



## ELEKTRON<sup>®</sup> RZ5

ELEKTRON RZ5 is a well proven magnesium casting alloy containing zinc, rare earths and zirconium. Used in the T5 condition, this high strength magnesium alloy is ideal for high integrity castings operating at ambient temperatures or up to 150°C. In addition to displaying excellent casting characteristics, the alloy is both pressure tight and weldable.

### APPLICATIONS

The versatility of this alloy makes it of interest to a wide range of designers dealing with aerospace, automotive, military and electronic applications.

Castings in ELEKTRON RZ5 are found in a wide range of applications including:

- Helicopter gearboxes
- Performance car components
- Video cameras
- Military equipment
- Computer parts
- Aircraft engines
- Power tools
- Vibration testing equipment
- Aircraft components
- Motorcycle wheels

### SPECIFICATIONS

ASTM B80 ZE41A-T5

AMS 4439

MIL-M-46062

UNS M16410

MMPDS

BS 2L128

BS2970 MAG5-TE

AIR 3380 RZ5

AFNOR G-Z4TR

DIN 1729 3.5101

Aircraft Number 3.6104

UNAVIA 816-02

EN 1753

EN MB 35110

### CHEMICAL COMPOSITION

Zinc	3.5–5.0%
Rare Earths	0.8–1.7%
Zirconium	0.4–1.0%
Magnesium	Balance

## HEAT TREATMENT

---

Optimum properties are achieved in the T5 condition after 2 hours at 330°C followed by 10–16 hours at 170–180°C. Water quenching is not required.

Satisfactory properties may be obtained from 1–6 hours at 325–360°C. Water quenching is not required.

## PHYSICAL PROPERTIES

---

Specific gravity	1.84
Coefficient of thermal expansion	$27.1 \times 10^{-6} \text{K}^{-1}$
Thermal conductivity	$109 \text{Wm}^{-1}\text{K}^{-1}$
Specific heat	$960 \text{Jkg}^{-1}\text{K}^{-1}$
Electrical resistivity	68 nΩm
Modulus of elasticity	44.1 GPa
Poissons ratio	0.35
Melting range	510–640°C
Damping index	1.0
Brinell hardness	55–70

## DESIGN DATA

---

Minimum specification tensile properties

BS 2L.128

0.2% Proof stress	135 MPa
Tensile strength	200 MPa
Elongation	3%

## OTHER PROPERTIES

---

### CASTABILITY

---

Good. Castings will contain minimal microporosity and the tendency to hot cracking is low. Castings are pressure tight and may be welded.

### PATTERN MAKERS SHRINKAGE FACTOR

---

1.3%

### 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.

### MACHINING

---

ELEKTRON RZ5 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	4–6mg/cm <sup>2</sup> /day 320–480mpy
----------------	--

### LOW TEMPERATURE PROPERTIES

---

Mechanical properties at -196°C:

Elongation	0.5%
Ultimate tensile strength	245MPa
Impact value (unnotched)	0.7J

## AMBIENT TEMPERATURE MECHANICAL PROPERTIES

### TYPICAL TENSILE PROPERTIES

0.2% Proof stress	148 MPa
Tensile strength	218 MPa
Elongation	4.5%

### TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress	130–150 MPa
Ultimate strength	330–365 MPa

### TYPICAL SHEAR PROPERTIES

Ultimate stress	138 MPa
-----------------	---------

### FRACTURE TOUGHNESS

$K_{IC}$	15.1–16.3 MPa m <sup>1/2</sup>
----------	--------------------------------

### FATIGUE PROPERTIES

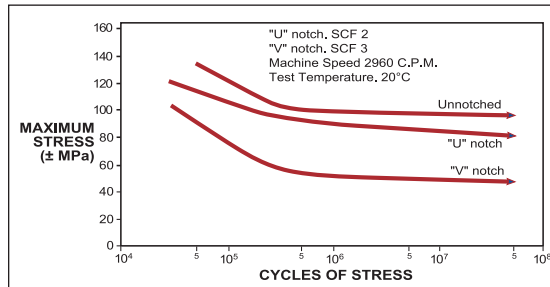


FIG. 1 Rotating bending fatigue tests on sand castings

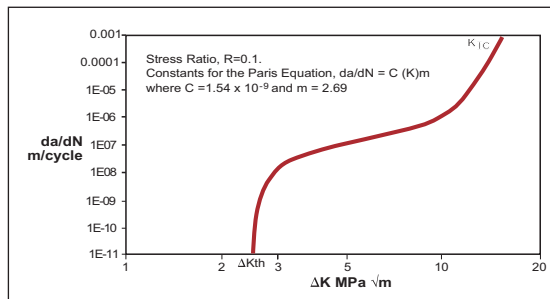


FIG. 2 Fatigue crack growth

## ELEVATED TEMPERATURE MECHANICAL PROPERTIES

### TYPICAL TENSILE PROPERTIES

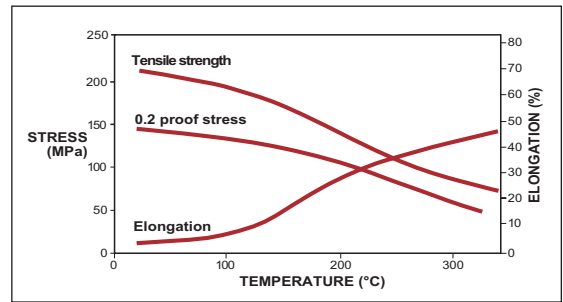


FIG. 3 Effect of temperature on tensile properties

### CREEP PROPERTIES

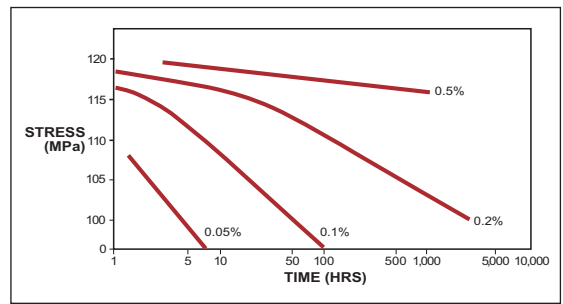


FIG. 4 Stress / time relationship for specified creep strains at 100°C

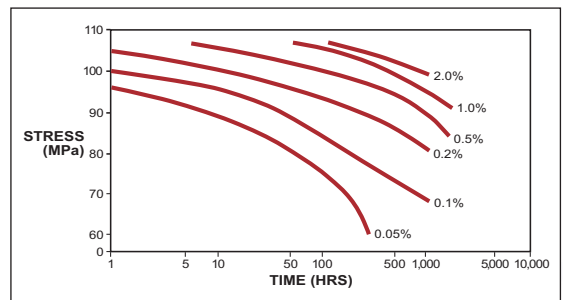


FIG. 5 Stress / time relationship for specified creep strains at 150°C

### FATIGUE PROPERTIES

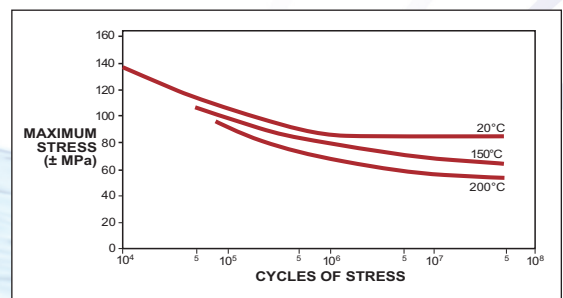


FIG. 6 Rotating bending fatigue tests

ELEKTRON<sup>®</sup> RZ5

## CUT UP PROPERTIES ON SAMPLES TAKEN FROM ACTUAL CASTINGS

Section Thickness (mm)	Number of Tests		0.2% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation
5	8	Minimum	139	214	4
		Average	147	222	4.5
		Maximum	153	237	7
10	25	Minimum	146	204	2
		Average	158	232	6.25
		Maximum	188	251	9.5
15	17	Minimum	133	204	3.5
		Average	151	232	6.5
		Maximum	165	250	9
19	26	Minimum	139	216	4
		Average	148	235	7.25
		Maximum	162	253	11
19–32	7	Minimum	-	208	7
		Average	142	216	7.5
		Maximum	-	234	9
32–45	13	Minimum	139	207	3
		Average	142	227	6
		Maximum	146	239	8

† The information contained within is meant as a guideline only

© Copyright Magnesium Elektron Ltd 2014. The information provided within this document is aimed to assist manufacturers and other interested parties in the use of magnesium alloys. Magnesium Elektron accepts no liability in whole or in part from use and interpretation of the data herein. All information is given in good faith but without warranty. Freedom from patent rights must not be assumed. Health and Safety information is available for all Magnesium Elektron products. MAGNESIUM ELEKTRON, The 'e' Logo, MEL, ELEKTRON and ZIRMAX are registered trademarks of Magnesium Elektron Limited.



Certificate No. FM12677

**Magnesium Elektron UK**  
Magnesium Technology Centre,  
Rake Lane, Swinton, Manchester  
M27 8BF, England  
Tel: +44 (0)161 911 1000

**Magnesium Elektron Alloys**  
4601 Westown Parkway  
Suite 130 West Des Moines  
IA 50266, USA  
Tel: +1 515 421 4100