



Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Elektron AZ91E

Datasheet : 456

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Elektron AZ91E

ELEKTRON AZ91E is a general purpose gravity sand casting alloy containing aluminium, zinc and manganese. Good properties may be achieved particularly with the use of chills in the mould. Corrosion resistance is excellent.

APPLICATIONS

The alloy may be used in aerospace casting applications particularly where there is no high temperature requirement or a requirement for pressure tightness.

SPECIFICATIONS

ASTM B80 AZ91E
BS2970 MAG7/3
DIN MgAl/19 Zn1
AFNOR G-A9Z1
BS2L125

CHEMICAL COMPOSITION

| | |
|-----------|--------------|
| Aluminium | 8.1 - 9.3% |
| Zinc | 0.4 - 1.0% |
| Manganese | 0.17 - 0.35% |
| Magnesium | Balance |

HEAT TREATMENT

For optimum properties the alloy should be used in the T6 condition i.e. 16 to 24 hours at 400°C - 420°C, aircool, and then 8 to 16 hours at 180°C to 210°C.

Alternatively it may be used in the T4 condition i.e. 16 to 24 hours at 400°C to 420°C.

PHYSICAL PROPERTIES

| | |
|----------------------------------|---------------------------------------|
| Specific gravity | 1.81 |
| Coefficient of thermal expansion | $27 \times 10^{-6} \text{K}^{-1}$ |
| Thermal conductivity | $84 \text{ Wm}^{-1} \text{K}^{-1}$ |
| Specific heat | $1000 \text{ Jkg}^{-1} \text{K}^{-1}$ |
| Electrical resistivity | 141 nΩm |
| Modulus of elasticity | $44 \times 10^3 \text{ MPa}$ |
| Poisson's ratio | 0.35 |
| Melting range | 470 - 595°C |
| Damping Index | 0.2 |
| Brinell hardness | 75 |

DESIGN DATA

Minimum specification
tensile properties
ASTM B80 AZ91E
T6 condition

| | |
|-------------------|---------|
| 0.2% Proof stress | 83 MPa |
| Tensile strength | 117 MPa |
| Elongation | 2% |

OTHER PROPERTIES

CASTABILITY

Good castability.

PATTERN MAKERS SHRINKAGE FACTOR

1.3%

WELDABILITY

Sand castings are weldable by the tungsten arc inert gas process (TIG) with a filler rod of a similar composition. Castings should be welded in the T4 or T6 condition and heat treated after welding. This may either be for 30 mins at 415°C plus 4 hours at 215°C or 16 hours at 170°C.

SURFACE TREATMENT

All the normal chromating, anodising and finishing treatments are applicable. If large grains are present at the surface there maybe some colour variation with chromated coatings.

CORROSION RESISTANCE

ASTM B117 salt spray test
Corrosion rate 0.05 - 0.18 mg/cm²/day
4 - 14 mpy

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

| | |
|-------------------|---------|
| T4 | |
| 0.2% Proof stress | 125 MPa |
| Tensile strength | 260 MPa |
| Elongation | 9% |

| | |
|-------------------|---------|
| T6 | |
| 0.2% Proof stress | 170 MPa |
| Tensile strength | 270 MPa |
| Elongation | 4.5% |

TYPICAL COMPRESSIVE PROPERTIES

| | |
|-------------------|---------|
| 0.2% Proof stress | 130 MPa |
| Ultimate strength | 400 MPa |

TYPICAL SHEAR PROPERTIES

| | |
|-----------------|---------|
| Ultimate stress | 140 MPa |
|-----------------|---------|

FRACTURE TOUGHNESS

| | |
|----------|---------------------------|
| K_{IC} | 13.2 MPa m ^{1/2} |
|----------|---------------------------|

FATIGUE PROPERTIES

| | |
|--|--------|
| Rotating Bend (5 x 10 ⁷ cycles) | 70 MPa |
|--|--------|



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