5xxx Plate

5XXX series alloys, with magnesium as the major alloying element, combine a wide range of strength, good forming and welding characteristics, and high resistance to general corrosion.

**Strength:**
Generally increases with increasing magnesium content, and can be further enhanced by cold work.

**Forming:**
5XXX alloys are easily cold formed. Formability being described by minimum cold bend radii. Formability tends to increase as alloy strength decreases.

**Welding:**
5XXX alloys are easily welded using GMA-W or GTA-W processes. Weld strength equals the minimum annealed strength (O temper) of the welded 5XXX alloy. Welds also show good ductility, facilitating cold forming.

**Corrosion Resistance:**
5XXX alloys generally have excellent corrosion resistance, often being used in marine applications e.g. 5083-H116. 5XXX series alloys with greater than 3.5% magnesium (e.g. 5086 & 5083) may be susceptible to stress corrosion cracking (SCC). In service, limitations should be placed on the amount of cold work and maximum permissible operating temperature for the higher magnesium alloys to avoid increased susceptibility to stress corrosion cracking and intergranular corrosion. Such alloys should not be used at operating temperatures >65°C. 5454 and 5754 are manufactured with 2.7% and 3.1% magnesium respectively and are designed for use at elevated temperatures.

**Technical Support:**
For further information and advice please contact your District Sales Office.

**Availability:**
5XXX alloys are most commonly available in F (as rolled) or O/H111 (fully soft) condition, although cold worked tempers such as H32, H321 and H116 are also available.
With a broad combination of desirable properties, 5XXX series alloys are used for many applications.

APPLICATION

- Cryogenic applications: production, storage and transportation of liquid petroleum and industrial gases
- Pressure vessels
- Hulls and superstructures of ships such as fast ferries, naval craft and workboats
- Road transport: commercial vehicles and trailers
- General Engineering: mechanical components, jigs, fixtures, flat beds, base plates and general tooling.

Most 5XXX alloys are ordered to the fully annealed O condition. H321 and H116 tempers are often used in transport applications. H321 and H116 tempers are work hardened to increase strength. The most widely used 5XXX alloys are 5083, 5086 and 5754.

5083 & 5086

5083 offers the highest strength of all non-heat treatable alloys, containing approximately 4.5% magnesium, 0.7% manganese and 0.13% chromium. 5086 is less highly alloyed than 5083, containing approximately 4.0% magnesium, 0.50% manganese and 0.13% chromium. This results in lower strength but greater ductility compared to 5083.

5086 is favoured when making fabrications which require greater formability than offered by 5083.

FORMABILITY

<table>
<thead>
<tr>
<th>Alloy/Temper</th>
<th>Thickness (mm)</th>
<th>Width (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>5052/5251</td>
<td>F</td>
<td>6.35</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>&gt;20</td>
<td>113</td>
</tr>
<tr>
<td>5454/H111</td>
<td>H112</td>
<td>&gt;113</td>
<td>103.2</td>
</tr>
<tr>
<td>5456/H111</td>
<td>F</td>
<td>&gt;203.2</td>
<td>590</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brushed Finish (available one or two side film coated - on request)</td>
<td></td>
</tr>
<tr>
<td>5083/H111</td>
<td>F</td>
<td>8</td>
<td>70</td>
</tr>
<tr>
<td>5086/H111</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Radii expressed as thickness (t) are minimum recommended for bending plates in a standard press brake with air bend dies. Minimum permissible radii will also vary with design and condition of tooling.