Standard Specification for
Welded UNS N06625, UNS N06219 and UNS N08825 Alloy
Tubes¹

This standard is issued under the fixed designation B704; the number immediately following the designation indicates the year of
original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A
superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers welded UNS N06625, UNS N06219 and UNS N08825 alloy boiler, heat exchanger, and
condenser tubes for general corrosion resisting and low or high-temperature service.

1.2 This specification covers tubes ⅛ to 5 in. (3.18 to 127
mm), inclusive, in outside diameter and 0.015 to 0.500 in. (0.38
to 12.70 mm), inclusive, in wall thickness. Specification B751
lists the dimensional requirements of these sizes. Tubes having
other dimensions may be furnished provided such tubing complies with all other requirements of this specification.

1.3 The values stated in inch-pound units are to be regarded
as standard. The values given in parentheses are mathematical
conversions to SI units that are provided for information only
and are not considered standard.

1.4 This standard does not purport to address all of the
safety concerns, if any, associated with its use. It is the
responsibility of the user of this standard to become familiar
with all hazards including those identified in the appropriate
Material Safety Data Sheet (MSDS) for this product/material
as provided by the manufacturer, to establish appropriate
safety and health practices, and determine the applicability of
regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:²
B751 Specification for General Requirements for Nickel and
Nickel Alloy Welded Tube
E8 Test Methods for Tension Testing of Metallic Materials

3. Ordering Information

3.1 Orders for material to this specification should include
the following information:

3.1.1 Quantity (feet or number of lengths),
3.1.2 UNS number,
3.1.3 Size (outside diameter, minimum or average wall
thickness),
3.1.4 Length (random or specific),
3.1.5 Class, and
3.1.6 Grade if UNS N06625 is specified. If neither grade of
N06625 is specified, grade 1 will be supplied.

3.1.7 ASTM designation.
3.1.8 Product Analysis—State if required.
3.1.9 Certification—State if a certification or a report of test
results is required.
3.1.10 Purchaser Inspection—State which tests or inspections
are to be witnessed, if any.

4. Materials and Manufacture

4.1 Tube shall be made from flat-rolled alloy by an auto-
matic welding process with no addition or filler metal. Subse-
quent to welding and prior to final annealing, the material shall
be cold-worked in either the weld metal only or both weld and
base metal.

4.2 Tube shall be furnished with oxide removed. When
bright annealing is used, descaling is not necessary.

5. Chemical Composition

5.1 The material shall conform to the composition limits
specified in Table 1. One test is required for each lot as defined
in Specification B751.

5.2 If a product analysis is performed, it shall meet the
chemistry limits prescribed in Table 1, subject to the analysis
tolerances of Specification B751.

6. Mechanical and Other Properties

6.1 Mechanical Properties—The material shall conform to
the mechanical property requirements specified in Table 2. One
test is required for each lot as defined in Specification B751.

6.2 Flattening Test—A flattening test shall be made on each
end of one tube per lot. Superficial ruptures resulting from
surface imperfections shall not be cause for rejection.

6.3 Flange Test—A flange test shall be made on each end of
one tube per lot.

¹ This specification is under the jurisdiction of ASTM Committee B02 on
Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee
B02.07 on Refined Nickel and Cobalt and Their Alloys.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or
contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM
Standards volume information, refer to the standard’s Document Summary page on
the ASTM website.
6.4 Nondestructive Test Requirements:
6.4.1 Class 1—Each piece in each lot shall be subject to one of the following four tests: hydrostatic, pneumatic (air underwater), eddy current, or ultrasonic.
6.4.2 Class 2—Each piece in each lot shall be subjected to a leak test and an electric test as follows:
   6.4.2.1 Leak Test—Hydrostatic or pneumatic (air underwater).
   6.4.2.2 Electric Test—Eddy current or ultrasonic.
6.5 The manufacturer shall have the option to test to Class 1 or 2 and select the nondestructive test methods, if not specified by the purchaser.

7. General Requirements
7.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification B751 unless otherwise provided herein.

8. Product Marking
8.1 In addition to the requirements of Specification B751, UNS N06625 tubes shall be marked with grade information.

9. Keywords
9.1 UNS N06219; UNS N06625; UNS N08825; welded tube

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**TABLE 1 Chemical Requirements**

<table>
<thead>
<tr>
<th>Element</th>
<th>UNS N06625</th>
<th>UNS N06219</th>
<th>UNS N08825</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni</td>
<td>58.0 min⁴</td>
<td>Bal</td>
<td>38.0–46.0</td>
</tr>
<tr>
<td>Cr</td>
<td>20.0–23.0</td>
<td>18.0–22.0</td>
<td>19.5–23.5</td>
</tr>
<tr>
<td>Fe</td>
<td>5.0 max</td>
<td>2.0–4.0</td>
<td>22.0 min⁴</td>
</tr>
<tr>
<td>Mo</td>
<td>8.0–10.0</td>
<td>7.0–9.0</td>
<td>2.5–3.5</td>
</tr>
<tr>
<td>Cb + Ta</td>
<td>3.15–4.15</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>C</td>
<td>0.10 max</td>
<td>0.05 max</td>
<td>0.05 max</td>
</tr>
<tr>
<td>Mn</td>
<td>0.50 max</td>
<td>0.50 max</td>
<td>1.0 max</td>
</tr>
<tr>
<td>Si</td>
<td>0.015 max</td>
<td>0.020 max</td>
<td>...</td>
</tr>
<tr>
<td>S</td>
<td>0.015 max</td>
<td>0.010 max</td>
<td>0.03 max</td>
</tr>
<tr>
<td>Al</td>
<td>0.4 max</td>
<td>0.50 max</td>
<td>0.2 max</td>
</tr>
<tr>
<td>Ti</td>
<td>0.40 max</td>
<td>0.50 max</td>
<td>0.6–1.2</td>
</tr>
<tr>
<td>Co (if determined)</td>
<td>1.0 max</td>
<td>1.0 max</td>
<td>...</td>
</tr>
<tr>
<td>Cu</td>
<td>...</td>
<td>0.50 max</td>
<td>1.5–3.0</td>
</tr>
</tbody>
</table>

⁴ Element may be determined arithmetically by difference.

**TABLE 2 Mechanical Property Requirements**

<table>
<thead>
<tr>
<th>Alloy Grade</th>
<th>Tensile Strength min, psi (MPa)</th>
<th>Yield Strength A min, psi (MPa)</th>
<th>0.2 % Offset, min, psi (MPa)</th>
<th>Elongation in 2 in. or 50 mm, min, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNS N06625</td>
<td>120 000 (827)</td>
<td>60 000 (414)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>UNS N06625</td>
<td>100 000 (690)</td>
<td>40 000 (276)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>UNS N06219</td>
<td>96 000 (660)</td>
<td>39 000 (270)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>UNS N08825</td>
<td>85 000 (586)</td>
<td>35 000 (240)</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

⁵ Yield strength shall be determined by the offset method at 0.2 % limiting permanent set in accordance with Test Methods E8.
⁶ Solution annealed at 2000°F (1093°C) minimum, with or without subsequent stabilization anneal at 1800°F (982°C) minimum to increase resistance to sensitization.