

ASTM - A210/A210M

SPECIFICATION FOR SEAMLESS MEDIUM-CARBON STEEL BOILER AND SUPERHEATER TUBES

This specification covers minimum-wall-thickness, seamless medium-carbon steel, boiler tubes and boiler flues, including safe ends (Note 1), arch and stay tubes, and superheater tubes.

NOTE 1 — This type is not suitable for safe ending by forge welding.

The tubing sizes and thicknesses usually furnished to this specification are 1/2 in. to 5 in. [12.7 to 127 mm] in outside diameter and 0.035 to 0.500 in. [0.9 to 12.7 mm], inclusive, in minimum wall thickness. Tubing having other dimensions may be furnished, provided such tubes comply with all other requirements of this specification.

Mechanical property requirements do not apply to tubing smaller than 1/8 in. [3.2 mm] in inside diameter or 0.015 in. [0.4 mm] in thickness.

A. Manufacture :-

1. Steelmaking Practice—The steel shall be killed.
2. The tubes shall be made by the seamless process and shall be either hot-finished or cold-finished, as specified.

B. Heat Treatment :-

1. Hot-finished tubes need not be heat treated.
2. Cold-finished tubes shall be given a subcritical anneal, a full anneal, or a normalizing heat treatment after the final cold-finishing process.

C. Chemical Composition :-

The steel shall conform to the requirements as to chemical composition prescribed in Table 1.

Table 1

Element	Composition, %	
	Grade A-1	Grade C
Carbon^A, max	0.27	0.35
Manganese	0.93 max	0.29–1.06
Phosphorus, max	0.035	0.035
Sulfur, max	0.035	0.035
Silicon, min	0.1	0.1

^A For each reduction of 0.01% below the specified carbon maximum, an increase of 0.06% manganese above the specified maximum will be permitted up to a maximum of 1.35%.

D. Tensile Requirements:-

1. The material shall conform to the requirements given in Table 2.
2. Table 3 gives the computed minimum elongation values for each 1/32-in. [0.8-mm] decrease in wall thickness.
3. Where the wall thickness lies between two values shown above, the minimum elongation value shall be determined by the following equation:

$$E = 48t + 15.00 \quad [E = 1.87t + 15.00]$$

where: E = elongation in 2 in. [50 mm], %, and,
t = actual thickness of specimen, in. [mm].

Table 1

	Grade A-1	Grade C
Tensile strength, min, ksi (MPa)	60 [415]	70 [485]
Yield strength, min, ksi (MPa)	37 [255]	40 [275]
Elongation in 2 in. [50 mm], min, %:	30	30

For longitudinal strip tests, a deduction shall be made for each 1/32 in. [0.8 mm] decrease in wall thickness under 5/16 in. [8 mm] from the basic minimum elongation of the following percentage points	1.5 ^A	1.5 ^A
When standard round 2 in. or 50 mm gage length or smaller proportionally sized specimen with the gage length equal to 4D (four times the diameter) is used	22	20

^A See Table 4 for the computed minimum values.

Table 3

Wall Thickness		Elongation in 2 in. or 50 mm, min, % ^A
in.	mm	
5/16 (0.312)	8	30
9/32 (0.281)	7.2	28
1/4 (0.250)	6.4	27
7/32 (0.219)	5.6	26
3/16 (0.188)	4.8	24
5/32 (0.156)	4	22
1/8 (0.125)	3.2	21
3/32 (0.094)	2.4	20
1/16 (0.062)	1.6	18
0.062 to 0.035, excl	[1.6 to 0.9]	17
0.035 to 0.022, excl	[0.9 to 0.6]	16
0.022 to 0.015, excl	[0.6 to 0.4]	16

^A Calculated elongation requirements shall be rounded to the nearest whole number

E. Hardness Requirements :-

The tubes shall have a hardness not exceeding the following:

Grade A-1 79 HRB or 143 HB
Grade C 89 HRB or 179 HB

F. Mechanical Tests Required :-

1. Tension Test.
2. Flattening Test.
3. Flaring Test.
4. Hardness Test.
5. Hydrostatic or Non-destructive Electric Test —Each tube shall be subjected to the hydrostatic, or, instead of this test, a non-destructive electric test may be used when specified by the purchaser.

Keyword

- astm a210 pdf
- sa210 gr a1 material specification
- sa210 gr a1 pdf
- sa210 gr a1 temperature
- astm a210 grade a1
- astm a210 specification

- [astm a210 pdf free download](#)

Pipingmart.COM