



## 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  
ISO 16220 MC21120

### 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 x 103 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 may be some colour variation with chromated coatings.

## Corrosion resistance

ASTM B117 salt spray test

Corrosion rate	<0.63 mg/cm <sup>2</sup> /day
	<50 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	30 MPa
Ultimate strength	400 MPa

### Typical shear properties

Ultimate stress	140 MPa
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### Fracture toughness

K <sub>IC</sub>	13.2 MPa m <sup>1/2</sup>
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### Fatigue properties

Rotating bend (5 x10 <sup>7</sup> cycles)	70 MPa
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† The information contained within is meant as a guideline only

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