



ELEKTRON[®] ZREI

ELEKTRON ZREI is a magnesium based alloy containing zinc, rare earths and zirconium.

The alloy exhibits excellent casting characteristics with components being both pressure tight and weldable. It is creep resistant to 250°C.

APPLICATIONS

The alloy is suitable for components operating at temperatures where creep resistance is required for low stressed complicated castings.

SPECIFICATIONS

ASTM B80 EZ33A-T5

AMS 4442

UNS I2330

BS 2L.126

BS2970 MAG6-TE

AIR 3380 ZREI

AFNOR G-TR3Z2

DIN 1729 3.5103

Aircraft Number 3.6204

AECMA MG-C-91

ISO 2119 and 3115

MMPDS

CHEMICAL COMPOSITION

Zinc	2.0 – 3.0%
Rare Earths	2.5 – 4.0%
Zirconium	0.4 – 1.0%
Magnesium	Balance

HEAT TREATMENT

ELEKTRON ZREI is normally used in the T5 condition ie: 10–16 hours at 170–200°C and air cooled.

PHYSICAL PROPERTIES

Specific gravity	1.80
Coefficient of thermal expansion	$26.8 \times 10^{-6} \text{K}^{-1}$
Thermal conductivity	$100 \text{Wm}^{-1}\text{K}^{-1}$
Specific heat	$1040 \text{Jkg}^{-1}\text{K}^{-1}$
Electrical resistivity	73 nΩm
Modulus of elasticity	44 GPa
Poissons ratio	0.33
Melting range	545-640°C
Damping index	1.89
Brinell hardness	50–60

DESIGN DATA

Minimum specification tensile properties BS 2L.126

0.2% Proof stress	95 MPa
Tensile strength	140 MPa
Elongation	3%

OTHER PROPERTIES

CASTABILITY

Excellent. Castings are free from microporosity and the tendency to hot cracking in difficult castings is low. Castings are pressure tight and may be welded.

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, ie 2 hours at 345°C and 5 hours at 215°C.

MACHINING

ELEKTRON ZRE1 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	3.5 mg/cm ² /day 270 mpy
----------------	--

LOW TEMPERATURE PROPERTIES

Mechanical properties at -196°C:

Elongation	0.5%
Ultimate tensile strength	154 MPa
Impact value (unnotched)	0.5 J

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

0.2% Proof stress	110 MPa
Tensile strength	160 MPa
Elongation	3%

TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress	85 –120 MPa
Ultimate strength	275 –340 MPa

TYPICAL SHEAR PROPERTIES

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

TYPICAL BEARING PROPERTIES

Yield	275 MPa
Ultimate	395 MPa

IMPACT VALUES HOUNSFIELD

Unnotched	6.1–7.4 J
Notched	0.7– 2.0 J

ELEKTRON[®] ZREI

FATIGUE PROPERTIES

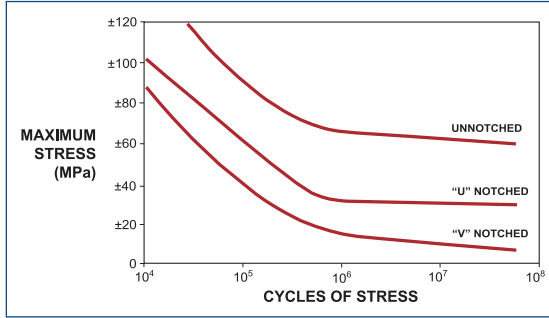


Figure 1 : Rotating bend fatigue tests

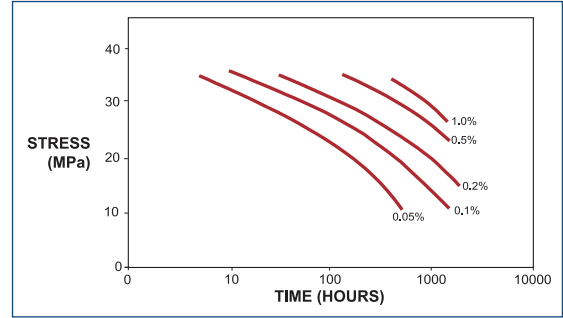


Figure 4 : Stress / time relationships for specified creep strains 250°C

ELEVATED TEMPERATURE MECHANICAL PROPERTIES

Typical Tensile Properties

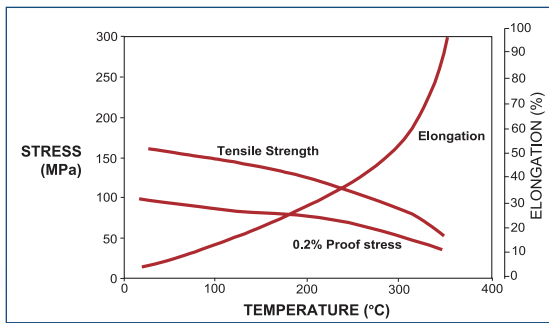


Figure 2 : Effect of temperature on tensile properties

FATIGUE PROPERTIES

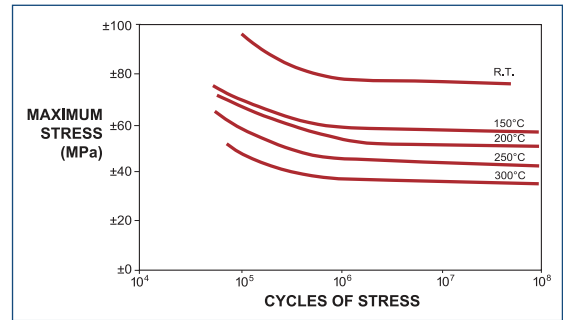


Figure 5 : Rotating bend fatigue curves

CREEP PROPERTIES

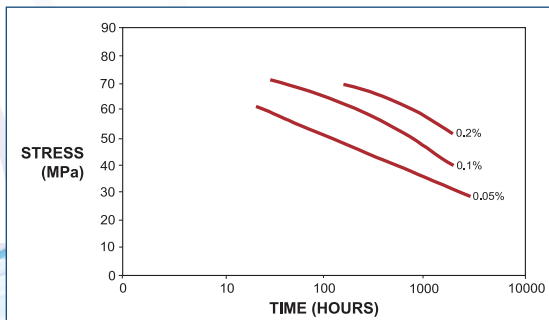


Figure 3 : Stress / time relationships for specified creep strains 200°C

† 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