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157/91

Judicial (1895) Department.

ORDINARY PRINTED.

G.O., No. 174.

25/1/1895

DATED 25 Jan. 1895.

INDEXED.

[Despatch Abstract.]

STEAM BOILERS ACT

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
	751		1895.				
	992		1895.				
	1472		1895.				
	1469		1895.				
	1602		1895.				
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706/95

25TH JANUARY 1895, No. 174, JUDICIAL.

GOVERNMENT OF MADRAS.

JUDICIAL DEPARTMENT.

READ—again the following papers :—

G.O., dated 24th August 1893, Nos. 1712-1713A, Judicial.

ABSTRACT.—Drawing the attention of all District Magistrates to Act III of 1893, and requesting them to report whether it is advisable to extend it to their several districts and whether a notification under section 14 should also be issued, and directing that the Governments of Bengal and Bombay be asked to furnish copies of rules and orders made under the Acts of those Presidencies.

G.O., dated 12th March 1894, No. 610, Judicial.

ABSTRACT.—Calling for information as to the number of steam-boilers in use in certain districts and in the town of Madras, and directing, with reference to sections 9, 11 and 12 of the Madras steam-boilers and Prime-movers Act, that certain questions be considered in the Public Works Department.

READ—also the following papers :—

From the District Magistrate,	Tanjore,	dated	30th	March	1894, No.	351.
,, ,,	Coimbatore,	,,	10th	May	,, ,,	568.
,, ,,	Salem,	,,	18th	,,	,, ,,	815.
,, ,,	Bellary,	,,	19th	,,	,, ,,	83.
,, ,,	Tinnevelly,	,,	22nd	,,	,, ,,	556.
,, ,,	,,	,,	20th	June	,, ,,	666.
,, ,,	Kistna,	,,	24th	July	,, ,,	560.

ABSTRACT.—Reporting as to the numbers of steam-boilers in their districts.

From the Commissioner of Police, Madras, dated 25th April 1894, No. 51.

ABSTRACT.—Forwarding a list of steam-boilers in use in the Madras City.

From the Under Secretary to the Government of Bombay, dated 24th May 1894, No. 1942.

ABSTRACT.—Forwarding copy of the rules under the Bombay Boiler Inspection Act, 1891, as finally approved by Government.

From the Under Secretary to the Government of Bombay, dated 8th June 1894, No. 2134.

ABSTRACT.—Inviting attention to his previous letter and stating that another set of rules under the same Act is under consideration.

From the Public Works Department, dated 18th July 1894, No. 614 D.

ABSTRACT.—Forwarding, with remarks, a form of register of boilers referred to in section 9 Act III of 1893.

ANALYZ—dated 25th January 1895, No. 174, Judicial.

for ... after a careful consideration of the correspondence read above, the Government ...d that it is not necessary at present to extend any portion of the Madras ...rs and Prime-movers Act, 1893, to the mufassal; it will, however, be ... to operation in the City of Madras with effect from the 1st April 1895.

Under ... 1893, the ... with regard to the appointment of Inspectors under section 3 of the Act, the Chief ... has come to the conclusion that there will not be enough work to occupy

the full time of even one such officer and therefore considers that to the Boiler Inspector should also be entrusted the duty of the periodical inspection of the engines and boilers of the several mufassal municipal water-works. For the combined duties a salary of Rs. 250–10–300 *per mensem* (*plus* travelling allowance for journeys to inspect municipal engines and boilers) will probably suffice; and towards the expenditure on this account the municipalities benefited by the appointment will be required to contribute. On this point further orders will issue in the Local and Municipal Department. The Inspector will need a clerk on Rs. 15 and a peon on Rs. 8. Eight applications for the post of Boiler Inspector have been received. These will be transferred to the Chief Engineer who will advertize in the Gazette and in the leading newspapers stating the terms offered and will, in consultation with the Sanitary Engineer, nominate a person for appointment by Government at an early date. Inasmuch as the Inspector will have to work under the Sanitary Engineer so far as regards municipal engines and boilers, it seems to Government expedient that he should be subordinate to that officer in his position as Boiler Inspector also. The draft rules in Appendix II provide accordingly and it will be considered in the Public Works Department what reports and returns relating to the working of the Act should be submitted by the Sanitary Engineer to Government.

3. With reference to section 4 of the Act, the Government resolves to fix the 1st July 1895 as the date after which no boiler may be used unless it has been licensed.

4. Section 12 (4) of the Act provides for the summoning of assessors to assist the Chief Presidency Magistrate in the hearing of appeals, in such manner as the Government may direct. Probably the best plan will be to permit the appellant to nominate one assessor and the Inspector the other, subject to the reservation that, if either of the assessors or both of them appears or appear to the Chief Presidency Magistrate to be incompetent, he may nominate one or both himself.

The Chief Presidency Magistrate will be requested to advise on the subject.

5. The Government has resolved not at present to give the direction referred to in section 14 of the Act and so much of the Act as relates to the issue of certificates of competency will, therefore, remain in abeyance until further orders.

6. The notifications and orders which it is proposed to issue under the provisions of sections 3, 4, 9, 11, 12 and 23 of the Act are printed as Appendix II to this Proceedings and will be published in the *Fort St. George Gazette*. The Government will consider any suggestions which may be made in respect of them on or before the 1st April 1895 by any persons interested. In particular the Government desires to be favoured by the said date with the opinions of the Public Works Department, the Sanitary Engineer, the Hon'ble the Advocate-General, the Chief Presidency Magistrate, the Accountant-General, the Chamber of Commerce and the Madras Trades Association.

7. All future correspondence in connection with the working of Madras Act III of 1893 will be dealt with in the Public Works Department of the Secretariat.

(True Extract.)

Chief Secretary.

To all District Magistrates.
" the Commissioner of Police, Madras.
" the Public Works Department, with applications.
" the Local and Municipal Department.
" the Sanitary Engineer.
" the Chief Presidency Magistrate.
" the Government Solicitor.
" the Accountant-General.
" the Chamber of Commerce.
" the Madras Trades Association.

Gazette.
Editor's Table.

APPENDIX I.

NOTIFICATION.

Under sub-section (2) of section 1 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government directs that the said Act shall come into force upon the 1st April 1895.

APPENDIX II.

PROPOSED NOTIFICATIONS.

NOTIFICATION A.

Under sub-section (2) of section 3 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government directs that the Inspector shall exercise the powers and perform the duties conferred and imposed by or under this Act on an Inspector throughout the City of Madras.

NOTIFICATION B.

Under section 4 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government fixes the 1st July 1895 as the date after which no boiler shall be used unless a license authorizing its use has been granted under the Act and is in force.

NOTIFICATION C.

(*a*) Under section 9 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government prescribes the following form of register of boilers:—

Name of Owner.	Place where boiler is situated.	Registry number and description of boiler and age.	Nominal horse-power.	When, where and by whom made.	When and where last repaired.	Date of grant of license.	Maximum pressure at which boiler may be worked.	Remarks.

(*b*) Under the same section the Government directs that the registry number of every boiler shall be cut in the front plate thereof in such position as shall be pointed out by the Inspector. The device to be so cut shall consist of the letters "RY" above the letters "No." and divided from them by a horizontal line; the letters "No." to be followed by the registry number in figures, the letters being at least one-half of an inch, and the figures at least one-and-a quarter inch, in height; the whole to be enclosed in a rectangular figure one-sixteenth of an inch clear from the letters and figures; thus—

RY.
No. 148.

The engraving shall be not less than one-sixty-fourth of an inch deep.

NOTIFICATION D.

Under section 11 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government authorizes the Sanitary Engineer to revoke and suspend licenses granted in respect of boilers, for the reasons therein given.

NOTIFICATION E.

Under sub-section (5) of section 12 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government prescribes the following as the form in which licenses shall be granted by the Chief Presidency Magistrate:—

LICENSE.

Name of owner.	Description of boiler and age.	Nominal horse-power.	When and where made.	When and where last repaired.	Time for which this license is to be in force.	Maximum pressure at which the boiler may be worked.	Remarks.

Certificate.—I, the undersigned, * being assisted by A and B, two competent assessors,* am satisfied that C is entitled to the above license and have granted it to him on this date under the provisions of section 12 (5) of Madras Act III of 1893; and I hereby direct the Inspector to register the boiler specified in the above license and to allot to it a registry number in accordance with section 9 of the said Act.

(Signed) D. E.,
Chief Presidency Magistrate.

* The words between asterisks to be omitted when no assessors employed.

NOTIFICATION F.

The Government will be prepared to consider any suggestions in respect of the following draft rules under clauses (*a*), (*b*) and (*f*) of section 23 of the Madras Steam-boilers and Prime-movers Act, 1893, which are received on or before the 1st April 1895 :—

A.—*Preliminary.*

1. These rules may be called the Boiler Examination Rules.

2. In these Rules—

(*a*) "The Act" means the Madras Steam-boilers and Prime-movers Act, 1893;
(*b*) "Section" means a section of the said Act;
(*c*) "Examination" means the examination of boilers under the Act, and "examination fees" means fees leviable on account of the examination of boilers.

B.—*The Inspector.*

3. The Inspector shall not undertake any professional work unconnected with his business under the Act except with the approval, or under the orders, of Government.

4. The Inspector shall receive such salary as Government may determine, all examination fees being credited to Government.

5. The Inspector shall have an office in which all records connected with the working of the Act shall be kept.

6. The Inspector shall keep the following records :—

(*a*) a register of examination fee receipts;
(*b*) a book containing counterfoils of licenses;
(*c*) a register of boilers in the following form which has been prescribed under section 9 :—

Name of owner.	Place where boiler is situated.	Registry number and description of boiler and age.	Nominal horse power.	When, where and by whom made.	When and where last repaired.	Date of grant of license.	Maximum pressure at which boiler may be worked.	Remarks.

(*d*) a book containing a detailed account of every examination made by him;
(*e*) a diary of the work done by him from day to day;
(*f*) a register of licenses suspended or revoked under section 11 (this register to be prepared upon information furnished to the Inspector by the suspending or revoking authority, *i.e.*, the Sanitary Engineer);
(*g*) a register showing the result of appeals presented under section 12 (this register to be prepared upon information furnished to the Inspector by the Chief Presidency Magistrate).

7. The Inspector shall furnish to the Sanitary Engineer, on the third working day of every month, a copy of his diary for the preceding month.

8. All examination fees shall be paid into the Madras Bank by the owners of boilers and no boiler shall be examined under section 5 unless the notice sent to the Inspector under that section is accompanied by a Bank receipt for the fee; and the Inspector, if he finds that the right fee has not been paid, may decline to examine the boiler until it has been paid.

9. An extract from the register of examination fee receipts which is compiled by the Inspector from the Bank receipts referred to in Rule 8 shall be forwarded by him, monthly, to the Accountant-General who shall verify it by reference to the amount actually received on account of examination fees during the month to which the extract relates and forward it to the Sanitary Engineer for record.

10. The Inspector shall be subordinate to the Sanitary Engineer and shall obey all lawful orders issued to him by that officer.

11. The Inspector's office and the records kept therein shall be examined in January and July of each year by such officer as the Chief Engineer may depute for this purpose.

C.—*Examinations.*

12. Examination fees shall be paid in accordance with the following scale :—

		Rs.
(i)	For the examination of each boiler not exceeding 10 N.H.P.	.. 12
(ii)	" " " " " 20 "	.. 16
(iii)	" " " " " 30 "	.. 24
(iv)	" " " " " 50 "	.. 32
(v)	" " " boiler exceeding 50 "	.. 40

Iron Boilers.

13. The Inspector is required by the Act to fix the pressure to be allowed on boilers. In performing this very responsible and onerous duty he must be very careful, as in the event of accident it will be necessary for him to prove clearly that he used due caution. On the one hand he must be careful as regards safety, and on the other hand he must not unduly reduce the pressure on a boiler.

14. The Inspector should fix the working pressure for boilers by a series of calculations of the strength of the various parts, and according to the workmanship and material.

In the case of boilers made in India, the Inspector may receive and examine plans and particulars of boilers before the commencement of manufacture with the object of preventing questions arising after the boilers are finished.

When the Inspector has received plans and tracings of new boilers, or of alterations of boilers, and has approved of them, he will of course be careful in making his examination, when the boiler is ready for work, to see that they have been followed out. When he has not had the plans submitted, but is called in to inspect a boiler, he will of course measure the parts, note the details of construction, and, if necessary, bore the plates to ascertain their thickness, &c., before he gives his certificate.

The Inspector shall not declare a boiler to be safe unless (*a*) he is fully informed as to its construction, material and workmanship, or unless (*b*) he is furnished with a certificate from a Chief Engineer of a recognised boiler insurance company. He should therefore be very careful how he refuses to give a certificate.

15. In the case of new boilers the Inspector may allow a stress not exceeding 7,000 lb. per inch of net section on solid iron screwed stays supporting flat surfaces, but the stress should not exceed 6,000 lb. when the stays have been welded or worked in the fire.

The strength of diagonal stays are found in the following way: Find the area of a direct stay which would support the surface, multiply this area by the length of the diagonal stay, and divide by the length of a line drawn at right angles to the surface supported to the end of the diagonal stay; the quotient will be the area of the diagonal stay required.

When gusset stays are used, their area should be in excess of that found in the above way.

16. When the tops of combustion boxes or other parts of a boiler are supported by solid rectangular girders the following formula should be used for finding the working pressure to be allowed on the girders, assuming that they are not subjected to a greater temperature than the ordinary heat of steam, and in the case of combustion chambers that the ends are fitted to the edges of the tube plate and the back plate of the combustion box.

$$\frac{C \times d^2 \times T}{(W-P)\ D \times L} = \text{Working Pressure.}$$

W = Width of combustion box in inches.
P = Pitch of supporting bolts in inches.
D = Distance between the girders from centre to centre in inches.
L = Length of girder in feet.
D = Depth of girder in inches.
T = Thickness of girder in inches.
C = 500 when the girder is fitted with one supporting bolt.
C = 750 when the girder is fitted with two or three supporting bolts.
C = 850 when the girder is fitted with four supporting bolts.

The working pressure for the supporting bolts and for the plate between them should be determined by the rule for ordinary stays.

17. The pressure on plates forming flat surfaces is found by the following formula :—

$$\frac{C \times (T+1)^2}{S-6} = \text{Working Pressure.}$$

T = Thickness of the plate in sixteenths of an inch.
S = Surface supported in square inches.
C = Constant according to the following circumstances.
C = 100 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.*
C = 90 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts only.
C = 60 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.
C = 54 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts only.
C = 80 when the plates are exposed to the impact of heat or flame with water in contact with the plates, and the stays screwed into the plates and fitted with nuts.
C = 60 when the plates are exposed to the impact of heat or flame, with water in contact with the plates, and the stays screwed into the plates, having the ends riveted over to form substantial heads.
C = 36 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, with the stays screwed into the plates, and having the ends riveted over to form substantial heads.

In cases where plates are stiffened by T or L irons, and a greater pressure is required for the plates than is allowed by the use of the above constants, the case should be submitted for the consideration of the Sanitary Engineer.

When the riveted ends of screwed stays are much worn or when the nuts are burned, the constants should be reduced, but the Inspector must act according to the circumstances that present themselves at the time of inspection, and it is expected that in cases where the riveted ends of screwed stays in the combustion boxes and furnaces are found in this state, it will be often necessary to reduce the constant 60 to about 36.

The Inspector should not in any case allow a greater compressive stress on the edge of the tube plates than 7,500 lb. per square inch, which is that used in the following formula :—

$$\frac{(D-d)\ T \times 15{,}000}{W \times D} = \text{Working Pressure.}$$

D = least horizontal distance between centres of tubes in inches.
d = inside diameter of ordinary tubes in inches.
T = thickness of tube plate in inches.

* If the diameter of riveted washers be at least two-thirds the pitch of the stays, and the thickness not less than plates they cover, the constant may be increased to 150.
When doubling plates are fitted of the same thickness as the plates they cover and not less in width than two-t the pitch of the stays, the constant may be increased to 160.

W = extreme width of combustion box in inches from front of tube plate to back of fire-box, or distance between combustion box tube plates when boiler is double ended and the box common to the furnaces at both ends.

18. The Inspector should take care that boilers, the outside of which cannot be seen, are cleared of all covering and fittings for inspection whenever the Inspector considers it necessary. It will often be found necessary to reduce the pressure, unless the boilers are partially cleared from their seats to enable the Inspector to judge of their condition. If the owners in any special case have any good reasons for not wishing to clear them when the Inspector requires it, the Inspector should submit the whole case in detail to the Sanitary Engineer for his consideration. The Inspector must recollect that he is not to certify as sufficient any boiler respecting which he cannot thoroughly satisfy himself.

The Inspector should record in his inspection book the dates on which boilers are inspected, when and to what extent cleared from brick work, and whether the boilers were set or not when examined, and if not set, where they were examined. Boilers which have been cleared should in all cases be subjected to the hydraulic test before the brick work is rebuilt.

19. Boilers well constructed, well designed, and made of good material should have an advantage in the matter of working pressure over boilers inferior in any of the above respects, as unless this is done the superior boiler is placed at a disadvantage, and good workmanship and material will be discouraged. The following rules are therefore prescribed.

When cylindrical boilers are made of the best material with all the rivet holes drilled in place and all the seams fitted with double butt straps each of at least five-eighths the thickness of the plates they cover, and all the seams at least double riveted with rivets having an allowance of not more than 75 per cent. over the single shear and provided that the boilers have been open to inspection during the whole period of construction, then 5 may be used as the factor of safety. The tensile strength of the iron is to be taken as equal to 47,000 lb. per square inch with the grain, and 40,000 lb. across the grain. But when the above conditions are not complied with, the additions in the following scale must be added to the factor 5, according to the circumstances of each case :—

A †	·15	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place after bending.
B †	·3	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place before bending.
C	·3	To be added when all the holes are fair and good in the longitudinal seams, but punched after bending instead of drilled.
D	·5	To be added when all the holes are fair and good in the longitudinal seams, but punched before bending.
E *	·75	To be added when all the holes are not fair and good in the longitudinal seams.
F	·1	To be added if the holes are all fair and good in the circumferential seams, but drilled out of place after bending.
G †	·15	To be added if the holes are fair and good in the circumferential seams, but drilled before bending.
H	·15	To be added if the holes are fair and good in the circumferential seams, but punched after bending.
I †	·2	To be added if the holes are fair and good in the circumferential seams, but punched before bending.
J *	·2	To be added if the holes are not fair and good in the circumferential seams.
K	·2	To be added if double butt straps are not fitted to the longitudinal seams, and the said seams are lap and double riveted.
L	·1	To be added if double butt straps are not fitted to the longitudinal seams, and the said seams are lap and treble riveted.
M	·3	To be added if only single butt straps are fitted to the longitudinal seams and the said seams are double riveted.
N	·15	To be added if only single butt straps are fitted to the longitudinal seams and the said seams are treble riveted.
O	·1	To be added when any description of joint in the longitudinal seams is single riveted.
	·1	To be added if the circumferential seams are fitted with single butt straps and are double riveted.
	·2	To be added if the circumferential seams are fitted with single butt straps and are single riveted.
	·1	To be added if the circumferential seams are fitted with double butt straps and are single riveted.
	·1	To be added if the circumferential seams are lap joints and are double riveted.
	·2	To be added if the circumferential seams are lap joints and are single riveted.
	·25	To be added when the circumferential seams are lap, and the stakes of plates are not entirely under or over.

V ‡ ·3 To be added when the boiler is of such a length as to fire from both ends, or is of unusual length, as in the case of flue boilers; and the circumferential seams fitted as described opposite P, R, and S, but of course when the circumferential seams are as described opposite Q and T, V ·3 will become V ·4.

W * ·4 To be added if the seams are not properly crossed.

X * ·4 To be added when the iron is in any way doubtful, and the Inspector is not satisfied that it is of the best quality.

Y †† 1·65 To be added if no certificate is produced from a Chief Engineer of a recognized Boiler Insurance Company or if the boiler was not open to inspection during the whole period of its construction by the Inspectors of any recognized Boiler Insurance Company.

Where marked * the factor of safety should be increased still further if the workmanship or material is very doubtful or is very unsatisfactory.

† When the holes are to be rimered, or bored out in place, the case should be submitted to the Sanitary Engineer as to the reduction or omission of A, B, G, and I as heretofore.

‡ When boilers are comparatively short, the cases should be submitted to the Sanitary Engineer for consideration as to the omission of V as heretofore.

When the circumferential seams are double strapped and double riveted or lapped and treble riveted, and the calculated strength not less than 65 per cent. of the solid plate V, ·3 may be omitted as heretofore.

The strength of ordinary joints is found by the following method :—

$$\frac{(\text{Pitch} - \text{Diameter of rivet}) \times 100}{\text{Pitch}} = \left.\right\} \text{Percentage of strength of plate at joint as compared with the solid plate.}$$

$$\frac{(\text{Area of rivet} \times \text{No. of rows of rivets}) \times 100}{\text{Pitch} \times \text{thickness of plate}} = \left.\right\} \text{Percentage of strength of rivets as compared with the solid plate.}\S$$

Then take iron as equal to 47,000 lb. per square inch and use the smaller of the two percentages as the strength of the joint, and adopt the factor of safety as found from the preceding scale.

$$\frac{(47{,}000 \times \text{percentage of strength of joint}) \times \text{twice the thickness of the plate in inches.}}{\text{Inside diameter of the boiler in inches} \times \text{factor of safety}} = \text{Pressure to be allowed per square inch on the safety-valves.}$$

In the case of ordinary zigzag riveting the strength through the plate diagonally between the rivets, when diagonal pitch $= \frac{6}{10}$ horizontal pitch $+ \frac{4}{10}$ diameter of rivet.

Plates that are drilled in place must have been taken apart and the burr taken off and the holes slightly countersunk from the outsides.

Butt straps must have been cut from plates and not from bars, and must be of as good a quality as the shell plates, and for the longitudinal seams must be cut across the fibre. The rivet holes may have been punched or drilled when the plates are punched or drilled out of place, but when drilled in place must have been taken apart and the burr taken off and slightly countersunk from the outside.

When single butt straps are used and the rivet holes in them punched, they must be one-eighth thicker than the plates they cover.

The diameter of the rivets must not be less than the thickness of the plates of which the shell is made, but it will be found when the plates are thin, or when lap joints or single butt straps are adopted, that the diameter of the rivets should be in excess of the thickness of the plates.

Dished ends must be stayed as flat surfaces; but when they are theoretically equal to the pressure needed, when considered as portions of spheres, the stays when solid may have a stress of 14,000 lb. per square inch of net section, but the stress should not exceed 10,000 lb. w[hen] the stays have been welded or worked in the fire.

Truly hemispherical ends subjected to internal pressure may be allowed double the pressure that is suitable for a cylinder of the same diameter and thickness.

All man-holes and openings must be stiffened with compensating rings of at least the sam[e] effective sectional area as the plates cut out, and in no case should the plate rings be less in thi[ck]ness than the plates to which they are attached. The openings in the shells of cylindrical boi[lers] should have their shorter axes placed longitudinally. It is very desirable that the compensat[ing] rings round openings in flat surfaces be made of L or T iron. Cast-iron doors are not t[o be] passed.

The neutral part of boiler shells under steam domes must be efficiently stiffened and st[ayed] as serious accidents have arisen from the want of such precautions.

20. New boilers are to be tested by hydraulic pressure according to the following scal[e]

§ If the rivets are exposed to double shear, multiply the percentage as found by 1·75.

Boilers intended to work up to 100 lb. pressure per square inch or any pressure below that are to be tested to double the working pressure.

Above lb.	100	up to lb.	125	to be tested to lb.	200.
,,	125	,,	150	,,	230.
,,	150	,,	175	,,	250.
,,	175	,,	200	,,	270.
,,	200	,,	225	,,	290.
,,	225	,,	250	,,	310.
,,	250	,,	275	,,	330.
,,	275	,,	300	,,	350.

Any boilers intended for working pressure above these to be tested to not less than 50 lb. above such working pressure.

In the case of old boilers the Inspector must use his own judgment as to the necessary pressure to be applied.

21. Circular furnaces with the longitudinal joints welded or made with a butt strap.

$$\frac{90{,}000 \times \text{the square of the thickness of the plate in inches}}{(\text{Length in feet} + 1) \times \text{diameter in inches}}$$

= working pressure per square inch, provided it does not exceed that found by the following formula :—

$$\frac{8{,}000 \times \text{thickness in inches}}{\text{diameter in inches.}} = \left.\right\} \text{Working pressure per square inch.}$$

The second formula limits the crushing stress on the material to 4,000 lb. per square inch.

The length is to be measured between the rings if the furnace is made with rings.

If the longitudinal joints instead of being butted are lap-jointed in the ordinary way, then 75,000 is to be used instead of 90,000, excepting only where the lap is bevelled and so made as to give the flues the form of a *true* circle, when 80,000 may be used.

When the material or the workmanship is not of the best quality, the constants given above must be reduced, that is to say, the 90,000 will become 80,000, the 80,000 will become 70,000, the 70,000 will become 60,000; when neither the material nor the workmanship is of the best quality, such constants will require to be further reduced, according to circumstances and the judgment of the Inspector, as in the case of old boilers. One of the conditions of best workmanship is that the joints are double riveted with double butt straps, or single riveted with double butt straps, and the holes drilled after the bending is done and when in place and the plates afterwards taken apart, the burr on the holes taken off and the holes slightly countersunk from the outside.*

The working pressure for corrugated furnaces, practically circular and machine made, provided the plane parts at the ends do not exceed 6 inches in length, and the plates are not less than $\frac{5}{6}$ inch thick, should not be greater than found by the following formula :—

$$\frac{9{,}000 \times \text{thickness in inches}}{\text{Mean diameter in inches}} = \left.\right\} \text{Working pressure per square inch.}$$

Steel Boilers.

22. For steel boilers the rules for iron boilers may be increased as follows :—

The constants for flat surfaces when they are supported by stays screwed into the plate and

* The following examples will serve to show the application of the constants for the different cases that may arise :—

Furnaces with butt joints and drilled rivet holes—

90,000 where the longitudinal seams are welded.
90,000 ,, ,, ,, double riveted and fitted with single butt straps.
80,000 ,, ,, ,, single ,, single ,,
90,000 ,, ,, ,, ,, double ,,

Furnaces with butt joints and punched rivet holes—

85,000 where the longitudinal seams are double riveted and fitted with single butt straps.
75,000 ,, ,, ,, single ,, single ,,
85,000 ,, ,, ,, ,, double ,,

Furnaces with lapped joints and drilled rivet holes—

80,000 where the longitudinal seams are double riveted and bevelled.
70,000 ,, ,, ,, ,, and not bevelled.
70,000 ,, ,, ,, single ,, and bevelled.
65,000 ,, ,, ,, ,, and not bevelled.

Furnaces with lapped joints and punched rivet holes—

75,000 where the longitudinal seams are double riveted and bevelled.
70,000 ,, ,, ,, ,, and not bevelled.
65,000 ,, ,, ,, single ,, and bevelled.
60,000 ,, ,, ,, ,, and not bevelled.

In the case of upright fireboxes of donkey or similar boilers, 10 per cent. should be deducted from the constants given above, applicable to the respective classes of work.

riveted, 10 per cent. The constants for flat surfaces when they are supported by stays screwed into the plate and nutted, or when the stays are nutted in the steam space, 25 per cent. This is also applicable to the constants for flat surfaces stiffened by riveted washers or doubling strips, and supported by nutted stays.

The constants for combustion box girders, 10 per cent.

Boilers—General.

23. Small boilers must be surveyed and be fitted the same way as the main boilers, and have a water and steam gauge, and all other fittings complete, and as regards safety valves, must comply with the same regulations as the main boilers.

24. No boilers or steam chamber is to be so constructed, fitted, or arranged so that the escape of steam from it through the safety-valve can be wholly, or partially, intercepted by the action of any other valve.

A stop valve must always be fitted between the boiler and the steam pipe, and, where two or more boilers are connected with a steam receiver or superheater, between each boiler and the superheater or steam receiver. The object of this is obvious, viz., to avoid the failure of all the boilers through the failure of one. The necks of stop valves should be as short as practicable.

25. Each boiler must be fitted with a glass water-gauge, at least two test cocks, and steam-gauge, that is to say, each boiler must be fitted with all fittings as complete as if there were only one boiler. When a factory has more than one boiler, and these boilers are fitted with stop-valves, each boiler must be treated as a separate one, and have all the requisite fittings.

26. On every inspection of a steam boiler the Inspector shall, if the boiler is large enough, go inside it, and make a thorough examination of it.

When the boilers are not large enough for the Inspector to get into, he should see them tested by hydraulic pressure at every annual inspection at least. The hydraulic test should also be applied at every inspection if the Inspector consider it necessary.

Whenever it is only removable stays that prevent getting in, he must order their removal, and he must see them properly replaced before granting his declaration.

If any part of a main boiler near the uptake fireboxes or furnaces is so constructed that the Inspector cannot examine it, he is not to give a declaration, but shall report the case to the Sanitary Engineer.

If for special reasons, and for special reasons only, the Inspector cannot go inside a small boiler, he must distinctly state on the face of his declaration his reasons for not being able to do so.

27. If the boiler is too hot for the Inspector to examine the inside efficiently, and with safety and convenience, he should decline to examine the boiler, and absolutely refuse to grant a certificate, until he can make an efficient internal examination.

28. Before testing a boiler the Inspector shall examine it, take the necessary measurements, and calculate what the working pressure should be in accordance with the regulations, and only test it with reference to that pressure in accordance with Rule 8. If the test is not satisfactory, the pressure must be proportionately reduced.

This course will enable any necessary alterations to be made by the owners and prevent delay or disappointment. The Inspector who grants the certificate should not increase the working pressure without first consulting the Sanitary Engineer.

The Inspector who grants the certificate must examine the boilers thoroughly, and in the absence of special instructions from the Sanitary Engineer, will be held responsible for the pressure allowed.

29. The Inspector shall see all new boilers, and boilers that have been cleaned for a thorough repair, tested by hydraulic pressure, in accordance with Rule 8 previous to the boilers being set, and before they are covered in, to test the workmanship, &c.; but the working pressure is to be determined by the strength of stays, thickness of plates, and strength of riveting, &c., and not by the hydraulic test.

The hydraulic test should in no case exceed twice the calculated working pressure of the boiler, and it is never to be applied until the boiler has been examined and until the strength has been calculated, from the necessary measurements taken from the boiler itself.

When the boilers are set the Inspector may, at any time he thinks it necessary, before he gives a certificate, have them tested by hydraulic pressure to satisfy himself as to any doubtful part, or of places not easy of access, care being taken in the case of old boilers not to overstrain them; but the test must always exceed the working pressure.

The hydraulic test should before a certificate is granted be applied to all boilers that have not previously had a working certificate.

When a boiler is partially inspected by one Inspector, and the inspection is completed and a certificate granted by another, if the Inspector who witnesses the test of the boiler by hydraulic pressure has an opportunity of examining it inside and outside after the test, such Inspector should determine the pressure to be allowed on the boiler in question, taking care to inform the makers, owners, or agents, and the Inspector who is ultimately to grant a certificate, what pressure should in his opinion be allowed on it. In the event of the original Inspectors having no opportunity to examine the boiler inside and out after the hydrostatic test, the Inspector must re-test the boiler by water and examine the boiler inside and out before determining the working pressure and granting a certificate.

The amount of the hydraulic pressure test, and the date on which it was last applied to the boiler, should be inserted in the Inspector's certificate, and recorded in the dimension sheet of that boiler.

Inspectors should pay particular attention to the examination and testing of steam pipes and economisers.

In all cases in which a socket expansion joint is fitted to a bent steam pipe, the Inspector should require a fixed gland and bolts to be fitted, in order to prevent the end of the pipe being forced out of the socket. This regulation should be complied with in all cases of bent pipes fitted with socket expansion joints. Fixed glands and bolts should be fitted to the expansion joints of straight steam pipes, as cases have occurred, particularly with small straight pipes, in which the ends of the pipes have been forced out of the sockets.

30. In all boilers in which the Inspector finds that cast iron is employed in such a manner as to be subject to the pressure of steam or water, he shall report the circumstances to the Sanitary Engineer, in order that he may obtain instructions how to act. Cast iron must not be used for stays, and the Inspector should discourage the use of cast iron saddles for boilers.

31. A pressure once allowed on a boiler is not, *under any circumstances whatever*, to be increased unless the Inspector has previously written for and obtained the sanction of the Sanitary Engineer.

In case the Inspector is of opinion that an increased pressure may with safety be allowed, he shall communicate with the Inspector who last inspected the boiler; and if on learning the reasons why the existing pressure was formerly allowed, the Inspector is still of opinion that it may be increased, he should communicate all the facts of the case to the Sanitary Engineer; but, as above stated, the pressure shall not in any case be increased until the question has been decided by him.

Safety-valves.

32. The Inspector is instructed that in all *new boilers*, and whenever *alterations can be easily made*, the safety-valve and stop valve should be placed directly on the boiler; and the neck, or part between the valve and the flange which is bolted on to the boiler, should be as short as possible.

The Inspector should note that it is not intended by this instruction that old boilers which have been previously passed with such an arrangement should be thrown out of work for the alterations to be carried out.

Of course in any case in which the Inspector is of opinion that it is positively dangerous to have a length of pipe between the boilers and the safety-valve, it is his duty at once to insist on the requisite alterations being made before granting a declaration.

The Inspector shall declare, amongst other things, the limits of the weight to be placed on the safety-valves, and that the safety-valves are such and in such condition as the circumstances of the case demand.

33. The area per square foot of fire grate surface of safety-valves, or (when there is more than one safety-valve on the boiler) the combined area of the safety-valves should be not less than that given in the following tables opposite the boiler pressure intended, provided the valves are not less than two inches in diameter. This applies to new boilers which have not received a working certificate.

In ascertaining the fire grate area, the length of the grate should be measured from the inner edge of the dead plate to the front of the bridge, and the width from side to side of the furnace on the top of the bars at the middle of their length.

If there is only one safety-valve on a *main* boiler the Inspector should not grant a certificate without first referring the case to the Sanitary Engineer for special instructions.

In the case of small boilers, if it is wished to fit valves smaller than two inches diameter, the case should be submitted for the consideration of the Sanitary Engineer.

Safety-Valve Areas.

Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.
LB.	SQ. INCH.	LB.	SQ. INCH.	LB.	SQ. INCH.
15	1·250	77	·407	139	·243
16	1·209	78	·403	140	·241
17	1·171	79	·398	141	·240
18	1·136	80	·394	142	·238
19	1·102	81	·390	143	·237
20	1·071	82	·386	144	·235
21	1·041	83	·382	145	·234
22	1·013	84	·378	146	·232
23	·986	85	·375	147	·231
24	·961	86	·371	148	·230
25	·937	87	·367	149	·228
26	·914	88	·364	150	·227
27	·892	89	·360	151	·225
28	.872	90	·357	152	·224
29	·852	91	·353	153	·223
30	·833	92	·350	154	·221
31	·815	93	·347	155	·220
32	·797	94	·344	156	·219
33	·781	95	·340	157	·218
34	·765	96	·337	158	·216
35	·750	97	·334	159	.215
36	·735	98	·331	160	·214
37	·721	99	·328	161	·213
38	·707	100	·326	162	·211
39	·694	101	·323	163	·210
40	·681	102	·320	164	·209
41	·669	103	·317	165	·208
42	·657	104	·315	166	·207
43	·646	105	·312	167	·206
44	·635	106	·309	168	·204
45	·625	107	·307	169	·203
46	·614	108	·304	170	·202
47	·604	109	·302	171	·201
48	·595	110	·300	172	·200
49	·585	111	·297	173	·199
50	·576	112	·295	174	·198
51	·568	113	·292	175	·197
52	·559	114	·290	176	·196
53	·551	115	·288	177	·195
54	·543	116	·286	178	·194
55	·535	117	·284	179	·193
56	·528	118	·281	180	·192
57	·520	119	·279	181	·191
58	·513	120	·277	182	·190
59	·506	121	·275	183	·189
60	·500	122	·273	184	·188
61	·493	123	·271	185	·187
62	·487	124	·269	186	·186
63	·480	125	·267	187	·185
64	·474	126	·265	188	·184
65	·468	127	·264	189	.183
66	·462	128	.262	190	·182
67	·457	129	·260	191	·181
68	·451	130	·258	192	·181
69	·446	131	·256	193	·180
70	·441	132	·255	194	·179
71	·436	133	·253	195	·178
72	·431	134	·251	196	·177
73	·426	135	·250	197	·176
74	·421	136	·248	198	·176
75	·416	137	·246	199	·175
76	·412	138	·245	200	·174

34. The Inspector in his examination of the boilers and appurtenances is particularly to direct his attention to the safety-valves, and whenever he considers it necessary, he is to satisfy himself as to the pressure on the boiler by actual trial.

The Inspector is to fix the limits of the weight to be placed on the safety-valves, and the responsibility of issuing a certificate before he is fully satisfied on the point is very grave. The Inspector is to examine the whole of the valves, weights, and springs at every inspection.

The responsibility of seeing to the efficiency of the mode by which the valves are fitted so as to be as much as practicable under the control of the Engineer when steam is up, rests with the Inspector.

The safety-valve should be fitted with lifting gear, which should in all cases be arranged so that it can be worked by hand.

Care should be taken that the safety-valves have a lift equal to at least one-fourth their diameter; that the openings for the passage of steam to and from the valves, including the waste steam pipe, should each have an area not less than the area of valves required, and that each valve-box has a drain pipe fitted at its lower part. In the case of lever valves, if the lever is not bushed with brass, the pins must be of brass; iron and iron working together must not be passed. Too much care cannot be devoted to seeing that there is proper lift, and free means of escape of waste steam, as it is obvious that unless the lift and means for escape of waste steam are ample, the effect is the same as reducing the area of the valve or putting on an extra load. The valve seats should be secured by studs and nuts.

The Inspector shall, as far as is in his power, make these points generally known to the owners of steam boilers.

35. When the Inspector has determined the amount of pressure, he is to see the valves weighted accordingly and the weights or springs fixed in such a manner as to preclude the possibility of their shifting or in any way increasing the pressure. The limits of the weight on the valves is to be inserted in the declaration, and should it at any time come to the Inspector's knowledge that the weights or the loading of the valves have been shifted, or otherwise altered, or that the valves have been in any way interfered with, so as to increase the pressure, without the sanction of the Sanitary Engineer, he is at once to report the facts.

14

Govt. of {1895} Madras.

JUDICIAL.

Issued

Recd. *Encl.*

G.O., 25th January 1895, No. 174.

JANUARY.

Steam-boilers Act, 1893.

Directing that the Madras — be brought into operation in the City of Madras with effect from the 1st April 1895, and passing certain other orders in connection with the same.

3 abstr
Judicial Dipt.

15

2165

From.

The Commissioner of Police
Madras.

To

The Chief Secretary to Govt.
Fort St. George

Dated 25th } April 1894
Received 26th }
Regd 27th.

CHIEF SECRETARY'S
26 APR 1894
GOVERNMENT OF MADRAS

No 51.

Enclosure. One.

Re Steam Boilers and Prime movers Act

Forwarding a list of Steam Boilers in use in the Madras City.

[signature]

21.4.97. Dy. Commissioner of Police.

Steam Road Roller	Wall Tax Road	[illegible]	[illegible]	[illegible]	do
Steam Pump	Madras Ry. Compound	1 boiler	6 H.P.	Pumping water	do
Steam Fire Engine	5/1 Station	1 boiler	4 H.P.	do	Registered.
Madras Harbour Works.	Royapuram.	4 boilers 2 do 1 do 1 do.	40 H.P. each 8. H.P. each 10. H.P. 5 H.P.	Stationary engine Hydraulic Crane Titan Crane Steam Crane	
do	Seven Wells Pier	2 boilers	4 H.P. each	Shipping & discharging cargo.	Not Registered
do	South Harbour Groyne shore end.	1 boiler	12 H.P.	Shipping Concrete blocks	do
do	North Harbour Groyne shore end	1 boiler	10 H.P.	Setting Concrete blocks	do
do	South Harbour Groyne. Sea end.	1 boiler	10 H.P.	do	do

96

99

Brick & tile works	Otteray	2 boilers	12 H.P. each	Making tiles of sorts	Not Registered.
Gun Carriage Factory	Vepery	8 boilers	96 H.P. each	Ordnance & miscellaneous works for Regiment and Batteries	Registered.
Simpson & Co.	Mount Road	1 boiler	10 H.P.	Carriage building	do
Oakes & Co.	do	1 boiler	6 H.P.	Aerated waters & printing	Not Registered
Smith & Co.	do	2 boilers	2 H.P. each	Aerated waters	do
Lawrence Asylum Press	do	1 boiler	12 H.P.	Printing	Registered
Madras Ice Manufacturing Co.	Poonamallee Road	2 boilers	20 H.P. each	Manufacturing ice	Not Registered
South India Ice Factory	do	1 boiler	12 H.P.	[illegible] stuff	do
Brick Fields	do	1 boiler	10 H.P.	Pugging & grinding clay	Registered
School of Arts	do	1 boiler	6 H.P.	Manufacturing pottery	do

Name of manufactory.	Locality situated in	Number of Steam boilers	What horse power each	What works they are used for	Whether Registered or not under the Factories Act.
Bee Hive Foundry	Popham's Broadway	1 boiler 1 do 1 do	12 H.P. 10 do 6 do	Used for machine shop " Smithy shed " do	Registered.
				Printing	do
Government Press	Mint Buildings	1 boiler	8 H.P.	for machine shop	do
Parham & Co.	[illegible] Street	1 boiler 1 do	6 H.P. 6 H.P.	for Blacksmith's shed.	
Medical Stores	Mint Street	1 boiler	6 H.P.	for cleaning, cutting, repairing surgical instruments, grinding powders, surgical instruments & putting bandages.	Not Registered
[illegible]	[illegible]	[illegible]	12 H.P.	for driving machine [illegible]	Registered
			12 H.P.	for Foundry for Steam Hammer	
[illegible] Brick & tile works	[illegible] Street	1 boiler	6 H.P.	Condiment works	Not Registered.
[illegible] Petroleum Installation	Royapuram	1 boiler	15 H.P.	Pumping oil from one tank into another.	do.
[illegible] works	[illegible] St	1 boiler	10 H.P.	Engineers works.	Registered
Cement works	do	1 boiler 1 do 1 do	30 H.P. 20 H.P. 8 H.P.	Manufacture of cements & tile works.	do
Basin Foundry	[illegible] Basin Road	1 boiler 1 do	12 H.P. 8 H.P.	Casting works	do
Bone Manufactory	[illegible] St	1 boiler	10 H.P.	Crushing bones	Not Registered
Southern India Spinning & Weaving Mill.	Royapuram	3 boilers 2 do	80 H.P. 30 H.P.	Manufacturing cotton fabrics.	Registered.
[illegible] grinding & [illegible] Mill	[illegible] High Road	1 boiler 2 do. 1 do. 1 do.	20 H.P. 12 H.P. 14 H.P. 8 H.	Paddy grinding, [illegible] machines.	Registered

Name of Manufactory.	Locality situated in	Number of Steam boilers.	What horse power.	What works they are used for.	If Registered or not under the Factories Act.
P. W. D. Workshop	Chepauk.	1 boiler	10 H.P.	Instruction of the students of the College.	Not Registered.
Messrs. Deschamps & Co.	Mount Road.	1 boiler	20 H.P.	Sewing Machine & Running lead	do
D. Raju & Co.	High Road - Saint Thome.	1 boiler	20 H.P.	Engineering	Registered.
Government Bakery	Mount Road Saidapett.	2 boilers	20 H.P. each	For grinding wheat	Not Registered
Buckingham Mill	Perambore	7 boilers	60 H.P. each.	Spinning & Weaving	Registered
Carnatic Mill	do	7 boilers	60 H.P. each	do	do.
Indian United Spinning [illegible]	[illegible]	1 boiler	300 H.P.	do	do

Name of Manufactory	Locality situated in	No. of steam boilers	What horse power	What work done and used for	If Registered or not under the Factories Act.
Municipal Workshops	Basin Street	8 boilers		Not in use	Registered
Municipal Pumping Station	Ryehaven	1 boiler	20 N.P.	Pumping drainage water	do
do	Williams	1 boiler	4 N.P.	Pumping Sewage	Not Registered
do	Mc Mullens Road	1 boiler	6 N.P.	do	do
do	Kirkmanhill	1 boiler	8 N.P.	do	do
do	Christchurch	1 boiler	8 N.P.	do	do

21

Name of Manufactory	Locality situated in	No. of Steam boilers	What horse power	What works they are used for	If Registered or not under the Factories Act.
Canadian Harbour Works.	South Block Yard.	1 boiler	8 H.P.	Lifting Concrete blocks	Not Registered.
do	Canada Harbour Groyne. Sea end.	1 boiler	10 H.P.	Lifting Concrete blocks.	do
do	Adjoining the Harbour Works Office	1 boiler	5 H.P.	Dragging Stone	do

6.9.06

27

Go 174 175

No. 51-

City Police Office.

Madras, 25th April 1894

From Colonel H. D. N. Cox
THE COMMISSIONER OF POLICE,
MADRAS.

To The Chief Secretary to Government
Fort Saint George.

Sir,

With reference to G. O. No. 610 dated 12th March 1894 I have the honour to forward a list of boilers in use in the Town of Madras.

2 ——— those marked "Registered" belong to the manufactories on the Register of Factories.

I have the honourable
Sir
Your most obedient Servant

H. D. N. Cox Colonel
Commissioner of Police
Madras

No. 568 / Magistrate of 1894

District Magistrate's
Coimbatore ~~Collector's~~ Office,
10th May 1894

From,

R. D. Broadfoot Esqre.
Acting District ~~Collector~~ Magistrate of Coimbatore.

To,

The Chief Secretary to Government
Judicial Department,

MADRAS.

Retaccamund

Sir,

With reference to Government Judicial Order, No. 610, Dated 12th March 1894 Judicial, I have the honor to report that there are eleven Steam-boilers in use in this District.

I have the honor to be,
Sir,
Your most obedient Servant.

[illegible]
For Acting District Magistrate.

C.V.V.
10/5

6-5-86

Judicial Dept
CURRENT NO. 2419

Judicial (1894) DEPARTMENT.

From, The Collector of Coimbatore.

CHIEF SECRETARY GOVERNMENT OF MADRAS
11 MAY 1894

To,

The Chief Secretary to Government

Judicial Department,

MADRAS.

Dofacammd

No. 568 Magistrate of 1894.

Dated 10th
Received 11th } May 1894
Regd 11th

No.

ENCS. Nil

SUBJECT.

Informing him that there are 11 Steam-boilers in the District in use.

Salem Collector's Office.

18 May 1894.

No. 815 M

From G. Slater Esq.,
Collr. & Dist. Magte. of Salem.

To

The chief Secretary to Government,
Judicial Department,
Madras.

SIR,

With reference to Government Order dated 12th March 1894 No 610 Judicial, I have the honour to report that there is only one steam boiler in use at Suramangalam Distillery in this District.

I have the honour to be
Sir
Your most obedient Servant

for Dist Magistrate

15/5

Judicial Dept
2569

From

The District Magistrate
Salem

To

The Chief Secretary to ~~Government~~
Government
Judicial Dept.
Madras

Dated: 18th May 1894
Recd 19th ~~20~~ 19 MAY. 94
Regd 21st ~~do~~
No. 815
Pm

Subject

Reporting that there is only one Steam boiler in use at Suramangalam Distillery in the District

Magistrate's No. (83 / 20/5/94)

BELLARY COLLECTOR'S OFFICE.
Dated 19th May 1894.

CHIEF SECRETARY
22 MAY 1894
GOVERNMENT OF MADRAS

FROM F. A. Nicholson Esqr
COLLECTOR ~~OF~~ & Dt Magte
BELLARY.

To

THE Chief Secretary to Government
Judicial Department, Madras.

SIR,

With reference to Government order No. 610 Judicial dated 12th March 1894, I have the honor to append in the margin a statement showing the number of steam boilers in this District.

Name of the Factory	No. of Boilers.
Bellary Town: Spinning and weaving mills	4
Western Cotton Press	1
Sahapathy Cotton Press	1
Messrs Symes & Co Cotton Press	1
Hafiz Abdul Cotton Press	1
Bellary Steam Distillery	1
Veerabadrappa distillery	1
Messrs Mathias Abraham distillery	1
Adoni: Sahapathy Motalaru Cotton Press	1
The City People's Press	1
Messrs Ramulu & Sons Cotton Press	1
Messrs Symes & Co's Cotton Press	1
Total	15

I have the honor to be
Sir
Your most obedient Servant

J. J. Cotton
for District Magistrate

Judicial Dept
CIRCUIT NO 2606

REVENUE DEPARTMENT.

FROM

THE COLLECTOR OF
BELLARY.

To

THE Chief Secretary to Government
Judicial Department
Madras.

M. Inds No. 83

Dated 19
Despatched 20 } May 1894
Received 22 nd
Regd 23 rd Enclosures.

Abstract.

Reporting the number of steam boilers in use in the district of Bellary.

K.
There are three more replies due - Tinnevelly, Kistnah
Pld.
MR 24/5.

1894

CHIEF SECRETARY
25 MAY 1894
GOVERNMENT OF MADRAS

Judicial Department.

TINNEVELLY Dist. Magte OFFICE.

From

The Dist. Magistrate

Tinnevelly.

To

The Chief Secretary to

Government
Judicial Dept.
Fort St. George.

Dated 22 } May 1894
Received 25 }
Regd 25 No. 556

ENCLOSURE. "

SUBJECT.

Stating that there are 27 steam boilers in use in this district

CURRENT NO 264/

Tinnevelly District Magistrates Office
Dated May 1894.

From

G. S. Forbes Esquire,
District Magistrate of
Tinnevelly,

To

The Chief Secretary to Government,
Judicial Department,
Fort St. George.

Sir,

In reply to G.O. No. 610 dated the 12th March 1894, I have the honor to state that there are 27 steam boilers in use in this district.

I have the honor to be,
Sir,
Your most obedient servant,

District Magistrate.

PR
22.5.94

22-5-94

Tanjore District Magistrate's Office
Vallam 30th March 1894.

No. 351/Magl. of 94

1705

From H. M. Winterbotham Esquire,
District Magistrate,
Tanjore;

To The Chief Secretary to Government,
Judicial Department,
Madras.

Sir,

With reference to Government Order, No. 610. Judicial Department, dated 12th March 1894, I have the honour to report that there are only 5 boilers in this District (Exclusive of those used for Railways) as hereunder given:-

(1) One steam boiler used by the Kumba-konam Municipality for pumping.

(2) Two steam boilers used by the Negapatam Municipality for pumping.

(3) One steam boiler at Oratur, near Nidamangalam, attached to a rice-mill.

(4) a boiler used for the Tanjore Town Water-Works.

I have the honour to be,
Sir,
Your most obedient servant,
M Rau Vanula
for District Magistrate

ei/ 1AV/

1705
Jud Dept

From

The District Magistrate

Tanjore

To

The Chief Secretary to Govt

Judicial Department

Madras.

Dated 30th March 1894

Desp'd. 1-4-94

CHIEF SECRETARY
No. 357 APR. 1894
GOVERNMENT OF MADRAS

Rec'd

Regd 3/4

Encl: nil.

SUBJECT

Reporting that there are only 5 Steam Boilers in this District exclusive of those used for Railways.

To await the replies.

[G/9]

5,000—14-7-93.

4 Chepauk

Current No. 2815

Judicial Department.

a/2806/94.
2953/94.

From

The Under Secretary
to the
Government of Bombay

No. 1942

Dated 25. May 94

Received 2. June

Regd. 4

Enclosures 3.2 + (2 Sets)

SUBJECT.

Bombay Boiler Inspection Act. 1891

Abstract

Forwards for information a copy of the rules under the ____ as finally approved by the Bombay Government with 2 Spare Copies.

GENERAL DEPARTMENT.

Bombay Castle, 21st May 1894.

No. 1877.—In exercise of the power conferred by Sections 4, 7 and 35 of the Bombay Boiler Inspection Act, 1891, and in supersession of any rules heretofore in force under the said Act, the Governor in Council is pleased to frame the following rules for every part of the Presidency in which the said Act is in force, including Aden, viz. :—

Preliminary.

Short title.

1. These rules may be cited as the Bombay Boiler Inspection Rules, 1894.

Definitions.

2. In these rules, unless there be something repugnant in the subject or context :

(*a*) "the Act" means the Bombay Boiler Inspection Act, 1891 ;

(*b*) "section" means a section of the said Act ;

(*c*) "the Collector" means

(i) in the City of Bombay, the Collector of Bombay,

(ii) in the Settlement of Aden, the First Assistant Resident, and

(iii) elsewhere, the chief local officer in charge of the Revenue administration of a district ;

(*d*) "Aden" means the Settlement of Aden ;

(*e*) the "Presidency Proper" includes every part of the Presidency of Bombay other than Aden and the Province of Sind,

"The Presidency" includes the Province of Sind and every other part of the Presidency of Bombay except Aden, and "Mofussil" means any part of the Presidency except the City of Bombay ;

(*f*) "Office" means the Bombay Boiler Inspection Office, in which all records in connection with the working of the Act in the area where it is located are to be kept ;

(*g*) "Inspection" means the inspection of boilers under the Act, and "inspection fees" mean fees leviable under sections 8 and 17 and these rules ;

(*h*) The terms defined in section 3 shall be deemed to have, respectively, the same meaning as is given to them by the Act ;

(*i*) words in the singular include the plural and *vice versâ*.

Inspector.

Duties and emoluments of Inspectors.

3. (1) No Inspector shall undertake any professional work unconnected with his duties under the Act.

(2) The emoluments of Inspectors shall consist

(*a*) in Aden entirely of inspection fees,

(*b*) in the Presidency entirely of monthly salaries payable by Government.

(3) Inspection fees received in the Presidency shall be placed to the credit of Government.

Boiler Inspection Office.

4. The location and charge of the offices for the undermentioned areas shall be as follows :—

Area.	Location.	Officer in charge.
For Aden	The Residency Office.	Inspector.
For the Presidency Proper.	The Town Custom House, Bombay.	Senior Inspector.
For Karáchi District .	Office of Collector.	Collector.
For Hyderabad District.	Do. ..	Do.

Duties of Senior Inspector.

5. The Senior Inspector shall ordinarily inspect in the City of Bombay. He

(*a*) *shall*, when not engaged in out-door duties,

(i) attend office during usual office hours,

(ii) act under the orders of the Collector of Bombay, and

(iii) make to the Collector of Bombay and to the Collectors of the districts in the Presidency all reports concerning the working of the Act in their respective charges ;

(*b*) *may*,

(i) whenever he thinks such a course necessary or desirable, make any particular inspection in any part of the Presidency, in order to supervise the work and proceedings of the Junior Inspectors ;

(ii) authorize or direct inspection in the said city by a Junior Inspector.

Aden Inspector's duties.

6. Inspection in Aden shall be conducted by an Inspector who shall

(*a*) act under the orders of the Political Resident, and

(*b*) make reports to that officer through the Collector.

Ordinary duties of Junior Inspectors.

7. (1) Inspections in the mofussil shall ordinarily be made by a Junior Inspector.

(2) All Junior Inspectors in the Presidency shall

(*a*) be subordinate to the Senior Inspector,

(*b*) submit every week to the Senior Inspector copies of their diaries for his information and record,

(*c*) make reports to the Senior Inspector.

Duties of all Inspectors in the Presidency.

8. Every Inspector in the Presidency shall keep the following records :

(*a*) a diary of the work which he performs from day to day, in which he shall enter

(i) each place visited,

(ii) each work performed by him under the Act,

(iii) the fees earned on account of such work,

(iv) such additional particulars as he or his superior from time to time thinks necessary ; and

(*b*) in accordance with such orders as the Collector of Bombay may make requiring statements with regard to boilers liable to inspection under the Act—

(i) an Index,

(ii) a Register,

(iii) Dimension sheets,

(iv) such other statements and records as may, from time to time, be required as aforesaid.

Subordination of Inspectors in the Presidency to Collectors.

9. Every Inspector in the Presidency shall act

(*a*) in respect of travelling and office work, under the orders of the Collector of Bombay;

(*b*) in respect of inspections in the mofussil and any action connected therewith, under the orders of the Collector of the district in which such inspection is required or made.

Duties of Inspectors with respect to Commissions.

10. An Inspector against whose proceedings an appeal is made shall attend every meeting of a Commission appointed under section 5 to hear such appeal and shall make statements on such matters and submit such plans to the Commission as he thinks necessary, or as shall be called for by the Commission.

Provisions as to inspection of boilers.

11. (1) Inspections shall be carried out in accordance with the separate "Rules for settling the duties of Inspectors."

(2) If the owner or person in charge of a boiler to be examined fails to comply in any material point with any of the provisions of section 9, the Inspector shall defer his inspection and shall report the case to the Collector, or in Bombay, if a Junior Inspector is making the inspection, to the Senior Inspector, for orders.

Fees for inspection.

12. Inspecting fees shall be levied according to the following scale:—

(1) For inspecting each boiler not exceeding	10	N. H. P.	Rs. 15
(2) For inspecting each boiler exceeding 10 but not over ...	20	,, ,,	20
(3) For inspecting each boiler exceeding 20 but not over ...	30	,, ,,	30
(4) For inspecting each boiler exceeding 30 but not over ..	50	,, ,,	40
(5) For inspecting each boiler exceeding	50	,, ,,	50

Commission.

Commissions to consist of three members.

13. (1) Elsewhere than in Aden, Commissions appointed by Government under section 5 will consist of three members, one of whom shall be President of the Commission.

(2) In Aden the Commission will consist of one person appointed by Government, who shall perform the duties hereinafter imposed on the President of a Commission elsewhere.

(3) The appointments and the terms for which they are respectively to endure will be notified in the *Bombay Government Gazette*.

Meeting of Commissions.

14. Members of Commissions shall assemble at the request of the Collector at his office or at such other place as he may specify whenever necessary for hearing appeals under section 11 or determining questions under section 14, or any matter relating to the Act, and a clerk of the Boiler Office or of the Collector's Office will act as Clerk to the Commission.

Emoluments of members of commissions.

15. Every member of a Commission shall be entitled to receive in Bombay a fee of Rs. (30) thirty, and elsewhere of such amount as may from time to time be prescribed by Government for each district, for each meeting of the Commission at which any duty prescribed by the Act is performed by the Commission and which he attends from the beginning to the end thereof. In the mofussil every member of Commission shall also be entitled to travelling expenses, if any have been incurred by him.

Enquiry into misconduct, &c., of Engineers.

16. It shall be the duty of the Collector to enquire into any alleged drunkenness, negligence or serious misconduct on the part of any Engineer in charge of a boiler or boilers of any horse-power, and at the close of such enquiry to make such recommendation to Government with reference to section 24 as he shall think fit.

Manner of marking registry number on boilers.

17. The registry number of every boiler shall be cut in the front plate thereof in such position as shall be pointed out by an Inspector. The device to be so engraved shall consist of the letters R Y above the letters No. divided by a horizontal line, the letters to be followed by the number in figures, the former to be one-half an inch and the latter one and a quarter inch in height, the whole to be enclosed in a rectangular figure one-sixteenth of an inch clear from the letters and figures.

The engraving shall be not less than one-sixty-fourth of an inch deep (*see* specimen).

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Appeals and enquiries under Section 14.

18. An appeal under section 11 shall be made in writing, either in English or in the vernacular.

19. It may either be presented personally to the Collector or sent by post.

20. The petition of appeal shall be accompanied by the original of the reasons, given in writing by the Inspector, for the refusal of the certificate or by a certified copy of it.

21. The petition shall state the grounds of appeal against the reasons given by the Inspector for refusing the certificate.

22. On receipt of an appeal forwarded by the Collector, the Commission shall issue a notice to the appellant stating a date not later than that within which the appeal must, under section 12 of the Act, be heard, on which it is proposed to hear the appeal, and informing him that if he wishes to be heard in support of the appeal or,

to produce evidence, he must be present either in person or by an authorized agent, with his evidence, on the date specified. The notice shall be sent to such address as shall be entered in the petition of appeal. If the petitioner is not present on the date fixed, the appeal shall be decided in his absence.

23. When it shall appear to the Collector that enquiry should be made with regard to any of the matters mentioned in clauses (*a*), (*b*), or (*c*) of sub-section (1) of section 14, he shall inform the Commission, which shall then take action under the section. The Commission may also take action under the section of its own motion.

24. Notice shall be sent by the Commission to the person regarding whose certificate an enquiry is to be held, specifying briefly the charge made and fixing the date of the enquiry. On such date he may either submit a written statement, or may be present in person or by authorized agent, and he shall be allowed to produce any evidence he may have bearing on the facts under enquiry.

25. The Commission may, at its discretion, summon any witness whose evidence it considers necessary for the purposes of any enquiry held by it.

26. All decisions of the Commission shall be in accordance with the votes of the majority of the members. The President shall have a casting vote.

27. The proceedings of the Commission shall be in writing and shall be signed by the President. A copy of any order passed shall be given to the person affected by it, if he apply for it, on payment of copying charges and stamp fees.

Enquiries under Section 24 (1).

28. If the Collector shall have reason to believe, from any cause whatever, that an enquiry should be made under section 24 (1) with regard to incompetency, drunkenness, serious misconduct or negligence on the part of any Engineer possessing a certificate of competency or service under the Act, he may either make such enquiry personally or cause it to be made by an Assistant or Deputy Collector. The proceedings shall be held in the presence of the Engineer whose conduct forms the subject of the enquiry, and he shall have an opportunity of making any statement he may wish to make and of producing evidence in his defence. The Collector shall forward the proceedings, with the opinion of the officer conducting the enquiry, to Government, with such recommendation with reference to section 24 as he shall think fit.

By order of His Excellency the Right Honourable the Governor in Council,

G. W. VIDAL,

Acting Chief Secretary to Government.

GENERAL DEPARTMENT.

Bombay Castle, 21st May 1894.

No. 1877*A*.—In exercise of the power conferred by Section 35 (*a*) of the Bombay Boiler Inspection Act, 1891, the Governor in Council is pleased to frame the following rules for settling the duties of Inspectors under the said Act with respect to the inspection of Steam Boilers in every part of the Bombay Presidency in which the said Act is in force, including Aden, viz. :—

Iron Boilers.

1. The Inspector is required by the Act to fix the pressure to be allowed on boilers. In performing this very responsible and onerous duty he must be very careful, as in the event of accident it will be necessary for him to prove clearly that he used due caution. On the one hand he must be careful as regards safety, and on the other hand he must not unduly reduce the pressure on a boiler.

2. The Inspector should fix the working pressure for boilers by a series of calculations of the strength of the various parts, and according to the workmanship and material.

In the case of boilers made in India, the Boiler Inspection Department may receive for examination plans and particulars of boilers before the commencement of manufacture, by these means hoping to prevent questions arising after the boilers are finished. The Senior Inspector should receive and report on any plans of boilers intended for use in Bombay or the districts that may be submitted in due course.

When the Inspector has received plans and tracings of new boilers, or of alterations of boilers, and has approved of them, he will of course be careful in making his examination, when the boiler is ready for work, to see that they have been followed out. When he has not had the plans submitted, but is called in to inspect a boiler, he will of course measure the parts, note the details of construction, and, if necessary, bore the plates to ascertain their thickness, &c., before he gives his certificate.

No Inspector shall declare a boiler to be safe unless (*a*) he is fully informed as to its construction, material and workmanship, or unless (*b*) he is furnished with a certificate from a Chief Engineer of a recognised boiler insurance company. He should therefore be very careful how he ventures to give a certificate.

3. In the case of new boilers the Inspector may allow a stress not exceeding 7,000 lbs. per square inch of net section on solid iron screwed stays supporting flat surfaces, but the stress should not exceed 5,000 lbs. when the stays have been welded or worked in the fire.

The areas of diagonal stays are found in the following way: Find the area of a direct stay needed to support the surface, multiply this area by the length of the diagonal stay, and divide the product by the length of a line drawn at right angles to the surface supported to the end of the diagonal stay; the quotient will be the area of the diagonal stay required.

When gusset stays are used, their area should be in excess of that found in the above way.

4. When the tops of combustion boxes or other parts of a boiler are supported by solid rectangular girders the following formula should be used for finding the working pressure to be allowed on the girders, assuming that they are not subjected to a greater temperature than the ordinary heat of steam, and in the case of combustion chambers that the ends are fitted to the edges of the tube plate and the back plate of the combustion box.

$$\frac{C \times d^2 \times T}{(W - P)\, D \times L} = \text{Working Pressure.}$$

W = Width of combustion box in inches.
P = Pitch of supporting bolts in inches.
D = Distance between the girders from centre to centre in inches.
L = Length of girder in feet.
d = Depth of girder in inches.
T = Thickness of girder in inches.
C = 500 when the girder is fitted with one supporting bolt.
C = 750 when the girder is fitted with two or three supporting bolts.
C = 850 when the girder is fitted with four supporting bolts.

The working pressure for the supporting bolts and for the plate between them should be determined by the rule for ordinary stays.

5. The pressure on plates forming flat surfaces is found by the following formula :

$$\frac{C \times (T + 1)^2}{S - 6} = \text{Working Pressure.}$$

T = Thickness of the plate in sixteenths of an inch.
S = Surface supported in square inches.
C = Constant according to the following circumstances.
C = 100 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.*
C = 90 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts only.
C = 60 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.
C = 54 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts only.

* If the diameter of riveted washers be at least $\frac{3}{4}$rds the pitch of the stays, and the thickness not less than the plates they cover, the constant may be increased to 150.
When doubling plates are fitted of the same thickness as the plates they cover and not less in width than $\frac{3}{4}$rds the pitch of the stays, the constant may be increased to 160.

The length is to be measured between the rings if the furnace is made with rings.

If the longitudinal joints instead of being butted are lap-jointed in the ordinary way, then 75,000 is to be used instead of 90,000, excepting only where the lap is bevelled and so made as to give the flues the form of a *true* circle, when 80,000 may be used.

When the material or the workmanship is not of the best quality, the constants given above must be reduced, that is to say, the 90,000 will become 80,000, the 80,000 will become 70,000, the 70,000 will become 60,000; when neither the material nor the workmanship is of the best quality, such constants will require to be further reduced, according to circumstances and the judgment of the Inspector, as in the case of old boilers. One of the conditions of best workmanship is that the joints are double riveted with double butt straps, or single riveted with double butt straps, and the holes drilled after the bending is done and when in place and the plates afterwards taken apart, the burr on the holes taken off and the holes slightly countersunk from the outside.*

The working pressure for corrugated furnaces, practically circular and machine made, provided the plane parts at the ends do not exceed 6 inches in length, and the plates are not less than $\frac{5}{8}$ inch thick, should not be greater than found by the following formula:

$$\frac{9{,}000 \times \text{thickness in inches}}{\text{Mean diameter in inches}} = \left\{ \begin{array}{l} \text{Working pressure per} \\ \text{square inch.} \end{array} \right.$$

* The following examples will serve to show the application of the constants for the different cases that may arise:

Furnaces with butt joints and drilled rivet holes.	90,000	where the longitudinal seams are welded.
	90,000	where the longitudinal seams are double riveted and fitted with single butt straps.
	80,000	where the longitudinal seams are single riveted and fitted with single butt straps.
	90,000	where the longitudinal seams are single riveted and fitted with double butt straps.
Furnaces with butt joints & punched rivet holes.	85,000	where the longitudinal seams are double riveted and fitted with single butt straps.
	75,000	where the longitudinal seams are single riveted and fitted with single butt straps.
	85,000	where the longitudinal seams are single riveted and fitted with double butt straps.
Furnaces with lapped joints and drilled rivet holes.	80,000	where the longitudinal seams are double riveted and bevelled.
	70,000	where the longitudinal seams are double riveted and not bevelled.
	70,000	where the longitudinal seams are single riveted and bevelled.
	65,000	where the longitudinal seams are single riveted and not bevelled.
Furnaces with lapped joints and punched rivet holes.	75,000	where the longitudinal seams are double riveted and bevelled.
	70,000	where the longitudinal seams are double riveted and not bevelled.
	65,000	where the longitudinal seams are single riveted and bevelled.
	60,000	where the longitudinal seams are single riveted and not bevelled.

In the case of upright fireboxes of donkey or similar boilers, 10 per cent. should be deducted from the constants given above, applicable to the respective classes of work.

Steel Boilers.

10. For Steel Boilers the rules for iron boilers may be increased as follows:—

The constants for flat surfaces when they are supported by stays screwed into the plate and riveted, 10 per cent. The constants for flat surfaces when they are supported by stays screwed into the plate and nutted, or when the stays are nutted in the steam space, 25 per cent. This is also applicable to the constants for flat surfaces stiffened by riveted washers or doubling strips, and supported by nutted stays.

The constants for combustion box girders, 10 per cent.

Boilers—General.

11. Small boilers must be surveyed and be fitted the same way as the main boilers, and have a water and steam gauge, and all other fittings complete, and as regards safety valves, must comply with the same regulations as the main boilers.

12. No boilers or steam chamber is to be so constructed, fitted, or arranged so that the escape of steam from it through the safety-valve can be wholly, or partially, intercepted by the action of any other valve.

A stop valve must always be fitted between the boiler and the steam pipe, and, where two or more boilers are connected with a steam receiver or superheater, between each boiler and the superheater or steam receiver. The object of this is obvious, viz., to avoid the failure of all the boilers through the failure of one. The necks of stop valves should be as short as practicable.

13. Each boiler must be fitted with a glass water-gauge, at least two test cocks, and steam-gauge, that is to say, each boiler must be fitted with all fittings as complete as if there were only one boiler. When a factory has more than one boiler, and these boilers are fitted with stop-valves, each boiler must be treated as a separate one, and have all the requisite fittings.

14. On every inspection of a steam boiler the Inspector shall, if the boiler is large enough, go inside it, and make a thorough examination of it.

When the boilers are not large enough for the Inspector to get into, he should see them tested by hydraulic pressure at every annual inspection at least. The hydraulic test should also be applied at every inspection if the Inspector consider it necessary.

Whenever it is only removable stays that prevent getting in, he must order their removal, and he must see them properly replaced before granting his declaration.

If any part of a main boiler near the uptake fireboxes or furnaces is so constructed that the Inspector cannot examine it, he is not to give a declaration, but shall report the case to the Senior Inspector.

If for special reasons, and for special reasons only, the Inspector cannot go inside a small boiler, he must distinctly state on the face of his declaration his reasons for not being able to do so.

15. If the boiler is too hot for the Inspector to examine the inside efficiently, and with safety and convenience, he should decline to examine

the boiler, and absolutely refuse to grant a certificate, until he can make an efficient internal examination.

16. Before testing a boiler the Inspector shall examine it, take the necessary measurements, and calculate what the working pressure should be in accordance with the regulations, and only test it with reference to that pressure in accordance with Rule 8. If the test is not satisfactory, the pressure must be proportionately reduced.

This course will enable any necessary alterations to be made by the owners and prevent delay or disappointment. The Inspector who grants the certificate should not increase the working pressure without first consulting the Senior Inspector.

The Inspector who grants the certificate must examine the boilers thoroughly, and in the absence of special instructions from the Senior Inspector, will be held responsible for the pressure allowed.

17. The Inspector shall see all new boilers, and boilers that have been cleaned for a thorough repair, tested by hydraulic pressure, in accordance with Rule 8 previous to the boilers being set, and before they are covered in, to test the workmanship, &c.; but the working pressure is to be determined by the strength of stays, thickness of plates, and strength of riveting, &c., and not by the hydraulic test.

The hydraulic test should in no case exceed twice the calculated working pressure of the boiler, and it is never to be applied until the boiler has been examined and until the strength has been calculated, from the necessary measurements taken from the boiler itself.

When the boilers are set the Inspector may, at any time he thinks it necessary, before he gives a certificate, have them tested by hydraulic pressure to satisfy himself as to any doubtful part, or of places not easy of access, care being taken in the case of old boilers not to overstrain them; but the test must always exceed the working pressure.

The hydraulic test should before a certificate is granted be applied to all boilers that have not previously had a working certificate.

When a boiler is partially inspected by one Inspector, and the inspection is completed and a certificate granted by another, if the Inspector who witnesses the test of the boiler by hydraulic pressure has an opportunity of examining it inside and outside after the test, such Inspector should determine the pressure to be allowed on the boiler in question, taking care to inform the makers, owners, or agents, and the Inspector who is ultimately to grant a certificate, what ressure should in his opinion be allowed on it. In the event of the original Inspectors having no opportunity to examine the boiler inside and out after the hydrostatic test, the Inspector must re-test the boiler by water and examine the boiler inside and out before determining the working pressure and granting a certificate.

The amount of the hydraulic pressure test, and the date on which it was last applied to the boiler, should be inserted in the Inspector's certificate, and recorded in the dimension sheet of that boiler.

Inspectors should pay particular attention to the examination and testing of steam pipes and economisers.

In all cases in which a socket expansion joint is fitted to a bent steam pipe, the Inspector should require a fixed gland and bolts to be fitted, in order to prevent the end of the pipe being forced out of the socket. This regulation should be complied with in all cases of bent pipes fitted with socket expansion joints. Fixed glands and bolts should be fitted to the expansion joints of straight steam pipes, as cases have occurred, particularly with small straight pipes, in which the ends of the pipes have been forced out of the sockets.

18. In all boilers in which the Inspectors find that cast iron is employed in such a manner as to be subject to the pressure of steam or water, they shall report the circumstances to the Senior Inspector, in order that they may receive instructions how to act. Cast iron must not be used for stays, and Inspectors should discourage the use of cast iron saddles for boilers.

19. A pressure once allowed on a boiler is not, *under any circumstances whatever*, to be increased unless the Inspector has previously written for and obtained the sanction of the Senior Inspector.

In case an Inspector is of opinion that an increased pressure may with safety be allowed, he shall communicate with the Inspector who last inspected the boiler; and if on learning the reasons why the existing pressure was formerly allowed, the Inspector is still of opinion that it may be increased, he should communicate all the facts of the case to the Senior Inspector; but, as above stated, the pressure shall not in any case be increased until the question has been decided by him.

Safety-valves.

20. The Inspectors are instructed that in all *new boilers*, and whenever *alterations can be easily made*, the safety-valve and stop-valve should be placed directly on the boiler; and the neck, or part between the valve and the flange which is bolted on to the boiler, should be as short as possible.

The Inspector should note that it is not intended by this instruction that old boilers which have been previously passed with such an arrangement should be thrown out of work for the alterations to be carried out.

Of course in any case in which an Inspector is of opinion that it is positively dangerous to have a length of pipe between the boilers and the safety-valve, it is his duty at once to insist on the requisite alterations being made before granting a declaration.

The Inspector shall declare, amongst other things, the limits of the weight to be placed on the safety-valves, and that the safety-valves are such and in such condition as required by the Act.

21. The area per square foot of fire grate surface of safety-valves, or (when there is more than one safety-valve on the boiler) the combined area of the safety-valves should be not less than that given in the following tables opposite the boiler pressure intended, provided the valves are not less than two inches in diameter. This

applies to new boilers which have not received a working certificate.

In ascertaining the fire grate area, the length of the grate should be measured from the inner edge of the dead plate to the front of the bridge, and the width from side to side of the furnace on the top of the bars at the middle of their length.

If there is only one safty-valve on a *main* boiler the Inspector should not grant a certificate without first referring the case to the Senior Inspector for special instructions.

In the case of small boilers, if it is wished to fit valves smaller than two inches diameter, the case should be submitted for the consideration of the Senior Inspector.

SAFETY-VALVE AREAS.

Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.
lbs.	Sq. inch.	lbs.	Sq. inch.	lbs.	Sq. inch.
15	1·250	77	·407	139	·243
16	1·209	78	·403	140	·241
17	1·171	79	·398	141	·240
18	1·136	80	·394	142	·238
19	1·102	81	·390	143	·237
20	1·071	82	·386	144	·235
21	1·041	83	·382	145	·234
22	1·013	84	·378	146	·232
23	·986	85	·375	147	·231
24	·961	86	·371	148	·230
25	·937	87	·367	149	·228
26	·914	88	·364	150	·227
27	·892	89	·360	151	·225
28	·872	90	·357	152	·224
29	·852	91	·353	153	·223
30	·833	92	·350	154	·221
31	·815	93	·347	155	·220
32	·797	94	·344	156	·219
33	·781	95	·340	157	·218
34	·765	96	·337	158	·216
35	·750	97	·334	159	·215
36	·735	98	·331	160	·214
37	·721	99	·328	161	·213
38	·707	100	·326	162	·211
39	·694	101	·323	163	·210
40	·681	102	·320	164	·209
41	·669	103	·317	165	·208
42	·657	104	·315	166	·207
43	·646	105	·312	167	·206
44	·635	106	·309	168	·204
45	·625	107	·307	169	·203
46	·614	108	·304	170	·202
47	·604	109	·302	171	·201
48	·595	110	·300	172	·200
49	·585	111	·297	173	·199
50	·576	112	·295	174	·198
51	·568	113	·292	175	·197
52	·559	114	·290	176	·196
53	·551	115	·288	177	·195
54	·543	116	·286	178	·194
55	·535	117	·284	179	·193
56	·528	118	·281	180	·192
57	·520	119	·279	181	·191
58	·513	120	·277	182	·190
59	·506	121	·275	183	·189
60	·500	122	·273	184	·188
61	·493	123	·271	185	·187
62	·487	124	·269	186	·186
63	·480	125	·267	187	·185
64	·474	126	·265	188	·184
65	·468	127	·264	189	·183
66	·462	128	·262	190	·182
67	·457	129	·260	191	·181
68	·451	130	·258	192	·181
69	·446	131	·256	193	·180
70	·441	132	·255	194	·179
71	·436	133	·253	195	·178
72	·431	134	·251	196	·177
73	·426	135	·250	197	·176
74	·421	136	·248	198	·176
75	·416	137	·246	199	·175
76	·412	138	·245	200	·174

22. The Inspector in his examination of the boilers and appurtenances is particularly to direct his attention to the safety-valves, and whenever he considers it necessary, he is to satisfy himself as to the pressure on the boiler by actual trial.

The Inspector is to fix the limits of the weight to be placed on the safety-valves, and the responsibility of issuing a certificate before he is fully satisfied on the point is very grave. The law places on the Inspector the responsibility of "declaring" that the boilers are in his judgment sufficient with the weights he states. The Inspector is to examine the whole of the valves, weights, and springs at every inspection.

The responsibility of seeing to the efficiency of the mode by which the valves are fitted so as to be as much as practicable under the control of the engineer when steam is up, rests with the Inspector.

The safety-valve should be fitted with lifting gear, which should in all cases be arranged so that it can be worked by hand.

Care should be taken that the safety-valves have a lift equal to at least one-fourth their diameter; that the openings for the passage of steam to and from the valves, including the waste steam pipe, should each have an area not less than the area of valves required, and that each valve-box has a drain pipe fitted at its lower part. In the case of lever valves, if the lever is not bushed with brass, the pins must be of brass; iron and iron working together must not be passed. Too much care cannot be devoted to seeing that there is proper lift, and free means of escape of waste steam, as it is obvious that unless the lift and means for escape of waste steam are ample, the effect is the same as reducing the area of the valve or putting on an extra load. The valve seats should be secured by studs and nuts.

The Inspectors are, as far as is in their power, to make these points generally known to the owners of Steam Boilers.

23. When the Inspector has determined the amount of pressure, he is to see the valves weighted accordingly and the weights or springs fixed in such a manner as to preclude the possibility of their shifting or in any way increasing the pressure. The limits of the weight on the valves is to be inserted in the declaration, and should it at any time come to an Inspector's knowledge that the weights or the loading of the valves have been shifted, or otherwise altered, or that the valves have been in any way interfered with, so as to increase the pressure, without the sanction of the Senior Inspector, he is at once to report the facts.

By order of His Excellency the Right Honourable the Governor in Council,

G. W. VIDAL,
Acting Chief Secretary to Government.

2815

No. 1942 of 1894.

General Department.

Bombay Castle, 24th May 1894.

CHIEF SECRETARY
2 JUN 1894
GOVERNMENT OF MADRAS

From

W. L. Harvey, Esquire, I.C.S.,
Under Secretary to the
Government of Bombay;

To

The Chief Secretary to the Government of Madras,
Fort St. George.

Sir,

With reference to the correspondence ending with the letter from this Government, No. 384, dated 2nd February 1894, I am directed to forward herewith for the information of the Government of Madras a copy of the rules under the Bombay Boiler Inspection Act, 1891, as finally approved by this Government.

Cir. 611/94 under Com. G.O. 12 Mar. 94 No. 610 J.D.

/.

I have the honour to be,
Sir,
Your Most Obedient Servant,
W. L. Harvey
Under Secretary to Government.

× two spare copies

Eja

[G/9]
5,000—14-7-93.

Current No. 2976

Judicial Department.

From
The Under Secretary to
the Government of Bombay

No. 2134

Dated 8
Received 11 } June 1894
Regd 12
Enclosures

SUBJECT.

Inviting attention to a letter No
1942 of 24th with copies of certain
rules under the Bombay Border
Inspection Act & stating that
another set of rules of the same
act is under Consideration

No 2134 of 1894.

General Department.

Bombay Castle, 8th June 1894.

From

W. L. Harvey, Esquire, I.C.S.,
Under Secretary to the Govern-
-ment of Bombay;

To

The Chief Secretary to the
Government of Madras,
Fort St. George.

Sir,

Rem^r Letter.

With reference to your letter No 984, dated 17th May 1894, I am directed to invite your attention to the letter from this Government No 1942, dated 24th idem, with which copies of certain rules under the Bombay Boiler Inspection Act, 1891, were forwarded to you and to state that another set of rules under the same act, viz, those relating to the certificates and Examinations of Mechanical Engineers are still under the Consideration of this Government and will be forwarded to you when finally sanctioned by this Government.

W^o-2815/94

I have the honour to be,
Sir,
Your most obedient Servant
W. L. Harvey
Under Secretary to Governmen

ggw

189/

Department.

TINNEVELLY Dt Magistrate OFFICE.

From

The District Magistrate

Tinnevelly.

To

The Chief Secretary to

Government

Fort St. George.

Dated 20 } June 189/
Received 23 }

No. 646

CHIEF SECRETARY
GOVERNMENT OF MADRAS
23. JUN. 1894

Enclosure.

Subject.

Reporting that, in addition to the number given already, there two more steam boilers in use in this District.

MR/23/6

6-9-06

ORIGINAL 312

Tinnevelly District Magistrate's office

No. 666 Dated June 20th 1894.

From

G. S. Forbes Esquire,
District Magistrate,
Tinnevelly.

To

The Chief Secretary
to Government.
Judicial department.
Fort Saint George.

Sir,

In continuation of my letter No. 556 dated the 22nd May 1894, I have the honor to state that, in addition to the number therein reported, there are two more steam boilers in use in the district.

I have the honor &c.,
Sir,
Your most obedt. Servant,

20/6/94

District Magistrate

[G / 9]
1,000—5-3-94.

6 abstract

Current No. 3536

Judicial Department.

From
The Public Works Dept R.

No. 614

Dated 18th July 1894

Received 18" —"— "

Enclosures one.

SUBJECT.

Forwarding, in triplicate, a form of Transforming Register showing location referred to in Section 9 of Act III of 1893 together with Note by the Chief Engineer P.W.D.

Register (showing) of boilers presented under inspection 9 of Act III of 1893.

Register Number	Owner	Factory	Name and Description	Makers' name	Makers' number	Power	Remarks as to condition of Boiler at the time of registering

189 a
2256
Register No. 1
for
3536

Flag W

Proceedings Judicial Dept No. 640 dated
12th March 1894.

Note by the Chief
Engineer P.W.D:—

With reference to question (1) in para 2 of the order in the Judicial Department quoted above, the accompanying form of Register is considered suitable.

2. Question (2). As to the mode of marking Register numbers on Boilers, it is suggested that a brass plate bearing the Register Number be fixed in a conspicuous place on the Boiler.

3. Question (3). The authority to revoke or suspend licences should

be the same as that which grants them.

4. Question (4). Reform of licence given in schedule A attached to the Act is suitable; the inspector's certificate at the foot being replaced by a certificate by the magistrate stating the circumstances under which it is granted.

5. In the opinion of the Chief Engineer the Act is absolutely unnecessary in any part of this Presidency, and its introduction will only cause unnecessary expense to the state and interfere with private industry

(Sd.) John Pennycuick
Col R.E.
Chief Engineer P. W. D.

CONFIDENTIAL 3330

No. 614 D dy 18th July 1894

Transferred to the Judicial Department.

John Pennycuick
Col R.E.
Secretary to Government P. W. D.

To,
The Judicial dept
with Form of Register

Not circulated in the P. W. D.

N.S.

Kistna District Magistrate's Office
Camp. Bezwada.
24th July 1894.

Dis No 560 / Magl 78

From,

L. E. Buckley Esquire,
Ag. District Magistrate,
Kistna

To

The Chief Secretary to Government
Judicial Department
Madras.

Sir,

With reference to para 1 of G. O. No 61 dated 12th March 1894, judicial, I have the honor to report that there are altogether 13 steam boilers in this District inclusive of boilers appertaining to the Public Works department, but exclusive of those used upon railways.

I have the honor to be,
Sir,
Your most obedient Servant

L. E. Buckley

Ag. District Magistrate.

W
24-7

E
18/7

From

The District Magistrate
Kistna

To

The Chief Secretary
to Govt. Judicial Department
(Madras.)

Forwarded.

Dated 24-7-94
Rcpd 26-7-94.

UNDER SECRETARY'S PUBLIC BRANCH 29 JUL 94

Dis No. 560
Magl Jan.

Reporting that there are 13 steam boilers in the Kistna district.

MR 116
WA/8

List of applications for Boiler Inspectors.

prepared as ordered in G.O. dy 2188 dy 20.10.93 mis

1	Mr. G.H. Morse.	Glasgow.	G.O. 2380 dy 24.12.92 mis
2	" P. Power.	Madras.	49 : 11.1.93 -
3	" D. Taffrey.	Bombay.	1326 : 29.6.93 -
4	" J.C. Gerrard.	do.	2065 : 6.10.93 -
5	" T. Dyson.	do.	2084 : 7.10.93 -
6	" T.R. Power.	do.	2188 : 20.10.93 -
7	" E. Morison.	N. Arcot.	2498 : 29.11.93 -
8	" Reuss.	Madras (P.W. Workshop)	1739 : 16.7.94 -

Applications 7

Submitted to C.S.

C.S. does not want to see the list; he simply ordered that one should be prepared & Rept.

h
22 Nov.

Not wanted just now

h
30/12

250—12-12-93.

Ind.l DEPARTMENT.

No. 1705, 2165, 2419, 2564, 2606, 2647, 2815, 2976, 3129, 3536 & 3719.

From

Dated 189 .

FOR ORDERS.

Subject as in margin

With reference to the remarks below, I concur in the proposals contained in the Note — They are however incomplete in respect of the financial question i.e., of the contributions of the municipalities in return for the periodical inspections of their boilers and engines. I have consulted Mr. Ellis on the subject & have come to the following conclusions: —

The expense of working the system cannot fully been worked out. I make out that it will be approximately as follows: —

	Rs
Pay of Inspector (average of 250-10-300)	284
1 clerk on Rs 15	15
1 Peon (Rs 6 is really too low for a man who will have constantly to travel)	8
	307

[In the first year the Insp. will get Rs 250 only as in the Budget of 1895-96 this amount will be entered]

Pay 307 × 12	=	3684
Travelling allce (see minute of 25/11/93 in G.O. 35-I, 15.1.94) for (say) 9 months	⊗	900
Office rent and contingencies, including charges on account of apparatus, at least		416
		5000

It would be convenient if, when lists of districts are given, they were arranged either (1) alphabetically, or (2) in the order usually adopted by the Revd. Bd. — One plan is as good as the other, but this higgledy-piggledy order is not convenient

10/9

Supposing, therefore, that Rs 2000 (about) is recovered by the levy of fees for the inspection of boilers in the city of Madras, there will be an annual deficit of Rs 3000 to be made up, when the system is in working order. For 1895-96 the figures will be *

⊗ The expense under this head would at first be less — say Rs 400, at which figure it may be entered in the Budget of 1895-96, as there will be only 4 months to go to

Attention is invited to the Note for Orders in G.O. of 12 March 1894, No. 610, Ind.l The answers quoted above are the replies to that G.O.

1. The first point to be settled is "shall the Act be extended "to parts of the Mufassal, or "shall it be brought into "force in Madras City only, or "shall its application to any "part of the Presidency be "post poned?"

The following table shows the number of boilers in use in each district: —

Kurnool	0	S. Canara	15
Bellary	0	Godavari	2
Trichinopoly	0	Anantapur	5
S. Arcot	3	Tanjore	5
Ganjam	1(?)	Madras City	102
Vizagapatam	5	Coimbatore	11
Cuddapah	3	Salem	1
Nilgiris	0(?)	Bellary	15
Malabar	27	Tinnevelly	29
Chingleput	1	Kistna	13
Madura	3 or 4 (?)		
N. Arcot	3		

If the Act is to be extended to the Mufassal at all it is pretty clear, then, that the only districts to which it

should be extended are (1) Malabar, (2) S. Canara, (3) Coimbatore, (4) Bellary, (5) Tinnevelly & (6) Kistna.
But it is doubtful whether the Extension of the Act even to these districts is advisable. The Dt. Mags. of Coimbatore, Malabar & S. Canara are opposed to the application of the Act, the six districts concerned are so widely separated that the expenditure on the Inspector's travelling allowance will be considerable & it is advisable to see how the Act works in Madras itself before applying it elsewhere.
It is subm^d then that the idea of extending the Act to the Mufassal may be abandoned for the present.
The Chief Engineer goes further & expresses the opinion that the Act is not necessary even in Madras City & that its application will only cause unnecessary expense to the State & hamper industry. This point calls for orders. It is true that boiler-accidents are almost unknown in Madras & that the Govt. is not in a position to incur avoidable expenditure, but one ×

2. Assuming ~~[illegible]~~ that Govt. decides to apply the Act to Madras, a date from which it is to come into force must be fixed under Sec. 1(2) of the Act. [illegible]
Probably the 1st Jan. 1895 would be suitable.

What was the "trouble" that led to the passing of the act? So far as I know there is nothing that shows action is needed in Madras at present, & we have no money to spare.
JG 12/9

We had better begin with Madras only.
HS 10/9

Very well - let us try it in Madras - where there are over 100 boilers - most of them in crowded districts.
W 14 Sep

This is quite my feeling - I don't know why the Act was passed. But as it has been passed it can hardly be allowed to lie dormant any longer. However, that point had better be settled first. If the Act is not to be applied, it will be useless to consider all the other matters, including complicated rules, dealt with in this note. The papers had better go round, & a decision be come to on this point, before I go further. It will not be necessary, either, for my Hon Colleagues to go further than this for the present.
HS 10/9/94

× or two accidents have occurred & led to the passing of the Act, & the expense to Govt. will be practically nil if the arrangements proposed below are approved.

There was trouble regarding the boilers of the Ice Manufacturing Company which led to the question of the Act being mooted.
Time has gone by - Say Apr 1, 1895 HS 5/12

⊗ different will be as under:—

Pay [(250+15+8) × 12]	3276
Trav. allce	400
Contingencies, including purchase of office furniture (say)	524
Purchase of apparatus (say)	1300
	5500

This sum should be entered in the Budget —
* The apparatus above ~~[illegible]~~ mentioned consists of "indicators" and hydraulic pumps & pressure gauges required for ascertaining the "duty" of engines and testing the strength of boilers. Mr. Ellis has given me a rough idea of what these will cost, as above. A formal estimate will of course be required of him. In the mean time, the above provision is necessary.

× So much for expenditure. As for receipts we have Rs 3000 to be made up on the average; and, so far as the next few years are concerned, it will have to be made up by the following Munic^ies, in the proportions (or thereabouts) shown against each:— ⊗ See next page

	Rs	
× Madura	300	3
× Cuddapah	150	1½
× Tanjore	300	3
× Trichy	400	4
Dindigul	150	1½
Kurnool	200	2
Conjeeveram	250	2½
Calicut	150	1½
Coimbatore	250	2½
Bellary	300	3
Tirupati	150	1½
Vizagapatam	150	1½
Tuticorin	200	2
Kumbhakonam	150	1½
Bezwada	150	1½
Rajahmundry	150	1½
	3400	34

× These above will contribute during 95-96 to the total amount of Rs 1150, so that Provl. will lose in that year Rs 5500 − (2060 + 1150) = 2290. But this is unavoidable.

If the all payments are realized from these (or other) Municipalities which start water works & pumping Engines, Provl. will apparently be a gainer; but only apparently, because pensionary liability has to be taken into account.
The ~~[illegible]~~ basis on which the above contributions are calculated is that the Inspr. should visit each place once a year & give the engines a thorough overhaul, taking them to pieces, examining every part, repairing all damages that can be dealt with locally, putting them together again, & setting them to work; and that each year he should

The rest of this note proceeds on the assumption that the Act will be applied to Madras City.
3. The next question is the appointment of Inspectors under sec. 3(1).
In his letter dated 15 Sept. 1892 the Sanitary Engineer pointed out that water-works are in existence or under construction at Ootacamund, Cuddapah, Madura, Trichinopoly, Tanjore & Dindigul & that the first-named place only possesses an Engineer. He therefore proposed in para. 14 of the said letter that a high class fitter should be entertained on a salary of R.200—350 (debitable to the Municipalities concerned) whose duty it should be to constantly visit the pumping stations with the object of inspecting the machinery & testing the boilers. This suggestion was approved in para. 4 of G.O. d/ 7 Nov. 1892, No. 1825, M, & further particulars were called for.
Mr. Jones came up again in Nov. 1893. This time, after remarking that there would soon be a water-supply at Kurnool also, he suggested that a man of qualifications superior to those of a mere fitter should be obtained, that he should be styled the Mechanical Assistant Engineer & that his pay should be fixed at R. 250-25-425 of which a portion should be borne for the present by

Provincial funds. Govt. considered these proposals in G.O. dd 15 Jan. 1894, No. 35, L, in which the necessity for the appointment was admitted, the preparation of a scale showing the division of the charges among the Municipalities concerned was ordered & the opinion was expressed that a practical fitter on R.200-10-250, to be called 'the Mechanical Foreman', would suffice for the work to be done.

Para. 7 of the Note for Orders in G.O. dd 12 Mar. 1894, No. 610, Judl., dealt with the appointment of Inspectors under the Boilers Act. It was therein pointed out that Bombay has 3 Inspectors on salaries ranging between R250 & R.700 & that Bengal proposes to have 4 on salaries ranging between R250 & R300-10-350; it was suggested that one man on R.200 plus t. a. would do for Madras & it was observed that 7 applications for the post had already been received.

On this H.M. remarked that the post of Mechanical Foreman for Municipal Water-works could, probably, be combined with that of Boiler Inspector & he directed that enquiries should be made as to what steps were being taken by the Sanitary Engineer.

Accordingly I spoke to Mr. Ellis & he addressed Govt. on the 14th March. Mr. Ellis saw no* difficulty in the way of the proposed combination of duties but observed

(1) that experience alone could show how much of the Mechanical Foreman's time could be spared for Boiler Inspection;

(2) that, as some of the boilers liable to inspection under the Act are in the charge of highly-paid Engineers, the Boiler Inspector ought to be a well-paid & responsible** officer.

The order passed on Mr. Ellis' communication (G.O. dd 24 Ap. 1894, No. 748, L,) was that the question must lie over until the Judl. Dept. had pronounced upon the appointment of a Boiler Inspector.

This point, therefore, has now to be settled.

Sec. 4 of the Act imposes on Govt. the duty of fixing the date after which boilers may not be used without a license, sec. 5 requires the owner to give notice to the Inspector before using his boiler & the Inspector to examine it within seven days after receipt of the notice, & sec. 7 declares that licenses shall not remain in force for more than one year.

Say Govt. prescribes the [...]

---

visit each place a second time, just a day or two, to see that all is right. Mr. Ellis calculates that the thorough annual inspection will take from a week or eight days in the case of the 2 2½ h.p. engines of Cuddapah to perhaps 2½ weeks for the 3 19 h.p. engines of Madura & for other places in the like proportion according to the number & nature of the engines supplied, or to be supplied, to each. On this basis, the two visits to Cuddapah will take 1½ weeks, the two to Madura 3 weeks, and so on, according to the red ink figures on the preceding page, the total of which is 34 — The effect of these figures is that it is estimated that in the course of a few years, when more water works are opened, & engines started, the Inspr's responsible work will take him about 34 weeks per annum, which is as much as a single man will be able to get through in addn. to the work of boiler inspection in Madras city; & on this basis we have arrived at the charge to be made, at the rate of Rs 100 a week, which is, Mr. Ellis tells me, a very low charge for the work proposed to be done — I must say, I think so myself.

These calculations should be scrutinized in the P.W.D.; & if accepted, should be set out in an order in the L & M. Dept. for formal acceptance by the Sanity. Engr.—

In the meantime I will have budget provision made accordingly

[initials]
5/12/94

It is desirable that the offices of Mechanical Foreman (for the Municipalities) & Boiler Inspector should be combined in the same person. The Hon Mr. Bliss' calculations seem to be well considered & may be accepted

J.G. 21/12

I concur generally — but I think that when more work is thrown upon this Inspector he will have to get more pay. Anyhow when he is appointed he must understand [that] future work will grow

W — 7 Jan

---

* I have since spoken again [to] Mr. Ellis about this. He remains of opinion that there will be no difficulty in combining the appts. if the pipes are left in the charge of the Municipal Councils & the Engines only placed under the Mechanical Foreman. If, however, the duty of inspecting pipes & valves is imposed upon the Mechl. Foreman, the combination may be found impossible, for he will be constantly required to inspect petty leakages, to arrange for extensions & house connections & such like matters. Mr. Ellis thinks that the supervision of pipes & valves should be left to the Councils which, he says, could get fitters on R30 or R40 who would be found quite competent to do all ordinary work in connection therewith.

[initials]
26/9

** It is suggested below that the Inspector should get R250-10-300, but it is doubtful if this will suffice. Mr. Ellis tells me that some of the firms pay R450 p.m. to their Engrs & it is not advisable that the Inspr. should get less. ~~If he is~~ Say his pay is fixed at R400-20-500 or R466 on an average & that the Municipalities pay $\frac{3}{4}$ as proposed by C.S. Then Govt. would have to pay R116 which would be easily covered by the fees even if levied at 20 p.c. below the max. as suggested below.

[initials]
26/9

This had better be done — The boiler inspr. [illegible] he is called [illegible] time for such details [illegible] he [illegible] not [illegible] much. W.H. 5/12

I don't think we can afford more than 250-10-300 at present. W.H. 5/12

April 1895 as the date referred to in sec. 4; then the applications for the Inspector's services would come in during March, mainly, & February, to some extent, & all the examns would have to be completed before 1st April 1895 & (under the proviso to sec. 4) before some later date in subsequent years.

Mr. Phipps in his note read in G.O. of 12 Mar. 1894, No. 610, Indl., considers that it is possible to examine in one day 3 or 4 "ordinary, average boilers" provided they are all in one place & duly prepared for inspection; but it is not probable that these conditions would be always present &, on the average, the Inspector would probably examine 2 boilers a day. There being 102 boilers in the City, it would take the Inspector 51 working days, or, say, 2 months, to complete his examns in Madras. He will, therefore, be tied to Madras from about the middle of Feb. to the middle of April & will have all the rest of the year free to perform his tours of inspection to Municipal Water Works.

At least half* the Inspector's pay should, therefore, be charged to his Municipal duties &, Provincial funds being thus relieved, his

The earliest date will now have to be July 1, 1895 — The provision as to examns within 7 days of receipt of notice will cause great difficulty and it will probably not be possible to comply with it — However, we shall see. Anyway the Inspr. will not incur any penalty by not examg within 7 days.

[initials]
5/12

* Why not say 3/4 as the Inspector would do the outside works [illegible] 2 months in each year in Madras.

I don't think the Municipalities can afford to pay 3/4 of the cost, even when all the Municities likely to have ~~boilers~~ engines at work within the next 3 or 4 years have actually started them — Wd? put too heavy a burden

The appt. shd. be made by Govt. acting on the advice of the C. E.

[initials]
5/12

[initials]

pay might be fixed at a figure higher than that originally proposed, or, say, R250-10-300 p.m.

Since the last note for Orders was written, an eighth application for the Inspectorship has been received. As suggested in that note, the decision of Govt. as to the pay can be intimated to the eight applicants, advertisements can be put in the leading newspapers & the Gazette & the actual selection of a man can be left to the Chief Engineer in consultation with the Sanitary Engineer.

4. It was suggested in para. 5 of the previous note for Orders that sec. 14 of the Act & the connected sections relating to the grant etc. of certificates of competency should not be brought into force yet awhile. It will be time enough to introduce these sections if (which is very improbable) the result of regular inspection is to show that boilers are frequently in the charge of incompetent men.

[initials]

5. Section 9 has now ~~[illegible]~~ to be considered. It imposes two duties on Govt., viz, (1) to prescribe a form for the registry of boilers & (2) to prescribe the manner in which the registry number shall be marked on boilers. These two points were referred to the D.P.W. in G.O. of 12 March 1894

6.9.06

No 610, Ind.

The P.W.D. proposes a form of register which contains 8 columns headed

(1) Register (letter Registry) No
(2) Owner
(3) Factory
(4) Name & description
(5) Maker's name
(6) Maker's number
(7) Power
(8) Remarks as to condition of Boiler at time of registering.

It is submitted that the 3rd column had better be headed 'Locality' & not 'Factory' because the boiler need not necessarily be in a factory as that term is defined by law. Also the register should contain a column headed "Date of license" so that a glance at the Register may show the Inspector what licenses are about to expire.

In fact, it would be simpler if the register-form were a mere copy of the license-form prescribed in Schedule A of the Act.

As to the marking of the registry-number, the P.W.D. suggests that a brass-plate bearing the number should be fixed in a conspicuous place on the boiler. Bombay rule 17, however, requires that the registry-number should be cut on the front plate & gives full directions as to the device & form of the letters. It will perhaps be best to follow the Bombay rules in this & other respects.

Yes – with a column for date of grant of license BA 5/12 JG

Yes – a plate could be moved. But I don't see that this point has been provided for in the draft rules. BA 5/12 JG

provided for under Sub-rule 9

6. Section 11 of the Act provides for the revocation & suspension of licenses by a person authorized by Govt in this behalf & in G.O. of 12 Mar. 1894, No 610, Ind., the P.W.D. was asked who should be authorized under this section. It replies that the revoking & suspending authority should be the same as the granting authority i.e. the Inspector. But this seems hardly advisable, for one of the grounds of revocation is that the Inspector has not performed his exam^ns properly & again, the Inspector might be bribed to grant a license. In both these cases it is plainly impossible to leave the revoking power in the hands of the Inspector. Perhaps the Chief Engineer or the Inspector of Railways would be the best person to authorize under sec. 11 &, of the two, perhaps the Inspector of Railways would be the better, because there is an appeal to the Chief Pres^y Mag. & he may summon two assessors of whom one would very likely be a subordinate of the Chief Eng^r & would thus sit in judgment on his superior's orders. If it is this that the same objection applies to some extent to the Insp^r of Railways, perhaps the D^y Insp^r of Railways might be appointed. Under sec. 12 (a) the Govt has to prescribe the manner in which the Chief Pres^y Mag. shall summon assessors.

Probably the best plan is

Yes – But I don't know what "the Insp^r of Railways" is – Perhaps the Const^l Eng^r for Railways is meant – Yes, no doubt he would do, but isn't he in some sort one officer of the Govt of India & could we use him in this way without India's permission? The P.W.D. might be consulted on this point. BA 5/12

On further consideration, as the Insp^r of Boilers will have to work for part of the year in Mysore with municipalities under the Dist^t Engr, I think it will be best to make him subordinate altogether to the officer who should therefore be the person authorized under S. 11 BA 5/12 JG

How are assessors nominated in ordinary cases under the Merchant Shipping Act? That would be a good model to follow. BA 5/12

This shd be worked up: this proposal in the Note seems to be unobjectionable JG

be to permit the appellant to nominate one assessor & the Inspector the other, subject to the reservation that, if either of, or both, the nominees appear to the C.P.M. to be incompetent, he may nominate one or both himself. The C.P.M. can, however, be consulted on this matter.

8. Sec. 12 (5) requires Govt. to prescribe the form of license to be granted by the Chief Presy. Mag. on appeal.

The P.W.D. was consulted as to this in G.O. of 12 March 1894, No. 680, Ind., & suggests that the Form in Schedule A to the Act should be prescribed, the certificate at foot being replaced by a certificate by the Mag. stating the circs. under which the license was granted. This proposal seems proper & it is suggested that the Mag.' certificate might be in the following form—

" I, the undersigned, [being*
" assisted by A & B, two
" competent Assessors], ~~have~~
" am satisfied that C is
" entitled to the above license
" & have granted it to him
" on this date under the
" provisions of sub-section
" (5) of Section 12 of the Madras
" Steam-boilers & Prime-movers
" Act, 1893; and I hereby direct the Inspector to register the boiler specified in the above license & to allot to it a registry number in accordance with sec. 9 of the said Act.

[Signature]
" [Date] Chief Presy. Mag. "

H.P. Jy

* This to be omitted if no Assessors employed

It seems necessary to omit the words "Registry number &" in the

---

* Notifns. Nos. 1877 & 1877 A under cover of L. No. 2815. No. 1877 is almost entirely inapplicable but No. 1877 A can be applied with a few changes as noted below.

these will not be known to the Mag.

9. We now come to the Rules to be made under sec. 23. If Govt. decides, as above suggested, not to bring secs. 14—20 into force, there will be no need to make any rules under clauses (c), (d) & (e) of sec. 23. ~~[illegible]~~ The Bombay rules* which we have now received cannot be adopted in their entirety because the circs. there are so different & a new set of rules has therefore been drafted & is subm. for approval. ~~[illegible]~~

The following rules seem suitable & sufficient:—

"In exercise of the power conferred
"by sub-sections (a), (b) & (f) of sec. 23
" of the Madras Steam-boilers & Prime-
" movers Act, 1893, the Govt. is pleased
" to make the following rules:—
" A. Preliminary
" 1. These rules may be called the
" Madras City Boiler Examn. Rules.
" 2. In these Rules—
" (a) 'the Act' means the Madras
" Steam boilers & Prime-movers
" Act, 1893;
" (b) 'section' means a section of
" the said Act;
" (c) 'examination' means the exam
" of boilers under the Act & 'exam.
" fees' means fees leviable
" ~~under~~ on account of the
" Examn. of boilers.
" B. The Inspector
" 3. The Inspector shall not under-
" take any professional work

(under the Act
"unconnected with his business)
"except with the approval, or
"under the orders, of Govt.
"4. The Inspector shall receive
"such salary as Govt. may de-
"termine, all Examination fees
"being credited to Govt.
"5. The Inspector shall have an
"office in which all records
"connected with the working of
"the Act shall be kept.
"6. The Inspector shall keep the
"following records:—
" (a) a register of Examn.-fee
" receipts;
" (b) a book containing counter-
" foils of licenses;
" (c) a register of boilers in the form
prescribed under ⊗ sec. 9;
" (d) a book containing a detailed
" account of ~~[illegible]~~ every
" Examn. made by him;
" (e) a diary of the work performed
" by him from day to day.
"7. The Inspector shall submit
" to the Chief Engineer ⊗ on the third
" working day of every month
" a copy of this diary for the
" preceding month.
"8. All Examn. fees shall be paid
" into the Madras Bank or the (by the owners of the boilers)
" Accountant-General's treasury
" & no boiler shall be examined
" under sec. 5 unless the notice
" sent to the Inspector under that
" section is accompanied by the
" owner's certificate that the pre-
" scribed fee has been duly paid.
" An extract from the Register
" of Examn. fee receipts which is
" compiled by the Inspector from
" the certificates of payment re-
" ferred to in the last preceding

⊗ Why not say "in the following form" & then give the form in the Rules? WS 5/12

N.B. Of these (b) would be unnecessary if the register (c) were a mere copy of the license form, as proposed above.
It seems safer to keep the counterfoils of licenses also WS 5/12 JG

"(f) a register of licenses sus-
" pended or revoked under sec.
" 11 (this register to be prepared
" upon information furnished to the
" Insp. by the suspending or revoking
" authority);
" (g) a register showing the result
" of appeals presented under
" sec. 12.

⊗ See my note on p. 9 of this Note – for Chf Engr. all through the Rules, substitute Sanity Engr. We can tell the latter to submit to Govt. in the P.W.D. (i.e. to the C.S.) any returns or info we require in order to see that the Act is being properly worked. WS 5/12

Why the A.G.'s Treasury? He does not undertake the collection of fees – The payments shd. be into the Bank only & the notice under s. 5 shd. be accompanied by the Bank receipt, not by the owner's certificate. There shd. also be a provision that if the Inspr. finds that the right fee has not been paid he may refuse to examine until it is paid, otherwise ~~[illegible]~~ the owner of (say) a 22 h.p. boiler might pay the fee for a 20 h.p. boiler only, & claim examn. Also, in case of doubt or dispute, how is the h.p. of a boiler to be settled? Molesworth gives a formula for finding N.H.P., but truly says that the term is arbitrary & varying – would it not be better to say indicated H.P.? That is much more certain thing and easily calculated – The C.E. should advise – WS 5/12

JG

Bank receipts WS 5/12

The corollary of this is that the working of the Act shd. be transferred from the Judl. to the P.W.D. WS 5/12

I don't see that either this rule or Rules 3, 4, 5, 6, 7, 9 or 10 need be made under the Act. They don't concern the public. On the other hand, Rules under the Act are required under SS. 11 & 12 (4) WS 5/12

It is not necessary, but it will be convenient to have all the rules in one list

* Note The maxm. under the Bombay & Madras Acts are the same & the max rates have been fixed in the Bombay Rules as the rates leviable. The rates proposed here are 20 p.c. < the maxm. The poverty of Madras renders reduced rates reasonable &, also, the reduced rates will be sufficient to cover expenses as shown below:—

(W 7 Jan)

No. of boilers not exceeding	10 H.P.	39
	20	22
	30	3
	50	4
Exceeding	50	26
disused	....	8
Total	....	102

R. 12 × 39 + R 16 × 22 + R. 24 × 3 + R 32 × 4 + R. 40 × 26 = R. 2,060.
Pay of Inspector R 250–10–300 = average R. 284 of which ½* or R. 142 falls on Govt.
Add 1 clerk on R 15 & 1 peon on R 6.
Total cost of inspecting estt. to Govt. is therefore R. 142 × 12 + R 15 × 12 + R. 6 × 12 = R 1,956.
Thus the levy of fees at the proposed reduced rates will cover the whole cost of estt. & leave R. 104 to meet miscellaneous charges from.
The reduced rates seem therefore sufficiently high.

* Why not 3/4? The work of the Inspr. in the Presidency would not be merely boiler inspection; that would form but a small part of it –

It will have to be 1st Feb. at least, now WS

" rule shall be forwarded by
" him monthly to the Acct.-General
" who shall verify it with reference
" to the (actually) amount received
" on account of Examn. fees during
" the month to which the extract
" relates & forward it to the Sanity (~~Chief~~) Engr. for record.
"10. The Inspector shall be
" subordinate to the Chief Sanitary Engineer WS 5/12
" & shall obey all lawful orders
" issued to him by that authority.
"11. The Inspector's office ~~[illegible]~~ & the
" records ~~[illegible]~~ kept therein
" shall be examined in January
" & July of each year by such
" officer as the Chief Engineer Sanitary Engr. WS 5/12
" may depute for this purpose.
" C. Examinations
"12. Examination fees shall be
" paid in accordance with the
" following scale:—*
" (1) For the Exam. of each boiler not exceeding

" (1)	10 N.H.P.	R 12
" (2)	20 N.H.P. ...	R. 16
" (3)	30 N.H.P. ...	R. 24
" (4)	50 N.H.P.	R. 32
" (5)	Exceeding 50 N.H.P.	R. 40

"13 — 35.
" [Here enter Rules 1–23 of the
" Bombay Rules framed under (Notif. No. 1877 A)
" sec. 35 (a), subject to the amendments
" noted in ink in the enclosed copy;
" of these amendments the most
" important is the substitution
" throughout of the Chief Engr. Say Sanitary WS
" for the Senior Inspector.]"

"These are entirely technical and can be criticised only by a professional"

If these proposed draft rules are approved, they will be published, as required by sec. 43, with an intimation that any suggestion received by Govt. before the 1st Novr. will be duly considered

" before they are finally published as Rules having the force of law.
Also, it would be as well to ask particularly the opinions of the P.W.D., the Acct. General, the Advocate General, the Chamber of Commerce & the Madras Trades Association upon the proposed rules.

20 Aug.

27/8/94

I do not see why if the suggestion made in this note is adopted Municipalities shall not pay 3/4. The man will work only 3 months in the year for Govt. To divide the charges half and half would be only an act of grace. The only thing that can be said for it is that at present there are very few Municipalities with water works completed or approaching completion and that paying 3/4 of the charges for the Inspector would fall heavy on them when added to what they have already to pay for their waterworks.

27/8/94

I countersign this on the assumption that it is decided that the Act is to be put in force, but I adhere to my opinion that it is entirely unnecessary —

L. 27/8

Extension Boiler Inspection Act

Resubm.d to the Hon. Mr. Bliss.
All H.Ms having agreed to extend the Act to Madras City, orders on the matters of detail referred to in the Note for Orders are now necessary.

26 Nov

27/11/94

H.M. & circ.

Circulated to the Hon Mr. Grose ~~& H.E. the Governor~~ with advertence to the Hon. Mr. Bliss' notes of the (5th inst. The circ.n has been delayed as the papers were wanted for a financial current. There is no reason for haste in bringing the Act into operation so the following dates are suggested:
under sec. 1(2) — 1st April 95
" " 4 — 1st July 95
Date up to which comments on proposed rules will be considered — 1st April 1895
The Hon Mr. Bliss proposes 1st July instead of 1st June but it will perhaps be better to fix an earlier date as the June rains may necessitate the Inspector's presence at Mufassal waterworks during July.

These dates seem good

Agree to 1st before 18 Dec

19/12/94

PWE. 3260/95

Note for Hon. Mr. Grose.
H.M. asks information as to the circ.s which led to the passing of the Act.
The Bill was drafted under the Hon. Mr. Stokes' orders as will be seen from G.O. dy 3/2/92, No. 213, Ind.l, which is now put up.
I seem to have been wrong when, relying on memory, I said one or two accidents had occurred.
In G.O. dy 15/4/89, No. 708, Ind.l the Engineer in charge, Madras Ice Manufacturing Co., was informed that there was no Boilers Act in force in Madras & this perhaps is the correspondence C.S. had in his mind.
I was thinking of the case referred to in G.O. dy 23/1/92, No. 162, Ind.l, where Mr. Arundel reported that a boiler was being worked at a dangerous pressure & recommended the passing of a Boilers Act.
Please see, too, Sir H. E. Stokes' speech before the Leg. Council on the 17th Jan. 1893.
The Hon. Mr. Grose's opinion as to the necessity for extending the Act to Madras City is —

=Dis C 3
3260/55

1475 Rev/55

[G/25.]

500—26-6-94.

DEPARTMENT.

C. No.

FOR ORDERS.

It was decided in 1892 that a Boiler Act was necessary for this Presidency, & as Sir G. Stokes said then, there have been such enactments in other Presidencies for years past. So far as we know there have been no accidents in our Presidency yet, but a terrible accident may occur at any time in Madras where, as H.E. says, there are over 100 boilers, most of them in crowded localities. If such an accident does occur we shall have laid ourselves open to blame, if having a boiler act we have not put it into force. I think therefore the Act shd be put in force in Madras though it shd not be extended to the Mofussil at present.

JG
23/11

These papers were detained as I [illegible] sure that the remark made by me in the margin of page 2 of the note for orders on C No. 1705 was correct. Being unable to trace the papers here a reference was made to Col Cox. This has resulted in a copy of a D.O. of the 6th of May 1889 from the C S (the original and other papers) being sent up. No copy of Col Rolland's D O of the 1st May to which this is an answer can be found in the Commr's Off and the original cannot be traced here. The note for orders on C. [illegible] also is not forthcoming & must have been mixed up in some other file: that regarding the Boiler Act has been searched & is not there. I am almost al[illegible] certain after seeing what papers are that it was the business of the Horse boiler that started the idea of a Boiler Act.

[illegible]
22/11/94

Hon'ble Mr. Gosse

DEPARTMENT.

No.

From

Dated 189 .

FOR ORDERS.

Office Note No. 184 A / 31-1-95

From the Chief Secy

To the Sec. to Govt. P.W.D.

despd. 1/2/95 with the Note for orders

The undersigned has the honour to invite attention to the direction given in the Hon. Mr. Bliss' notes of the 5th ult. & 19th inst. (on the enclosed Indl. Note for Orders & note by the C.E., respectively) that his calculations should be scrutinized in the P.W.D. It is requested that H.M.'s orders may be complied with at a very early date & the original Note for Orders returned to the Indl. Dept. with such remarks as the P.W.D. may consider necessary

12 Jan

15/1.

To issue after the Indl. Dept. G.O. has issued

Office

The [illegible] of these [illegible] rules will have to be very carefully [illegible]

3260 5.2 / 5/55

5-2/95

No 168 C of/ 17th January 1895

Draft order in Judicial
Dept on Boiler Inspection

I don't think I asked that my figures should be checked, so it is put in the M.S. note on the back of this, but that my "calculations should be continued in the P.W.D.", by which I meant that that Dept. should be asked to consider whether the system proposed by me after consultation with the Sanitary Engr., for the distribution among Municipalities of the cost of the Boiler Inspn Dept, was based on sound principles. This has still to be done. The arithmetical check I have made is obvious.

19/1/95

— Note by W. —

The Honorable Mr. Bliss' figures are based on information supplied by the Sanitary Engineer; so far as they go, the following are the results arrived at:—

For 1895-96, the total cost will come to Rs 5300

The recoveries will be

(1) City of Madras . Rs 2060
(2) District Municipalities " 1150

Total Rs 3210

leaving a balance of Rs 2090 to be provided by Provincial.

In future years, the expenditure will be Rs 5000

The pecuaries

City of Madras .. Rs 2060
District Municipalities . 3400
Total Rs 5460

Rs 460 in excess of the Provincial outlay. But this excess will not be arrived at till all the Municipalities mentioned by the Honorable Member are supplied with engines requiring inspection.

2. I am however doubtful whether the services of a man really competent to perform the combined work of boiler inspection and inspection of Municipal engines will be obtained for Rs 250; I have not seen the applications which have been submitted, and cannot therefore say whether any of the candidates are what

When we must pay more. Not I think we can get higher pay we employ on this duty in Bengal & Bombay (vide p. 4 of the note of 20/8/94)
WS

I should call competent.

3. I quite agree with Mr Ellis that the duty of the Inspector as regards Municipal waterworks should be confined to the pumping machinery, and not extend to the boilers.

4. I cannot help thinking that the decision to make the Inspector subordinate to the Sanitary Engineer requires reconsideration; the chief person appears to be that a considerable portion of the Inspector's duties will be in connection with Municipal Waterworks. the construction of which is at present under the Sanitary Engineer, I do not think that this is sufficient reason

I don't think he said this - but the said "pipes & valves" & this report, not "boilers", vide end pink note of 26/9 on p. 5 of the Note of 20/8/94.
WS

I am not wedded to this decision, but am quite open to reconsider the question whether the Insp. Engr. shd be the person mentioned under S. 11, & therefore the person to whom the Inspr. will be subordinate in the most complete & in the most important particular manner, and therefore, again, the person to whom the Inspr. shd be generally subordinate. But for the reasons given on p. 9 of the note of 20/8/94, the C.E. cannot be the person empowered under S. 11, & he should not therefore be the direct superior of the Inspr. However is the Inspr's superior under S. 11 should be his superior generally. If the C.E. can suggest some generally appropriate superior to the Inspr. than the Sanitary Engr., I shall be glad to reconsider the point.

WS
19/1/95

by placing him under the Sanitary Engineer, and not under the Chief Engineer P.W. Dept. who can control and supervise his movements much better. In this connection it may be mentioned that the weight of evidence in favor of the entire transfer of the construction work of the Sanitary Engineer to the Public Works Dept. is increasing daily, and it is morally certain that this transfer will have to be carried out before long.

Ou.c.i 3260/95

S

14/75 Ju/95

W

To Chief Sec.

CHIEF SECRETARY
18 JAN 1895
GOVERNMENT OF MADRAS

CAM 17/1 95

C 19/1 | C 21/1

When we make a change in this respect, we can give the Insp. a new superior

WD 19/1/95

E

I submit W.S.
H.M. & H.E. the Govr.

It was not intended that the P.W.D. should check the Hon. Mr. Bliss' figures at this stage, but after the G.O. had issued.
However, the remarks on this subject of the Chief Engineer will be brought to the notice of the L. & M. Dept., in view to the issue of the G.O. on the subject of distribution of cost which the Hon. Mr. Bliss ordered should issue from that dept.
Attention is invited to Col. Pennycuick's remarks on the pay to be offered to the Inspector & on the proposed subordination of the Inspector to the Sanitary Engineer.
If the Ind. draft is approved as it stands it will issue at once.

W.
18 Jan

[illegible] 18/1

500—20-6 94.

1

Ind. DEPARTMENT.

Papers to be read in Proceedings :—

8P

P. { —— 24 Aug. 1893, No. 1712 Ind.
{ Again G.O., dated 12 March 1894, No. 610, Ind.

Again G.O., dated 18 , No.

	Current No.				from	
P	1705	of 1894, dated	30 Mar.	from	D.M. Tanjore.	No. 351
	2165	—	— 25 Ap.	—	Comr. of Police, Madras.	
	2419	—	— 10 May	—	D.M. Coimbatore	No. 563
	2569	—	— 18 May	—	D.M. Salem	No. 875
	2606	—	— 19 May	—	D.M. Bellary	No. 83
	2647	of 1894, dated	22 May	from	D.M. Tinnevelly.	No. 556
	2815	—	— 25 May	—	Govt. of Bombay.	
	2976	—	— 8 June	—	Do.	
	3129	—	— 20 June	—	D.M. Tinnevelly.	No. 556
	3536	—	— 18 July	—	P.W.D.	
	3719	—	— 24 July	—	D.M. Kistna	No. 560

Note
This is marked urgent as the Notifns. should issue at once. It could not be taken up before as it was first wanted for a Fin. current & had then to be sent to the Hon. Mr. Grose & H.E. It returned from H.E. only a few days ago.

W.

* Note This will perhaps do.
Yes, I think so
W.S.
[with amendments]

Submit to below
W.S.
19/1/95

also be entrusted the duty of the periodical inspection of the engines and boilers of the small

Order 25th January 1895.
P.S.
No. 174.

After a careful consideration of the correspondence read above, the Govt. has decided that it is not necessary at present to extend any portion of the Madras Steam-boilers & Prime-movers Act, 1893, to the Mufassal; it will, however, be brought into operation in the City of Madras ~~[illegible]~~ with effect from * the 1st April 1895.

2. With regard to the appointment of Inspectors under sec. 3 of the Act, the Govt. has come to the conclusion that there will not be enough ~~time~~ work to occupy the full time of (even) one ~~man~~ such officer & therefore considers that to the ~~appt. of~~ Boiler Inspector should ~~be combined with that of~~ inspector of Mufassal Municipal Water-works. For the

duties

combined appointment a salary of £250-10-300 per mensem (plus travelling allowance for journeys to inspect Municipal Water-works) will probably suffice & towards the expenditure on this account the Municipalities benefited by the appointment will be required to contribute. On this point* further orders will issue in the L. & M. Dept. The Inspector will send a clerk on £15 & a peon on £8.

Eight applications for the post of Boiler Inspector have been received. These will be transferred to the Chief Engineer who will advertise in the Gazette & in the leading newspapers stating the terms offered & will, in consultation with the Sanitary Engineer, nominate a person for appointment by Govt at as early a date. as possible. Inasmuch as the Inspector will have to work under the Sanitary Engineer so far as regards Municipal water-works, it seems to Govt expedient that he should be subordinate to that officer in his position as Boiler Inspector also. The

3. With reference to sec. 4 the Govt resolves to fix the 1st June 1895 as the date after which no boiler may be used unless it has been licensed,

* Note H.M.'s calculations will be scrutinized in P.W.D. & his note & the remarks of the P.W.D. will then be transferred to L. & M. Dept. for issue of definite orders as to the distribution of contributions is what H.M. has ordered.

Note
The 1st June is suggested instead of 1st July as the June rains may necessitate the Inspector's absence in the interval towards the close of June. The Govt thinks the 1st June better than 1st July.

draft rules in App. II provide accordingly & it will be considered in the P.W.D. what reports & returns relating to the working of the Act should be called for by the Sanitary Engr to Govt.

* Note H.M. ordered that the method of summoning assessors adopted in the Merchant Shipping Act, 1883, should be followed. It will however be seen that sec. 13 of that Act is not explicit as to the procedure & the course suggested in the Note for Orders (approved by Hon. Col. Goss) has accordingly been adopted in the draft. Pending the C.P.M.'s reply it appears unnecessary to prepare a draft Notif. under sec. 12 (4) of Act III of 1893.

4. Section 12 (4) of the Act provides for the summoning of assessors to assist the Chief Presidency Magistrate in such manner as the Govt may direct. Probably the best plan will be to permit the appellant to nominate one assessor & the Inspector the other, subject to the reservation that, if either of the assessors or both of them appears or appear to the Chief Presy Mag. to be incompetent, he may nominate one or both himself.

The Chief Presy Mag. will be requested to advise on the subject.

5. The Govt has resolved not to give the direction referred to in sec. 14 & so much of the Act as relates to the issue of certificates of competency will, therefore, remain in abeyance until further orders.

6. The Notifications which it is proposed to issue under the provisions of sections 3, 4, 9, 11, 12 & 23 of the Act are printed as Appendix II to this Proceedings & the Govt will consider any suggestions which may be made in respect of them on or before the 1st April 1895 by any persons interested. In particular the Govt desires to be favoured

* Note It seems better to invite criticism on all the Notifs in App. II & not to confine it to the draft Rules under sec. 23. The Notif. in App. I bringing the Act into force may issue at once. It will perhaps be as well to publish the whole G.O. in the Gazette as well as the Appendices & also to lay it on the Table. The 1st Ap. seems a suitable date up to which replies will be received.

by the said date with the opinions of the P.W.D., the Sanitary Engineer, the Hon. the Advocate-General, the Chief Presidency Magistrate, the Accountant-General, the Chamber of Commerce & the Madras Trades Association.

7. All future correspondence in connection with the working of Madras Act III of 1895 will be dealt with in the P.W. Department* of the Secretariat.

(From orders)

10 Jan

To all St. Mag.s
— the Comr. of Police, Madras.
— P.W.D. with applications
— L. & M. Dept.
— Sanitary Engineer
— Chief Pres.y Mag.
— Hon. Govt. Solicitor
— Advt. General.
— Chamber of Commerce.
— Madras Trades Association
Gazette (appendices) (3 of 4 appendices)

Appendix I

Notification

Under sub-sec. (2) of sec. 1 of the Madras Steam-boilers & Prime-movers Act, 1893, the Govt. direct that the said Act shall come into force upon the 1st April 1895.

Appendix II.

Notification A.

Under sub-sec. (2) of sec. 3 of the Madras Steam-boilers & Prime-movers Act, 1893, the Govt. directs that the Inspector shall exercise

* So ordered by H.M.

the powers & perform the duties conferred & imposed by or under this Act on an Inspector throughout the City of Madras.

Notification B.

Under sec. 4 of the Madras Steam-boilers & Prime-movers Act, 1893, the Govt. fixes the 1st June 1895 as the date after which no boiler shall be used unless a license authorizing its use has been granted under the Act & is in force.

Notification C.

(a) Under sec. 9 of the Madras Steam-boilers & Prime-movers Act, 1893, the Govt. prescribes the following form of register of Boilers:—

Name of Owner	Registry number & Description of boiler & age (Place where boiler is situated)	Power (Nominal / Horse power)	When, & where & by whom made	When & where last repaired	Date of grant of license	Maximum pressure at which boiler may be worked	Remarks

* Follows the Bombay Rule as ordered by H.M.

(b) Under* the same section the Govt. directs that the registry number of every boiler shall be cut in the front plate thereof in such position as shall be pointed out by the Inspector. The device to be so engraved shall consist of the letters "RY" above the letters "No." divided by a

horizontal line; the letters ("No") to be followed by the registry number in figures, the letters being ^at least^ one-half ~~of~~ an inch, ~~&~~ the figures ^at least^ one & a quarter inch, in height; the whole to be enclosed in a rectangular figure one-sixteenth of an inch clear from the letters & figures; thus ——

RY / No 148

The engraving shall be not less than one-~~[illegible]~~ sixty-fourth of an inch deep.

Notification D.

Under sec. 11 of the Madras Steam-boilers & Prime-movers Act, 1893, the Govt. authorizes the Sanitary Engineer ~~[illegible]~~ to revoke & suspend licenses granted in respect of boilers for the reasons therein given.

Notification E.

Under sub-sec. (5) of sec. 12 of the Madras Steam-boilers & Prime-movers Act, 1893, the Govt. prescribes the following as the form in which licenses shall be granted by the Chief Presidency Magistrate:——

License ~~under Sec. 12(5) of Madras Act III~~

Name of Owner.	Description of boiler & age.	Power. (Nominal horse power)	When & where made.	When & where last repaired.	Time for which this license is to be in force.	Maximum pressure at which the boiler may be worked.	Remarks.

Certificate. I, the undersigned, *being assisted by A & B, two competent Assessors,* am satisfied that C is entitled to the above license & have granted it to him on this date under the provisions of sec. 12 (5) of Madras Act III of 1893; and I hereby direct the Inspector to register the boiler specified in the above license & to allot to it a registry number in accordance with sec. 9 of the said Act.

(Signed) D. E. Chief Presy. Magte.

** [The words between asterisks to be omitted when no assessors are employed.]

DEPARTMENT.

No. 118/12

From

Dated 189 .

FOR ORDERS.

* Note. Under the Gen. Clauses Act it is necessary to state distinctly in this notif. that suggestions regarding these rules will be considered up to 1st April although the same statement has been made in the G.O.

H.M. has observed that several of these rules might be replaced by mere Executive orders. But the Hon. Mr. Grose & H.E. think it better that they should ~~remain~~ included in the rules & clause (a) of sec. 23 contemplates the framing of rules in respect of matters which might be dealt with by Executive order.

Notification F

The* Govt. will be prepared to consider any suggestions in respect of the following draft rules under clauses (a), (b) & (f) of sec. 23 of the Madras Steam-boilers & Prime-movers Act, 1893, which are received on or before the 1st April 1895:—

A. Preliminary.

Rule 1. These rules may be called the ~~[illegible]~~ Boiler Examination Rules.

Rule 2. In these Rules:—

(a) "the Act" means the Madras Steam-boilers & Prime-movers Act, 1893;

(b) "section" means a section of the said Act;

(c) "Examination" means the Examination of boilers under the Act & "Examination fees" means fees leviable on account of the Exam.n of boilers.

B. The Inspector.

Rule 3. The Inspector shall not undertake any professional work unconnected with his business under the Act except with the approval, or under the

orders, of Govt.

Rule 4. The Inspector shall receive such salary as Govt. may determine, all examination fees being credited to Govt.

Rule 5. The Inspector shall have an office in which all records connected with the working of the Act shall be kept.

Rule 6. The Inspector shall keep the following records:—

(a) a register of Exam.n fee receipts;

(b) a book containing counterfoils of licenses;

(c) a register of boilers in the following form, which has been prescribed under sec. 9,—

Name of Owner	Situation of Factory where boiler is situated	Registry number & description of boiler & age	Power (Nominal Horse power)	When, where & by whom made	When & where last repaired	Date of Grant of licence	Maximum pressure at which boiler may be worked	Remarks

(d) a book containing a detailed account of every Exam.n made by him;

(e) a diary of the work done by him from day to day;

(f) a register of licenses suspended or revoked under sec. 11 (this register to be prepared upon information furnished to the Inspector by the suspending or revoking authority i.e. the Sanitary Engineer);

(g) a register showing the result of appeals presented

DEPARTMENT.

No.

From

Dated 12 8 189 .

FOR ORDERS.

under sec. 12 (this register to be prepared upon information furnished to the Inspector by the Chief Presidency Mag.).*

Rule 7. The Inspector shall furnish to the Sanitary Engineer, on the third working day of every month, a copy of his diary for the preceding month.

Rule 8. All Exam.n fees shall be paid into the Madras Bank by the owners of boilers & no boiler shall be Exam.d under sec. 5 unless the notice sent to the Inspector under that section is accompanied by a Bank receipt for the fee; & the Inspector,* if he finds that the right fee has not been paid, may decline to examine the boiler until it has been paid.

Rule 9. An Extract from the register of examination-fee receipts which is completed by the Inspector from the Bank receipts referred to in Rule 8 shall be forwarded by him monthly, to the Acct. Genl.

* Note. H.Ms. proposes to use the term Indicated H.P. for Nominal H.P. Unfortunately however the Act uses the latter term (vide Schedule B) so it seems necessary to leave the rules untouched in this respect. For the purpose of settling the fee, the N.H.P. must be ascertained & in case of dispute as to what this is, the difficulty alluded to by H.Ms. will be got over by an appeal under sec. 12; for, if the Insp.r says the N.H.P. is 21 while the owner contends that it is only 20 N.H.P. he will be entitled to pay a fee for more than 20 N.H.P.

who shall verify it by reference to the amount actually received on account of exam.n fees during the month to which the extract relates & forward it to the Sanitary Engineer for record.

Rule 10. The Inspector shall be subordinate to the Sanitary Engineer & shall obey all lawful orders issued to him by that officer.

Rule 11. The Inspector's office & the records kept therein shall be exam.d in January & July of each year by such officer as the Chief Engineer may depute for this purpose.

C. Examinations.

Rule 12. ~~[illegible]~~ Exam.n fees shall be paid in accordance with the following scale:—

(i)	For the exam.n of each boiler not exceeding	10 N.H.P.	.....	R.12.
(ii)	" " " " " " "	20 "	.....	R.16
(iii)	" " " " " " "	30 "	......	R.24
(iv)	" " " " " " "	50 "	.....	R.32
(v)	" " " " " " exceeding	50 "	.....	R.40.

Rules 13—35

(H.E printed rules as amended).

W.

[G/69]
250—23-1-95.

CHIEF SECRETARIAT. MADRAS.

Judicial DEPARTMENT.

Memorandum.

Endt. No. 585 dated 16—3—95
~~READ the following~~

The Public Works Dept. is requested to return the original note for orders & note by the Chief Engineer forwarded with office-note no. 184 A, d/ 31st Jany. 1895, together with the remarks passed thereon in the P.W.D. These are urgently required in the L & M. Dept. for issue of definite orders as to the distribution of cost as ordered by the Hon'ble member.

16/3

To

The Public Works Dept. despd 16/3/95

MR 15.3.95 Copied 16/3

200—31-1-94.

Chief Secretariat,

Madras, 28 March 95

OFFICE NOTE. No. 680

Done 26/3

From

~~Chief~~ Under

The ~~Chief~~ Secretary,

Judicial Dept.

To

The Under Secretary,

P. W. Dept.

desp.d 28/3/95

The undersigned has the honour to invite attention to Judicial Endt. No. 585 of 16 March 1895 and ~~to~~ request that the original notes for orders etc, therein called for may be returned immediately as the orders in the L & M. dept ~~are~~ have been deferred pending the return of the same.

[illegible]

25/3

2

MR 28/3/95

~~Endt~~ No. 680/95
O N } 585/95
& 174/95 ...

C/P 1/4.

Office note No 733
Dt 3d april 1895

From

The Under Secretary

Judicial Dept.

To

The Asst. Secretary

Local & Munl. dept.

with papers

Desp.d 4/4/95

The undersigned has the honour to forward herewith the original notes for orders, etc. relating to the Madras steam-boilers Act, 1893, with a request that they may be returned after the issue of the necessary orders as to the distribution of cost as ordered by the Hon'ble member.

[illegible] 1/4

MR 1.4.95

Sanitary Engineering Department

Memorandum No. 434 dated 20th February 1895.

With reference to Memorandum No. 606C from Public Works Department, dated 15th February 1895, the Sanitary Engineer regrets that he is unable at present to give any opinion as to the estimate made in regard to the probable time to be spent by the Boiler Inspector in the various Municipalities. Very few Engines will be at work even at the end of 1895 and it will certainly be ten years before all the towns enumerated have water supply or drainage and even then it is not a consequence that all will have engines. The Sanitary Engineer is addressing Government on the matter of the rules under the Boiler Act, and as this communication sets forth fully his views on the subject and as it, under G.O., dated 25th January 1895, etc. 174 (Judicial), will be sent to Government in the Public Works Department it is unnecessary to reply to the memorandum more fully.

2. It may however be pointed out that Government desired[+] to obtain eventually only Rs 2,000 from Municipalities allowing Rs 3,000 to be paid from Provincial Funds, that is presuming that that will be the cost of the establishment in question.

+ The authority for this establishment is not given & the [illegible] cannot be traced. [illegible] 23 Feb[illegible]

J. [illegible]
Sanitary Engineer to Govt

[illegible]

To
The Deputy Chief Engineer
Public Works Department

S.E. 13-12-92—500.

P.W. CURRENT No. 1312

1895.

Recd: 21.2.95

From

The Sanitary Engineer

to Government,

To

The Dy. Chief Engineer,
Public Works Dept,

No. 434

Dated 20th
Despd. 21st } February 1895.
Recd.

Enc.—

Subject.

Informing that he is unable
present to give any opinion as to the
timate made regarding the time
be spent by the Boiler Inspector
the various municipalities for
asons herein.

P.W. CURRENT No. 1602

No. 1364C

Government of Madras.

PUBLIC WORKS DEPARTMENT.

Madras, 29th March 1895.

OFFICE NOTE.

From

The Secretary to Government
P.W. Department

To

The Hon: the Chief Secretary
Judicial Department

184A. dated 31-1-'95
585. dated 16-3-'95
680. dated 28-3-'95

As requested in the office
notes quoted in the margin
the undersigned has the
honour to return the papers
herein asked for, together with
a memo: in original from the
Sanitary Engineer, No. 434
dated 20th February 1895, in
which he explains that he
is unable at present to
give

(48—1,000—11-8-93.)

give any opinion as to the estimate made (by himself presumably) in regard to the probable time to be spent by the Boiler Inspector in the various Municipalities.

2. The question of the revision of the rules, also referred to by the Sanitary Engineer, is still under consideration in the Public Works Department.

Colonel R.E.
Secretary to Govt. P.W.D.

CHIEF SECRETARY'S GOVERNMENT OF MADRAS
30 MAR 1895

This file to be sent to the Jud. Dept.

Proposed Rules 13—35

GENERAL DEPARTMENT.

Bombay Castle, 21st May 1894.

No. 1877 *A.*—In exercise of the power conferred by Section 35 (*a*) of the Bombay Boiler Inspection Act. 1891, the Governor in Council is pleased to frame the following rules for settling the duties of Inspectors under the said Act with respect to the inspection of Steam Boilers in every part of the Bombay Presidency in which the said Act is in force, including Aden, viz.:—

Iron Boilers.

13 The Inspector is required by the Act to fix the pressure to be allowed on boilers. In performing this very responsible and onerous duty he must be very careful, as in the event of accident it will be necessary for him to prove clearly that he used due caution. On the one hand he must be careful as regards safety, and on the other hand he must not unduly reduce the pressure on a boiler.

14 The Inspector should fix the working pressure for boilers by a series of calculations of the strength of the various parts, and according to the workmanship and material.

In the case of boilers made in India, the ~~Boiler~~ Inspection ~~Department~~ may receive ~~for examination~~ plans and particulars of boilers before the commencement of manufacture, ~~by these means hoping to prevent~~ questions arising after the boilers are finished. ~~The Senior Inspector should receive and report on any plans of boilers intended for use in Bombay or the districts that may be submitted in due course.~~

When the Inspector has received plans and tracings of new boilers, or of alterations of boilers, and has approved of them, he will of course be careful in making his examination, when the boiler is ready for work, to see that they have been followed out. When he has not had the plans submitted, but is called in to inspect a boiler, he will of course measure the parts, note the details of construction, and, if necessary, bore the plates to ascertain their thickness, &c., before he gives his certificate.

The 15. Inspector shall declare a boiler to be safe unless (*a*) he is fully informed as to its construction, material and workmanship, or unless (*b*) he is furnished with a certificate from a Chief Engineer of a recognised boiler insurance company. He should therefore be very careful how he ventures to give a certificate.

15 *A.* In the case of new boilers the Inspector may allow a [illegible] not exceeding 7,000 lbs. per square inch on net section on solid iron screwed stays supporting flat surfaces, but the stress should not exceed 5,000 lbs. when the stays have been welded or worked in the fire.

The areas of diagonal stays are found in the following way: Find the area of a direct stay needed to support the surface, multiply this area by the length of the diagonal stay, and divide the product by the length of a line drawn at right angles to the surface supported to the end of the diagonal stay; the quotient will be the area of the diagonal stay required.

When gusset stays are used, their area should be in excess of that found in the above way.

16 *A.* When the tops of combustion boxes or other parts of a boiler are supported by solid rectangular girders the following formula should be used for finding the working pressure to be allowed on the girders, assuming that they are not subjected to a greater temperature than the ordinary heat of steam, and in the case of combustion chambers that the ends are fitted to the edges of the tube plate and the back plate of the combustion box.

$$\frac{C \times d^2 \times T}{(W - P)\, D \times L} = \text{Working Pressure.}$$

W = Width of combustion box in inches.
P = Pitch of supporting bolts in inches.
D = Distance between the girders from centre to centre in inches.
L = Length of girder in feet.
d = Depth of girder in inches.
T = Thickness of girder in inches.
C = 500 when the girder is fitted with one supporting bolt.
C = 750 when the girder is fitted with two or three supporting bolts.
C = 850 when the girder is fitted with four supporting bolts.

The working pressure for the supporting bolts and for the plate between them should be determined by the rule for ordinary stays.

17 *A.* The pressure on plates forming flat surfaces is found by the following formula:

$$\frac{C \times (T + 1)^2}{S - 6} = \text{Working Pressure.}$$

T = Thickness of the plate in sixteenths of an inch.
S = Surface supported in square inches.
C = Constant according to the following circumstances.
C = 100 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.*
C = 90 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts only.
C = 60 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.
C = 54 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts only.

* If the diameter of riveted washers be at least ⅜rds the pitch of the stays, and the thickness not less than the plates they cover, the constant may be increased to 150.
When doubling plates are fitted of the same thickness as the plates they cover and not less in width than ⅜rds the pitch of the stays, the constant may be increased to 160.

C = 80 when the plates are exposed to the impact of heat or flame, with water in contact with the plates, and the stays screwed into the plates and fitted with nuts.

C = 60 when the plates are exposed to the impact of heat or flame, with water in contact with the plates, and the stays screwed into the plates, having the ends riveted over to form substantial heads.

C = 36 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, with the stays screwed into the plates, and having the ends riveted over to form substantial heads.

In cases where plates are stiffened by T or L irons, and a greater pressure is required for the plates than is allowed by the use of the above constants, the case should be submitted for the consideration of the Senior Inspector.

When the riveted ends of screwed stays are much worn or when the nuts are burned, the constants should be reduced, but the Inspector must act according to the circumstances that present themselves at the time of inspection, and it is expected that in cases where the riveted ends of screwed stays in the combustion boxes and furnaces are found in this state, it will be often necessary to reduce the constant 60 to about 36.

The Inspector should not in any case allow a greater compressive stress on the edge of the tube plates than 7,500 lbs. per square inch, which is that used in the following formula:

$$\frac{(D-d)\,T \times 15{,}000}{W \times D} = \text{Working Pressure.}$$

D = least horizontal distance between centres of tubes in inches.

d = inside diameter of ordinary tubes in inches.

T = thickness of tube plate in inches.

W = extreme width of combustion box in inches from front of tube plate to back of fire-box, or distance between combustion box tube plates when boiler is double ended and the box common to the furnaces at both ends.

8. Having regard to many cases in which serious defects have been discovered, the Inspector should take care that boilers, the outside of which cannot be seen, are cleared of all covering and fittings for inspection whenever the Inspector considers it necessary. It will often be found necessary to reduce the pressure, unless the boilers are partially cleared from their seats to enable the Inspector to judge of their condition. If the owners in any special case have any good reasons for not wishing to clear them when the Inspector requires it, the Inspector should submit the whole case in detail to the Senior Inspector for his consideration. The Inspector must recollect that he is not to certify as sufficient any boiler respecting which he cannot thoroughly satisfy himself.

The Inspector should record in his inspection book the dates on which boilers are inspected, when and to what extent cleared from brick work, and whether the boilers were set or not when examined, and if not set, where they were examined. Boilers which have been cleared should in all cases be subjected to the hydraulic test before the brick work is rebuilt.

9. Boilers well constructed, well designed, and made of good material should have an advantage in the matter of working pressure over boilers inferior in any of the above respects, as unless this is done the superior boiler is placed at a disadvantage, and good workmanship and material will be discouraged. The following rules are therefore prescribed.

When cylindrical boilers are made of the best material with all the rivet holes drilled in place and all the seams fitted with double butt straps each of at least five-eighths the thickness of the plates they cover, and all the seams at least double riveted with rivets having an allowance of not more than 75 per cent. over the single shear and provided that the boilers have been open to inspection during the whole period of construction, then 5 may be used as the factor of safety. The tensile strength of the iron is to be taken as equal to 47,000 lbs. per square inch with the grain, and 40,000 lbs. across the grain. But when the above conditions are not complied with, the additions in the following scale must be added to the factor 5, according to the circumstances of each case:

A†	·15	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place after bending.
B†	·3	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place before bending.
C	·3	To be added when all the holes are fair and good in the longitudinal seams, but punched after bending instead of drilled.
D	·5	To be added when all the holes are fair and good in the longitudinal seams, but punched before bending.
E*	·75	To be added when all the holes are not fair and good in the longitudinal seams.
F	·1	To be added if the holes are all fair and good in the circumferential seams, but drilled out of place after bending.
G†	·15	To be added if the holes are fair and good in the circumferential seams, but drilled before bending.
H	·15	To be added if the holes are fair and good in the circumferential seams, but punched after bending.
I†	·2	To be added if the holes are fair and good in the circumferential seams, but punched before bending.
J*	·2	To be added if the holes are not fair and good in the circumferential seams.
K	·2	To be added if double butt straps are not fitted to the longitudinal seams, and the said seams are lap and double riveted.
L	·1	To be added if double butt straps are not fitted to the longitudinal seams, and the said seams are lap and treble riveted.
M	·3	To be added if only single butt straps are fitted to the longitudinal seams, and the said seams are double riveted.
N	·15	To be added if only single butt straps are fitted to the longitudinal seams and the said seams are treble riveted.
O	·1	To be added when any description of joint in the longitudinal seams is single riveted.
P	·1	To be added if the circumferential seams are fitted with single butt straps and are double riveted.
Q	·2	To be added if the circumferential seams are fitted with single butt straps and are single riveted.
R	·1	To be added if the circumferential seams are fitted with double butt straps and are single riveted.
S	·1	To be added if the circumferential seams are lap joints and are double riveted.
T	·2	To be added if the circumferential seams are lap joints and are single riveted.
U	·25	To be added when the circumferential seams are lap, and the stakes of plates are not entirely under or over.
V‡	·3	To be added when the boiler is of such a length as to fire from both ends, or is of unusual length, as in the case of flue boilers; and the circumferential seams fitted as described opposite P, R, and S, but of course when the circumferential seams are as described opposite Q and T, V ·3 will become V ·4.
W*	·4	To be added if the seams are not properly crossed.
X*	·4	To be added when the iron is in any way doubtful, and the Inspector is not satisfied that it is of the best quality.
Y††	1·65	To be added if no certificate is produced from a Chief Engineer of a recognized Boiler Insurance Company or if the boiler was not open to inspection during the whole period of its construction by the Inspectors of any recognized Boiler Insurance Company.

Where marked* the factor of safety should be increased still further if the workmanship or material is very doubtful or is very unsatisfactory.

† When the holes are to be rimered, or bored out in place, the case should be submitted to the Senior Inspector as to the reduction or omission of A, B, G, and I as heretofore.

‡ When boilers are comparatively short, the cases should be submitted to the Senior Inspector for consideration as to the omission of V as heretofore.

When the circumferential seams are double strapped and double riveted or lapped and treble riveted, and the calculated strength not less than 65 per cent. of the solid plate V, ·3 may be omitted as heretofore.

The strength of ordinary joints is found by the following method:

$$\frac{(\text{Pitch} - \text{Diameter of rivet}) \times 100}{\text{Pitch}} = \left\{\begin{array}{l}\text{Percentage of strength of plate at joint as compared with the solid plate.}\end{array}\right.$$

$$\frac{(\text{Area of rivet} \times \text{No. of rows of rivets}) \times 100}{\text{Pitch} \times \text{thickness of plate}} = \left\{\begin{array}{l}\text{Percentage of strength of rivets as compared with the solid plate.§}\end{array}\right.$$

Then take iron as equal to 47,000 lbs. per square inch and use the smaller of the two percentages as the strength of the joint, and adopt the factor of safety as found from the preceding scale.

$$\frac{(47{,}000 \times \text{percentage of strength of joint}) \times \text{twice the thickness of the plate in inches}}{\text{Inside diameter of the boiler in inches} \times \text{factor of safety}} = \text{Pressure to be allowed per square inch on the safety-valves.}$$

In the case of ordinary zigzag riveting the strength through the plate diagonally between the rivets, when diagonal pitch $= \frac{6}{10}$ horizontal pitch $+ \frac{4}{10}$ diameter of rivet.

Plates that are drilled in place must have been taken apart and the burr taken off and the holes slightly countersunk from the outsides.

Butt straps must have been cut from plates and not from bars, and must be of as good a quality as the shell plates, and for the longitudinal seams must be cut across the fibre. The rivet holes may have been punched or drilled when the plates are punched or drilled out of place, but when drilled in place must have been taken apart and the burr taken off and slightly countersunk from the outside.

§ If the rivets are exposed to double shear, multiply the percentage as found by 1·75.

When single butt straps are used and the rivet holes in them punched, they must be one-eighth thicker than the plates they cover.

The diameter of the rivets must not be less than the thickness of the plates of which the shell is made, but it will be found when the plates are thin, or when lap joints or single butt straps are adopted, that the diameter of the rivets should be in excess of the thickness of the plates.

Dished ends must be stayed as flat surfaces; but when they are theoretically equal to the pressure needed, when considered as portions of spheres, the stays when solid may have a stress of 14,000 lbs. per square inch of net section, but the stress should not exceed 10,000 lbs. when the stays have been welded or worked in the fire.

Truly hemispherical ends subjected to internal pressure may be allowed double the pressure that is suitable for a cylinder of the same diameter and thickness.

All man-holes and openings must be stiffened with compensating rings of at least the same effective sectional area as the plates cut out, and in no case should the plate rings be less in thickness than the plates to which they are attached. The openings in the shells of cylindrical boilers should have their shorter axes placed longitudinally. It is very desirable that the compensating rings round openings in flat surfaces be made of L or T iron. Cast-iron doors are not to be passed.

The neutral part of boiler shells under steam domes must be efficiently stiffened and stayed, as serious accidents have arisen from the want of such precautions.

10. New boilers are to be tested by hydraulic pressure according to the following scale.

Boilers intended to work up to 100 lbs. pressure per square inch or any pressure below that are to be tested to double the working pressure.

Above lbs.	100	up to lbs.	125	to be tested to lbs.	200.
"	125	"	150	"	230.
"	150	"	175	"	250.
"	175	"	200	"	270.
"	200	"	225	"	290.
"	225	"	250	"	310.
"	250	"	275	"	330.
"	275	"	300	"	350.

Any boilers intended for working pressure above these to be tested to not less than 50 lbs. above such working pressure.

In the case of old boilers the Inspector must use his own judgment as to the necessary pressure to be applied.

11. Circular furnaces with the longitudinal joints welded or made with a butt strap.

$$\frac{90{,}000 \times \text{the square of the thickness of the plate in inches}}{(\text{Length in feet} + 1) \times \text{diameter in inches}} = \text{working pressure per square inch,}$$

provided it does not exceed that found by the following formula:

$$\frac{8{,}000 \times \text{thickness in inches}}{\text{diameter in inches.}} = \left\{\begin{array}{l}\text{Working pressure per square inch.}\end{array}\right.$$

The second formula limits the crushing stress on the material to 4,000 lbs. per square inch.

The length is to be measured between the rings if the furnace is made with rings.

If the longitudinal joints instead of being butted are lap-jointed in the ordinary way, then 75,000 is to be used instead of 90,000, excepting only where the lap is bevelled and so made as to give the flues the form of a *true* circle, when 80,000 may be used.

When the material or the workmanship is not of the best quality, the constants given above must be reduced, that is to say, the 90,000 will become 80,000, the 80,000 will become 70,000, the 70,000 will become 60,000; when neither the material nor the workmanship is of the best quality, such constants will require to be further reduced, according to circumstances and the judgment of the Inspector, as in the case of old boilers. One of the conditions of best workmanship is that the joints are double riveted with double butt straps, or single riveted with double butt straps, and the holes drilled after the bending is done and when in place and the plates afterwards taken apart, the burr on the holes taken off and the holes slightly countersunk from the outside.*

The working pressure for corrugated furnaces, practically circular and machine made, provided the plane parts at the ends do not exceed 6 inches in length, and the plates are not less than $\frac{5}{6}$ inch thick, should not be greater than found by the following formula:

$$\frac{9{,}000 \times \text{thickness in inches}}{\text{Mean diameter in inches}} = \left\{ \begin{array}{l} \text{Working pressure per} \\ \text{square inch.} \end{array} \right.$$

* The following examples will serve to show the application of the constants for the different cases that may arise:

Furnaces with butt joints and drilled rivet holes.	90,000 where the longitudinal seams are welded.
	90,000 where the longitudinal seams are double riveted and fitted with single butt straps.
	80,000 where the longitudinal seams are single riveted and fitted with single butt straps.
	90,000 where the longitudinal seams are single riveted and fitted with double butt straps.
Furnaces with butt joints & punched rivet holes.	85,000 where the longitudinal seams are double riveted and fitted with single butt straps.
	75,000 where the longitudinal seams are single riveted and fitted with single butt straps.
	85,000 where the longitudinal seams are single riveted and fitted with double butt straps.
Furnaces with lapped joints and drilled rivet holes.	80,000 where the longitudinal seams are double riveted and bevelled.
	70,000 where the longitudinal seams are double riveted and not bevelled.
	70,000 where the longitudinal seams are single riveted and bevelled.
	65,000 where the longitudinal seams are single riveted and not bevelled.
Furnaces with lapped joints and punched rivet holes.	75,000 where the longitudinal seams are double riveted and bevelled.
	70,000 where the longitudinal seams are double riveted and not bevelled.
	65,000 where the longitudinal seams are single riveted and bevelled.
	60,000 where the longitudinal seams are single riveted and not bevelled.

In the case of upright fireboxes of donkey or similar boilers, 10 per cent. should be deducted from the constants given above, applicable to the respective classes of work.

Steel Boilers.

22 16. For Steel Boilers the rules for iron boilers may be increased as follows:—

The constants for flat surfaces when they are supported by stays screwed into the plate and riveted, 10 per cent. The constants for flat surfaces when they are supported by stays screwed into the plate and nutted, or when the stays are nutted in the steam space, 25 per cent. This is also applicable to the constants for flat surfaces stiffened by riveted washers or doubling strips, and supported by nutted stays.

The constants for combustion box girders, 10 per cent.

Boilers—General.

23 17. Small boilers must be surveyed and be fitted the same way as the main boilers, and have a water and steam gauge, and all other fittings complete, and as regards safety valves, must comply with the same regulations as the main boilers.

24 18. No boilers or steam chamber is to be so constructed, fitted, or arranged so that the escape of steam from it through the safety-valve can be wholly, or partially, intercepted by the action of any other valve.

A stop valve must always be fitted between the boiler and the steam pipe, and, where two or more boilers are connected with a steam receiver or superheater, between each boiler and the superheater or steam receiver. The object of this is obvious, viz., to avoid the failure of all the boilers through the failure of one. The necks of stop valves should be as short as practicable.

25 19. Each boiler must be fitted with a glass water-gauge, at least two test cocks, and steam-gauge, that is to say, each boiler must be fitted with all fittings as complete as if there were only one boiler. When a factory has more than one boiler, and these boilers are fitted with stop-valves, each boiler must be treated as a separate one, and have all the requisite fittings.

6 20. On every inspection of a steam boiler the Inspector shall, if the boiler is large enough, go inside it, and make a thorough examination of it.

When the boilers are not large enough for the Inspector to get into, he should see them tested by hydraulic pressure at every annual inspection at least. The hydraulic test should also be applied at every inspection if the Inspector consider it necessary.

Whenever it is only removable stays that prevent getting in, he must order their removal, and he must see them properly replaced before granting his declaration.

If any part of a main boiler near the uptake fireboxes or furnaces is so constructed that the Inspector cannot examine it, he is not to give a declaration, but shall report the case to the Senior Inspector.

If for special reasons, and for special reasons only, the Inspector cannot go inside a small boiler, he must distinctly state on the face of his declaration his reasons for not being able to do so.

7 21. If the boiler is too hot for the Inspector to examine the inside efficiently, and with safety and convenience, he should decline to examine the boiler, and absolutely refuse to grant a certificate, until he can make an efficient internal examination.

28 26. Before testing a boiler the Inspector shall examine it, take the necessary measurements, and calculate what the working pressure should be in accordance with the regulations, and only test it with reference to that pressure in accordance with Rule 8. If the test is not satisfactory, the pressure must be proportionately reduced.

This course will enable any necessary alterations to be made by the owners and prevent delay or disappointment. The Inspector who grants the certificate should not increase the working pressure without first consulting the Senior Inspector.

The Inspector who grants the certificate must examine the boilers thoroughly, and in the absence of special instructions from the Senior Inspector, will be held responsible for the pressure allowed.

29 27. The Inspector shall see all new boilers, and boilers that have been cleaned for a thorough repair, tested by hydraulic pressure, in accordance with Rule 8 previous to the boilers being set, and before they are covered in, to test the workmanship, &c.; but the working pressure is to be determined by the strength of stays, thickness of plates, and strength of riveting, &c., and not by the hydraulic test.

The hydraulic test should in no case exceed twice the calculated working pressure of the boiler, and it is never to be applied until the boiler has been examined and until the strength has been calculated, from the necessary measurements taken from the boiler itself.

When the boilers are set the Inspector may, at any time he thinks it necessary, before he gives a certificate, have them tested by hydraulic pressure to satisfy himself as to any doubtful part, or of places not easy of access, care being taken in the case of old boilers not to overstrain them; but the test must always exceed the working pressure.

The hydraulic test should before a certificate is granted be applied to all boilers that have not previously had a working certificate.

When a boiler is partially inspected by one Inspector, and the inspection is completed and a certificate granted by another, if the Inspector who witnesses the test of the boiler by hydraulic pressure has an opportunity of examining it inside and outside after the test, such Inspector should determine the pressure to be allowed on the boiler in question, taking care to inform the makers, owners, or agents, and the Inspector who is ultimately to grant a certificate, what pressure should in his opinion be allowed on it. In the event of the original Inspectors having no opportunity to examine the boiler inside and out after the hydrostatic test, the Inspector must re-test the boiler by water and examine the boiler inside and out before determining the working pressure and granting a certificate.

The amount of the hydraulic pressure test, and the date on which it was last applied to the boiler, should be inserted in the Inspector's certificate, and recorded in the dimension sheet of that boiler.

Inspectors should pay particular attention to the examination and testing of steam pipes and economisers.

In all cases in which a socket expansion joint is fitted to a bent steam pipe, the Inspector should require a fixed gland and bolts to be fitted, in order to prevent the end of the pipe being forced out of the socket. This regulation should be complied with in all cases of bent pipes fitted with socket expansion joints. Fixed glands and bolts should be fitted to the expansion joints of straight steam pipes, as cases have occurred, particularly with small straight pipes, in which the ends of the pipes have been forced out of the sockets.

30 28. In all boilers in which the Inspector finds that cast iron is employed in such a manner as to be subject to the pressure of steam or water, they shall report the circumstances to the Senior Inspector, in order that they may obtain instructions how to act. Cast iron must not be used for stays, and Inspectors should discourage the use of cast iron saddles for boilers.

31 29. A pressure once allowed on a boiler is not, *under any circumstances whatever*, to be increased unless the Inspector has previously written for and obtained the sanction of the Senior Inspector.

In case the Inspector is of opinion that an increased pressure may with safety be allowed, he shall communicate with the Inspector who last inspected the boiler; and if on learning the reasons why the existing pressure was formerly allowed, the Inspector is still of opinion that it may be increased, he should communicate all the facts of the case to the Senior Inspector; but, as above stated, the pressure shall not in any case be increased until the question has been decided by him.

Safety-valves.

32 30. The Inspectors are instructed that in all *new boilers*, and whenever *alterations can be easily made*, the safety-valve and stop-valve should be placed directly on the boiler; and the neck, or part between the valve and the flange which is bolted on to the boiler, should be as short as possible.

The Inspector should note that it is not intended by this instruction that old boilers which have been previously passed with such an arrangement should be thrown out of work for the alterations to be carried out.

Of course in any case in which an Inspector is of opinion that it is positively dangerous to have a length of pipe between the boilers and the safety-valve, it is his duty at once to insist on the requisite alterations being made before granting a declaration.

The Inspector shall declare, amongst other things, the limits of the weight to be placed on the safety-valves, and that the safety-valves are such and in such condition as required by the Act, *the circumstances of the case demand.*

33 31. The area per square foot of fire grate surface of safety-valves, or (when there is more than one safety-valve on the boiler) the combined area of the safety-valves should be not less than that given in the following tables opposite the boiler pressure intended, provided the valves are not less than two inches in diameter. This

applies to working certificate.

In ascertaining the fire grate area, the length of the grate should be measured from the inner edge of the dead plate to the front of the bridge, and the width from side to side of the furnace on the top of the bars at the middle of their length.

If there is only one safty-valve on a *main* boiler the Inspector should not grant a certificate without first referring the case to the ~~Senior Inspector~~ for special instructions.

In the case of small boilers, if it is wished to fit valves smaller than two inches diameter, the case should be submitted for the consideration of the ~~Senior Inspector~~.

SAFETY-VALVE AREAS.

Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve Per square foot of Fire grate.
lbs.	Sq. inch.	lbs.	Sq. inch.	lbs.	Sq. inch.
15	1·250	77	·407	139	·243
16	1·209	78	·403	140	·241
17	1·171	79	·398	141	·240
18	1·136	80	·394	142	·238
19	1·102	81	·390	143	·237
20	1·071	82	·386	144	·235
21	1·041	83	·382	145	·234
22	1·013	84	·378	146	·232
23	·986	85	·375	147	·231
24	·961	86	·371	148	·230
25	·937	87	·367	149	·228
26	·914	88	·364	150	·227
27	·892	89	·360	151	·225
28	·872	90	·357	152	·224
29	·852	91	·353	153	·223
30	·833	92	·350	154	·221
31	·815	93	·347	155	·220
32	·797	94	·344	156	·219
33	·781	95	·340	157	·218
34	·765	96	·337	158	·216
35	·750	97	·334	159	·215
36	·735	98	·331	160	·214
37	·721	99	·328	161	·213
38	·707	100	·326	162	·211
39	·694	101	·323	163	·210
40	·681	102	·320	164	·209
41	·669	103	·317	165	·208
42	·657	104	·315	166	·207
43	·646	105	·312	167	·206
44	·635	106	·309	168	·204
45	·625	107	·307	169	·203
46	·614	108	·304	170	·202
47	·604	109	·302	171	·201
48	·595	110	·300	172	·200
49	·585	111	·297	173	·199
50	·576	112	·295	174	·198
51	·568	113	·292	175	·197
52	·559	114	·290	176	·196
53	·551	115	·288	177	·195
54	·543	116	·286	178	·194
55	·535	117	·284	179	·193
56	·528	118	·281	180	·192
57	·520	119	·279	181	·191
58	·513	120	·277	182	·190
59	·506	121	·275	183	·189
60	·500	122	·273	184	·188
61	·493	123	·271	185	·187
62	·487	124	·269	186	·186
63	·480	125	·267	187	·185
64	·474	126	·265	188	·184
65	·468	127	·264	189	·183
66	·462	128	·262	190	·182
67	·457	129	·260	191	·181
68	·451	130	·258	192	·181
69	·446	131	·256	193	·180
70	·441	132	·255	194	·179
71	·436	133	·253	195	·178
72	·431	134	·251	196	·177
73	·426	135	·250	197	·176
74	·421	136	·248	198	·176
75	·416	137	·246	199	·175
76	·412	138	·245	200	·174

direct his attention to the safety-valves, and whenever he considers it necessary, he is to satisfy himself as to the pressure on the boiler by actual trial.

The Inspector is to fix the limits of the weight to be placed on the safety-valves, and the responsibility of issuing a certificate before he is fully satisfied on the point is very grave. ~~The law places on the Inspector the responsibility of "declaring" that the boilers are in his judgment sufficient with the weights he states.~~ The Inspector is to examine the whole of the valves, weights, and springs at every inspection.

The responsibility of seeing to the efficiency of the mode by which the valves are fitted so as to be as much as practicable under the control of the engineer when steam is up, rests with the Inspector.

The safety-valve should be fitted with lifting gear, which should in all cases be arranged so that it can be worked by hand.

Care should be taken that the safety-valves have a lift equal to at least one-fourth their diameter; that the openings for the passage of steam to and from the valves, including the waste steam pipe, should each have an area not less than the area of valves required, and that each valve-box has a drain pipe fitted at its lower part. In the case of lever valves, if the lever is not bushed with brass, the pins must be of brass; iron and iron working together must not be passed. Too much care cannot be devoted to seeing that there is proper lift, and free means of escape of waste steam, as it is obvious that unless the lift and means for escape of waste steam are ample, the effect is the same as reducing the area of the valve or putting on an extra load. The valve seats should be secured by studs and nuts.

The Inspectors shall see, as far as is in their power, to make these points generally known to the owners of Steam Boilers.

523. When the Inspector has determined the amount of pressure, he is to see the valves weighted accordingly and the weights or springs fixed in such a manner as to preclude the possibility of their shifting or in any way increasing the pressure. The limits of the weight on the valves is to be inserted in the declaration, and should it at any time come to the Inspector's knowledge that the weights or the loading of the valves have been shifted, or otherwise altered, or that the valves have been in any way interfered with, so as to increase the pressure, without the sanction of the ~~Senior Inspector~~, he is at once to report the facts.

By order of His Excellency the Right Honourable the Governor in Council,

G. W. VIDAL,
Acting Chief Secretary to Government.

Judicial G.O. No. 174 dated 25th May 1894.

The Collectors of
The District Magistrates of

Anantapur.	8
North Arcot, Chittoor.	8
South Arcot, Cuddalore.	8
Bellary.	8
South Canara, Mangalore.	8
Chingleput, Saidapet.	8
Coimbatore.	8
Cuddapah.	8
Ganjam, Chatrapur.	8
Godavari, Cocanada.	8
Kistna, Masulipatam.	8
Kurnool.	8
~~Madras (when necessary)~~	
Madura.	8
Malabar, Calicut.	12
Nilgiris, Ootacamund.	8
Nellore.	8
Salem.	8
Tanjore.	9
Tinnevelly.	8
Trichinopoly.	8
Vizagapatam.	8

From the Under Secretary to the Government of Bombay, dated 25th May 1894, No. 1942.

ABSTRACT.—Forwarding copy of the rules under the Bombay Boiler Inspection Act, 1891, as finally approved by Government.

From the Under Secretary to the Government of Bombay, dated 8th June 1894, No. 2134.

ABSTRACT.—Inviting ... to his previous letter and stating that another set of rules ... Act is under ... ration.

The engineer ... Department, dated 18th July 1894, No. 614. ... Works, a form of register showing boilers referred to in ...

Under section ... authorizes the ... for the reasons the ...

Under sub-sect ... 1893, the Governme ... the Chief Presidency ...

... correspondence read above, the Government ... to extend any portion of the Madras ... to the mufassal; it will, however, be ... with effect from the 1st April 1895.

2. With regard to the appointment of Inspectors under section 3 of the Act, the Government has come to the conclusion that there will not be enough work to occupy the full time of even one such officer and therefore considers that to the Boiler Inspector should also be entrusted the duty of the periodical inspection of the engines and boilers of the several mufassal municipal water-works. For the combined duties a salary of Rs. 250–10–300 *per mensem* (*plus* travelling allowance for journeys to inspect municipal engines and boilers) will probably suffice; and towards the expenditure on this account the municipalities benefited by the appointment will be required to contribute. On this point further orders will issue in the Local and Municipal Department. The Inspector will need a clerk on Rs. 15 and a peon on Rs. 8. Eight applications for the post of Boiler Inspector have been received. These will be transferred to the Chief Engineer who will advertize in the Gazette and in the leading newspapers stating the terms offered and will, in consultation with the Sanitary Engineer, nominate a person for appointment by Government at an early date. Inasmuch as the Inspector will have to work under the Sanitary Engineer so far as regards municipal engines and boilers, it seems to Government expedient that he should be subordinate to that officer in his position as Boiler Inspector also. The draft rules in Appendix II provide accordingly and it will be considered in the Public Works Department what reports and returns relating to the working of the Act should be submitted by the Sanitary Engineer to Government.

3. With reference to section 4 of the Act, the Government resolves to fix the 1st July 1895 as the date after which no boiler may be used unless it has been licensed.

4. Section 12 (4) of the Act provides for the summoning of assessors to assist the Chief Presidency Magistrate in the hearing of appeals, in such manner as the Government may direct. Probably the best plan will be to permit the appellant to nominate one assessor and the Inspector the other, subject to the reservation that, if either of the assessors or both of them appears or appear to the Chief Presidency Magistrate to be incompetent, he may nominate one or both himself.

The Chief Presidency Magistrate will be requested to advise on the subject.

5. The Government has resolved not at present to give the direction referred to in section 14 of the Act and so much of the Act as relates to the issue of certificates of competency will, therefore, remain in abeyance until further orders.

6. The notifications and orders which it is proposed to issue under the provisions of sections 3, 4, 9, 11, 12 and 23 of the Act are printed as Appendix II to this Proceedings and will be published in the *Fort St. George Gazette*. The Government will consider any suggestions which may be made in respect of them on or before the 1st July 1895 by any persons interested. In particular the Government desires to be favoured by the said date with the opinions of the Public Works Department, the Sanitary Engineer, the Hon'ble the Advocate-General, the Chief Presidency Magistrate, the Accountant-General, the Chamber of Commerce and the Madras Trades Association.

7. All future correspondence in connection with the working of Madras Act III of 1893 will be dealt with in the Public Works Department of the Secretariat.

(True Extract.)

To all District Magistrates.
" the Commissioner of Police, Madras.
" the Public Works Deparment, with applications.
" the Local and Municipal Department.
" the Sanitary Engineer.
" the Chief Presidency Magistrate.
" the Government Solicitor.
" the Accountant-General.
" the Chamber of Commerce.
" the Madras Trades Association.

APPENDIX I.

NOTIFICATION.

Under sub-section (2) of section 1 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government directs that the said Act shall come into force upon the 1st April 1895.

APPENDIX II.

Proposed Notifications

NOTIFICATION A.

Under sub-section (2) of section 3 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government directs that the Inspector shall exercise the powers and perform the duties conferred and imposed by or under this Act on an Inspector throughout the City of Madras.

NOTIFICATION B.

Under section 4 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government fixes the 1st July 1895 as the date after which no boiler shall be used unless a license authorizing its use has been granted under the Act and is in force.

NOTIFICATION C.

(*a*) Under section 9 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government prescribes the following form of register of boilers:—

Name of Owner.	Place where boiler is situated.	Registry number and description of boiler and age.	Nominal horse-power.	When, where and by whom made.	When and where last repaired.	Date of grant of license.	Maximum pressure at which boiler may be worked.	Remarks.

(*b*) Under the same section the Government directs that the registry number of every ler shall be cut in the front plate thereof in such position as shall be pointed out by the ector. The device to be so cut shall consist of the letters "RY" above the letters "No." ivided from them by a horizontal line; the letters "No." to be followed by the registry " in figures, the letters being at least one-half of an inch, the figures at least one-and-a and inch, in height; the whole to be enclosed in a rectangular figure one-sixteenth of an inch om the letters and figures; thus—

RY.
No 148.

The engraving shall be not less than one-sixty-fourth of an inch deep.

NOTIFICATION D.

Under section 11 of the Madras Steam-boilers and Prime-movers Act, 1893, the Government authorizes the Sanitary Engineer to revoke and suspend licenses granted in respect of b... for the reasons therein given.

NOTIFICATION E

Under sub-section (5) of section 12 of ... 1893, the Government prescribes the following as the Chief Presidency Magistrate.

LICENSE.

Name of owner.	Description of boiler and age.	Nominal horse-power.	When and where made.	When and where last repaired.	Time for which this license is to be in force.	Maximum pressure at which the boiler may be worked.	Remarks.

Certificate.—I, the undersigned, * being assisted by A and B, two competent assessors, * are satisfied that C is entitled to the above license and have granted it to him on this date under the provisions of section 12 (5) of Madras Act III of 1893; and I hereby direct the Inspector to register the boiler specified in the above license and to allot to it a registry number in accordance with section 9 of the said Act.

(Signed) D. E.
Chief Presidency Magistrate.

* The words between asterisks to be omitted when no assessors employed.

NOTIFICATION F.

The Government will be prepared to consider any suggestions in respect of the following draft rules under clauses (*a*), (*b*) and (*f*) of section 23 of the Madras Steam-boilers and Prime-movers Act, 1893, which are received on or before the 1st April 1895:—

A.—*Preliminary.*

1. These rules may be called the Boiler Examination Rules.

2. In these Rules—
   (*a*) "The Act" means the Madras Steam-boilers and Prime-movers Act, 1893;
   (*b*) "Section" means a section of the said Act;
   (*c*) "Examination" means the examination of boilers under the Act, and "examination fees" means fees leviable on account of the examination of boilers.

B.—*The Inspector.*

3. The Inspector shall not undertake any professional work unconnected with his business under the Act except with the approval, or under the orders, of Government.

4. The Inspector shall receive such salary as Government may determine, all examination fees being credited to Government.

5. The Inspector shall have an office in which all records connected with the working of the Act shall be kept.

6. The Inspector shall keep the following records:—
   (*a*) a register of examination fee receipts;
   (*b*) a book containing counterfoils of licenses;
   (*c*) a register of boilers in the following form which has been prescribed under section 9:—

Name of owner.	Place where boiler is situated.	Registry number and description of boiler and age.	Nominal horse power.	When, where and by whom made.	When and where last repaired.	Date of grant of license.	Maximum pressure at which boiler may be worked.	Remarks.

   (*d*) a book containing a detailed account of every examination made by him;
   (*e*) a diary of the work done by him from day to day;
   (*f*) a register of licenses suspended or revoked under section 11 (this register to be prepared upon information furnished to the Inspector by the suspending or revoking authority, *i.e.*, the Sanitary Engineer);
   (*g*) a register showing the result of appeals presented under section 12 (this register to be prepared upon information furnished to the Inspector by the Chief Presidency Magistrate).

7. The Inspector shall furnish to the Sanitary Engineer, on the third working day of every month, a copy of his diary for the preceding month.

8. All examination fees shall be paid into the Madras Bank by the owners of boilers and no boiler shall be examined under section 5 unless the notice sent to the Inspector under that section is accompanied by a Bank receipt for the fee; and the Inspector, if he finds that the right fee has not been paid, may decline to examine the boiler until it has been paid.

9. An extract from the register of examination fee receipts which is compiled by the Inspector from the Bank receipts referred to in Rule 8 shall be forwarded by him, monthly, to the Accountant-General who shall verify it by reference to the amount actually received on account of examination fees during the month to which the extract relates and forward it to the Sanitary Engineer for record.

10. The Inspector shall be subordinate to the Sanitary Engineer and shall obey all lawful orders issued to him by that officer.

11. The Inspector's office and the records kept therein shall be examined in January and July of each year by such officer as the Chief Engineer may depute for this purpose.

C.—*Examinations.*

12. Examination fees shall be paid in accordance with the following scale:—

		RS.
(i)	For the examination of each boiler not exceeding 10 N.H.P. ..	12
(ii)	„ „ „ „ „ 20 „ ..	16
(iii)	„ „ „ „ „ 30 „ ..	24
(iv)	„ „ „ „ „ 50 „ ..	32
(v)	„ „ „ boiler exceeding 50 „ ..	40

Iron Boilers.

13. The Inspector is required by the Act to fix the pressure to be allowed on boilers. In performing this very responsible and onerous duty he must be very careful, as in the event of accident it will be necessary for him to prove clearly that he used due caution. On the one hand he must be careful as regards safety, and on the other hand he must not unduly reduce the pressure on a boiler.

14. The Inspector should fix the working pressure for boilers by a series of calculations of the strength of the various parts, and according to the workmanship and material.

In the case of boilers made in India, the Inspector may receive and examine plans and particulars of boilers before the commencement of manufacture with the object of preventing questions arising after the boilers are finished.

When the Inspector has received plans and tracings of new boilers, or of alterations of boilers, and has approved of them, he will of course be careful in making his examination, when the boiler is ready for work, to see that they have been followed out. When he has not had the plans submitted, but is called in to inspect a boiler, he will of course measure the parts, note the details of construction, and, if necessary, bore the plates to ascertain their thickness, &c., before he gives his certificate.

The Inspector shall not declare a boiler to be safe unless (*a*) he is fully informed as to its construction, material and workmanship, or unless (*b*) he is furnished with a certificate from a Chief Engineer of a recognised boiler insurance company. He should therefore be very careful how he ventures to give a certificate.

15. In the case of new boilers the Inspector may allow a stress not exceeding 7,000 lb. per square inch of net section on solid iron screwed stays supporting flat surfaces, but the stress should not exceed 5,000 lb. when the stays have been welded or worked in the fire.

The areas of diagonal stays are found in the following way: Find the area of a direct stay needed to support the surface, multiply this area by the length of diagonal stay, and divide the product by the length of a line drawn at right angles to the surface supported to the end of the diagonal stay; the quotient will be the area of the diagonal stay required.

V ‡ ·3 To be added when the boiler is of such a length as to fire from both ends, or is of unusual length, as in the case of flue boilers; and the circumferential seams fitted as described opposite P, R, and S, but of course when the circumferential seams are as described opposite Q and T, V ·3 will become V ·4.

W * ·4 To be added if the seams are not properly crossed.

X * ·4 To be added when the iron is in any way doubtful, and the Inspector is not satisfied that it is of the best quality.

Y †† 1·65 To be added if no certificate is produced from a Chief Engineer of a recognized Boiler Insurance Company or if the boiler was not open to inspection during the whole period of its construction by the Inspectors of any recognized Boiler Insurance Company.

Where marked * the factor of safety should be increased still further if the workmanship or material is very doubtful or is very unsatisfactory.

† When the holes are to be rimered, or bored out in place, the case should be submitted to the Sanitary Engineer as to the reduction or omission of A, B, G, and I as heretofore.

‡ When boilers are comparatively short, the cases should be submitted to the Sanitary Engineer for consideration as to the omission of V as heretofore.

When the circumferential seams are double strapped and double riveted or lapped and treble riveted, and the calculated strength not less than 65 per cent. of the solid plate V, ·3 may be omitted as heretofore.

The strength of ordinary joints is found by the following method :—

$$\frac{(\text{Pitch} - \text{Diameter of rivet}) \times 100}{\text{Pitch}} = \left.\begin{array}{l}\\\end{array}\right\} \text{Percentage of strength of plate at joint as compared with the solid plate.}$$

$$\frac{(\text{Area of rivet} \times \text{No. of rows of rivets}) \times 100}{\text{Pitch} \times \text{thickness of plate}} = \left.\begin{array}{l}\\\end{array}\right\} \text{Percentage of strength of rivets as compared with the solid plate. §}$$

Then take iron as equal to 47,000 lb. per square inch and use the smaller of the two percentages as the strength of the joint, and adopt the factor of safety as found from the preceding scale.

$$\frac{(47{,}000 \times \text{percentage of strength of joint}) \times \text{twice the thickness of the plate in inches.}}{\text{Inside diameter of the boiler in inches} \times \text{factor of safety}} = \text{Pressure to be allowed per square inch on the safety-valves.}$$

In the case of ordinary zigzag riveting the strength through the plate diagonally between the rivets, when diagonal pitch $= \frac{6}{10}$ horizontal pitch $+ \frac{4}{10}$ diameter of rivet.

Plates that are drilled in place must have been taken apart and the burr taken off and the holes slightly countersunk from the outsides.

Butt straps must have been cut from plates and not from bars, and must be of as good a quality as the shell plates, and for the longitudinal seams must be cut across the fibre. The rivet holes may have been punched or drilled when the plates are punched or drilled out of place, but when drilled in place must have been taken apart and the burr taken off and slightly countersunk from the outside.

When single butt straps are used and the rivet holes in them punched, they must be one-eighth thicker than the plates they cover.

The diameter of the rivets must not be less than the thickness of the plates of which the shell is made, but it will be found when the plates are thin, or when lap joints or single butt straps are adopted, that the diameter of the rivets should be in excess of the thickness of the plates.

Dished ends must be stayed as flat surfaces; but when they are theoretically equal to the pressure needed, when considered as portions of spheres, the stays when solid may have a stress of 14,000 lb. per square inch of net section, but the stress should not exceed 10,000 lb. when the stays have been welded or worked in the fire.

Truly hemispherical ends subjected to internal pressure may be allowed double the pressure that is suitable for a cylinder of the same diameter and thickness.

All man-holes and openings must be stiffened with compensating rings of at least the same effective sectional area as the plates cut out, and in no case should the plate rings be less in thickness than the plates to which they are attached. The openings in the shells of cylindrical boilers should have their shorter axes placed longitudinally. It is very desirable that the compensating rings round openings in flat surfaces be made of L or T iron. Cast-iron doors are not to be passed.

The neutral part of boiler shells under steam domes must be efficiently stiffened and stayed, as serious accidents have arisen from the want of such precautions.

20. New boilers are to be tested by hydraulic pressure according to the following scale :—

§ If the rivets are exposed to double shear, multiply the percentage as found by 1·75.

,, the
Gazette.

Boilers intended to work up to 100 lb. pressure per square inch or any pressure below that are to be tested to double the working pressure.

Above lb.	100 up to	lb.	125 to	be tested to lb.	200.
,,	125	,,	150	,,	230.
,,	150	,,	175	,,	250.
,,	175	,,	200	,,	270.
,,	200	,,	225	,,	290.
,,	225	,,	250	,,	310.
,,	250	,,	275	,,	330.
,,	275	,,	300	,,	350.

Any boilers intended for working pressure above these to be tested to not less than 50 lb. above such working pressure.

In the case of old boilers the Inspector must use his own judgment as to the necessary pressure to be applied.

21. Circular furnaces with the longitudinal joints welded or made with a butt strap.

$$\frac{90{,}000 \times \text{the square of the thickness of the plate in inches}}{(\text{Length in feet} + 1) \times \text{diameter in inches}}$$

= working pressure per square inch, provided it does not exceed that found by the following formula :—

$$\frac{8{,}000 \times \text{thickness in inches}}{\text{diameter in inches.}} = \left.\begin{array}{l}\\\end{array}\right\} \text{Working pressure per square inch.}$$

The second formula limits the crushing stress on the material to 4,000 lb. per square inch.

The length is to be measured between the rings if the furnace is made with rings.

If the longitudinal joints instead of being butted are lap-jointed in the ordinary way, then 75,000 is to be used instead of 90,000, excepting only where the lap is bevelled and so made as to give the flues the form of a *true* circle, when 80,000 may be used.

When the material or the workmanship is not of the best quality, the constants given above must be reduced, that is to say, the 90,000 will become 80,000, the 80,000 will become 70,000, the 70,000 will become 60,000; when neither the material nor the workmanship is of the best quality, such constants will require to be further reduced, according to circumstances and the judgment of the Inspector, as in the case of old boilers. One of the conditions of best workmanship is that the joints are double riveted with double butt straps, or single riveted with double butt straps, and the holes drilled after the bending is done and when in place and the plates afterwards taken apart, the burr on the holes taken off and the holes slightly countersunk from the outside.*

The working pressure for corrugated furnaces, practically circular and machine made, provided the plane parts at the ends do not exceed 6 inches in length, and the plates are not less than $\frac{5}{16}$-inch thick, should not be greater than found by the following formula :—

$$\frac{9{,}000 \times \text{thickness in inches}}{\text{Mean diameter in inches}} = \left.\begin{array}{l}\\\end{array}\right\} \text{Working pressure per square inch.}$$

Steel Boilers.

22. For steel boilers the rules for iron boilers may be increased as follows :—
The constants for flat surfaces when they are supported by stays screwed into the plate and

* The following examples will serve to show the application of the constants for the different cases that may arise :—
Furnaces with butt joints and drilled rivet holes—
90,000 where the longitudinal seams are welded.
90,000 ,, ,, ,, double riveted and fitted with single butt straps.
80,000 ,, ,, ,, single ,, single ,,
90,000 ,, ,, ,, ,, double ,,
Furnaces with butt joints and punched rivet holes—
85,000 where the longitudinal seams are double riveted and fitted with single butt straps.
85,000 ,, ,, ,, single ,, single ,,
,, ,, ,, ,, ,, double ,,
Furnaces with lapped joints and drilled rivet holes—
80,000 where the longitudinal seams are double riveted and bevelled.
70,000 ,, ,, ,, ,, and not bevelled.
70,000 ,, ,, ,, single ,, and bevelled.
65,000 ,, ,, ,, ,, and not bevelled.
Furnaces with lapped joints and punched rivet holes—
75,000 where the longitudinal seams are double riveted and bevelled.
70,000 ,, ,, ,, ,, and not bevelled.
65,000 ,, ,, ,, single ,, and bevelled.
60,000 ,, ,, ,, ,, and not bevelled.
In the case of upright fireboxes of donkey or similar boilers, 10 per cent. should be deducted from the constants given above, applicable to the respective classes of work.

Safety-Valve Areas.

Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.	Boiler Pressure.	Area of Valve per square foot of Fire grate.
LB.	SQ. INCH.	LB.	SQ. INCH.	LB.	SQ. INCH.
15	1·250	77	·407	139	·243
16	1·209	78	·403	140	·241
17	1·171	79	·398	141	·240
18	1·136	80	·394	142	·238
19	1·102	81	·390	143	·237
20	1·071	82	·386	144	·235
21	1·041	83	·382	145	·234
22	1·013	84	·378	146	·232
23	·986	85	·375	147	·231
24	·961	86	·371	148	·230
25	·937	87	·367	149	·228
26	·914	88	·364	150	·227
27	·892	89	·360	151	·225
28	·872	90	·357	152	·224
29	·852	91	·353	153	·223
30	·833	92	·350	154	·221
31	·815	93	·347	155	·220
32	·797	94	·344	156	·219
33	·781	95	·340	157	·218
34	·765	96	·337	158	·216
35	·750	97	·334	159	·215
36	·735	98	·331	160	·214
37	·721	99	·328	161	·213
38	·707	100	·326	162	·211
39	·694	101	·323	163	·210
40	·681	102	·320	164	·209
41	·669	103	·317	165	·208
42	·657	104	·315	166	·207
43	·646	105	·312	167	·206
44	·635	106	·309	168	·204
45	·625	107	·307	169	·203
46	·614	108	·304	170	·202
47	·604	109	·302	171	·201
48	·595	110	·300	172	·200
49	·585	111	·297	173	·199
50	·576	112	·295	174	·198
51	·568	113	·292	175	·197
52	·559	114	·290	176	·196
53	·551	115	·288	177	·195
54	·543	116	·286	178	·194
55	·535	117	·284	179	·193
56	·528	118	·281	180	·192
57	·520	119	·279	181	·191
58	·513	120	·277	182	·190
59	·506	121	·275	183	·189
60	·500	122	·273	184	·188
61	·493	123	·271	185	·187
62	·487	124	·269	186	·186
63	·480	125	·267	187	·185
64	·474	126	·265	188	·184
65	·468	127	·264	189	·183
66	·462	128	·262	190	·182
67	·457	129	·260	191	·181
68	·451	130	·258	192	·181
69	·446	131	·256	193	·180
70	·441	132	·255	194	·179
71	·436	133	·253	195	·178
72	·431	134	·251	196	·177
73	·426	135	·250	197	·176
74	·421	136	·248	198	·176
75	·416	137	·246	199	·175
76	·412	138	·245	200	·174

34. The Inspector in his examination of the boilers and appurtenances is partic… in the direct his attention to the safety-valves, and whenever he considers it necessary, he …ne pres- himself as to the pressure on the boiler by actual trial.

The Inspector is to fix the limits of the weight to be placed on the safety-valves, and the responsibility of issuing a certificate before he is fully satisfied on the point is very grave. The Inspector is to examine the whole of the valves, weights, and springs at every inspection.

The responsibility of seeing to the efficiency of the mode by which the valves are fitted so as to be as much as practicable under the control of the Engineer when steam is up, rests with the Inspector.

The safety-valve should be fitted with lifting gear, which should in all cases be arranged so that it can be worked by hand.

Issued

Recd. *Encl.*

G.O., 25th January 1895, No. 174.

JANUARY.

Steam-boilers Act, 1893.

Directing that the Madras — be br… operation in the City of Madras with… the 1st April 1895, and passing … orders in connection with the sa…