



Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Elektron WE43 Wrought Alloy

Datasheet : 478

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

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Registered Office: The Victoria, 150-182 Harbour City, Salford Quays, Salford, M50 3SP
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Elektron WE43

Wrought ELEKTRON WE43 is a high strength magnesium based alloy for use at temperatures up to 300°C. The alloy is stable to long term exposure at temperatures up to 250°C. The mechanical properties of ELEKTRON WE43 are more isotropic than conventional wrought magnesium alloys.

APPLICATIONS

The excellent retention of properties at elevated temperatures and improved corrosion resistance will be of interest to designers of aircraft, aero engines and performance cars.

DESIGNATIONS

ASTM WE43A
UNS M18430

CHEMICAL COMPOSITION

Yttrium	3.7–4.3%
Rare Earths*	2.4–4.4%
Zirconium	0.4% min
Magnesium	Balance

*Rare earths consist of Neodymium 2.0–2.5%, the remainder being heavy rare earths, principally ytterbium, erbium, dysprosium and gadolinium.

HEAT TREATMENT

The alloy develops its properties in the fully heat treated (T6) condition ie:

4–8 hours at 525°C,
Air cool, hot water or polymer quench,
Age for 16 hours at 250°C,
Air cool.

Alternatively, for applications up to 200°C, the alloy may be used in the T5 condition ie:
16 hours at 250°C.

PHYSICAL PROPERTIES

Specific gravity	1.84
Coefficient of thermal expansion	$26.7 \times 10^{-6} \text{K}^{-1}$
Thermal conductivity	$51.3 \text{ Wm}^{-1}\text{K}^{-1}$
Specific heat	$966 \text{ Jkg}^{-1}\text{K}^{-1}$
Electrical resistivity	148 nΩm
Modulus of elasticity	44 GPa
Poissons ratio	0.27
Melting range	540–640°C
Damping index	0.09
Brinell hardness	70–90

DESIGN DATA

Proposed minima

EXTRUDED BAR T6	
0.2% Proof stress	130 MPa
Tensile strength	230 MPa
Elongation	7%
EXTRUDED BAR T5	
0.2% Proof stress	160 MPa
Tensile strength	245 MPa
Elongation	6%

OTHER PROPERTIES

WELDABILITY

Weldable by the tungsten arc inert gas process (TIG) with a filler rod of the parent alloy composition.

Components should be heat treated after welding.

FORGING

ELEKTRON WE43 is a high strength alloy that responds well to press forging.

MACHINING

ELEKTRON WE43, like all magnesium alloys, 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 centimetre of metal removed varies from 9 to 14 watts per minute depending on the operation.

SURFACE TREATMENT

Yttrium containing magnesium alloys do not respond to certain chemical treatments, notably some of the chromate conversion coating baths. Alternative treatments are identified in the Magnesium Elektron surface treatment data sheet.

CORROSION RESISTANCE

Additions of yttrium contribute to the excellent corrosion resistance characteristics of ELEKTRON WE43 to the extent that it is of a similar order to aluminium alloys under salt spray conditions.

Corrosion rate	mg/cm ² /day
Intermittent salt spray	0.023
ASTM B117 salt fog	0.1–0.2
Sea water immersion	0.1

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

EXTRUDED

	0.2% Proof stress MPa	Tensile strength MPa	Elongation %
T5	195	280	10
T6	190	270	10

FORGED

	0.2% Proof stress MPa	Tensile strength MPa	Elongation %
T5	180	300	10
T6	180	280	7

ELEVATED TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

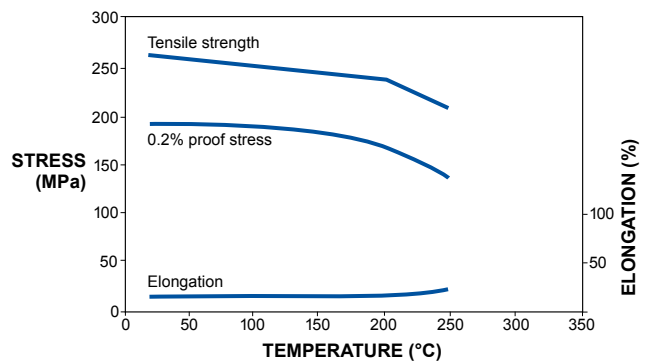
EXTRUDED

	0.2% Proof stress MPa	Tensile strength MPa	Elongation %
T6 20°C	190	270	10
250°C	130	210	24

FORGED

	0.2% Proof stress MPa	Tensile strength MPa	Elongation %
T5 20°C	180	300	10
150°C	174	269	13
T6 20°C	180	280	7
150°C	172	249	9

FIG. 1 Tensile properties vs temperature
Extruded Elektron WE43-T6 bar





Certificate No. FM12677

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