Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

1. Scope

1.1 This specification covers stainless and heat-resisting chromium steel plate, sheet, and strip available in a wide variety of surface finishes.

1.2 The values stated in inch-pound units are to be regarded as the standard.

Note 1—Grades that were previously covered in both Specifications A 176 and A 240/A 240M have been removed from this specification and may now be supplied and purchased in compliance with Specification A 240/A 240M. The chemical and mechanical property requirements of these grades were identical in Specifications A 176 and A 240/A 240M at the time of removal from Specification A 176.

2. Referenced Documents

2.1 ASTM Standards:

A 240/A240M Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 480/A480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

E 527 Practice for Numbering Metals and Alloys (UNS)

2.2 SAE Standard:

J1086 Practice for Unified Numbering for Metals and Alloys (UNS)

3. Chemical Composition

3.1 The steel shall conform to the requirements as to chemical composition specified in Table 1, and shall conform to applicable requirements specified in Specification A 480/A 480M.

4. Mechanical Properties

4.1 The material shall conform to the mechanical properties specified in Table 2.

5. General Requirements

5.1 The following requirements for orders for material furnished under this specification shall conform to the applicable requirements of the current edition of Specification A 480/A480M.

5.1.1 Definitions,

5.1.2 General requirements for delivery,

5.1.3 Ordering information,

5.1.4 Process,

5.1.5 Special tests,

5.1.6 Heat treatment,

5.1.7 Dimensions and permissible variations,

5.1.8 Workmanship, finish and appearance,

5.1.9 Number of tests/test methods,

5.1.10 Specimen preparation,

5.1.11 Retreatment,

5.1.12 Inspection,

5.1.13 Rejection and rehearing,

5.1.14 Material test report, and

5.1.15 Certification.
### TABLE 1 Chemical Requirements

<table>
<thead>
<tr>
<th>UNS Designation</th>
<th>Type</th>
<th>Carbon</th>
<th>Manganese</th>
<th>Phosphorus</th>
<th>Sulfur</th>
<th>Silicon</th>
<th>Chromium</th>
<th>Nickel</th>
<th>Nitrogen</th>
<th>Other Elements&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>S40300</td>
<td>403</td>
<td>0.15</td>
<td>1.00</td>
<td>0.040</td>
<td>0.030</td>
<td>0.50</td>
<td>11.5–13.0</td>
<td>0.60</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>S42000</td>
<td>420</td>
<td>0.15 min</td>
<td>1.00</td>
<td>0.040</td>
<td>0.030</td>
<td>1.00</td>
<td>12.0–14.0</td>
<td>0.75</td>
<td>. . .</td>
<td>Mo 0.50 max</td>
</tr>
<tr>
<td>S42200</td>
<td>422</td>
<td>0.20–0.25</td>
<td>0.50–1.00</td>
<td>0.025</td>
<td>0.025</td>
<td>0.50</td>
<td>11.0–12.5</td>
<td>0.50–1.00</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>S43100</td>
<td>431</td>
<td>0.20</td>
<td>1.00</td>
<td>0.040</td>
<td>0.030</td>
<td>1.00</td>
<td>15.0–17.0</td>
<td>1.25–2.50</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>S44200</td>
<td>442</td>
<td>0.20–0.25</td>
<td>0.50–1.00</td>
<td>0.025</td>
<td>0.025</td>
<td>1.00</td>
<td>18.0–23.0</td>
<td>0.60</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>S44600</td>
<td>446</td>
<td>0.20</td>
<td>1.50</td>
<td>0.040</td>
<td>0.030</td>
<td>1.00</td>
<td>23.0–27.0</td>
<td>0.75</td>
<td>0.25</td>
<td>. . .</td>
</tr>
</tbody>
</table>

<sup>a</sup> Maximum unless range or minimum is indicated.

<sup>b</sup> New designation established in accordance with Practice E 527 and SAE J1086.

<sup>c</sup> The terms Columbium (Cb) and Niobium (Nb) both relate to the same element.

### TABLE 2 Mechanical Test Requirements

<table>
<thead>
<tr>
<th>UNS Designation</th>
<th>Type</th>
<th>Tensile Strength, min</th>
<th>Yield Strength, min&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Elongation in 2 in. or 50 mm, min. %</th>
<th>Hardness, max&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Cold Bend, deg&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>S40300</td>
<td>403</td>
<td>70–90</td>
<td>30–205</td>
<td>25.0&lt;sup&gt;d&lt;/sup&gt;</td>
<td>217</td>
<td>96</td>
</tr>
<tr>
<td>S42000</td>
<td>420</td>
<td>300&lt;sup&gt;e&lt;/sup&gt;</td>
<td>205</td>
<td>15.0</td>
<td>217</td>
<td>96</td>
</tr>
<tr>
<td>S42200</td>
<td>422</td>
<td>200</td>
<td>125</td>
<td>. . .</td>
<td>248</td>
<td>29&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>S43100</td>
<td>431</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>285</td>
<td>29&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>S44200</td>
<td>442</td>
<td>515</td>
<td>275</td>
<td>20.0</td>
<td>217</td>
<td>96</td>
</tr>
<tr>
<td>S44600</td>
<td>446</td>
<td>. . .</td>
<td>275</td>
<td>20.0</td>
<td>217</td>
<td>96</td>
</tr>
</tbody>
</table>

<sup>a</sup> Yield strength shall be determined by the offset method at 0.2 % in accordance with Test Methods and Definitions A 370. Unless otherwise specified (see 5.1.10), an alternative method of determining yield strength may be based on a total extension under load of 0.5 %.

<sup>b</sup> Either Brinell or Rockwell B hardness is permissible.

<sup>c</sup> Bend test not required for steels thicker than 1 in. (25.4 mm) unless specified by the purchaser.

<sup>d</sup> Material 0.050 in. (1.27 mm) and under in thickness shall have a minimum elongation of 20.0 %.

<sup>e</sup> Maximum. Type 420 is usually used in the heat treated condition (quenched and tempered to a specified range of hardness or tensile strength).

<sup>f</sup> Rockwell C scale.

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