

ASME SA 192 / ASTM A192

Seamless Carbon Steel Boiler and Superheater Tubes

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Standard Overview

Standard Overview

ASTM A192/ASME SA192 is a standard specification recognized by both the American Society for Testing and Materials (ASTM) and the American Society of Mechanical Engineers (ASME), covering minimum-wall-thickness, seamless carbon steel boiler and superheater tubes for high-pressure service. Both standard numbers correspond to identical content, differing only in the issuing organization.



INTRODUCTION

This standard specifies the chemical composition,

mechanical properties, manufacturing process, heat treatment requirements, dimensional tolerances, and necessary testing methods for seamless carbon steel boiler and superheater tubes, ensuring that the products can operate safely and reliably in high-pressure environments.

SCOPE OF APPLICATION

- **Product Type**: Seamless carbon steel boiler and superheater tubes
- Service Conditions: High-pressure service
- Wall Thickness Requirements: Minimum wall thickness specifications
- Standard Size Range:
 - Outside Diameter: 1/2 inch to 7 inches (12.7 mm to 177.8 mm)
 - Minimum Wall Thickness: 0.085 inch to 1.000 inch (2.2 mm to 25.4 mm)
- **Special Cases**: Tubing having other dimensions may be furnished, provided such tubes comply with all other requirements of this specification
- **Limitations**: Mechanical property requirements do not apply to tubing smaller than 1/8 inch (3.2 mm) inside diameter or 0.015 inch (0.4 mm) thickness

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Product Technical Specifications

CHEMICAL COMPOSITION

The chemical composition requirements for ASME SA 192 / ASTM A192 seamless carbon steel tubes are shown in the following table:

Element	Content Range (%)
Carbon (C)	0.06~0.18
Manganese (Mn)	0.27~0.63
Phosphorus (P)	≤0.035
Sulfur (S)	≤0.035
Silicon (Si)	≤0.25

Note: All values shall be based on heat analysis.

2.2 Mechanical Properties

The mechanical property requirements for ASME SA 192 / ASTM A192 seamless carbon steel tubes are shown in the following table:

Property	Requirement
Minimum Tensile Strength	47 ksi [325 MPa]
Minimum Yield Strength	26 ksi [180 MPa]
Minimum Elongation (2 inches)	35%
Maximum Brinell Hardness (Wall thickness ≥0.200 inch [5.1 mm])	137 HBW
Maximum Rockwell Hardness (Wall thickness <0.200 inch [5.1 mm])	77 HRBW

Note: Mechanical property requirements do not apply to tubing smaller than 1/8 inch [3.2 mm] inside

diameter or 0.015 inch [0.4 mm] thickness.



Product Technical Specifications



2.3 Dimensional Specifications

2.3.1 Wall Thickness Tolerances

Tube Type	Wall Thickness Tolerance (%)

Seamless cold-finished tubes, OD $\leq 1\frac{1}{2}$ inch (38.1 mm) +20, 0

Seamless cold-finished tubes, OD > $1\frac{1}{2}$ inch (38.1 mm) +22, 0

2.3.2 Outside Diameter Tolerances

Outside Diameter Range	Permissible Variations (inch [mm])
<1 inch (25.4 mm)	±0.004 [0.10]
1 to 1½ inch (25.4 to 38.1 mm)	±0.006 [0.15]
>1½ to 2 inch (38.1 to 50.8 mm)	±0.008 [0.20]
>2 to 2½ inch (50.8 to 63.5 mm)	±0.010 [0.25]

2.3.3 Length Options

- Single random length
- Double random length
- Maximum length as per customer's actual request (up to 27 meters)









Manufacturing Process and Quality Control

3.1 MANUFACTURING METHOD

ASME SA 192 / ASTM A192 tubes are manufactured using the seamless process and can be either hot-finished or cold-finished. The seamless process ensures uniform properties throughout the entire cross-section of the tube, without the potential weaknesses associated with welds, making it particularly suitable for highpressure applications.



3.2 HEAT TREATMENT REQUIREMENTS

- Hot-finished tubes: Need not be heat treated
- Cold-finished tubes: Shall be heat treated after the final cold-finishing at a temperature of 1200°F
 [650°C] or higher

Heat treatment is particularly important for cold-finished tubes as it eliminates internal stresses generated during the cold-working process, restores material ductility, and ensures stable performance of the tubes in high-pressure and high-temperature environments.

3.3 QUALITY TESTING AND INSPECTION

ASME SA 192 / ASTM A192 tubes must undergo the following necessary mechanical tests:

- 1. Flattening Test: Evaluates the tube's plastic deformation capability and weld quality
- 2. Flaring Test: Examines the tube's performance during radial expansion
- 3. Hardness Test: Ensures the tube's hardness falls within the specified range
- 4. Hydrostatic Test: Verifies the tube's sealing properties and pressure-bearing capacity
- 5. **Tensile Test**: Determines the tube's tensile strength, yield strength, and elongation

3.4 QUALITY CERTIFICATION

- Mill test certificates in accordance with EN10204.3.1 standard
- Testing shall be conducted according to A 450/A 450M
- IBR certification (Indian Boiler Regulations) available upon request



Application Areas and Case Studies



MAIN APPLICATION INDUSTRIES

ASME SA 192 / ASTM A192 seamless carbon steel tubes are primarily used in the following industries:

- 1. Power Industry: Boiler systems and steam pipelines in thermal power plants
- 2. Petrochemical Industry: High-pressure heat exchange equipment in refineries and chemical plants
- 3. Manufacturing Industry: Industrial production facilities requiring high-pressure steam
- 4. Energy Sector: Various energy conversion and transmission systems

TYPICAL APPLICATION CASES

- High-Pressure Boiler Systems: As boiler tubes, withstanding high-temperature and high-pressure steam
- Superheater Systems: Used in power plants to increase steam temperature, improving energy • efficiency
- Heat Exchange Equipment: Used in chemical plants for heat transfer and energy recovery •





Special Product Forms

FINNED TUBES



ASME SA 192 finned tubes are heat exchange elements that increase the outer surface area by adding fins to the tube surface, improving heat exchange efficiency. Key features include:

- Increased heat exchange surface area, improving thermal efficiency
- Available in square finned heat exchanger tubes
- Suitable for various heat exchangers and cooling systems





Special Product Forms

U-BEND TUBES

ASME SA 192 U-bend tubes are primarily used in heat exchangers and boilers, with the following features:

- Available in different bend radius options
- Reduced connection points, lowering leakage risks
- Accommodates thermal expansion, improving system reliability

FITTINGS

ASME SA 192 standard also offers various complementary fittings, including:

- Butt-welded elbows
- Various sizes of tube fittings
- Customized connectors











International Standards Comparison

ASME SA 192 / ASTM A192 has multiple equivalent standards worldwide, with the main correspondences as follows:

Standard System	Equivalent Standard Number
DIN	17175 Grade St 35.8
EN	P235GH Grade 10216-2
BS	BS 3059 Part II
NFA	A 49-213 Grade TU 37 F
JIS	D3563 / G3461
UNS	K01201
Old British Standard	CFS 320
German Standard Number	1.0305
Belgian Standard	837
Italian Standard	5462

Ordering Guidelines

REQUIRED ORDERING INFORMATION

When ordering ASTM A192/ASME SA192 seamless carbon steel tubes, the following information should be included:

- 1 Quantity (feet, meters, or number of lengths)
- 2 Material name (seamless tubes)
- 3 Manufacturing method (hot-finished or cold-finished)
- 4 Dimensions (outside diameter and minimum wall thickness)

5 Length (specific or random)

6 Optional requirements

7 Test report requirements (see section on Certification of Specification A 450/A 450M)

8 Specification designation

9 Special requirements



COMMON STOCK SPECIFICATIONS

We maintain stock of ASME SA 192 / ASTM A192 seamless carbon steel tubes in the following specifications:

- 1 Outside diameter range: 1/2 inch to 7 inches (12.7 mm to 177.8 mm)
- 2 Wall thickness range: 0.085 inch to 1.000 inch (2.2 mm to 25.4 mm)
- 3 Nominal bore sizes: 15NB to 600NB

Product Identification and Packaging

IDENTIFICATION METHOD

- Paint marking on tube ends
- Bundle tags containing specifications, batch number, standard number, etc.

PACKAGING FORM

- Hexagonal bundles or round bundles tied with steel strip
- Bundle weight: According to customer requirements, up to 5000 kg
- Each bundle is furnished with three tags







