

# Elektron WE43

Datasheet: 467

ELEKTRON WE43 is a high strength magnesium based casting alloy developed and patented by Magnesium Elektron 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 WE43 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

## **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  $26.7 \times 10^{-6} \text{K}^{-1}$ thermal expansion 51.3 Wm<sup>-1</sup>K<sup>-1</sup> Thermal conductivity 966 Jkg<sup>-1</sup>K<sup>-1</sup> Specific heat Electrical resistivity 148 n $\Omega$ m 44 x 10<sup>3</sup>MPa Modulus of elasticity Poissons ratio 0.27 540-640°C Melting range Damping index 0.09

85-105

# **DESIGN DATA**

Vickers hardness

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 WE43 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 WE43 but some chromating baths may need to be modified for the satisfactory treatment of castings.

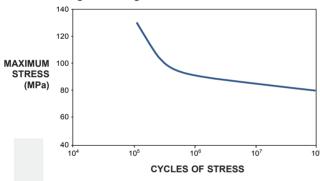
Please refer to Magnesium Elektron Data Sheet 206.

# AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES 0.2% Proof stress Tensile strength Elongation	180 MPa 250 MPa 7%
TYPICAL COMPRESSIVE PROPERTIES 0.2% Proof stress Ultimate strength	187 MPa 323 MPa
TYPICAL SHEAR PROPERTIES Ultimate stress	162 MPa
FRACTURE TOUGHNESS K <sub>IC</sub>	15.9 MPa m <sup>1/2</sup>

# **FATIGUE PROPERTIES**

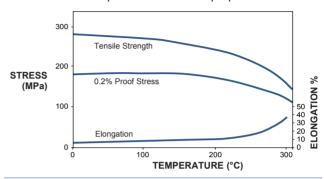
# FIG. 1 Rotating bend fatigue test



# ELEVATED TEMPERATURE MECHANICAL PROPERTIES

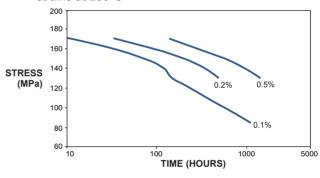
### **TYPICAL TENSILE PROPERTIES**

FIG. 2 Effect of temperature on tensile properties

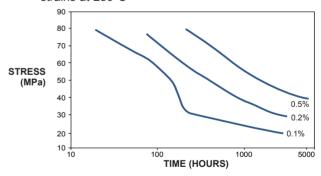


#### **CREEP PROPERTIES**

FIG. 3 Stress/time relationship for specified creep strains at 200°C

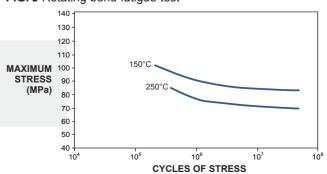


**FIG. 4** Stress/time relationship for specified creep strains at 250°C



# **FATIGUE PROPERTIES**

FIG. 5 Rotating bend fatigue test



# **Elektron WE43 Castings**

# CUT UP PROPERTIES OF SAMPLES TAKEN FROM ACTUAL CASTINGS

Temperature	Number of Tests	0.2% Proof S (MPa)	stress	Tensile Strength (MPa)	Elongation (%)
20°C	215	Minimum 1	149	200	2
		Average 1	178	250	7
		Maximum 2	215	293	17
250°C	56	Minimum 1	134	187	2
		Average 1	155	211	18
			193	235	36



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