Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM



# ELEKTRON 43 EXTRUDED PRODUCTS

## APPLICATIONS

Elektron® 43 is a light, high strength wrought magnesium alloy for use at temperatures up to 250˚C. Designs in Elektron® 43 can be 20% to 30% lighter than a corresponding aluminium design. Elektron® 43 is available as rolled plate, forging feedstock and extruded bar, section & profile. Elektron® 43 is an optimised wrought evolution of the original casting alloy, Elektron WE43.

The properties of Elektron® 43 mean it is well suited for use as feedstock material from which to machine high performance components, especially those associated with elevated temperature performance.

Elektron® 43 has undergone extensive flammability testing by the Federal Aviation Administration (FAA). The FAA have shown that the use of Elektron® 43 in aircraft seat frames does not reduce the level of safety of the aircraft when compared to heavier aluminium seat components.

## DESIGNATIONS

UNS M18434
ASTM WE43C

## SPECIFICATIONS

AMS 4485 – Extrusion

ASTM B107 and B107M – Extrusion

MMPDS-08 (and later versions) – including full A & B basis statistical analysis of properties for both extrusions and plate.

## CHEMICAL COMPOSITION

| | |
|---|---|
| Yttrium | 3.7 – 4.3% |
| Rare Earths | 2.3 – 3.5% |
| Zirconium | 0.2% min |
| Magnesium | Balance |

## HEAT TREATMENT

Extruded Elektron® 43 develops its maximum strength in the artificially aged (T5) heat treated condition.

## PHYSICAL PROPERTIES

| | |
|---|---|
| Specific Gravity | 1.83 |
| Coefficient of thermal expansion | 25.6 x $10^{-6}K^{-1}$ |
| Thermal conductivity | 57.6 $Wm^{-1}K^{-1}$ |
| Specific heat | 993 $Jkg^{-1}K^{-1}$ |
| Electrical Resistivity | 148 nΩm |
| Modulus of Elasticity | 44 GPa |
| Poisson's Ratio | 0.326 |
| Melting Range | 540 – 640˚C |
| Damping Index | 0.09 |
| Brinell Hardness | 70 - 90 |

## DESIGN DATA

Longitudinal - Specification minima (A-basis statistical)

| EXTRUDED – T5 | |
|---|---|
| 0.2% Proof | 195 MPa (28.2 ksi) |
| Ultimate Tensile Strength | 303 MPa (43.9 ksi) |
| Elongation | 6% |

## AMBIENT TEMPERATURE MECHANICAL PROPERTIES

T5 properties for extruded Elektron® 43 are dependent upon extruded profile. Tensile strength values up to 300 MPa 0.2% PS (43.5 ksi); 375 MPa UTS (54.4 ksi); and elongation of 11% have been demonstrated.

## TYPICAL TENSILE PROPERTIES

*EXTRUDED BAR - Longitudinal*

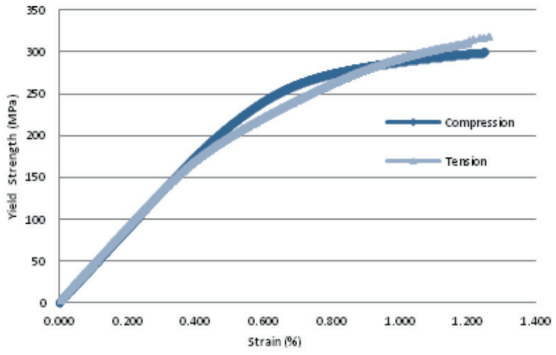
| 0.2% Proof Stress MPa (ksi) | Tensile Strength MPa (ksi) | Elongation % |
|---|---|---|
| 243 (34.8) | 352 (51.0) | 11.5 |

*EXTRUDED BAR - Transverse*

| 0.2% Proof Stress MPa (ksi) | Tensile Strength MPa (ksi) | Elongation % |
|---|---|---|
| 183 (26.5) | 305 (44.2) | 11.3 |

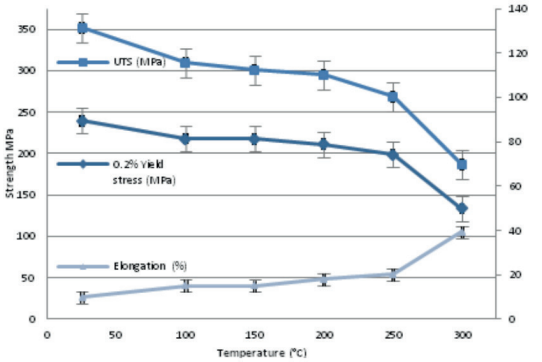
## ASYMMETRY OF PROPERTIES

Asymmetry is when the tensile yield strength is greater than the compressive yield strength due to the twinning behaviour. Elektron® 43 has reduced asymmetry compared to other magnesium alloys.




## ELEVATED TEMERATURE PROPERTIES

| | 0.2% Proof Stress MPa (ksi) | Tensile Strength MPa (ksi) | Elongation % |
|---|---|---|---|
| 20˚C | 240 (34.8) | 350 (50.8) | 11 |
| 250˚C | 200 (29.0) | 268 (38.9) | 22 |

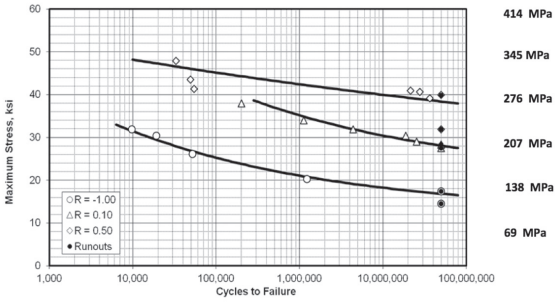



## EXTRUDED BAR - Fatigue Properties

### ASTM E466 Axial fatigue

R=0.1 at 50 million cycles = 195MPa

Other R ratios are shown in the graph below.



## OTHER PROPERTIES

### PLATE

Elektron® 43 rolled plate is available and has specification AMS 4371. Please see Magnesium Elektron Datasheet 492.

### FORGING

Elektron® 43 is a high strength alloy that responds well to forging – please see Magnesium Elektron information sheet, available on the website, for the forging of Elektron® 43.

### MACHINING

Elektron® 43, like all magnesium alloys, machines faster than any other metal.

### CORROSION RESISTANCE

Corrosion rate < 30 mpy

### SURFACE TREATMENT

Elektron® 43 can be anodised with treatments including: Keronite®, Tagnite® and MagOxid®, amongst others.

Conversion coatings that are Hexavalent chromium free are also available. These include:

Alodine® 160/161, Surtec® 650, Metalast® TCP-HF, Oxsilan® MG 0611, Gardobond® X4729, and MagPass®, amongst others.

Like all magnesium alloys, Elektron® 43 can be painted or coated using conventional techniques following pre-treatment.

† The information contained within is meant as a guideline only



Certificate No. FM12677

**Magnesium Elektron UK**
Magnesium Technology Centre,
Rake Lane, Swinton, Manchester
M27 8BF, England
Tel: +44 (0)161 911 1000

**Magnesium Elektron Powders NJ**
2590 Ridgeway Blvd., Manchester,
NJ 08759, USA
Tel: +1 732 657 6451

**Magnesium Elektron North America**
1001 College Street, P.O. Box 258,
Madison, IL 62060, USA
Tel: +1 618 452 5190

**Magnesium Elektron CZ s.r.o**
Nadrazni 214, 435 33 Louka u Litvinova,
Czech Republic
Tel: +420 478 019 011