AL-SiC
Silicon Carbide Aluminum Metal Matrix Composites

AMETEK®
SPECIALTY METAL PRODUCTS
**Al-SiC materials provide superior thermal management for high technology electronics applications in a lightweight, cost-effective material.**

**Al-SiC C**
is a composite material that combines Silicon Carbide particles in an Aluminum alloy matrix. It provides lightweight, high thermal conductivity and controlled thermal expansion.

**AMETEK** can supply Al-SiC in either plated or unplated versions to customer specifications.

**Key Advantages**
- Superior thermal properties compared to other silicon carbide aluminum products.
- Thermal expansion is closely controlled to match the components used in electronic packages.
- Offered in both simple and complex fabricated shapes and in any variety of net shaped parts.
- Cost-effective solutions for many thermal management problems.
- Manufacturing process does not require a separate preform to produce the composite product.

**AVAILABLE TYPES OF PLATING**

<table>
<thead>
<tr>
<th>Material</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electroless Nickel</td>
<td>MIL-C-26074E Class 1, 2, 3 or 4</td>
</tr>
<tr>
<td>Electrolytic Nickel</td>
<td>QQ-N-290A Class 1 or 2</td>
</tr>
<tr>
<td>Hard Gold</td>
<td>MIL-G-54204C Type 3 Grade A</td>
</tr>
<tr>
<td>Electrolytic Copper</td>
<td>MIL-C-14550B Class 1, 2, 3 or 4</td>
</tr>
<tr>
<td>Tin</td>
<td>MIL-T-10727C</td>
</tr>
<tr>
<td>Silver</td>
<td>As specified</td>
</tr>
</tbody>
</table>

*Parts are typically bake tested at temperatures up to 400°C*
AI-SiC FOR LIGHTWEIGHT THERMAL MANAGEMENT APPLICATIONS

68±2% Volume Fraction Alpha Silicon Carbide

<table>
<thead>
<tr>
<th>Property</th>
<th>Al-SiC C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density Lb/in³</td>
<td>0.109</td>
</tr>
<tr>
<td>Density Gm/cc</td>
<td>3.03</td>
</tr>
<tr>
<td>C.T.E. 30-150°C</td>
<td>8.75</td>
</tr>
<tr>
<td>Thermal Conductivity W/MK</td>
<td>210</td>
</tr>
<tr>
<td>Thermal Conductivity BTU/Hr.Ft.°F</td>
<td>122</td>
</tr>
<tr>
<td>Electrical Conductivity %IACS</td>
<td>5.4</td>
</tr>
<tr>
<td>Tensile Strength KSI</td>
<td>33</td>
</tr>
<tr>
<td>Tensile Strength MPa</td>
<td>225</td>
</tr>
</tbody>
</table>

Al-SiC materials are available as finished parts with the following dimensions:

- **Width**: 5.5 inches (140 mm) maximum
- **Length**: 9.5 inches (240 mm) maximum
- **Thickness**: 0.020 inches (0.500 mm) minimum

**MEAN COEFFICIENT OF THERMAL EXPANSION (CTE) VS. TEMPERATURE**
For more than a quarter of a century, AMETEK Specialty Metal Products has been developing innovative, proprietary alloying techniques, adding valuable mechanical and metallurgical qualities to its strip, wire and composite products. This business unit produces more alloy variations through powder metallurgy than any other producer in the world. All of its products are tailored for specific applications.

Whether in use on land or sea, in the air, or in outer space, the silicon carbide aluminum metal matrix composites of Al-SiC C are at home in their environment. These materials offer increased design flexibility advantages that cannot be matched by competitive products.

Key Applications:
Al-SiC C is ideal for use in such electronic products applications as:

- Chip mounting
- Electronic packages
- Circuit boards
- Power supplies
- Thermal spreaders
- Lids and covers

Key Markets:
Products using Al-SiC C can be found in such high-technology markets as:

- Portable laptop computers
- Land- and space-based radar systems
- Telecommunications systems
- Electric vehicles

AMETEK . . .
a well-known name for high tech materials.

AMETEK Specialty Metal Products is a business unit of AMETEK, Inc., (NYSE ticker symbol: AME) a leading global manufacturer of electronic instruments and electromechanical devices with annual sales of more than $1.8 billion.

AMETEK Specialty Metal Products is a world leader in metal powder, strip, wire, and bonded products with numerous patents in technically advanced metallurgical materials. For over 35 years, it has developed innovative, proprietary products tailored to specific customer applications.

AMETEK Specialty Metal Products also is a pioneer in alloy development by wrought powder metallurgy, holding numerous metallurgical patents, alloy designations and recognition awards. It offers the broadest range of advanced metal matrix composites for electronic thermal management and other applications. Its line includes molybdenum-copper (AMC Series), tungsten copper (AWC Series) and silicon carbide aluminum composites (Al-SiC). This business also produces a variety of iron nickel alloys and iron nickel cobalt alloys that are used for seal rings and frames in electronic packages.