



# Alcoa Specialty Alloys: **AT237 High Thermal Conductivity**

AT237 is a high thermal conductivity, high-pressure die casting (HPDC) alloy that provides outstanding thermal conductivity combined with optimal castability and fluidity to achieve complex application shapes.

## Advantages of the AT237 High Thermal Conductivity Alloy

- Cost-competitive and optimal recyclability for end-of-life products.
- Outstanding thermal conductivity, higher than competitive materials in as-cast state.
- High corrosion resistance and machinability.
- Very good castability and fluidity, suitable for HPDC to enhance thin walls, small parts and complex shapes.

## AT237 High Thermal Conductivity Technical Data

### CHEMICAL COMPOSITION\*

(all in wt%. Single values indicate maximum content)

Si	Fe	Mn	Mg	Ti	Sr	Others Each	Others Total
7.0-11.0	<0.8	<0.05	<0.05	<0.05	<0.02	<0.02	<0.1

\*Special treatment to enhance conductivity

Heat sink E&E | Connectors | Lamp radiators | Heat sink | 5G networks  
Antennae | Router E-motor cases | PV inverter cases | Battery boxes

## Physical and Mechanical Characterization of AT237 Alloy Behavior

- The study analyzed 3-mm thick cast plates, which were made using a 400-ton vacuum assisted high-pressure die casting machine.
- Mechanical properties were evaluated at the Alcoa Technical Center.
- General corrosion performance of the AT237 alloy evaluated per ASTM G110 specification.

### PHYSICAL PROPERTIES (TYPICAL VALUES)

Density (g/cm <sup>3</sup> )	Young's Modulus (GPa)	Coeff. Of Thermal Expansion (CTE) 20-300°C (µm/m/K)	Thermal Conductivity [W/(mK)]	Solidification Range (°C)
2.67 - 2.69	70 - 74	20 - 21.5	180 - 220	610 - 575

### MECHANICAL PROPERTIES

All properties below reflect cooling after injection (water quench)

Ultimate Tensile Strength, Mpa	Yield Strength, Mpa	Elongation, %
240 - 250	90 - 100	15 - 20%

\* The achievable mechanical properties are strongly dependent on the casting process used. The table and plot refer to typical properties obtained in thin-walled high-pressure vacuum die cast (HPDC) components.

### THERMAL CONDUCTIVITY PROPERTIES

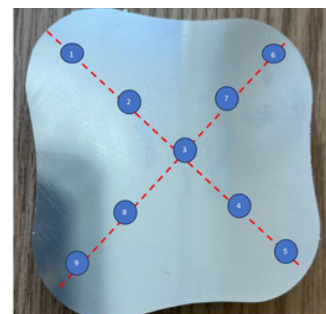
Alcoa AT237 High Thermal Conductivity alloy shows improved thermal conductivity when compared to competitive alloys\*\*

Alcoa*	Competitor 1	Competitor 2	Competitor 3
180 - 220	>160	140 - 165	160 - 200

\*Thermal Conductivity measured according to ASTM E1461 at different temperatures (W/m°C).

\*\*Competitive high thermal conductivity alloys available in the market.

### ELECTRICAL CONDUCTIVITY



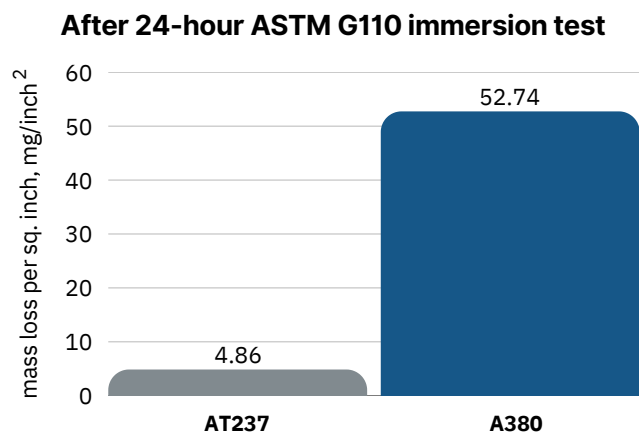
	Sample 1	Sample 2	Sample 3	Sample 4
Avg.	41.46	41.33	41.28	41.21
<b>Overall Average 41.32 %IACS</b>				

### CORROSION TESTS

Alcoa high thermal conductivity alloy AT237 has a very good corrosion performance.

After 24-hour G110 immersion tests:

- maximum corrosion depth is less than 50µm for the AT237 alloy, but close to 200µm for the A380 alloy.
- mass loss per square inch is less than 5 mg/inch<sup>2</sup> for the AT237 alloy, but greater than 50 mg/inch<sup>2</sup> for the A380 alloy.



### Corrosion depth: AT237 vs. A380

