufficient size to accommodate the blow-down connections and permit necessary maintenance.

(7) Where a number of steam boilers are connected to a common flue system, means shall be provided to isolate any steam boiler for cleaning or repair.

(8) The flues of a steam boiler fired by oil or pulverised fuel shall not be connected to the same chimney as the flues of a steam boiler fired by solid fuel except with the written permission of the Chief Inspector.

(9) Where the setting of a steam boiler is provided with an explosion relief door such door shall be of the outward opening hinged gravity closing type without catch or other fastening device and if located in the setting within a distance of seven feet of the firing floor or operating platform, it shall be provided with substantial deflectors to divert the blast.

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Regulation 28. Dampers.

(1) No damper which may entirely close a flue or uptake shall be fitted to any steam boiler fired by oil or pulverised fuel unless such damper is interlocked with the burners so that they cannot function when the damper is closed.

(2) Where the provisions of paragraph (1) of this regulation are not satisfied means shall be provided to prevent the damper closing more than ninety *per centum* of the area of the flue or uptake.

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Regulation 29. Chimneys.

- (1) Every steam boiler chimney made of mild steel which is fitted directly above the uptake or smoke-box shall be provided with a suitable cowl to prevent entry of rain.

- (2) Every chimney shall be provided to the satisfaction of an Inspector with facilities for cleaning and repair.

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Regulation 30. Lagging.

The lagging of any steam boiler shall be of a non-heat conducting material which will allow the existence of a leak to be detected. Building or fire bricks shall not be used for lagging.

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Regulation 31. Access.

(1) Where the distance from the floor to the top of a steam boiler or steam boiler setting is eight feet or more, a permanent stairway or an inclined or vertical ladder at least eighteen inches wide, shall be provided to give safe access to the steam boiler top. Where three or more steam boilers are operated in battery, two means of access remote from each other shall be provided.

(2) A permanent platform with standard toe-board and fencing shall be provided-

(i) to give access to a steam boiler main stop valve except where the top of the steam boiler setting is flat and without obstruction;

(ii) to give access to both ends of any steam drum of a water-tube steam boiler; and

(iii) to give access to the water gauges mounted on a steam boiler.

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Regulation 32. Boiler to be under cover.

Every stationary steam boiler shall be housed under adequate and permanent cover unless specially designed to operate under outdoor conditions.

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Regulation 33. Boiler houses.

(1) Every steam boiler house shall be of sufficient size to permit-

(i) the safe and efficient working and maintenance of the steam boiler;

(ii) ample space between the steam boiler and any other steam boiler, machinery, wall or column, for inspection and repairs (including the removal of any tubes):

Provided that in the case of a vertical steam boiler there shall be a clear height not less than three feet between the top of the steam boiler and the roof and in the case of any other type of steam boiler there shall be a clear height not less than seven feet between any platform or the top of any setting and the roof, as the case may be.

(2) The floor of every steam boiler house shall be kept at all times free of water and oil.

(3) Every part of any steam boiler house in the vicinity of any oil burning equipment shall be impervious to oil and so graded as to prevent the accumulation of oil.

(4) Spaces at the top and sides of any steam boiler shall not be used for storage purposes, neither shall any combustible material other than material used for firing any steam boiler be stored or allowed to accumulate near it.

(5) The door of any boiler house shall not open inwards.

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Regulation 34. Oil burning equipment.

The oil burning equipment of every oil fired steam boiler or of any steam boiler converted to burn fuel oil after the coming into force of these regulations shall comply with the provisions of regulations 35 and 36 as are appropriate and with the provisions following:

(i) no part thereof which comes into contact with fuel oil shall be made of lead, zinc, galvanised metal or yellow brass;

(ii) galvanised pipes and pipe fittings shall not be used;

(iii) every pipe joint shall be either flanged or welded:

Provided that any such joint for service at a pressure of one hundred pounds per square inch or less may comprise an all metal union;

(iv) where any joint is flanged the pipes shall be either welded to or screwed and expanded into the flanges. Every flange shall be machined on the face and have a metallic or other suitable joint. Red lead and boiled oil shall not be used for jointing material;

(v) no running point, long screw or connector shall be used in any oil pipe, nor shall any such pipe be buried in earth or concrete;

(vi) a flange and spindle packing shall be of graphite asbestos compound or equivalent material;

(vii) means shall be provided to ensure that the supply of oil to any burner is cut off before such burner can be uncoupled and that such supply cannot be resumed until the burner has been correctly recoupled;

(viii) means shall be provided to ensure that any needle valve cannot be removed from any burner while it is in operation;

(ix) any air register shall, so far as practicable, be arranged to close against the pressure caused by an explosion or blow-back in the furnace;

(x) means shall, so far as practicable, be provided for the absorption or drainage and disposal of any oil that may fall on the furnace bottom of the steam boiler;

(xi) where a lighting-up torch of the oil-soaked type is used it shall consist of a substantial metal rod with a suitable hand grip having the absorbent material securely fixed to the rod and it shall be provided with a dip-pot fastened to the furnace front in a convenient position;

(xii) an Inspector may require that a tray, save-all or gutter shall be provided under any pump, filter and heater and at every furnace front.

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Regulation 35. Hand controlled burner system.

Every hand-controlled burner system fitted to a steam boiler shall be provided-

- (i) with a stop valve, independent of the burner control valve, fitted as close to the burner as practicable;
- (ii) with means for regulating the supply of air to the combustion chamber;
- (iii) with means for regulating by hand the supply of oil to the burner;
- (iv) where an electric motor is used to drive any oil pump, fan or compressor supplying oil or air to the combustion chamber, with:
 - (a) no-volt protection on the starter of such motor; and
 - (b) a device which automatically cuts off the supply of oil to the burner when the electricity supply fails and does not permit such supply to be resumed until the device is re-set manually.

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Regulation 36. Semi-automatic burner system.

(1) For the purposes of this regulation a semi-automatic burner system is one in which the supply of oil to the burner is regulated by an automatic device within predetermined limits but the burner is ignited and the plant shut down by hand.

(2) Every semi-automatic burner system fitted to steam boiler shall comply with the provisions following:

(i) the automatic device shall so regulate the supply of oil to the burner that the pressure generated in the steam boiler shall not be greater than its authorised safe working pressure;

(ii) there shall be provided, either as a separate control or incorporated in the automatic device a mechanism to cut off the supply of oil when the authorised safe working pressure of the steam boiler is reached or exceeded. Such mechanism shall prevent the further supply of oil to the burner until it has been re-set manually;

(iii) where there is more than one burner in any combustion chamber the automatic controls shall operate on all burners;

(iv) means shall be provided to cut off automatically the supply of oil to the burner within a period of sixty seconds from the failure of the flame thereof. Such means shall indicate visually that the control is working:

Provided that this provision shall not apply to the oil burning equipment of a steam boiler installed in a thermal power station operated by an electricity undertaking engaged in the generation and distribution to the public of electricity energy;

(v) no light-operated flame failure device shall be prevented from functioning by illumination from any source other than the flame of the burner it controls.

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Regulation 37. Fully automatic burner system.

(1) For the purposes of this regulation a fully automatic burner system is one in which, while the electricity supply is switched on, an electrically operated burner starts up, continues in operation at a preset oil consumption or by flame modulation until the heat demand is satisfied, and then shuts down.

(2) Energy fully automatic burner system fitted to a steam boiler shall comply with the provisions following:

(i) means shall be provided to ignite the oil immediately it enters the combustion chamber;

(ii) an automatic device shall be provided to cut off the supply of oil to the burner within a period of sixty seconds of the oil entering the combustion chamber if it fails to ignite and to prevent resumption of the supply until the device is re-set manually;

(iii) means shall be provided to cut off the supply of oil to the burner whenever it is idle or stopped for any cause whatever;

(iv) means shall be provided to cut off automatically the supply of oil to the burner within a period of thirty seconds from any failure of the flame thereof:

Provide that this provision shall not apply to the oil burning equipment of a steam boiler installed in a thermal power station operated by an electricity undertaking engaged in the generation and distribution to the public of electrical energy;

(v) no light-operated flame failure device shall be prevented from functioning by illumination from any source other than the flame of the burner it controls;

(vi) the automatic devices shall be coupled either electrically or mechanically or both so that-

(a) the burner will not start until the draught is established;

(b) the means of ignition is established before the oil leaves the burner;

(c) normal operation is maintained when the flame is satisfactorily established;

(d) the supply of oil to the burner is cut off if the flame is not established satisfactorily or in the event of any defect in the flame failure device;

(e) there is a time lag of not less than two minutes between the shutting down and starting up of any burner after an interruption of normal operation; and

(f) failure of the electric supply shall not prevent any of the devices from shutting down the burners.

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Regulation 38. Oil flash point.

The closed flash point of any oil fired in a steam boiler shall not be less than one hundred and fifty degrees Fahrenheit as determined by means of the Pensky Martens apparatus.

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Regulation 39. Exhibition of manufacturer's or maker's instructions.

The manufacturer's or maker's instructions for the care and maintenance of oil burning equipment shall be exhibited in a prominent place in the boiler house.

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Regulation 40. Oil fuel tanks.

(1) Every oil storage and service tank installed for the supply of oil to a steam boiler after the date of the coming into force of these regulations shall comply generally with British Standard Specifications No. 799-Oil burning equipment-or an equivalent specification in respect of materials, construction, fittings, location and installation.

(2) Every such tank from the oil is discharged by air pressure shall comply with the provisions of these regulations relating to air receivers.

(3) No service tank shall be installed in such a position that any leakage therefrom can come in contact with a hot surface.

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Regulation 41. Heating surface.

(1) For the purpose of determining the area of the safety valve and the inspection fee the heating surface of a steam boiler shall be the total surface of all plates and tubes exposed to heat on one side and in contact with water on the other, measured on the water or fire side, whichever is the greater.

(2) The heating surface of an economiser other than a steaming economiser and of a superheater shall not be included in the steam boiler heating surface for the purpose of determining the inspection fee, but shall be considered when calculating the capacity of the steam boiler safety valve.

(3) For a Lancashire or Cornish type steam boiler the total heating surface shall include the wetted surface of the furnace between the end plates, the fire surface of the cross tubes where fitted and that part of the external shell below the side flue covers. In estimating areas, any furnace shall be considered as a plain cylinder and the area of its wetted surface shall be taken as its mean external circumference multiplied by the length of the steam boiler between the end plates. For the shell, the width of the part of the circumference below the flue covers shall be taken as equivalent to twice the mean diameter of the shell and this width multiplied by the length between the end plates shall be taken as the area of the shell heating surface. Any part of the back end plate exposed to heat shall be ignored.

(4) For a water-tube steam boiler the heating surface of a steam and water drum shall be taken as half its external mean circumference multiplied by the clear length between the outer brick walls or centres of cross boxes, as the case may be. The heating surface of a tube shall be taken as its external surface between tube plates or headers. The surface of any header shall be ignored.

(5) For a marine steam boiler of the fire-tube type the heating surface shall include the wetted surface of any furnace between the tube plates (considered as for a Lancashire steam boiler), the wetted surface of any combustion chamber (less the area of the tube holes) and the wetted surface of any tubes between the tube plates. Any part of the front tube plate exposed to heat shall be ignored.

(6) For a traction (loco-portable) or a vertical steam boiler the heating surface shall include the wetted surface of the fire-box above the foundation ring (less the area of the fire-hole and ring and the tube holes) and the surface of any cross or other tube and uptake below a point half way up the gauge glass.

(7) For a locomotive type steam boiler the heating surface shall include the wetted surface of the inner fire-box plates (excluding the surface covered by the foundation and fire-hole rings, the area of the tube holes and the area within the junction of the plates in the case of a flange fire-hole) and the wetted surface of the tubes between the tube plates. The smoke-box plate shall be ignored.

(8) No deduction shall be made for the area of any stay in calculating the heating surface.

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Regulation 42. Steam tests.

(1) Every steam boiler inspected for the first time and every other steam boiler of which the authorised safe working pressure has been altered shall be tested under steaming conditions to the satisfaction of the Inspector.

(2) A steam boiler other than a water tube steam boiler shall be tested with the safety valves set at the authorised safe working pressure under full steam and firing for at least ten minutes with the feed water and the stop valve closed. Where the accumulation of pressure during such test exceeds ten per centum of the authorised safe working pressure of the steam boiler the area of the safety valves shall be considered insufficient, and a certificate of fitness for that working pressure shall not be granted.

(3) When witnessing a safety valve test an Inspector shall use the standard pressure gauge supplied for his use unless he is satisfied that the steam boiler pressure gauge is accurate.

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Regulation 43. Boiler feed water.

(1) Where in the opinion of an Inspector any steam boiler feed water is so impure as to constitute a danger, he may require samples of the water to be provided by the owner of such steam boiler for analytical purposes and the cost of any analytical test shall be borne by the owner.

(2) An Inspector may require that feed water be filtered or otherwise treated to make it suitable for use in such steam boiler.

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Regulation 44. Boiler register.

(1) The owner of every steam boiler shall keep in respect thereof a boiler register in such form as the Chief Inspector may require in which shall be entered the dates on which the steam boiler was brought into and taken out of commission, cleaned, inspected, tested or repaired with details of any alterations and repairs.

(2) Every entry in such register shall be initialled by the owner and by the person making any inspection, test or repair.

(3) Every boiler register shall be produced whenever called for by an Inspector.

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Regulation 45. Corrosive service conditions.

Where an unfired pressure vessel is to be subject to corrosive, abrasive or erosive conditions-

(i) the Chief Inspector may require that the scantlings of such vessel shall be increased by an amount which he may deem appropriate before assigning and authorised safe working pressure;

(ii) the Chief Inspector may require that a suitable lining shall be fitted to any part of such vessel as he may specify before it is placed in service; and

(iii) an Inspector may require tell-tale holes to be drilled in the walls of such unfired pressure vessel. Such holes shall be drilled to a depth not less than half the calculated wall thickness less any corrosion allowance and shall be spaced not more than two feet apart.

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Regulation 46. Doors.

Where it is necessary to load and unload an unfired pressure vessel any door fitted thereto shall-

- (i) if of the bayonet or other quick opening type, be provided with a mechanical interlock that will prevent the door from being opened until all internal pressure has been relieved;

 - (ii) if of the bolted type, be provided with a tell-tale valve in full sight of the attendant. Such tell-tale valve shall indicate by visual or other means the absence of pressure in the unfired pressure vessel.
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Regulation 47. Essential Fittings.

(1) Every steam receiver shall be provided with-

- (i) one or more safety valves;
- (ii) a pressure gauge;
- (iii) a stop valve; and
- (iv) the manufacturer's or maker's nameplate.

(2) Every air receiver shall be provided with-

- (i) one or more safety valves;
- (ii) a pressure gauge;
- (iii) a drain cock or valve; and
- (iv) the manufacturer's or maker's nameplate.

(3) Every unfired pressure vessel (other than a steam receiver or an air receiver) shall be provided with-

- (i) one or more safety valves:

Provided that a suitable rupture disc shall be provided in lieu thereof where it is impracticable to provide a safety valve because-

- (a) pressure fluctuations of an explosive character are to be encountered in the unfired pressure vessel; or
 - (b) a safety valve would be gummed up owing to the nature of the working fluid;
or
 - (c) the working fluid is of a penetrating nature and a safety valve cannot be maintained tight;
- (ii) a pressure gauge; and
 - (iii) the manufacturer's or maker's nameplate.

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Regulation 48. Safety valves.

Every safety valve fitted to an unfired pressure vessel shall:

- (i) be so designed and constructed and adjusted that it will open when the authorised safe working pressure is reached;
- (ii) have an effective valve area sufficient to ensure that under the conditions of maximum supply of the working fluid the pressure in such unfired pressure vessel shall not exceed the authorised safe working pressure assigned to such vessel by ten per centum of such safe working pressure;
- (iii) not be less than three-eighths of an inch;
- (iv) be of the direct spring loaded type with a washer or ferrule fitted under the spring adjusting screw so that the valve cannot be overloaded when under pressure;
- (v) be so constructed as to allow the valve to be eased by hand from its seat when under pressure, and of such material that it cannot seize on its seat on account of corrosion or distortion of the valve body;
- (vi) have a valve seat and valve made of non-ferrous material;
- (vii) where such unfired pressure vessel contains a viscous liquid, have a plain valve disc. No fin or web shall be in contact with such fluid and the passage to the valve disc shall be as short as practicable;
- (viii) be clearly marked with the manufacturer's or maker's name, the nominal diameter and the designed lift of calculated relieving capacity at the pressure to which the valve has been set.

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Regulation 49. Location of safety valves.

Every unfired pressure vessel safety valve shall-

(i) be mounted direct on the unfired pressure vessel:

Provided that where this is not practicable the connecting branch shall have an unobstructed cross-sectional area not less than the area of the safety valve and shall be as short as practicable:

Provided further that where an air receiver can be isolated from its protecting safety valve a suitable fusible plug, the fusible portion of which will melt at a temperature of not more than two hundred degrees Fahrenheit greater than the working temperature of the air receiver, shall be fitted to it;

(ii) where it is so located that liquid may collect above the valve, be fitted with a drain at the lowest point where such liquid can collect. Such drain shall not be less than three-sixteenths of an inch in diameter; and

(iii) have an entrance thereto clear and unobstructed by any internal pipe or baffle and so situated that the carry-over of any viscous substance cannot block it.

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Regulation 50. Discharge from safety valves.

The discharge from any safety valve or rupture disc fitted to an unfired pressure vessel which contains any poisonous, noxious or inflammable substance shall be led to a position of safety. Such discharge shall not be led to a condenser or closed receiver unless such condenser or closed receiver is itself fitted with a safety valve or rupture disc of sufficient capacity to prevent the pressure therein exceeding its authorised safe working pressure and the connections between such safety valves or rupture discs, as the case may be cannot become obstructed.

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Regulation 51. Inter-connected vessels.

Where a number of unfired pressure vessels are inter-connected by a system of piping having a cross sectional area not less than the area of safety valve required, such safety valve may be fitted to one of such vessels or fitted to the system inlet pipe, provided that it shall not be possible to isolate it from any of the vessels.

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Regulation 52. Vessels having internal coil.

Any unfired pressure vessel which is provided with an internal coil under a pressure greater than the vessel and which in the opinion of the Chief Inspector is, or is likely to be subject to corrosion, shall be provided with safety valves of sufficient capacity to relieve the discharge from such coil in case of rupture thereby preventing any danger to the vessel.

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Regulation 53. Rupture discs.

- (1) Every rupture disc fitted to an unfired pressure vessel shall be of suitable metal which-
- (i) is uniform in thickness;
 - (ii) is capable of withstanding any chemical action to which it is subjected; and
 - (iii) will undergo as little change in tensile strength as possible on account of temperature changes.
- (2) Where on any unfired pressure vessel a rupture disc only is fitted it shall be constructed to burst at the authorised safe working pressure of such vessel. Such rupture disc shall be renewed at least once in every period of two years.
- (3) Where on any unfired pressure vessel a rupture disc is fitted as additional protection therefor, it shall be constructed to burst at a pressure greater than the safety valve blowing off pressure but not greater than one and one-half times the authorised safe working pressure of the vessel.
- (4) Every rupture disc shall have particulars of its bursting pressure and temperature stamped on the flange thereof or on a metal tab permanently attached thereto.

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Regulation 54. Pressure gauge.

(1) Every pressure gauge fitted to an unfired pressure vessel shall-

(i) not be less than three inches in diameter across the dial:

Provided that where the external shell diameter of the unfired pressure vessel is less than twelve inches and the pressure in such vessel is not more than one hundred and fifty pounds per square inch, such gauge shall not be less than two inches in diameter;

(ii) be graduated from zero to not less than one and one-third times and not more than twice the authorised safe working pressure of the pressure vessel to which it is fitted;

(iii) have the authorised safe working pressure clearly marked in red on the dial;

(iv) be provided with a single stop pin at the lowest pressure reading; and

(v) accurately show the pressure within a tolerance of plus or minus two per centum of the authorised safe working pressure of the pressure vessel to which it is attached.

(2) Where a pressure gauge cock is fitted, the handle thereof shall be parallel with the bore of the cock when the cock is open.

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Regulation 55. Nameplates.

Every unfired pressure vessel nameplate shall be located in a conspicuous position and have legibly and permanently marked thereon-

- (i) the manufacturer's or maker's name and address;
- (ii) the manufacturer's or maker's serial number;
- (iii) the manufacturer's or maker's design pressure;
- (iv) code, specification and rule to which the pressure vessel is designed;
- (v) hydrostatic test pressure; and
- (vi) date of the hydrostatic test.

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Regulation 56. Drain valves.

Every drain valve or drain cock for an air receiver shall be located as near to the lowest point of the air receiver as practicable except where an internal pipe is fitted. Any such internal pipe shall be of material resistant to corrosion.

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Regulation 57. Stop valves.

- (1) Every stop valve for a steam receiver shall comply with the provisions of these regulations relating to main stop valves for steam boilers.
- (2) A stop valve or cock shall not be fitted between any unfired pressure vessel shall and its safety valve or rupture disc.
- (3) A stop valve or cock shall not be fitted between any safety valve or rupture disc and its discharge pipe.
- (4) Where a stop valve is placed in the discharge line between a compressor and an air receiver, a relief valve shall be placed between the compressor and the stop valve unless the compressor is provided with an automatic unloading device.

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Regulation 58. Pressure reducing valve.

(1) Where an unfired pressure vessel is supplied at a pressure greater than its authorised safe working pressure, a pressure reducing valve shall be fitted between the source of pressure and the unfired pressure vessel, so adjusted as to prevent the authorised safe working pressure of the vessel being exceeded.

(2) For the purpose of paragraph (1) of this regulation any set of unfired pressure vessels supplied through a single pipe may be treated as one unfired pressure vessel if the reducing valve is fitted on such single pipe.

(3) Every reducing valve shall be fitted with a suitable safety valve and a suitable pressure gauge adjacent thereto on the low pressure side.

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Regulation 59. Snifting valves.

Any unfired pressure vessel wherein may be formed a partial vacuum shall be provided with a snifting valve or other vacuum breaking device unless such vessel is constructed to withstand such vacuum.

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Regulation 60. Installation.

(1) Every stationary unfired pressure vessel shall be installed so as to give sufficient space between it and any other machinery, wall, ceiling or column, for inspection and repairs. No part thereof shall be encased in concrete or earth.

(2) Every stationary vertically mounted unfired pressure vessel shall be clear of the floor or ground by a distance not less than six inches.

(3) An air receiver shall only be mounted vertically where the lower end is dished concave to pressure so as to allow proper drainage.

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Regulation 61. Supports.

- (1) Every unfired pressure vessel shall be adequately supported so as to take the load when the vessel is under hydrostatic test.
- (2) The distance between any two supports of any horizontal unfired pressure vessel shall not be greater than sixteen feet and each support shall extend over not less than one-third of the circumference of the vessel except where authorised in writing by the Chief Inspector.
- (3) The support of any unfired pressure vessel shall be kept clear of any seam or riveted joint.
- (4) A layer of bituminous or other damp-proof protective material shall be placed between the bottom of the vessel and any masonry or similar foundation with which it is in contact.

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Regulation 62. Working test.

Every unfired pressure vessel inspected for the first time and every other unfired pressure vessel the authorised safe working pressure of which has been altered shall be tested under working conditions of maximum fluid flow to the satisfaction of an Inspector. Where the accumulation of pressure during such test exceeds ten per centum of the authorised safe working pressure of the pressure vessel the area of the safety valves shall be considered insufficient and a certificate of fitness for that working pressure shall not be granted.

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Regulation 63. Discharge of contents.

Where in any process it is necessary to discharge to atmosphere the contents of an unfired pressure vessel, provision shall be made to lead such discharge to a position of safety.

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Regulation 64. Cubic capacity.

For the purpose of determining the inspection fee of an unfired pressure vessel an Inspector shall accept the cubic capacity stated on the manufacturer's or maker's name plate:

Provided that where the cubic capacity of the vessel is not stated thereon the Inspector shall determine the cubic capacity by measurement and calculation.

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Regulation 65. Coupled boilers and pressure vessels.

(1) Where two or more steam boilers or unfired pressure vessels having differing authorised safe working pressures are coupled together, such steam boilers or unfired pressure vessels shall not be operated at a pressure greater than that of the steam boiler or unfired pressure vessel having the lowest authorised safe working pressure:

Provided that each such steam boiler or unfired pressure vessel may be operated at its own authorised working pressure where suitable pressure reducing valves are fitted to the system to the satisfaction of an Inspector to ensure that no steam boiler or unfired pressure vessel can be subjected to a pressure greater than its authorised safe working pressure.

(2) Every reducing valve shall be fitted with a suitable safety valve and a suitable pressure gauge adjacent thereto on the low pressure side.

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Regulation 66. Piping connection.

No owner or other person shall connect any steam, feed water or other piping to any new steam boiler or unfired pressure vessel or alter the arrangement of piping on an existing steam boiler or unfired pressure vessel without the approval of an Inspector. Before giving such approval the Inspector may require to be submitted to him a drawing to a suitable scale showing the proposed arrangement and description of piping.

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Regulation 67. Pipes and pipe fittings for steam or feed water.

(1) Every ferrous and non-ferrous pipe, bend, elbow, tee and special for use under steam or feed water pressure shall comply in respect of material, mode of manufacture, dimensions, hydrostatic and other tests, method of securing and type of flange and maximum safe working pressure with the appropriate provisions of British Standard Specification No. 806-Ferrous pipes and piping installations-or No. 1306- Non-ferrous pipes and piping installations.

(2) The limits within which any such pipe, bend, elbow, tee and special are to be used shall be in accordance with the table following:

TABLE
 MAXIMUM DESIGN PRESSURES AND TEMPERATURES

<i>Material and form</i>	<i>Method of manufacture</i>	<i>Maximum design pressure in pounds per square inch</i>	<i>Maximum design temperature in degrees Fahrenheit</i>	<i>Remarks</i>
Carbon Steel ..	Cold drawn seamless	No restriction ..	900	Class A
	Hot finished seamless	900	Class B
	Hydraulic lapwelded	900	Class C
Carbon Steel ..	Hot finished seamless	300	500	Class D
	Roll lapwelded	300	500	Class E
	Buttwelded	300	500	Class F
Carbon Steel ..	Cast	No restriction ..	900	
Cast iron	Cast	Blow down 150 ..	400	elbow, tee or special only
		Steam 150	400	
		Feed 200	400	
Bronze or gunmetal	Cast	Steam 250	405	elbow, tee or special only
		Feed 350	300	
Copper	Solid drawn ..	Up to and including 5 inches diameter for steam 250	405	Straights and bends
		Above 5 inches up to and including 8	405	

inches diameter for
steam 175

300

Up to and
including 8 inches
diameter for
feed 300

NOTE-Class of manufacture A to F means class of manufacture as set out in British Standard specification No. 806-Ferrous pipes and piping installations.

(3) A screwed and socketed joint may be used for any steam pipe, bend or fitting if such pipe, bend or fitting is made of steel or wrought iron for service at a temperature not greater than five hundred degrees Fahrenheit and at a pressure within the following limits:

Nominal bore in inches	Maximum design pressure in pounds per square inch
1" diameter and under	175
1 1/2" ,, ,,	150
3" ,, ,,	125
4" ,, ,,	100

(4) Every copper pipe and bend for steam or feed water service shall be carefully annealed before fitting and thereafter at intervals of not more than four years of working life.

(5) Piping for service with an unfired pressure vessel not under steam pressure shall comply generally with the provisions of this regulation in respect of piping under steam pressure:

Provided that an Inspector may, in his discretion, and in consideration of the service conditions, allow the limits of pressure, temperature, type of joint and size prescribed in this regulation to be exceeded by an amount not greater than fifty per centum thereof.

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Regulation 68. Pipe Installation.

- (1) Every pipe connected to a steam boiler or an unfired pressure vessel shall be adequately supported. Supports shall maintain proper alignment of the pipe-line, withstand vibration and, with the exception of anchor supports, permit free movement for expansion and contraction.
- (2) Provision shall be made to accommodate pipeline expansion and contraction so far as practicable other than by the use of special expansion bends or glands.
- (3) Where special expansion bends or glands are used effective measures shall be taken to anchor the pipes between such bends or glands and correctly distribute the expansion between each bend or gland.
- (4) Every expansion gland shall be provided with an adequate number of safety bolts.
- (5) No expansion gland shall be used with superheated steam.
- (6) Every pipe support or hanger shall so far as practicable be arranged adjacent to a pipe joint.
- (7) Timber shall not be used for pipe anchors.

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Regulation 69. Steam pipe drainage.

(1) Every steam pipeline shall be provided with suitable means of drainage so arranged that the entire line and any portion thereof, which it is possible to isolate, can be freed of water when the line is in use or when the line is isolated from the steam boiler and there is no pressure on the line.

(2) Every steam pipeline shall, so far as practicable, be graded so that all water that may be formed in the pipeline will gravitate to the drainage point, in the direction of flow of the steam.

(3) Where it is not practicable to comply with paragraph (2) of this regulation at any point where water can collect under working conditions, the drainage point shall consist of a drain pocket or a separator which is itself drained by a steam trap with a bye-pass connection.

(4) A hand-operated drain valve or cock shall be fitted to the lowest point of each section of every steam pipeline for the purpose of draining such section when it is not in use or during any warming-up period. For the purpose of this paragraph a section is that portion of the pipeline between two shut-offs.

(5) Every steam trap, drain cock and valve shall be provided with a discharge pipe which will convey the condensate to such a position that it may be discharged with safety. The discharge pipe shall not be connected to any sump or hotwell in such a manner that the end of the pipe may become submerged in water. So far as is practicable and consistent with safety, the discharge end of any pipe connected to any hand-operated drain valve or cock shall be visible.

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Regulation 70. Boiler blow-down.

- (1) Every steam boiler blow-down and scum pipe shall have a continuous fall from the valve to the point of discharge.
- (2) The discharge outlet of every steam boiler blow-down pipe shall be either visible to the operator of the blow-down valve or led into a sump so arranged that there is no danger of injury to any person.
- (3) No blow-down pipe shall be bound fast in earth, concrete or brickwork.

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Regulation 71. Feed delivery pipe.

Means shall be provided to absorb the expansion and contraction of any steam boiler feed delivery pipe without undue stressing thereof. Where necessary means shall be provided to support the weight of the pipe and to restrict any vibration.

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Regulation 72. Hydrostatic tests.

(1) Every steam boiler and unfired pressure vessel shall, before being put into service for the first time, be subjected to a hydrostatic test-

(a) of twice the authorised safe working pressure where such pressure is not more than one hundred pounds per square inch; and

(b) of one and a half times the authorised safe working pressure plus fifty pounds where such pressure exceeds one hundred pounds per square inch:

Provided that where any steam boiler or unfired pressure vessel complies with the standard conditions in regulation 7 or where there is evidence that it has been satisfactorily tested hydrostatically at the manufacturer's or maker's works in accordance with the above, the Inspector may in his discretion carry out a hydrostatic test to one and one-half times the authorised safe working pressure only.

(2) Such steam boiler or unfired pressure vessel shall withstand satisfactorily such hydrostatic pressure without appreciable leakage or undue deflection or distortion of its parts for at least twenty consecutive minutes.

(3) After any repair affecting the strength of any steam boiler or unfired pressure vessel, the Inspector may require it to be tested hydrostatically to one and one-half times the authorised safe working pressure.

(4) Every steam boiler shall be tested hydrostatically at intervals not exceeding seven years.

Provided that where any steam boiler by reason of its construction, cannot be inspected thoroughly internally, an Inspector may require such steam boiler to be tested hydrostatically after any regular inspection.

(5) Where by reason of its construction an unfired pressure vessel cannot be inspected thoroughly internally, an Inspector may require such unfired pressure vessel to be tested hydrostatically after any regular inspection.

(6) Where in the opinion of the Inspector the hydrostatic test of any steam boiler or unfired pressure vessel is not satisfactory the authorised safe working pressure of such steam boiler or unfired pressure vessel shall be reduced by an amount which the Chief Inspector may deem to be appropriate:

Provided that where the owner of such steam boiler or unfired pressure vessel makes such alterations thereto as will enable it to withstand to the satisfaction of the Inspector a further hydrostatic test the authorised safe working pressure may be retained.

(7) During a hydrostatic test of any steam boiler or unfired pressure vessel the safety valve thereof shall be removed.

(8) All pipes and pipe fittings shall be satisfactorily tested hydrostatically to twice the authorised safe working pressure of the steam boiler or unfired pressure vessel to which they are to be fitted, before erection on site:

Provided that where an Inspector is satisfied that such pipes and pipe fittings have been satisfactorily so tested at the manufacturer's or maker's works he may require a hydrostatic test to one and one-half times the authorised safe working pressure only.

(9) Where the joints in a pipe system are of welded construction the system shall, after erection on site be tested hydrostatically to twice the authorised safe working pressure of the steam boiler or unfired pressure vessel to which it is fitted or such joints shall be completely radiographed.

(10) No person shall, without the approval in writing of an Inspector, test any part of a steam boiler or unfired pressure vessel or the fittings thereof or any pipes or pipe fittings, for pressure tightness by any means other than water pressure.

(11) After any satisfactorily hydrostatic test and on payment of the prescribed fees for such test an Inspector shall issue to the owner a certificate in the form shown in the sixth Schedule to these regulations.

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Regulation 73. Safety valves padlock.

(1) An Inspector may require that one safety valve on every steam boiler and every unfired pressure vessel shall be so padlocked that no alteration can be made to the blowing off pressure while such safety valve is locked.

(2) Such precautions shall be observed as an Inspector shall direct to ensure that the key to such padlock is retained by a responsible person.

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Regulation 74. Directions by Chief Inspector.

In respect of the operation, repair and maintenance of any steam boiler or unfired pressure vessel the Chief Inspector may issue such directions and order such precautions to be taken as he may deem desirable to obviate any danger to life or damage to property and such directions shall be observed and such precautions shall be taken.

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Regulation 75. Routine Instructions.

Every owner, engineer or dredgemaster shall issue routine instructions for the safe working of any steam boiler and unfired pressure vessel in his charge and shall satisfy himself that every person employed on or in close proximity thereto is familiar with and observes such instructions.

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Regulation 76. Opening up boiler or pressure vessel.

(1) No person shall open up or require or permit any other person to open up any steam boiler or unfired pressure vessel for repair, cleaning or for any other purpose unless precautions have been taken to ensure that such steam boiler or unfired pressure vessel is relieved of all pressure.

(2) No person shall enter or require or permit any other person to enter any steam boiler or unfired pressure vessel opened up for repair, cleaning or for any other purpose unless and until:

(a) it is cooled sufficiently to prevent the person entering from being burned or overcome by heat;

(b) it is free from hazardous fumes and vapours; and

(c) in respect of a steam boiler or steam receiver, all steam and hot water communication with any other steam boiler or steam receiver under steam has been effectively disconnected.

(3) For the purposes of sub-paragraph (c) of paragraph (2) of this regulation, "effectively disconnected" means either:

(i) the removal of any boiler stop valve, feed check valve, blow-down valve or in the case of a steam receiver the receiver stop valve; or

(ii) the removal of appropriate piping between such boiler or steam receiver and the source of pressure; or

(iii) the insertion of a substantial blank flange between the stop valve of such boiler or steam receiver and the source of pressure; or

(iv) the padlocking of not less than two stop valves located between such boiler or steam receiver and the source of pressure:

Provided that in respect of an unfired pressure vessel which requires to be loaded and unloaded at frequent intervals, such unfired pressure vessel may be considered as effectively disconnected if not less than two stop valves between the unfired pressure vessel and the source of pressure have been closed and suitable precautions have been taken to ensure that neither shall be opened while such loading or unloading is taking place.

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Regulation 77. Maintenance.

(1) In respect of any steam boiler and unfired pressure vessel it shall be the responsibility of the owner, occupier, engineer or dredgemaster in charge thereof to ensure that-

(i) every safety valve, water gauge, pressure gauge and every other safety device fitted thereto is maintained; and

(ii) the fusible metal of every fusible plug is renewed at intervals not greater than two years.

(2) Any owner, occupier, engineer or dredgemaster in charge of a steam boiler or unfired pressure vessel who works or causes or permits the same to be worked at a pressure greater than the authorised safe working pressure, or when it is not maintained in a safe working condition or when the fittings thereof are not in proper working order shall be guilty of an offence against these regulations.

(3) Any driver in charge of a steam boiler or unfired pressure vessel which is working above the authorised safe working pressure shall be deemed to be guilty of an offence against these regulations.

(4) Any pressure gauge fitted to a steam boiler or unfired pressure vessel which, in the opinion of an Inspector, is not fit for further use, shall be so marked and disposed of accordingly.

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Regulation 78. Notifiable occurrences.

The owner of any steam boiler or unfired pressure vessel shall notify an Inspector in writing of any occurrence which may affect the safety or strength of the steam boiler or unfired pressure vessel. Loss of boiler water, the melting of a fusible plug and the bursting of a tube shall be deemed to be notifiable occurrences under this regulation.

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Regulation 79. Repairs.

(1) An owner or other person shall not, unless approval has been given by an Inspector, make or cause to be made any repair to any steam boiler or unfired pressure vessel where such repair involves the cutting, welding, patching or riveting of any member thereof which is subject to a stress induced by fluid pressure.

(2) Where any steam boiler or unfired pressure vessel repair necessitates welding, the metallic arc process shall be used.

(3) Welding shall not be used to repair any part of a fitting which is made of cast iron and is subject to fluid pressure.

(4) Where repair has been made to a steam boiler or unfired pressure vessel such boiler or vessel shall not be placed in service except with the approval of an Inspector.

(5) For the purpose of this regulation "repair" does not include normal maintenance work or boiler tube renewals not exceeding ten per centum of the total number of tubes.

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Regulation 80. Tests of welders.

The Chief Inspector may formulate tests for operators of welding equipment and may restrict the repair of steam boilers and unfired pressure vessels by welding to such operators as have satisfied him of their skill and experience.

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Regulation 81. Reduction of safe working pressure.

Where it appears to an Inspector that any defect in a steam boiler or unfired pressure vessel is such that it would be dangerous to continue to operate such steam boiler or unfired pressure vessel at the authorised safe working pressure hitherto assigned, and it is impracticable or unreasonable to remedy such defect he shall reduce such authorised safe working pressure by an amount which he deems to be appropriate.

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Regulation 82. Registration number plate.

The owner of every steam boiler and unfired pressure vessel under certificate of fitness shall provide a registration number plate which shall be affixed thereto in a suitable and prominent position and bear the Government registration number allocated by the Chief Inspector to such steam boiler and unfired pressure vessel.

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Regulation 83. Records.

On the first inspection of a steam boiler or an unfired pressure vessel the Inspector shall make, and thereafter maintain, a complete record of all particulars necessary to ascertain the state and condition of such steam boiler or unfired pressure vessel in the form prescribed by the Chief Inspector. On each subsequent inspection of such steam boiler or unfired pressure vessel the Inspector shall make a comparison with such record and note any change since the previous inspection.

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Regulation 84. Fees.

(1) Fees shall be charged as follows:

(i) For approval of design and assigning an authorised safe working pressure in respect of any steam boiler to be manufactured in the Federation	\$100
...	
(ii) For approval of the design and assigning an authorised safe working pressure in respect of any unfired pressure vessel to be manufactured in the Federation	50
(iii) For every visit of survey made during construction on any steam boiler or unfired pressure vessel manufactured in the Federation	25
(iv) For assigning an authorised safe working pressure on any imported steam boiler which-	\$100
(a) complies with standard conditions as prescribed under regulation 7 (2) ...	150
(b) which does not comply with standard conditions prescribed	
(v) For assigning an authorised safe working pressure to any imported unfired pressure vessel	half the fee prescribed in respect of a steam boiler under sub-paragraph (iv) of this paragraph.
(vi) for conducting an hydrostatic test on-	\$25
(a) a steam boiler having a heating surface less than 250 sq. ft.	50
(b) a steam boiler having a heating surface of or exceeding 250 sq. ft. ...	15
(c) an unfired pressure vessel having a cubic capacity of or	

[Ins. P.U.(A) 375/71]

less than 100 cu. ft. ...	25
Provided that where such an unfired pressure is a hand fire extinguisher or cylinder solely for pyurpose of fire fighting the fee for conducting an hydrostatic test on every sech vessel shall be fifty cents.	30
(d) an unfired pressure vessel having a cubic capacity exceeding 100 cu. ft but less than 250 cu. ft. ...	
(e) an unfired pressure vessel having a cubic capacity of or exceeding 250 cu. ft. ...	

(2) Where the design of a steam boiler or unfired pressure vessel is identical with that of a steam boiler or unfired pressure vessel which has previously been assigned an authorised safe working pressure, no fee shall be charged for approval of design or assigning an authorised safe working pressure.

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970
PART IV - MISCELLANEOUS PROVISIONS

Regulation 85. Compliance with other written law.

Nothing in these regulations shall-

- (i) be construed as relieving or exempting the owner of any steam boiler or unfired pressure vessel or other person from complying with the provisions of any other written law;

 - (ii) operate to relieve any owner, occupier, engineer, dredgemaster, driver or other person from any civil or criminal liability.
-

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970
PART IV - MISCELLANEOUS PROVISIONS

Regulation 86. Penalties.

Any person who commits an offence against these regulations for which no corresponding penalty is provided by the Act, shall be liable to a fine not exceeding one thousand dollars.

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970
PART IV - MISCELLANEOUS PROVISIONS

Regulation 87. [Deleted]

[Deleted by P.U.(A) 167/92]

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

FIRST SCHEDULE

MATERIAL CODES

Regulation 7 (2) (ii)

1. The Rules for Quality and Testing of Materials of Lloyds Register of Shipping, London.
2. British Standard No. 1633-Steel for land boilers, receivers, and other pressure vessels.
3. The provisions relating to materials of any of the following:
 - (i) the Rules for the Construction of Welded Steel Boilers and other Pressure Vessels of the Associated Offices Technical Committee, Manchester, England;
 - (ii) the Standards Association of Australia Boiler Code CB 1;
 - (iii) the Indian Boiler Regulations 1950;
 - (iv) Section II of the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers;
 - (v) the Specifications set out in the Second Schedule to these regulations.
4. Det Norske Veritas Rules for Quality and Testing of Materials.

[Ins. P.U.(B) 519/81]

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

SECOND SCHEDULE

DESIGN CODES

Regulation 7 (2) (iii)

1. British Standard No. 537-Lancashire and Cornish Boilers.
2. British Standard No. 609-Horizontal Multitubular Boilers.
3. British Standard No. 665-Vertical Cross-tube Boilers.
4. British Standard No. 761-Vertical Multitubular Boilers
5. British Standard No. 931-Loco-type Multitubular Boilers.
6. British Standard No. 1113-Water-tube Boilers and their Integral Superheaters.
7. British Standard No. 2790-Cylindrical Land Steam Boilers of Welded Construction (other than water-tube).
8. British Standard No. 1894-Electrode Boilers.
9. The appropriate provisions of any British Standard relating to the construction of Steam Boilers.
10. The Engine and Boiler Rules of Lloyds Register of Shipping, London.
11. The Rules for Welded Pressure Vessels of Lloyds Register of Shipping, London.
12. The Indian Boiler Regulations.
13. Rules for the Construction of Welded Steel Boilers and other Pressure Vessels of the Associated Offices Technical Committee, Manchester, England.
14. Standards Association of Australia Boiler Code CB 1.
15. Section I (Power Boilers) of the Boiler and Unfired Pressure Vessel Code of the American Society of Mechanical Engineers.
16. INSTA --- (Inter-Nordic-STANDARDIZATION) --- Recommendation for Welded Pressure Vessels.
17. Swedish Pressure Vessel Code 1967:
 Provided that the inspection of survey during manufacture of the vessel is carried out by Inspectors or inspection bodies authorised by Angpanneforeningen (the Swedish Steam

User's Association) including the Technical X'ray Centre and the Swedish National Board of Industrial Safety.

18. Boilers---Technische Regeln für Dampfkessel (TRD) (Technical Regulations for Boilers) :

Provided that the inspection of survey during manufacture of the vessel is carried out by any of the following :

- (a) Members of the Vereinigung der Technischen Überwachungs-Vereine e.V., Essen, the Federal Republic of Germany;
- (b) Groupement des APAVE, Paris, France;
- (c) Association des Industries de Belgique (A.I.B), Brussel, Belgium;
- (d) Associated Offices Technical Committee, Manchester 3, Great Britain;
- (e) Technischer Überwachungs-Verein Wien, Wien, Austria;
- (f) Schweizer Verein Von Dampfkesselbesitzern, Zurich, Switzerland;
- (g) Angpanneforeningen (The Swedish Steam User's Association) Stockholm, Sweden.

[Ins. P.U.(A) 172/70]

19. Nippon Kaiji Kyokai Rules for Boilers and Pressure Vessels.

20. American Bureau of Shipping Rules for Boilers and Pressure Vessels.

[Ins. P.U.(A) 85/79]

21. Det Norske Veritas Rules for Boilers and Pressure Vessels.

[Ins. P.U.(B) 39/82]

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

THIRD SCHEDULE

DESIGN CODES

Regulation 7 (2) (iii)

1. British Standard No. 429-Riveted Air Receivers.
2. British Standard No. 1500-Fusion-welded Pressure Vessels for the Chemical and Allied Trades.
3. British Standard No. 487-Fusion-welded Steel Air Receivers.
4. British Standard No. 1099-Small Fusion-welded Steel Air Receivers.
5. British Standard No. 1101-Pressure Paint Containers.
6. British Standard No. 428-Forge-welded Steel Air Receivers.
7. British Standard No. 430-Solid-drawn Steel Air Receivers.
8. British Standard No. 186-Cast Iron Steam Jacketed Pans.
9. British Standard No. 1515 Pt. I-Fusion-welded Pressure Vessels (Advanced Design and Construction for use in the Chemical, Petroleum and Allied Industries).
10. British Standard No. 2079-Steam Receivers and Separators.
11. Rules for Welded Pressure Vessels of Lloyds Register of Shipping, London.
12. Standards Association of Australia Code No. B-55-Cast Iron Steam Jacketed Pans.
13. Standards Association of Australia Boiler Code No. CB 1.
14. Section VIII (Unfired Pressure Vessels) of the Boiler and Unfired Pressure Vessel Code of the American Society of Mechanical Engineers.
15. Rules for the Construction of Steel Boilers and other Pressure Vessels of the Associated Offices Technical Committee, Manchester, England.
16. Standards of Tubular Exchanger Manufacturers Association, U.S.A.
17. INSTA --- (Inter-Nordic-STANDARDization) --- Recommendation for Welded Pressure Vessels.

18. Swedish Pressure Vessel Code 1967:

Provided that the inspection of survey during manufacture of the vessel is carried out by Inspectors or inspection bodies authorised by Angpanneforeningen (the Swedish Steam User's Association) including the Technical X'ray Centre and the Swedish National Board of Industrial Safety.

19. Boilers---Technische Regeln für Dampfkessel (TRD) (Technical Regulations for Boilers) :

Provided that the inspection of survey during manufacture of the vessel is carried out by any of the following :

(a) Members of the Vereinigung der Technischen Überwachungs-Vereine e.V., Essen, the Federal Republic of Germany;

(b) Groupement des APAVE, Paris, France;

(c) Association des Industries de Belgique (A.I.B), Brussel, Belgium;

(d) Associated Offices Technical Committee, Manchester 3, Great Britain;

(e) Technischer Überwachungs-Verein Wien, Wien, Austria;

(f) Schweizer Verein von Dampfkesselbesitzern, Zurich, Switzerland;

(g) Angpanneforeningen (The Swedish Steam User's Association) Stockholm, Sweden.

[Ins. P.U.(A) 173/70]

(h) The Hartford Steam Boiler Inspection and Insurance Company, Connecticut, U.S.A.

[Ins. P.U.(A) 323/99].

20. Nippon Kaiji Kyokai Rules for Boilers and Pressure Vessels.

21. American Bureau of Shipping Rules for Boilers and Pressure Vessels.

[Ins. P.U.(A) 86/79]

22. Det Norske Veritas Rules for Boilers and Pressure Vessels.

[Ins. P.U.(B) 40/82]

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

FOURTH SCHEDULE

INSPECTING AUTHORITIES

Regulation 7 (2) (iv)

1. Lloyds Register of Shipping, London.
2. Bureau Veritas International Register of Shipping, Paris.
3. The Scottish Boiler and General Insurance Co., Glasgow.
4. National and Vulcan Engineering Insurance Group, Manchester.
5. The British Engine Boiler and Electrical Insurance Co., Manchester.
6. The Ocean Accident and Guarantee Corporation, London.
7. The London and Lancashire Insurance Co. Ltd, England.
8. The Eagle Star Insurance Co. Ltd, London.
9. Insurance Engineers' Ltd, London.
10. Commercial Union Insurance Co. of New York, U.S.A.
11. The American Employees Insurance Co., Mass., U.S.A.
12. The Employees Liability Assurance Corporation Ltd, Mass., U.S.A.
13. The Mutual Boiler Insurance Company of Boston, Mass., U.S.A.
14. The Columbia Casualty Co., New York, U.S.A.
15. The London Guarantee and Accident Co., Ltd, New York, U.S.A.
16. The Phoenix Indemnity Co., New York, U.S.A.
- 17 Chief Inspector of Machinery, Western Australia.
18. The General Accident Fire and Life Assurance Corporation Ltd, England.
19. Ewbank Preece Limited, England.

20. Esso Research and Engineering Co., New Jersey, U.S.A.
21. Chief Inspector of Machinery, Sub-Department of Machinery and Scaffolding, Queensland, Australia.
22. The Hartford Steam Boiler Inspection and Insurance Company, Conn., U.S.A.
23. *[Deleted by P.U.(A) 323/99]*
24. Bataafse Internationale Petroleum Maatschappij NV., Holland.
25. The Shell International Petroleum Co., Ltd, London.
26. Central Inspection Section of the Imperial Chemical Industries Ltd, London.
27. Old Republic Insurance Company.
[Subs. P.U.(A) 365/98]
28. Intertek Testing Services (Japan) K.K.
[Subs. P.U.(A) 365/98]
29. Crown Agents for Oversea Governments and Administrations, London.
30. Chief Inspector of Boilers, Dept. of Labour and Industry, South Australia, Adelaide.
31. Chief Inspector of Boilers and Pressure Vessels, Dept. of Labour and Industry, Victoria, Australia.
32. Chief Inspector, Dept. of Labour and Industry, N.S.W. Australia.
33. New Zealand Marine Department.
34. Technical Standards and Safety Authority, Ontario, Canada.
[Subs. P.U.(A) 323/99]
35. All members of the Vereinigung der Technischen Überwachungs-Vereine e.V.
36. Groupment des APAVE, Paris, France;
37. Association des Industriels de Belgique (A.I.B.) Brussel, Belgium;
38. Associated Offices Technical Committee, Manchester 3, Great Britain;
39. Technischer Überwachungs-Verein Wien, Wien, Austria;
40. Schweizer Verein von Dampfkesselbesitzern, Zurich, Switzerland;
41. SAQ Kontroll AB, Stockholm, Sweden.

42. The Royal Danish Boiler Inspection Department. *[Subs. P.U.(A) 365/98]*
43. Japan Quality Assurance Organisation, Tokyo
44. Japan Boiler Association, Tokyo; *[Subs. P.U.(A) 323/99]*
45. Japan Inspection Company Ltd., Tokyo;
46. S.G.s Far East Ltd.
47. Association Vincotte, Belgium.
48. Sticing Independent Inspectors Pool, Holland.
- Provided that the end user of the Steam Bioler or Unifired Pressure vessel is any one of the Shell group of Companies or Campanies associated with Shell in Malaysia.
49. Nippon Kaiji Kyokai, Japan.
50. ABS Services Inc. *[Subs. P.U.(A) 365/98]*
51. Societe Generale de Surveillance S.A
52. Det Norske Veritas.
53. Germanischer Llyod.
54. Koatsugasu Hoan Kyokai (KHK), Japan.
- [Ins. P.U.(A) 174/70; Ins. P.U.(B) 29/72; Ins. P.U.(B) 112/77;
Ins. P.U.(A) 87/79; Ins. P.U.(B) 665/80; Ins. P.U.(B) 41/82;
Ins. P.U.(A) 81/85; Ins. P.U.(A) 352/88; Subs. P.U.(A) 6/90]*
55. Shanghai Bolier & Pressure Vessel Inspection Institute, Shanghai, People Republic of China.
- [Ins. P.U.(A) 167/92]*
56. Moody International Ltd. (M.M.I) United Kingdom, Germany, The Nederlans and Italy.
- [Ins. P.U.(A) 418/93; Subs. P.U.(A) 365/98]*
57. Registro Italiano Navale (RINA), Italy.
- [Ins. P.U.(A) 195/95]*

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

FIFTH SCHEDULE

GOVERNMENT OF MALAYSIA

FACTORIES AND MACHINERY ACT, 1967

FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL),
REGULATIONS, 1970

Regulation 7 (3)

CERTIFICATE OF INSPECTING AUTHORITY

I,being a Member / Surveyor ofan
Inspecting Authority named in the Fourth Schedule to the Factories and Machinery (Steam Boiler
and Unfired Pressure Vessel), Regulations, 1970, Malaysia, hereby certify that Steam Boiler /
Unfired Pressure Vessel Serial No.was constructed by Messrs
..... forin accordance with their
drawing number

It was surveyed during construction by me and the scantlings are in accordance with
..... (being a code name in the Second / Third Schedule to the
aforementioned Regulations) for a design pressure of pounds per square
inch. The workmanship is good.

Samples of all materials used in its construction were tested by, or in the presence of, Inspectors
of this Company and found to comply with the provisions of the above-mentioned Code.

On completion the Steam Boiler / Unfired Pressure Vessel was tested hydrostatically
to..... pounds per square inch for a period of
..... minutes in my presence on It
Showed no signs of weakness and was found tight and sound in every respect at that pressure. It
was stamped by me as follows:

.....
.....

Dated thisday of 19

(Signed)
Member / Surveyor

.....
Chief Engineer to Inspecting Authority

**P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970**

SIXTH SCHEDULE

GOVERNMENT OF MALAYSIA

FACTORIES AND MACHINERY ACT, 1967

FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL),
REGULATIONS, 1970

Regulation 72 (11)

CERTIFICATE OF HYDROSTATIC TEST OF A STEAM BOILER / UNFIRED PRESSURE
VESSEL

I certify that the Steam Boiler / Unfired Pressure Vessel, details of which are given below, was tested hydrostatically in my presence topounds per square inch for a period of at least twenty (20) minutes and that there was no leakage or undue deflection or distortion of its parts, and that I am satisfied that the same may be safely operated atpounds per square inch.

Details of Steam Boiler / Unfired Pressure Vessel:

Description:
Name and address of manufacturer:
Government Reg. No.
Name and address of owner:
Date and place of test:

Dated thisday of19

.....
Inspector

NOTE-This certificate is not a receipt for any fee.

Dated this 25th day of November, 1969.
[JK / KB. No. 414; P.N 250 / 54-258A.]

V. MANICKAVASAGAM,
Minister of Labour

P.U.(A) 5/70
FACTORIES AND MACHINERY (STEAM BOILER AND UNFIRED PRESSURE VESSEL)
REGULATIONS, 1970

LIST OF AMENDMENTS.

<i>Amending law</i>	<i>Short title</i>	<i>In force from</i>
P.U.(A) 172/70	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	21-5-1970
P.U.(A) 173/70	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	21-5-1970
P.U.(A) 174/70	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	21-5-1970
P.U.(A) 375/71	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1971.	21-10-1971
P.U.(B) 29/72	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	20-6-1972
P.U.(B) 112/77	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	10-3-1977
P.U.(A) 85/79	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	26-4-1979
P.U.(A) 86/79	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	26-4-1979
P.U.(A) 87/79	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	26-4-1979
P.U.(B) 655/80	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	11-12-1977

P.U.(B) 519/81	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	10-9-1981
P.U.(B) 39/82	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	4-2-1982
P.U.(B) 40/82	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	4-2-1982
P.U.(B) 41/82	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations 1970.	4-2-1982
P.U.(A) 81/85	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1985.	21-2-1985
P.U.(A) 352/88	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1988.	6-10-1988
P.U.(A) 6/90	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1990.	18-6-1990
P.U.(A) 167/92	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1992.	23-4-1992
P.U.(A) 418/93	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1993.	9-12-1993
P.U.(A) 195/95	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1995.	1-6-1995
P.U.(A) 365/98	Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) (Amendment) Regulations 1998.	1-9-1995

P.U.(A)
323/99

Factories and Machinery (Steam
Boiler and Unfired Pressure
Vessel) (Amendment)
Regulations 1999.

1-4-1999