6092/SiC/25p Aluminum Metal-Matrix-Composite (Al MMC) is an emerging material for helicopter gearbox bearing liners. Its combination of enhanced strength and Titanium-equivalent stiffness, along with high hardness and moderately low CTE cannot be matched by monolithic aluminum alloys.

TYPICAL AND MINIMUM MECHANICAL PROPERTIES FOR BEARING LINER STOCK

<table>
<thead>
<tr>
<th>6092/SiC/25p-T6</th>
<th>F, ty</th>
<th>F, tu</th>
<th>elong.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MPa</td>
<td>ksi</td>
<td>MPa</td>
</tr>
<tr>
<td>Die Forging, 250mm (10in), Typical (L)</td>
<td>430</td>
<td>62</td>
<td>495</td>
</tr>
<tr>
<td>Seamless Tube Extrusion, (11in), Typical (L)</td>
<td>391</td>
<td>57</td>
<td>477</td>
</tr>
<tr>
<td>Sheet, 2.5mm (0.100in), Typical (L, LT)</td>
<td>427</td>
<td>62</td>
<td>488</td>
</tr>
</tbody>
</table>

Minimum Properties (L) | 345 | 50 | 414 | 60 | 3 |

Notes:
1) Young's Modulus is typically 112 GPa (16.2 msi).
2) Coefficient-of-Thermal-Expansion (CTE) is typically 15.3 ppm/°C (8.5 ppm/°F).
3) Typical Rockwell B scale hardness is 83-85.

6092/SiC/25p is a powder metallurgy Al MMC comprised of AA6092 aluminum and 25 Vol% Silicon Carbide particles. It is available in vacuum-hot-pressed billet, extruded, forged and sheet product forms.
ALUMINUM METAL-MATRIX-COMPOSITES:
MORE THAN ALUMINUM

The extremely low CTE of the SiC particles strains the atomic lattice of the aluminum matrix resulting in a dramatic increase in dislocation density. The combination of solid-state MMC processing and dislocation formation also results in a super-fine, coherent field of precipitates in the matrix. Ultimately, both the reinforcement and the precipitates limit the mobility of these dislocations leading to enhanced yield and ultimate tensile strength in the Al MMC. Further, it is important to note that there is a direct relationship between SiC content and Al MMC strength, as shown in the measured properties for extruded bar stock.

Chemical surface conversions such as MIL-DTL-5541 Class 1A can easily be applied to Al MMCs without process modification.

Anodizing of Al MMCs can be performed using chromic and sulfuric acid techniques.

6092/SiC/25p Al MMC and 4720 Steel Wear Properties (ASTM G77 Block-on-Ring)

Surface treatments
In general, DWA-USA Al MMCs can accept most surface treatments that are used for conventional aluminum. The fine aluminum grain size and fine to ultrafine SiC particle size distribution (PSD) translates to excellent surface treatment response compared to other Al MMCs that use far coarser reinforcement.

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