STAINLESS GROUP

High performance Alloys - Medical - Aerospace - Microtechnics - Motorsport - Industry

SupremEX® 215XK MMC

GENERALITES

SupremEX® 215XK MMC is a high quality, aerospace-grade aluminum alloy (2009) reinforced with 15 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 enhancing mechanical properties.

SupremEX 215XK is heat treatable, offering high strength and modulus for structural applications. It is available in billet, forged and extruded forms.

APPLICATIONS

- Satellite structures
- Aerospace optical systems and sensors
- Aircraft engine components
- Automotive powertrain components
- Defence

STANDARDS AND DESIGNATIONS

Designations :
- 2009/SiC/15p (5 µm).

Contact our Technical Support

TYPICAL CHEMICAL ANALYSIS

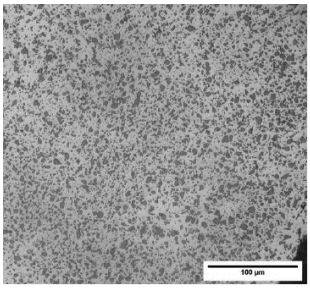
Aluminium alloy die	Fraction of SiC particles	SiC particle size
alloy 2009	15 %	5 µm

TYPICAL PHYSICAL PROPERTIES

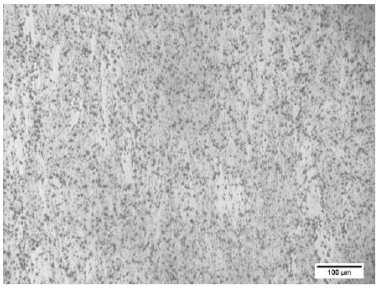
Density g/cm³ (lb./in³)	Elastic Modulus Young GPa (msi)	Specific Stiffness GPa/g/cm³	Poisson's Ratio
2.84 (0.102)	94 (13.7)	33	0.3

Thermal Conductivity @ 25˚C W/m˚K (BTU/hr.ft.˚F)	Thermal Expansion @ 25˚C ppm/˚C (ppm/˚F)	Solidus˚C (˚F)	Specific Heat Capacity J/g/˚C (BTU/lb./˚F)
155 (90)	18.5 (10.3)	548 (1018)	0.848 (0.203)

METALLURGY



SiC distribution: raw state



SiC distribution: forged state

SupremEX® 215XK MMC

TYPICAL MECHANICAL PROPERTIES

Product Form	Billet	Forged Plate
Heat Treatment	T4 CWQ*	T4 CWQ
$R_{p0.2}$ MPa (ksi)	410 (59.5)	385 (55.8)
R_m MPa (ksi)	545 (79.0)	550 (79.8)
Elongation to Failure %	5	8
Fracture Toughness MPa √m (ksi inch1/2)	-	28 (25.5)

*CWQ refers to "cold water quench."

ADVANTAGES

- Weight saving versus titanium alloys
- High fatigue and fretting fatigue resistance
- Increased modulus versus aluminum alloys
- Hardness, wear resistance and low friction characteristics
- Good machinability using conventional techniques
- Homogenous and stable microstructure

FORMS AVAILABLE

SupremEX 215XK metal matrix composite is available as billet/shaped billet (DPT), forgings, near-net-shape forgings, plate and extrusions.

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SupremEX® 225XE MMC

GENERALITES

SupremEX® 225XE MMC is A high-quality aerospace grade aluminum alloy (2124A) reinforced with 25 vol.% silicon carbide particles which produces a metal matrix composite (MMC). 225XE is manufactured via a powder metallurgy route using a mechanical alloying process to ensure a homogeneous reinforcement distribution. This provides a refined grain structure enhances mechanical properties. The MMC is heat treatable, offering high strength and modulus for structural applications, and is available in billet, forged and extruded forms.

APPLICATIONS

- Satellite structures
- Aerospace optical systems and sensors
- Aircraft engine components
- Automotive powertrain components
- Defence

STANDARDS AND DESIGNATIONS

Standars:
AMS 4355

Designations :
- 2124A/SiC/25p (3µm).

Contact our Technical Support

TYPICAL CHEMICAL ANALYSIS

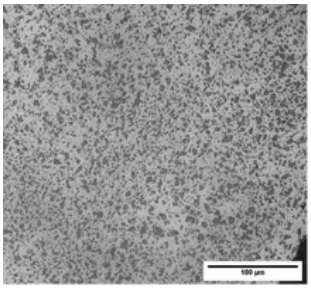
Aluminium alloy die	Fraction of SiC particles	SiC particle size
alloy 2124	25 %	3 µm

TYPICAL PHYSICAL PROPERTIES

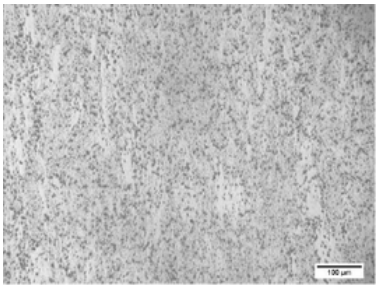
Density g/cm³ (lb./in³)	Elastic Modulus Young GPa (msi)	Specific Stiffness GPa/g/cm³	Poisson's Ratio
2.88 (0.104)	115 (16.7)	39	0.3

Thermal Conductivity W/m°K (BTU/hr. ft. °F)	Thermal Expansion ppm/ °C (ppm/°F) at 25°C	Solidus ˚C (˚F)	Specific Heat Capacity J/g/ °C (BTU/lb/°F)
150 (87)	16.1 (8.9)	548 (1018)	0.846 (0.200)

METALLURGY



Distribution of SiCs: raw state



SiC distribution: forged state

SupremEX® 225XE MMC

TYPICAL MECHANICAL PROPERTIES

Product Form	Billet			Forged Plate		Extruded Bar (30:1)
Heat Treatment	T4 CWQ*	T6 HWQ**	T6 PGQ***	T4 CWQ	T6 PGQ	T6 PGQ
$R_{p0.2}$ MPa (ksi)	470 (68.2)	440 (63.8)	400 (58.0)	440 (63.8)	400 (58.0)	400 (58.0)
R_m MPa (ksi)	570 (82.7)	550 (79.8)	535 (77.6)	610 (88.5)	570 (82.7)	600 (87.0)
Elongation to Failure %	1.8	1.9	2	3-4	3-4	4-5

*CWQ refers to "cold water quench."
**HWQ refers to "hot water quench."
***PGQ refers to "poly-glycol quench."

ADVANTAGES

- Weight saving
- High strength
- Increased component stiffness
- High fatigue resistance
- Hardness, wear resistance and low friction characteristics
- Good machinability using conventional techniques
- Homogenous stable microstructure

FORMS AVAILABLE

SupremEX 225XE alloy is available as billet/shaped billet (DPT), forgings, near-net-shape forgings, plate and extrusions.

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SupremEX® 640XA MMC

GENERALITES

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.

APPLICATIONS

- Satellite structures
- Aerospace optical systems and sensors
- Aircraft engine components
- Automotive powertrain components
- Defence

STANDARDS AND DESIGNATIONS

Standars:
AMS 4368

Designations:
- 6061B/SiC/40p (3 µm).

Contact our Technical Support

TYPICAL CHEMICAL ANALYSIS

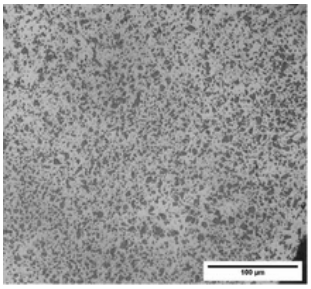
Aluminium alloy die	Fraction of SiC particles	SiC particle size
alloy 6061	40 %	3 µm

TYPICAL PHYSICAL PROPERTIES

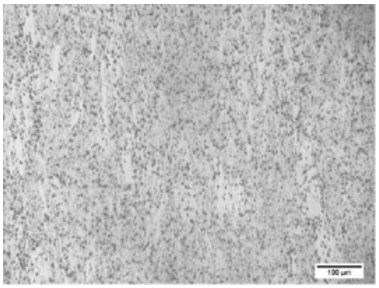
Density g/cm³ (lb./in³)	Elastic Modulus Young GPa (msi)	Specific Stiffness GPa/g/cm³	Poisson's Ratio
2.90 (0.105)	140 (20.3)	48	0.3

Thermal Conductivity @ 25˚C W/m˚K (BTU/hr.ft.˚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)

METALLURGY



SiC distribution: raw state



SiC distribution: forged state

SupremEX® 640XA MMC

TYPICAL MECHANICAL PROPERTIES

Product Form	Billet				Forged Plate			
Heat Treatment	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)	385 (55.8)	490 (71.1)	425 (61.1)	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

*CWQ refers to "cold water quench."
**PGQ refers to "poly-glycol quench."

ADVANTAGES

- 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

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.