



## ELEKTRON<sup>®</sup> WE43B

ELEKTRON WE43B is a high strength magnesium based casting alloy developed and patented by Magnesium Elektron for use at temperatures up to 300°C. This alloy system maintains its good mechanical properties at elevated temperatures, without the use of either silver or thorium. The alloy is stable for long term exposure up to 250°C.

ELEKTRON WE43B has excellent corrosion resistance characteristics.

### APPLICATIONS

The excellent retention of properties at elevated temperatures will be of interest to designers of aeroengines and other power systems, helicopter transmissions, missiles, racing and high performance cars.

### SPECIFICATIONS

UNS No. M18430  
ASTM B80  
AMS 4427  
MAM 4427  
AECMA MG-C96002  
ISO 16220:MC95310

### CHEMICAL COMPOSITION

Yttrium	3.7–4.3%
Rare Earths	2.4–4.4%
Zirconium	0.4% min
Magnesium	Balance

### HEAT TREATMENT

The alloy develops its optimum properties in the fully heat treated condition ie:

Solution heat treat for 8 hours at 525°C,

Air cool, hot water or polymer quench,

Age for 16 hours at 250°C, Air cool.

### PHYSICAL PROPERTIES

Specific gravity	1.84
Coefficient of thermal expansion	26.7 x10 <sup>-6</sup> K <sup>-1</sup>
Thermal conductivity	51 Wm <sup>-1</sup> K <sup>-1</sup>
Specific heat	966 Jkg <sup>-1</sup> K <sup>-1</sup>
Electrical resistivity	148 nΩm
Modulus of elasticity	45 x 10 <sup>3</sup> MPa
Poissons ratio	0.27
Melting range	540–640°C
Damping index	0.09
Vickers hardness	85–105

### DESIGN DATA

Minimum specification tensile properties	
0.2% Proof stress	172 MPa
Tensile strength	220 MPa
Elongation	2%

## OTHER PROPERTIES

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### CASTABILITY

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Fine grained and pressure tight with good casting characteristics.

### PATTERN MAKERS SHRINKAGE FACTOR

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1.5%

### WELDABILITY

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Fully weldable by the tungsten arc inert gas (TIG) process, using filler rods of the parent alloy composition.

### MACHINING

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ELEKTRON WE43B 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

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Normal protective treatments apply for ELEKTRON WE43B but some chromating baths may need to be modified for the satisfactory treatment of castings. Please refer to Magnesium Elektron Design Guide.

### CORROSION RESISTANCE

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ASTM B117 Salt spray test

Corrosion rate                      0.1–0.2 mg/cm<sup>2</sup>/day  
   10 mpy

## AMBIENT TEMPERATURE MECHANICAL PROPERTIES

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### TYPICAL TENSILE PROPERTIES

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0.2% Proof stress	185 MPa
Tensile strength	265 MPa
Elongation	7%

### TYPICAL COMPRESSIVE PROPERTIES

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0.2% Proof stress	187 MPa
Ultimate strength	323 MPa

### TYPICAL SHEAR PROPERTIES

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Ultimate stress	160 MPa
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### FRACTURE TOUGHNESS

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K <sub>IC</sub>	15.9 MPa m <sup>1/2</sup>
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### FATIGUE PROPERTIES

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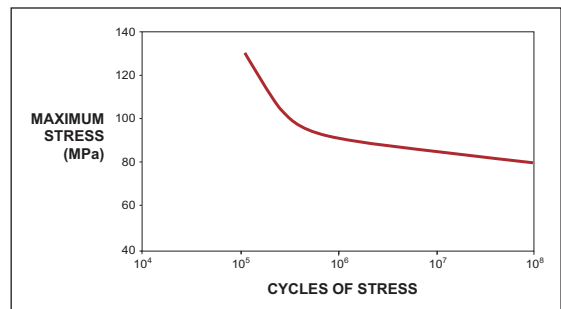


FIG. 1 Rotating bend fatigue test

# ELEKTRON<sup>®</sup> WE43B

## ELEVATED TEMPERATURE MECHANICAL PROPERTIES

### TYPICAL TENSILE PROPERTIES

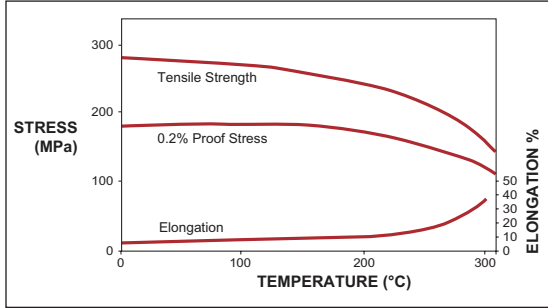


FIG. 2 Effect of temperature on tensile properties

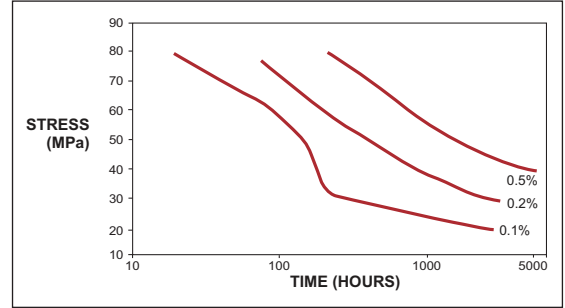


FIG. 4 Stress / time relationship for specified creep strains at 250°C

### CREEP PROPERTIES

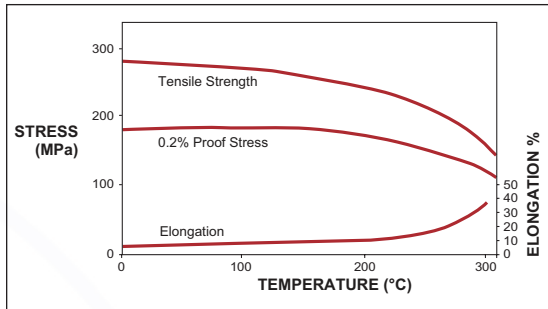


FIG. 3 Stress / time relationship for specified creep strains at 200°C

### FATIGUE PROPERTIES

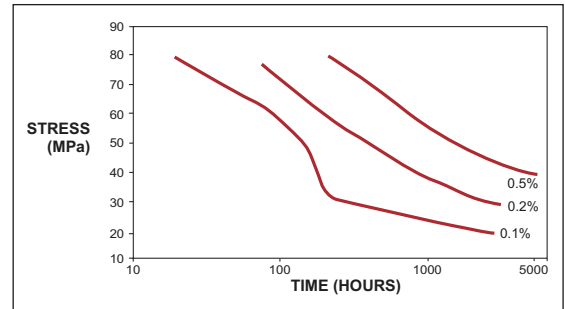


FIG. 5 Rotating bend fatigue test

### CUT UP PROPERTIES ON SAMPLES TAKEN FROM ACTUAL CASTINGS

Temperature	Number of Tests		0.2% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation (%)
20°C	215	Minimum	149	200	2
		Average	178	250	7
		Maximum	215	293	17
250°C	56	Minimum	134	187	2
		Average	155	211	18
		Maximum	193	235	36

† The information contained within is meant as a guideline only

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