



Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Elektron WE43

Datasheet : 467

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ELEKTRON WE43 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 WE43 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

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	$26.7 \times 10^{-6} \text{K}^{-1}$
Thermal conductivity	$51.3 \text{ Wm}^{-1} \text{K}^{-1}$
Specific heat	$966 \text{ Jkg}^{-1} \text{K}^{-1}$
Electrical resistivity	148 nΩm
Modulus of elasticity	$44 \times 10^3 \text{ MPa}$
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

CASTABILITY

Fine grained and pressure tight with good casting characteristics.

PATTERN MAKERS SHRINKAGE FACTOR

1.5%

WELDABILITY

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

MACHINING

ELEKTRON WE43 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

Normal protective treatments apply for ELEKTRON WE43 but some chromating baths may need to be modified for the satisfactory treatment of castings.

Please refer to Magnesium Elektron Data Sheet 206.

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

0.2% Proof stress	180 MPa
Tensile strength	250 MPa
Elongation	7%

TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress	187 MPa
Ultimate strength	323 MPa

TYPICAL SHEAR PROPERTIES

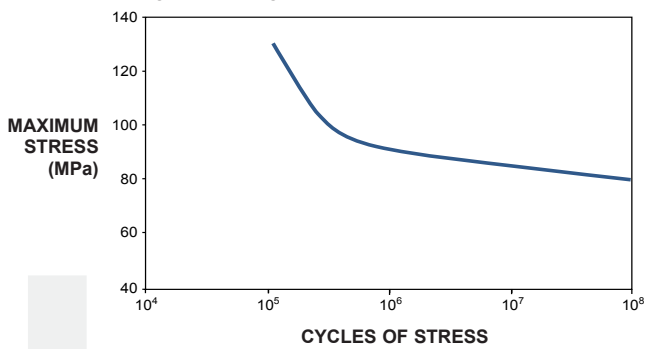
Ultimate stress	162 MPa
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FRACTURE TOUGHNESS

K_{IC}	15.9 MPa m ^{1/2}
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FATIGUE PROPERTIES

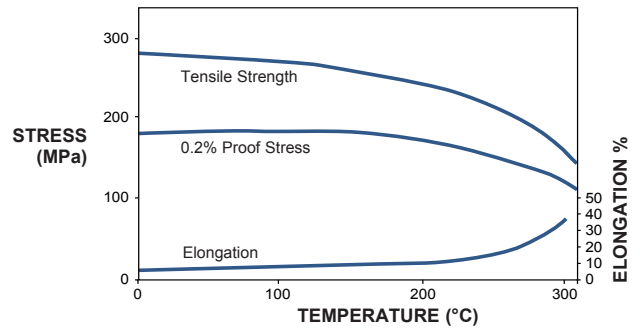
FIG. 1 Rotating bend fatigue test



ELEVATED TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

FIG. 2 Effect of temperature on tensile properties



CREEP PROPERTIES

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

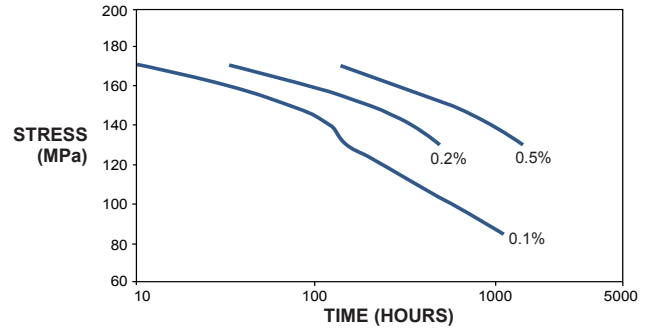
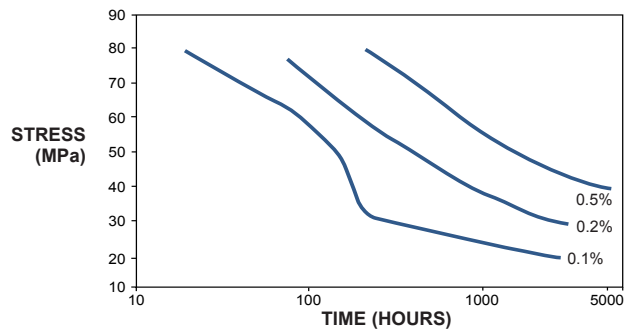
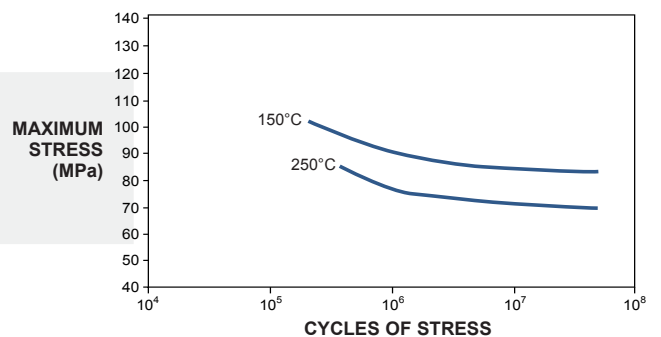


FIG. 4 Stress/time relationship for specified creep strains at 250°C



FATIGUE PROPERTIES

FIG. 5 Rotating bend fatigue test



Elektron WE43 Castings

CUT UP PROPERTIES OF 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



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