

ASTM A213 / ASME SA213 T91 Seamless Boiler & Superheater Tube Specification

This specification covers ASTM A213 / ASME SA213 Grade T91 seamless ferritic alloy steel tubes for high-temperature and high-pressure boiler and superheater service.

1. Standard Overview – ASTM A213 / ASME SA213

ASTM A213 specifies seamless ferritic and austenitic alloy steel boiler, superheater, and heat exchanger tubes. ASME SA213 is the ASME code adoption of ASTM A213.

2. Material Introduction – Grade T91

T91 is a 9Cr-1Mo-V-Nb alloy steel offering superior creep strength, oxidation resistance, and thermal fatigue resistance at elevated temperatures.

3. Chemical Composition – ASTM A213 T91

Element	Composition (%)
C	0.07 – 0.13
Mn	0.30 – 0.60
P	≤ 0.020
S	≤ 0.010
Si	0.20 – 0.50
Cr	8.00 – 9.50
Mo	0.85 – 1.05
V	0.18 – 0.25
Nb	0.06 – 0.10
N	0.03 – 0.07

4. Mechanical Properties (Room Temperature)

Property	Requirement
Tensile Strength	585 – 760 MPa
Yield Strength (0.2%)	≥ 415 MPa
Elongation	≥ 20 %

5. Heat Treatment

T91 tubes shall be supplied in normalized and tempered condition. Normalizing at 1040–1080 °C followed by tempering at ≥ 730 °C.

6. Hardness Requirement

Maximum hardness shall not exceed 250 HBW unless otherwise specified.

7. Testing Requirements

Chemical analysis, tensile test, flattening test, hydrostatic or non-destructive electric test, and dimensional inspection are required in accordance with ASTM A213 and ASTM A999.

8. Size Range

Outside Diameter: 1/8" – 5". Wall Thickness: 0.5 mm – 25 mm. Length: Random, double random, or cut-to-length.

9. Typical Applications

Boilers, superheaters, reheaters, heat exchangers, power plants, petrochemical furnaces, and high-temperature pressure systems.

10. Related Products Recommendation

ASTM A213 T22 Boiler Tubes

ASTM A213 T11 Seamless Tubes

ASTM A335 P91 Seamless Pipes

ASTMA182 F91 Forged Fittings

ASTM A234 WP91 Alloy Steel Fittings

