

SupremEX 640XA Metal Matrix Composite

Materion's SupremEX[®] 640XA MMC is a high quality, aerospace-grade aluminum alloy (6061B) reinforced with 40 vol.% silicon carbide particles. This composite material is manufactured via powder metallurgy using a mechanical alloying process to ensure a homogeneous reinforcement distribution, providing a refined grain structure and enhanced mechanical properties.

SupremEX 640XA MMC is heat treatable, offering high strength and modulus with a CTE match to nickel plating (13 ppm/°C). This material is excellent for lightweight, high-stability structural applications. Designation: 6061B/SiC/40p (3 μm).

Benefits:

- Weight saving
- Static strength comparable to high-strength Al alloys
- Exceptional specific stiffness for increased component stiffness
- High fatigue resistance
- Refined, homogeneous and stable microstructure
- Excellent hardness, wear resistance and low friction characteristics
- Good machinability using high-speed machining techniques
- Superior thermal stability, with CTE match to Ni plating

Typical Physical Properties

Density g/cm ³ (lb./in ³)	Elastic Modulus GPa (msi)	Specific Stiffness GPa/g/cm ³	Poisson's Ratio
2.90 (0.105)	140 (20.3)	48	0.3
Thermal Conductivity @ 25°C W/m ² K (BTU/hr.ft. ² °F)	Thermal Expansion @ 20-50°C ppm/°C (ppm/°F)	Solidus °C (°F)	Specific Heat Capacity J/g/°C (BTU/lb./°F)
150 (87)	13 (7.2)	570 (1058)	0.82 (0.196)

Typical Mechanical Properties*

Product Form	Billet				Forged Plate			
	T1**	T6 CWQ***	T6 PGQ****	T7	T1**	T6 CWQ***	T6 PGQ****	T7
R _{p0.2} MPa (ksi)	320-360 (46-53)	500 (72.5)	455 (66.0)	390 (56.6)	350-390 (51-56)	490 (71.1)	425 (61.6)	360 (52.2)
R _m MPa (ksi)	410-450 (59-65)	570 (82.7)	540 (78.3)	460 (66.7)	440-500 (64-73)	590 (85.6)	540 (78.3)	480 (69.6)
Elongation to Failure %	1.0	1.1	1.4	1.2	2.0	1.7	2.0	2.0

*Data is for information purposes only; it does not constitute a guarantee.

**T1 temper is cooled from elevated temperature processing so the properties are more variable than controlled heat treatment tempers.

***CWQ refers to "cold water quench."

****PGQ refers to "poly-glycol quench."

^Data is typical of the forged plate product form; final properties are dependent on exact forge ratio and direction.

Forms Available

SupremEX 640XA metal matrix composite is available as billet/shaped billet, forgings, near-net-shape forgings and plate. AMS 4368 defines hot isostatic pressed shapes. This material is commonly shipped in the T1 temper, rough machined to near finish, heat treated and then finish machined.

Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.