Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Elektron ZK60A Forgings

Datasheet : 486

Magnesium Elektron UK,
P.O. Box 23, Rake Lane, Swinton, Manchester, M27 8DD, England.
Tel: 0161 911 1000 Fax: 0161 911 1010
Web: www.magnesium-elektron.com VAT No: GB 668 2142 26

Elektron ZK60A Forgings

ZK60A

ZK60A is a wrought magnesium base alloy containing zinc and zirconium. Increased strength is obtained by artificial aging from the as-fabricated form. ZK60A-T5 has the best combination of strength and ductility at room-temperature of the wrought magnesium alloys.

APPLICATIONS

Forgings in ZK60A find application in high strength parts for use primarily where the service temperature is below 150°C.

ZK60A forgings can be used where pressure tightness or machinability are required. That parts are dimensionally stable during and after machining is also an important design consideration.

Forgings in ZK60A find application in high strength parts for satellites, helicopter gearboxes and rotor hubs, bicycle frames, roadwheels, missle frames and interstage fairings, brake housings and landing gear struts.

SPECIFICATIONS

UNS Number M16600
AMS4362
ASTM B91
FEDERAL QQ-M-40

CHEMICAL COMPOSITION

Zinc	4.8-6.2%
Zirconium	0.45% min
Magnesium	Balance

HEAT TREATMENT

As-fabricated (F) forgings can be converted to the precipitation treated temper (T5) by heating to 150°C for 24 hours, followed by air cooling.

PHYSICAL PROPERTIES

Specific gravity	1.83
Coefficient of thermal expansion	$27.1 \times 10^{-6} K^{-1}$
Thermal conductivity	121.0 $Wm^{-1}K^{-1}$
Specific heat	1100 $Jkg^{-1}K^{-1}$
Electrical resistivity	57 nΩm
Modulus of elasticity	45×10^{9} Pa
Poissons ratio	0.35
Melting range	520-635°C

DESIGN DATA

Specification minimum tensile properties.

ZK60A-T5 Die Forgings

0.2% Proof stress	180 MPa
Tensile strength	290 MPa
Elongation in $5.65\sqrt{A}$	6%

ZK60A-T6 Die Forgings

0.2% Proof stress	220 MPa
Tensile strength	295 MPa
Elongation in $5.65\sqrt{A}$	3%

OTHER PROPERTIES

TYPICAL HARDNESS

ZK60A-T6	85 Rockwell E
ZK60A-T5	77 Rockwell E

WELDABILITY

ZK60A is not considered to be weldable by conventional techniques due to hot-shortness cracking. However, resistance welding response is excellent. Friction stir welding can be used to join ZK60A to itself and other magnesium alloys.

MACHINING

ZK60A, like all magnesium alloy forgings, machines 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 centimeter of metal removed varies from 9 to 14 watts per minute depending on the operation.

SURFACE TREATMENT

All the normal chromating, anodizing, plating, and finishing treatments are readily applicable.

CORROSION RESISTANCE

ASTM B117 salt spray test

Corrosion rate	0.6 mg/cm^2/day
	50 mpy

Elektron ZK60A Forgings

AMBIENT TEMPERATURE MECHANICAL PROPERTIES FOR T5 TEMPER

TYPICAL TENSILE PROPERTIES

0.2% Proof stress	200 MPa
Tensile strength	310 MPa
Elongation in 5.65√A	13%

TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress	160 MPa

TYPICAL SHEAR PROPERTIES

Ultimate stress	165 MPa

TYPICAL BEARING PROPERTIES

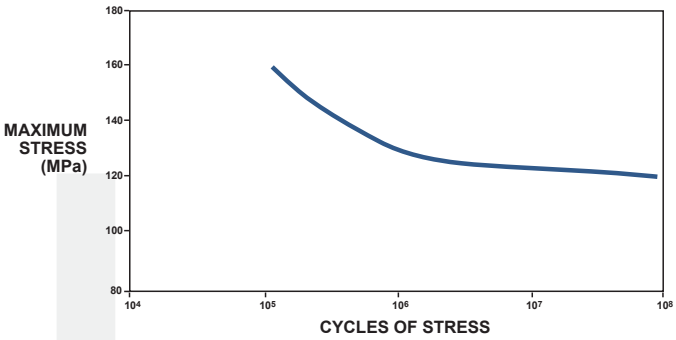
0.2% Proof stress	285 MPa
Ultimate stress	420 MPa

FRACTURE TOUGHNESS

K_{IC}	34 MPa√m

FATIGUE PROPERTIES

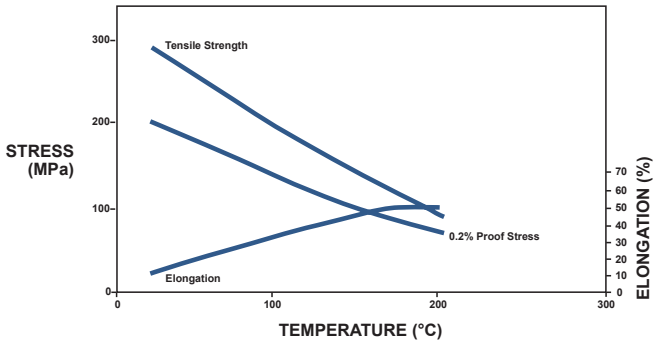
FIG. 1 Rotating bend fatigue test



ELEVATED TEMPERATURE MECHANICAL PROPERTIES FOR T5 TEMPER

TYPICAL TENSILE PROPERTIES

FIG. 2 Effect of temperature on tensile properties



CREEP PROPERTIES

FIG. 3 Stress/time relationship for specified creep at 100°C

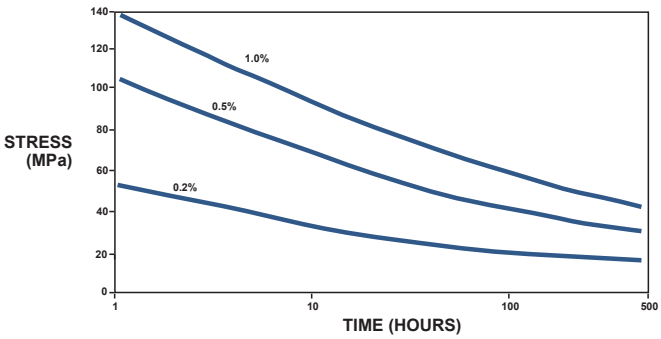
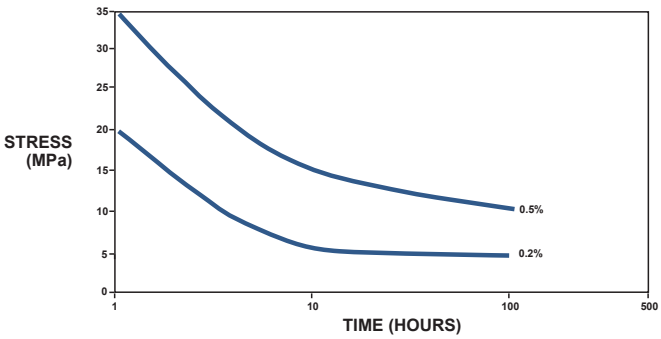


FIG. 4 Stress/time relationship for specified creep at 150°C



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