Hastelloy X is an austenitic nickel base alloy containing approximately 22 percent chromium for outstanding resistance to oxidation at high temperatures. In addition, the alloy, which is solid solution strengthened, possesses exceptional strength at elevated temperatures. The alloy has good high temperature and stress rupture properties above 1405°F (788°C) and can be used for applications up to 2200°F (1204°C). With the high levels of chromium, nickel and molybdenum in the material, Hastelloy X exhibits levels of corrosion resistance similar to high nickel alloys more customarily used in corrosion applications.

### Specifications

| AMS: | 5536, 5587, 5588, 5754, 5798 |
| ASME: | SB 435, SB 572, Sect. IX P No. 43, SFA 5.14 |
| ASTM: | B366, B435, B572, B619, B622, B626 |
| UNS: | NO6002 |
| EN: | 2.4665 |

### Chemical Composition, %

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Si</th>
<th>Cr</th>
<th>Ni</th>
<th>Mo</th>
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<tbody>
<tr>
<td>Min</td>
<td>0.05</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>20.50</td>
<td>Bal.</td>
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<tr>
<td>Max</td>
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<td>1</td>
<td>0.040</td>
<td>0.030</td>
<td>1</td>
<td>23.00</td>
<td>Bal.</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Ti</th>
<th>Al</th>
<th>Fe</th>
<th>B</th>
<th>Co</th>
<th>W</th>
<th>Cu</th>
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<tbody>
<tr>
<td>Min</td>
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<td>--</td>
<td>17</td>
<td>--</td>
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<td>0.20</td>
<td>--</td>
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<tr>
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<td>0.50</td>
<td>20</td>
<td>0.01</td>
<td>2.50</td>
<td>1.00</td>
<td>0.50</td>
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</table>

**Resistance to Corrosion:** Hastelloy X has good resistance to oxidizing, reducing and neutral atmospheres encountered in furnace and jet engine operations up to 2200°F (1204°C). The alloy develops a protective, tenacious oxide film which does not spall off and therefore, retains oxidation resistance at high temperatures.

### Features
- Exhibits good fabricability
- Machinability is good in the annealed condition
- Can be welded by most of the fusion and resistance welding processes

### Applications
- Aircraft Engine Components
- Gas Turbine
- After Burners
- Combustion Liners
- Transition Ducts
- Pressure Vessels
- Turbo chargers
Nickel Alloy X

Physical Properties

Density: 0.297 lb/in
Specific Gravity: 8.22
Melting Range: 2300-2470°F 1260-1355°C
Magnetic Permeability: <1.002

Thermal Conductivity

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Coefficients</th>
<th>W/m·K</th>
<th>Btu/(hr/ft²/in/°F)</th>
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</thead>
<tbody>
<tr>
<td>°C</td>
<td>°F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>70</td>
<td>9.1</td>
<td>5.23</td>
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<td>93</td>
<td>200</td>
<td>11</td>
<td>6.33</td>
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<tr>
<td>260</td>
<td>500</td>
<td>14.1</td>
<td>8.17</td>
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<tr>
<td>593</td>
<td>1100</td>
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<td>704</td>
<td>1300</td>
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<td>927</td>
<td>1700</td>
<td>27.2</td>
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Electrical Resistivity

<table>
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<th>°C</th>
<th>°F</th>
<th>microhm-cm</th>
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</thead>
<tbody>
<tr>
<td>21</td>
<td>70</td>
<td>115.8</td>
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<tr>
<td>200</td>
<td>392</td>
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<tr>
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<td>752</td>
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<tr>
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<td>129</td>
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</table>
Typical Short Time Tensile Properties

Typical short time cryogenic and elevated temperature tensile properties for sheet and plate materials solution treated at 2150 to 2175°F (1177 to 1190°C) and rapidly cooled are shown below.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>0.2% Yield Strength</th>
<th>Ultimate Tensile Strength</th>
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</thead>
<tbody>
<tr>
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<td>°C</td>
<td>psi</td>
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<tr>
<td>-321</td>
<td>-196</td>
<td>-</td>
</tr>
<tr>
<td>-108</td>
<td>-78</td>
<td>-</td>
</tr>
<tr>
<td>72</td>
<td>22</td>
<td>47,000</td>
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<tr>
<td>400</td>
<td>204</td>
<td>48,700</td>
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<tr>
<td>600</td>
<td>316</td>
<td>42,600</td>
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<tr>
<td>800</td>
<td>427</td>
<td>43,700</td>
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<tr>
<td>1000</td>
<td>538</td>
<td>41,500</td>
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<tr>
<td>1200</td>
<td>649</td>
<td>39,500</td>
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<tr>
<td>1400</td>
<td>760</td>
<td>37,800</td>
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<td>1600</td>
<td>871</td>
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<td>1800</td>
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<tr>
<td>2000</td>
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<td>8,000</td>
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<tr>
<td>2200</td>
<td>1204</td>
<td>3,700</td>
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</tbody>
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