LUXFER
MEL TECHNOLOGIES

DATASHEET • 467†

# Elektron® WE43B

Elektron WE43B is a high strength magnesium based casting alloy developed and patented by Luxfer MEL Technologies for use at temperatures up to 300˚C. This alloy system maintains its good mechanical properties at elevated temperatures, without the use of either silver or thorium. The alloy is stable for long term exposure up to 250˚C. Elektron WE43B has excellent corrosion resistance characteristics.

## Applications

The excellent retention of properties at elevated temperatures will be of interest to designers of aeroengines and other power systems, helicopter transmissions, missiles, racing and high performance cars.

## Specifications

UNS No. M18430
ASTM B80
AMS 4427
MAM 4427
AECMA MG-C96002
ISO 16220: MC95320

## Chemical composition

| | |
|---|---|
| Yttrium | 3.7–4.3% |
| Rare earths | 2.4–4.4% |
| Zirconium | 0.4% min |
| Magnesium | Balance |

## Heat treatment

The alloy develops its optimum properties in the fully heat treated condition ie:
Solution heat treat for 8 hours at 525˚C,
Air cool, hot water or polymer quench,
Age for 16 hours at 250˚C, Air cool.

## Physical properties

| | |
|---|---|
| Specific gravity | 1.84 |
| Coefficient of thermal expansion | 26.7 x$10^{-6}K^{-1}$ |
| Thermal conductivity | 51 $Wm^{-1}K^{-1}$ |
| Specific heat | 966 $Jkg^{-1}K^{-1}$ |
| Electrical resistivity | 148 nΩm |
| Modulus of elasticity | 45 x $10^3$ MPa |
| Poissons ratio | 0.27 |
| Melting range | 540–640˚C |
| Damping index | 0.09 |
| Vickers hardness | 85–105 |

## Design data

Minimum specification tensile properties:

| | |
|---|---|
| 0.2% proof stress | 172 MPa |
| Tensile strength | 220 MPa |
| Elongation | 2% |

## Other properties

### Castability

Fine grained and pressure tight with good casting characteristics.

### Pattern makers shrinkage factor

1.5%

### Weldability

Fully weldable by the tungsten arc inert gas (TIG) process, using filler rods of the parent alloy composition.

### Machining

Elektron WE43B 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

Normal protective treatments apply for Elektron WE43B but some chromating baths may need to be modified for the satisfactory treatment of castings. Please refer to Luxfer MEL Technologies Design Guide.

### Corrosion resistance

ASTM B117 salt spray test

| | |
|---|---|
| Corrosion rate | 0.1–0.2 mg/cm²/day |
| | 10 mpy |

## Ambient temperature mechanical properties

### Typical tensile properties

| | |
|---|---|
| 0.2% proof stress | 185 MPa |
| Tensile strength | 265 MPa |
| Elongation | 7% |

### Typical compressive properties

| | |
|---|---|
| 0.2% proof stress | 187 MPa |
| Ultimate strength | 323 MPa |

### Typical shear properties

| | |
|---|---|
| Ultimate stress | 160 MPa |

### Fracture toughness

| | |
|---|---|
| $K_{IC}$ | 15.9 MPa $m^{1/2}$ |

### Fatigue properties

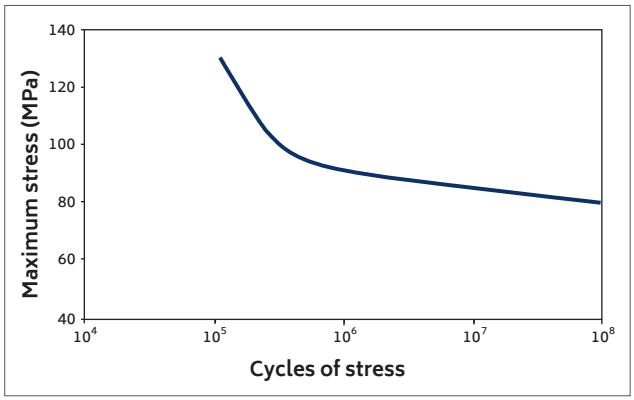


Figure 1. Rotating bend fatigue test.

## Elevated temperature mechanical properties

### Typical tensile properties

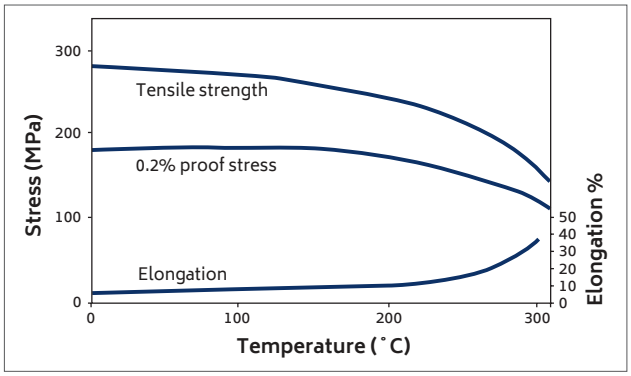


Figure 2. Effect of temperature on tensile properties.

### Creep properties

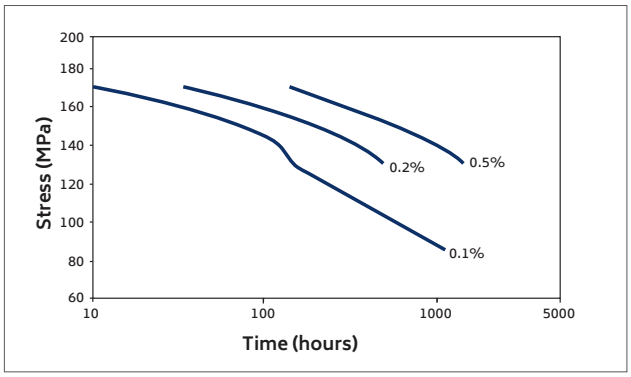


Figure 3. Stress / time relationship for specified creep strains at 200˚C.

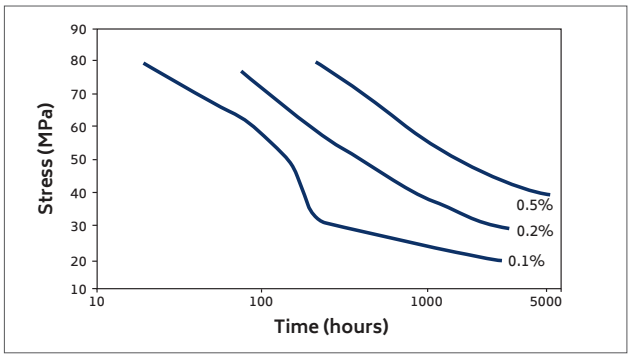


Figure 4. Stress / time relationship for specified creep strains at 250˚C.

### Fatigue properties

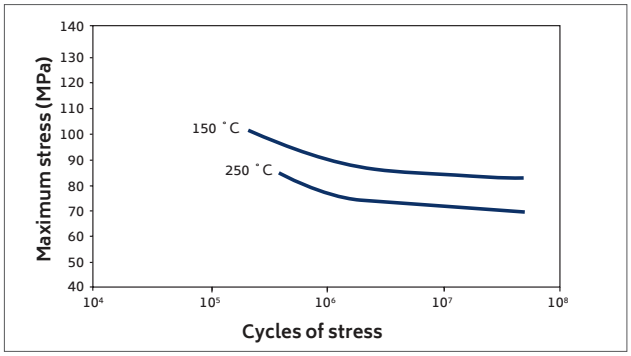


Figure 5. Rotating bend fatigue test.

Table 1. Cut up properties on samples taken from actual castings.

| Temperature | Number of tests | | 0.2% proof stress (MPa) | Tensile strength (MPa) | Elongation (%) |
|---|---|---|---|---|---|
| 20˚C | 215 | Minimum<br>Average<br>Maximum | 149<br>178<br>215 | 200<br>250<br>293 | 2<br>7<br>17 |
| 250˚C | 56 | Minimum<br>Average<br>Maximum | 134<br>155<br>193 | 187<br>211<br>235 | 2<br>18<br>36 |

Discover more at

**www.luxfermeltechnologies.com**

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† The information contained within is meant as a guideline only



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