



## ELEKTRON 21

ELEKTRON 21 is a new high strength fully heat treatable magnesium based casting alloy for use at temperatures up to 400 °F. This alloy has excellent corrosion resistance characteristics and castability.

### APPLICATIONS

Magnesium Elektron has developed this lightweight, high performance alloy for motorsport and aerospace applications. It is designed to provide superior mechanical properties and improved corrosion resistance together with good castability.

### SPECIFICATIONS

AMS 4429

UNS M12310

### CHEMICAL COMPOSITION

Zinc	0.2 - 0.5%
Neodymium	2.6 - 3.1%
Gadolinium	1.0 - 1.7%
Zirconium	Saturated
Magnesium	Balance

### HEAT TREATMENT

Castings are given the following T6 heat treatment to obtain optimum mechanical properties. Solution treat for 8 hours at 520 °C (970 °F), Hot water quench using water at 60 - 80 °C (140 - 175 °F) or polymer quench, Age for 16 hours at 200 °C (400 °F), Air cool.

### PHYSICAL PROPERTIES

Specific gravity	1.82
Coefficient of thermal expansion	$14.6 \times 10^{-6}/^{\circ}\text{F}$
Thermal conductivity	67.0 Btu/lb <sup>h</sup> °F
Specific heat	0.24 Btu/lb°F
Electrical resistivity	94.6 nΩm
Modulus of elasticity	$6.4 \times 10^3$ ksi
Poissons ratio	0.27
Melting range	1013 °F - 1184 °F
Brinell hardness	65 - 75

### DESIGN DATA

Minimum specification tensile properties.

0.2% Proof stress	21.0 ksi
Tensile strength	36.0 ksi
Elongation	2%

### OTHER PROPERTIES

#### CASTABILITY

Excellent castability as a consequence of low oxidation characteristics.

Fine-grained micro structure. Pressure tight.

#### PATTERN MAKERS SHRINKAGE FACTOR

1.5%

#### WELDABILITY

Weldable by the tungsten arc inert gas process (TIG) with a filler rod of a similar composition.

Castings should be heat treated after welding to obtain optimum properties.

**MACHINING**

ELEKTRON 21 castings, like all magnesium alloy castings, machine faster than any other metal. Providing the geometry of the part allows, the limiting factor is the power and speed of the machine rather than the quality of the tool material. The power required per cubic centimetre of metal removed varies from 9 to 14 watts per minute depending on the operation.

**SURFACE TREATMENT**

All the normal chromating, anodising and finishing treatments are applicable.

**CORROSION RESISTANCE**

ASTM B117 Salt spray test  
Corrosion rate for base metal: 0.13 - 0.37 mg/cm<sup>2</sup>/day  
10 - 30 mpy

**AMBIENT TEMPERATURE MECHANICAL PROPERTIES**

**TYPICAL TENSILE PROPERTIES**

0.2% Proof stress	24.7 ksi
Tensile strength	40.6 ksi
Elongation	5%

**TYPICAL COMPRESSIVE PROPERTIES**

0.2% Proof stress	24.4 ksi
Ultimate strength	53.2 ksi

**TYPICAL SHEAR PROPERTIES**

Ultimate stress	25 ksi
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**FRACTURE TOUGHNESS**

K <sub>IC</sub>	13.6 ksi inch <sup>1/2</sup>
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**FATIGUE PROPERTIES**

Pull-pull fatigue: R = 0.1      5 x 10<sup>7</sup> cycles  
16.7 - 17.4 ksi

**LOW TEMPERATURE MECHANICAL PROPERTIES**

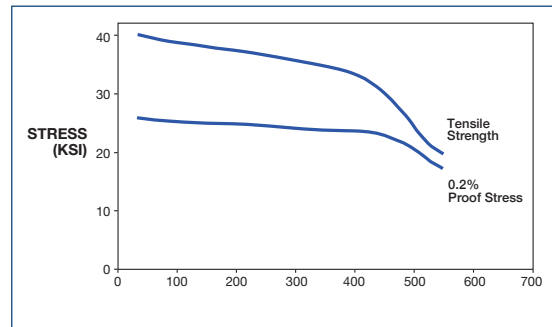
**TYPICAL MECHANICAL PROPERTIES AT -31°F**

Elongation:	7%
Ultimate tensile strength	39.2 ksi
Impact value (notched)	1.7 J

**ELEVATED TEMPERATURE MECHANICAL**

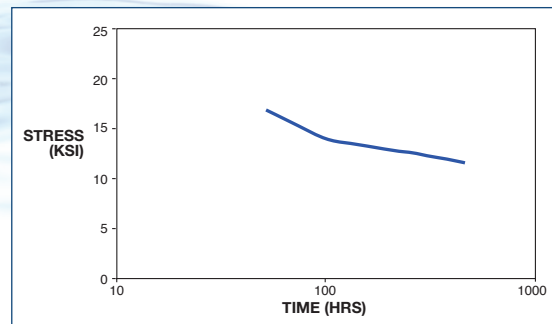
**TYPICAL TENSILE PROPERTIES**

Figure 1. Effect of temperature on tensile properties.



**CREEP PROPERTIES**

Figure 2. Stress / time relationship at 392 °F (0.1% creep strain).



† The information contained within is meant as a guideline only

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