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Government of India
Ministry of Commerce and Industry
Department of Industrial Policy and Promotion
(Central Boilers Board)

New Delhi, the 10th December, 2001.

Notification

G.S.R. 672. - Whereas certain draft regulations further to amend the Indian Boiler Regulations, 1950 were published, as required by sub-section (1) of section 31 of the Indian Boilers Act, 1923 (5 of 1923), at pages 1301 to 1311 in Part II, Section 3, Sub-section (i) of the Gazette of India, dated the 7th April, 2001, vide notification of the Government of India in the Ministry of Commerce and Industry (Department of Industrial Policy and Promotion) (Central Boilers Board) number G.S.R. 200, dated the 26th March, 2001 for inviting objections and suggestions from all persons likely to be affected thereby till the expiry of forty-five days from the date on which copies of the Gazette containing the said notification were made available to the public;

And whereas the copies of the said Gazette were made available to the public on the 24th April, 2001;

And whereas no objections or suggestions have been received within the specified period in respect of the amendments contained in this notification;

Now, therefore, in exercise of the powers conferred by section 28 of the Indian Boilers Act, 1923, the Central Boilers Board hereby makes the following regulations further to amend the Indian Boiler Regulations, 1950, namely:-

1. (1) These regulations may be called the Indian Boiler (Third Amendment) Regulations, 2001.
(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Indian Boiler Regulations, 1950 (hereinafter referred to as the said regulations), in regulation 19, for clause (c), the following shall be substituted, namely: -

"(c) (i) For bend test of plates of all grades of steel, the test piece shall withstands, without fracture, being bent cold through 180° around a mandrel, the radius of which shall have a relationship to the plate thickness as given below:

Tensile strength	Mandrel Radius
36 - 49 kg./mm^2	1 T
41 - 57 kg./mm^2	1 T
45 - 64 kg./mm^2	1.5 T

where T = Plate thickness

(ii) For cold bend test of sections and bars, the test piece shall withstand, without fracture, being doubled over until the internal radius is equal to that shown in Table under regulation 16 and the limbs are parallel.".

3. In the said regulations, in regulation 151, in clause (d), for the words beginning with "for carbon steel", and ending with the words, figure and letters "thickness of 9mm", the following shall be substituted, namely:-

"for Carbon steel,
(i) a thickness of 9mm when the carbon percentage does not exceed 0.300, and
(ii) a thickness of 20mm when the carbon percentage does not exceed 0.250.".

4. In the said regulations, in regulations 250, for the words beginning with "Before welding of the joint" and ending with the words "for circumferential joints", the following shall be substituted, namely: -

"Before welding of the joint is commenced (apart from tack welding) it shall be ascertained that the chamfered edges are in alignment and that the defects in alignment between the surface of the plates do not exceed the limits indicated in the following table:-

Alignment tolerance of Sections to be butt-welded.

Section	Direction of joints in cylindrical shells	
Thickness, mm	Longitudinal	Circumferential
Up to 13 mm incl.	1/4 t	1/4 t
Over 13 mm up to 19 mm	3 mm	1/4 t
Over 19 mm and up to 38 mm	3 mm	5 mm
Over 38 mm and up to 51 mm	3 mm	3 mm
Over 51 mm	Lesser of 1/16 t or 9mm	Lesser of 1/8 t or 19mm".

5. In the said regulations, in regulation 338, for clause (c), the following shall be substituted, namely:-

"(c)(i) **General**: Tubes that are hot or cold bent for parts of boilers, including economizers, furnace walls, superheaters and reheaters, shall comply with this clause and suitably heat treated.

Butt welds shall not be permitted within bends.

Thinning and departure from circularity limits shall be demonstrated by one of the following methods.

(a) relevant and satisfactory service experience;
(b) a procedure test;.
(c) By measurement of 2% of the bends, including the first bend of each shift.

The method selected shall be at the option of the manufacturer.

(ii) **Thinning on tube bends.** Thinning on tube bends shall comply with the following.

(a) At any location around the bend extrados, the reduction in thickness (in percent) below the calculated minimum permissible design thickness of the straight tube, except where permitted by (b), shall not exceed:

$$\frac{100}{\frac{4R}{D} + 2}$$

where
R is the mean radius of the bend to the centre line of the tube (in mm).
D is the ordered outside diameter of the tube (in mm).

(b) Bend thickness below the minimum value required under (a) shall be permitted in cases where the manufacturer can demonstrate by bursting tests carried out on at least three bends that the strength of the bend is not less than that of the straight tube.

(c)Where the amount of thinning at any location around the bend extrados on cold formed bends exceeds 25% of the actual thickness of the tube on the straight the bends shall be suitably heat treated. The actual thickness of the same plans as the line of the extrados at each and of the bend.

(iii) **Departure from circularity in tube bends**. The departure from circularity at the bend apex shall not exceed 10% for bends performed in a single bending operation and 15% for bends which are hot pressed after the primary, bending operation.

The departure from circularity (in percent) shall be calculated from:

$$\frac{D_{max} - D_{min}}{D} \times 100$$

where
D_{max} is the maximum outside diameter measured in the tube bend apex (mm),
D_{min} is the minimum outside diameter measured at the same cross section as D_{max}(mm)
D is the ordered outside diameter of the tube (in mm).".

6. In the said regulations, in regulation 360, for clause (b), the following shall be substituted, namely:-

"(b) Arc welded butt joints of pipes or socket welded joints for pipes, valves and fitting shall be made by metallic shielded arc process and post weld heat treated effectively except in the following cases.

For Carbon steel -

(i) The nominal wall thickness in case of butt joints does not exceed 20 mm or carbon content does not exceed 0.25%;
(ii) The throat thickness of fillet weld for socket welded joints or other types of joints does not exceed 20 mm or carbon content does not exceed 0.25%.

Note.- In case of carbon content for above cases lies between $0.25\% < C \leq 0.30\%$, the PWHT is not required for maximum thickness of 9mm.

For Alloy steel: -

(i) In case of 0.5 Molybdenum steel, if the thickness does not exceed 13mm and outside diameter does not exceed 127mm and for any fillet welds, the throat thickness does not exceed 13mm.

(ii) In case of 1 Chromium and 1/2 Molybdenum steel, if the thickness does not exceed 13mm and outside diameter does not exceed 127mm and pre-heated to 125°C and for any fillet welds if the throat thickness does not exceed 13mm.

(iii) In case of 2-1/4 Chromium 1 Molybdenum steel, post weld heat treatment is not mandatory under the following conditions.

(1) a maximum specified Chromium content of 3.0%.
(2) a maximum nominal outside diameter of 102mm.
(3) a maximum thickness of 13mm.
(4) a maximum specified carbon content of 0.15%.
(5) a minimum pre-heat temperature of 150°C.
(6) a maximum throat thickness of 13mm in case fillet weld.

Method of Heat Treatment: -

(1) For carbon steel, a stress relieving heat treatment shall be performed by heating the part to at least 600±20°C.

When required by the characteristics of the material, different temperatures may be necessary to obtain proper stress relieving. The part to be stress relieved shall be brought slowly up to the specified temperature and held at that temperature for a period proportionate on the basis of at least 2-1/2 minutes per millimetre of the maximum thickness of the part (approximately one hour per twenty five millimetres of thickness) and shall be left to cool in the furnace to a temperature which, for parts with thickness greater than 20 millimetres, does not exceed 400°C. After withdrawal from the furnace, the part shall be allowed to cool in a still atmosphere.

A temperature-time diagram of the stress relieving process shall be provided when the Inspecting Authority requires it.

(2) For alloy steel a stress relieving heat treatment shall be carried out on the basis of the composition of the alloy as shown in the table below: -

Table

Type of steel	Range of temperature	Time at the temperature per 25mm of thickness of the plate.
1 Cr 1/2 Mo 1/2 Cr 1/2 Mo	620°C - 650°C	1 hour (1 hr. min.)
1 Cr 1/2 Mo 1.1/4 Cr 1/2 Mo	620°C - 660°C	1 hour (1 hr. min.)
2.1/4 Cr 1 Mo	625°C - 750°C	1 hour (1 hr. min.)

Note.- This wide range for the post weld heat treatment temperature is necessary because of the marked dependence of the mechanical properties of this steel on the tempering temperature. In production a definite temperature with a tolerance of ±20°C would be

selected to ensure that the mechanical properties upon which the design was based are in fact achieved.

Heat treatment shall be carried out by one of the following methods: -

(i) Local heating using portable muffle induction coil or other suitable heating appliance. Particular care shall be taken to apply heat uniformly over the area to be treated. The use of procedure that does not provide adequate control for this purpose, such as manual operation of gas torches, is not permissible. The temperature shall be maintained symmetrically over peripheral band of metal of a minimum width of three times the width of the butt-welded preparation. The temperature shall be measured by thermocouples pinned, welded or otherwise suitably attached to the surface of the pipe and, where necessary, protected from flame impingement.

(ii) Heating in stationary furnace:- The temperature of the joint shall be measured by the thermocouples so disposed within the furnace as to give a true measure of the joint temperature.

In case the materials made to the foreign codes or standards are accepted under regulation 3(2)(i), the method of heat treatment shall conform to that specified in the codes or standards.".

7. In the said regulations, in regulation 391A, in clause (b), after item (ii), the following shall be inserted, namely: -

"Notwithstanding anything contained in this regulation, for boilers working at a pressure less than 50 kg/cm^2, such elaborate remnant life assessment is not mandatory. However, in such cases, drums and headers of such boilers shall be inspected by Ultrasonic testing, Magnetic particle testing and Dye penetrant test.".

8. In the said regulations, in regulation 592, in clause (j) relating to Circular Reversal Chambers, in sub-clause (i), the following shall be added at the end, namely : -

"However, the design temperature for reversal chamber wrapper plates shall be determined in accordance with the following equations: -

$t = (ts + 2e_2)$ or
$(ts + 50)$ whichever is greater.

where,
t = Design temperature (in degree Centigrade)
ts = Saturation temperature of water (in degree Centigrade) at the design pressure, for both steam or hot water boilers.
e_2 = nominal plate thickness (in mm).".

[File No. 6(8)/2000-Boilers]

Sd/-
(V. K. GOEL)
Secretary, Central Boilers Board

Footnote.- The principal regulations were published in Part II, Section 3, Sub-section (i) of the Gazette of India vide S.O. 600, dated the 15th September, 1950 and subsequently amended vide notifications –

(i) G.S.R. 178, dated the 24th March, 1990;
(ii) G.S.R. 179, dated the 24th March, 1990;
(iii) G.S.R. 488, dated the 9th October, 1993;
(iv) G.S.R. 516 dated the 23rd October, 1993;
(v) G.S.R. 634 dated the 25th December, 1993;
(vi) G.S.R. 107 dated the 26th February, 1994; Errata G.S.R. 223 dated the 14th May, 1994;
(vii) G.S.R. 250 dated the 4th June, 1994;
(viii) G.S.R. 402 dated the13th August, 1994;
(ix) G.S.R. 427 dated the 20th August, 1994;
(x) G.S.R. 562 dated the12th November, 1994;
(xi) G.S.R. 607 dated the10th December, 1994;
(xii) G.S.R. 83 dated the 25th February, 1995;
(xiii) G.S.R. 93 dated the 4th March, 1995;
(xiv) G.S.R. 488 dated the 9th November, 1996;
(xv) G.S.R. 582 dated the 28th December, 1996;
(xvi) G.S.R. 59 dated the 25th January, 1997;
(xvii) G.S.R. 117 dated the 1st March, 1997;
(xviii) G.S.R. 172 dated the 29th March, 1997.
(xix) G.S.R. 221 dated the 21st November, 1998.
(xx) G.S.R. 131 dated 1st May, 1999. Errata GSR 201 dated 7th April, 2001.
(xxi) G.S.R. 139 dated 8th May, 1999.
(xxii) G.S.R. 237 dated 31st July, 1999.
(xxiii) G.S.R. 345 dated 23rd October, 1999.
(xxiv) G.S.R. 397 dated 14th October, 2000.
(xxv) G.S.R. 219 dated 14th April, 2001.
(xxvi) G.S.R. 496 dated 8th September, 2001.

To

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