ASTM A213 T22


Grades containing the letter H in their designation have requirements different from those of similar grades not containing the letter H.

These different requirements provide higher creep-rupture strength than normally achievable in similar grades without these different requirements. The tubes shall be made by the seamless process and shall be either hot finished or cold finished, as specified. Grade TP347HFG shall be cold finished. Heat treatment shall be done separately and in addition to heating for hot forming. The ferritic alloy and ferritic stainless steels shall be reheated. On the other hand, austenitic stainless steel tubes shall be furnished in the heat-treated condition. Alternatively, immediately after hot forming, while the temperature of the tubes is not less than the minimum solution temperature, tubes may be individually quenched in water or rapidly cooled by other means. Tension test, hardness test, flattening test, and flaring test shall be done to each tube. Also, each tube shall be subjected to the nondestructive electric test or hydrostatic test.
ASTM A209 through A213

- Other standard specifications include the categories of A209 seamless carbon-molybdenum alloy-steel boiler and superheater tubes;
- A210 seamless medium-carbon steel boiler and superheater tubes and A213 seamless ferritic and austenitic steel boiler, superheater and heat-exchanger tubes.
- Piping wall thicknesses range from 1/2 inch to 5 inches. A213 grades also have the letter H or M assigned, which changes the composition and specifications for that series.

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View the data of the steel grade as below:

### Mechanical properties for ASTM A213 T22 Low Alloy Steel

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength(min)</td>
<td>415Mpa</td>
</tr>
<tr>
<td>Yield strength(min)</td>
<td>220Mpa</td>
</tr>
<tr>
<td>Elongation</td>
<td>30%</td>
</tr>
<tr>
<td>Delivery condition</td>
<td>annealed</td>
</tr>
</tbody>
</table>
### Chemical Composition (%) for ASTM A213 T22 Low Alloy Steel

<table>
<thead>
<tr>
<th>UNS Designation</th>
<th>K21590</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td>0.05–0.15</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.30–0.60</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.025</td>
</tr>
<tr>
<td>Sulfur</td>
<td>0.025*</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.50</td>
</tr>
<tr>
<td>Nickel</td>
<td>…</td>
</tr>
<tr>
<td>Chromium</td>
<td>1.90–2.60</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>0.87–1.13</td>
</tr>
<tr>
<td>Vanadium</td>
<td>…</td>
</tr>
<tr>
<td>Boron</td>
<td>…</td>
</tr>
<tr>
<td>Niobium</td>
<td>…</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>…</td>
</tr>
<tr>
<td>Aluminum</td>
<td>…</td>
</tr>
<tr>
<td>Tungsten</td>
<td>…</td>
</tr>
<tr>
<td>Other Elements</td>
<td>…</td>
</tr>
</tbody>
</table>

### Referenced Documents (purchase separately)

Other ASTM Standards

- A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
- A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
- A1016/A1016M Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes
- E112 Test Methods for Determining Average Grain Size
ASTM A213 Standard Scope

1.1 This specification covers seamless ferritic and austenitic steel boiler, superheater, and heat-exchanger tubes, designated Grades T5, TP304, etc. These steels are listed in Tables 1 and 2.

1.2 Grades containing the letter, H, in their designation, have requirements different from those of similar grades not containing the letter, H. These different requirements provide higher creep-rupture strength than normally achievable in similar grades without these different requirements.

1.3 The tubing sizes and thicknesses usually furnished to this specification are 1/8 in. [3.2 mm] in inside diameter to 5 in. [127 mm] in outside diameter and 0.015 to 0.500 in. [0.4 to 12.7 mm], inclusive, in minimum wall thickness or, if specified in the order, average wall thickness. Tubing having other diameters may be furnished, provided such tubes comply with all other requirements of this specification.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. The inch-pound units shall apply unless the “M” designation of this specification is specified in the order.

TABLE 1 Chemical Composition Limits, %, for Low Alloy Steel

<table>
<thead>
<tr>
<th>Element</th>
<th>Maximum, unless range or minimum is indicated. Where ellipses (...) appear in this table, there is no requirement, and analysis for the element need not be determined or reported.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>It is permissible to order T2 and T22 with a sulfur content of 0.045 max. See 16.3.</td>
</tr>
<tr>
<td>C</td>
<td>Alternatively, in lieu of this ratio minimum, the material shall have a minimum hardness of 275 HV in the hardened condition, defined as after austenitizing and cooling to room temperature but prior to tempering. Hardness testing shall be performed at mid-thickness of the product. Hardness test frequency shall be two samples of product per heat treatment lot and the hardness testing results shall be reported on the material test report.</td>
</tr>
</tbody>
</table>

After testing, the test piece shall be free from cracks or breaks. However, slight incipient cracks at its edges shall not be regarded as justification for rejection.

Online: http://www.sunnysteel.com/blog/index.php/astm-a213-T22/
Read more information of seamless steel pipes

- Why seamless steel pipe? Some benefits of Seamless Steel Pipe
- Seamless steel pipes for high temperature and pressure service

- ASTM A213/ ASME SA213 Standard specification
- ASTM A213 T2/ ASME SA213 T2 specification
- ASTM A213 T2/ ASME SA213 T5 specification
- ASTM A213 T5/ ASME SA213 T5 specification
- ASTM A213 T9/ ASME SA213 T9 specification
- ASTM A213 T11/ ASME SA213 T11 specification
- ASTM A213 T12/ ASME SA213 T12 specification
- ASTM A213 T17/ ASME SA213 T17 specification
- ASTM A213 T21/ ASME SA213 T21 specification
- ASTM A213 T22/ ASME SA213 T22 specification
- ASTM A213 T91/ ASME SA213 T91 specification

- ASTM Standard for Boilers tube, Super heater tubes
- Seamless steel pipes for high temperature and pressure service
- Standards commonly used stainless steel tube
- Seamless tube, Seamless tubing
- What is boiler tube
- Heat exchanger tube
Boiler Tube in the following Spec/Grades:

- ASTM A178 Grade A, C, D
- ASTM A192
- SA210 / A210 – Grade A1, C
- SA213 / A213 – Grades (limited sizes) T-5, T-9, T-11, T-22, T-91
- BS3059-1 320 CFS
- BS3059-II 360, 440, 243, 620-460, 622-490, S1, S2, TC1, TC2
- EN10216-1 P195TR1/TR2, P235TR1/TR2, P265TR1/TR2
- EN10216-2 P195GH, P235GH, P265GH, TC1, TC2
- DIN17175 ST35.8, ST45.8
- DIN1629, DIN1629 ST37.0, DIN1629 ST44.0, DIN1629 ST52.0
- JIS G3454 STPG370, STPG410
- JIS G3461 STB340, STB410, STB440
- GB5310 20G, 15MoG, 12CrMoG, 12Cr2MoG, 15CrMoG, 12Cr1MoVG, 12Cr2MoWVTiB
- GB9948 10, 20, 12CrMo, 15CMo

Inspection and Test:

- Chemical Composition Inspection, Mechanical Properties Test
- Tensile Strength, Yield Strength, Elongation, Flaring, Flattening, Bending, Hardness, Impact Test
- Surface and Dimension Test, No-destructive Test, Hydrostatic Test.

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