LUXFER
MEL TECHNOLOGIES

DATASHEET • 452†

Elektron® 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 equitment
- Aircraft components
- Motorcycle wheels

Specifications

ASTM B80 ZE41A-T5
AMS 4439
MIL-M-46062
UNS M16410
MMPDS

BS 2L.128
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	27.1x $10^{-6}K^{-1}$
Thermal conductivity	109 $Wm^{-1}K^{-1}$
Specific heat	960 $Jkg^{-1}K^{-1}$
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

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^2/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 $m^{1/2}$

Fatigue properties

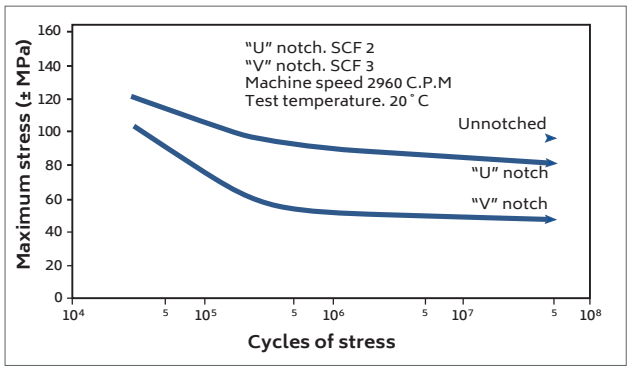

Figure 1. Rotating bending fatigue tests on sand castings.

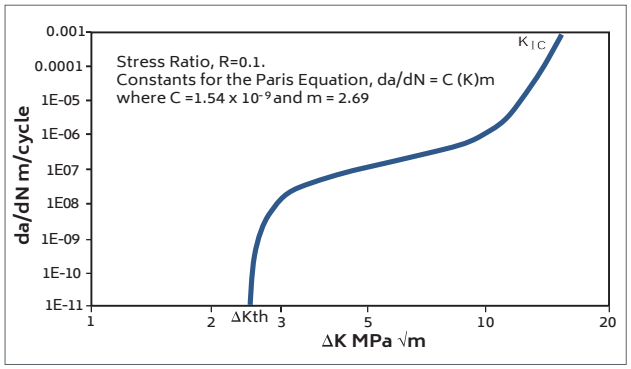

Figure 2. Fatigue crack growth.

Elevated temperature mechanical properties

Typical tensile properties

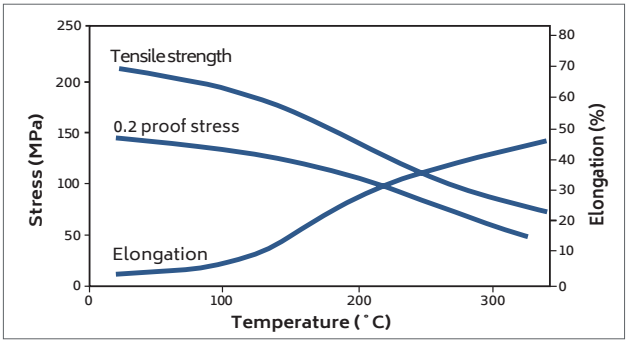

Figure 3. Effect of temperature on tensile properties.

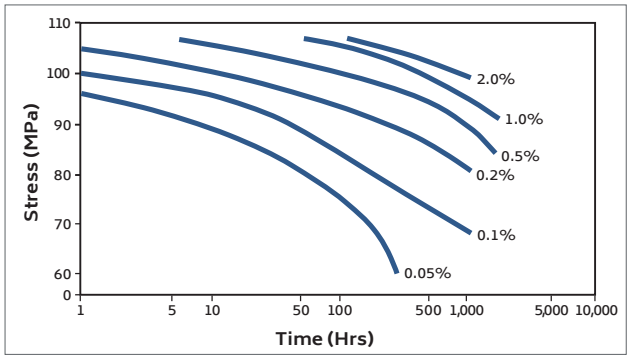

Figure 5. Stress / time relationship for specified creep strains at 150˚C

Creep properties

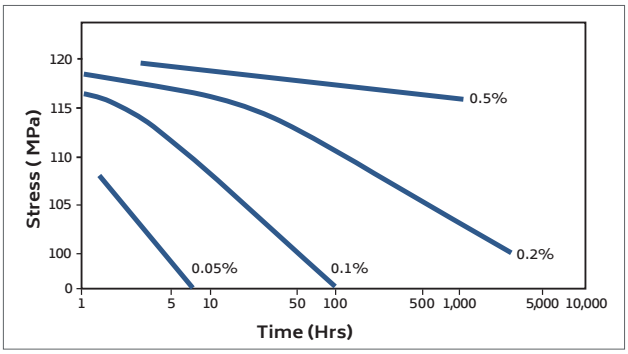

Figure 4. Stress / time relationship for specified creep strains at 100˚C.

Fatigue properties

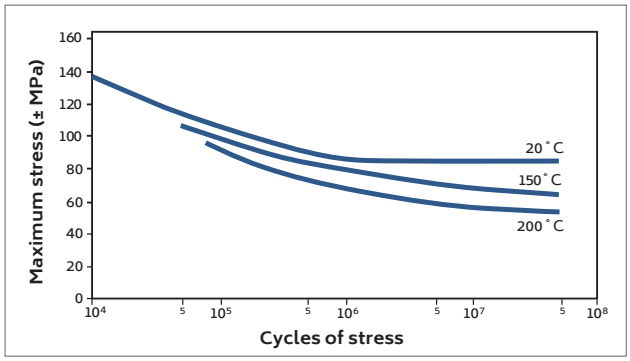

Figure 6. Rotating bending fatigue tests.

Table 1. 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 Average Maximum	139 147 153	214 222 237	4 4.5 7
10	25	Minimum Average Maximum	146 158 188	204 232 251	2 6.25 9.5
15	17	Minimum Average Maximum	133 151 165	204 232 250	3.5 6.5 9
19	26	Minimum Average Maximum	139 148 162	216 235 253	4 7.25 11
19–32	7	Minimum Average Maximum	- 142 -	208 216 234	7 7.5 9
32–45	13	Minimum Average Maximum	139 142 146	207 227 239	3 6 8

Discover more at

www.luxfermeltechnologies.com

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† The information contained within is meant as a guideline only

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