



LUXFER®
MAGNESIUM
ROLLED PRODUCTS

ELEKTRON 43 PLATE

ELEKTRON 43 Benefits

Flame Resistant

Non burning

Lightweight

33% lighter than aluminum

75% lighter than steel

High Strength

Creep Resistant

Easy Machining

40% faster than Al 6061

96% faster than Al 7075

Elektron 43 Applications

The isotropic properties of Elektron 43 means it is well suited for use as material from which to machine high performance components, especially those associated with elevated temperature applications. The high specific stiffness and good ductility of the alloy makes it an ideal metallic material for achieving weight reduction in applications that would traditionally employ high strength aluminum alloys.



ELEKTRON 43 PLATE

CHEMICAL COMPOSITION

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

PHYSICAL PROPERTIES

Specific Gravity	1.83
Coefficient of thermal expansion	$25.6 \times 10^{-6} K^{-1}$
Specific heat	$993 J kg^{-1} K^{-1}$
Thermal conductivity	$57.6 W m^{-1} K^{-1}$
Electrical resistivity	148 nΩm
Modulus of elasticity	44 GPa
Poissons ratio	0.295
Melting range	540° - 640°C

FLAME RESISTANT

Elektron 43 is a flame resistant alloy. It meets the flammability requirements set out in the FAA's Aircraft Materials Fire Test Handbook DOT/FAA/AR-00/12 for commercial aircraft. The unique alloy content of Elektron 43 provides it with flammability resistance that is similar to aluminum when the alloy is in bulk form. This is the result of the robust surface oxide that forms as a combination of MgO and Y₂O₃. Pure magnesium metal has a Pilling-Bedworth (P-B) ratio of 0.81, which makes it susceptible to burning. However the addition of yttrium into the system creates Y₂O₃, which has a P-B of 1.39. This greatly increases the protective nature of the oxide film and this makes it the alloy of choice when the application requires lightweight and high strength.

MINIMUM TENSILE PROPERTIES INCH/POUND UNITS

Nominal Thickness inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
1.00 to 1.50 incl.	44	33	12
Over 1.50 to 6.0 incl.	47	30	6

MINIMUM TENSILE PROPERTIES SI UNITS

Nominal Thickness inches	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
25.4 to 38.1 incl.	303	228	12
Over 38.1 to 152.4 incl.	324	207	6

MACHINING

Magnesium machines faster than any other known metal.

Machining magnesium is only limited to the speed of the tool which is doing the cutting. Studies have shown that magnesium machines 40% faster than 6000 series aluminum and up to 96% faster than 7000 series aluminum employing the use of large feed rates and greater depths of cut. Machining magnesium uses 55% less power than what is required to machine aluminum. Magnesium machines like wood with well broken chips and does not accumulate on the tooling as compared to aluminum alloys. Extremely fine and smooth surfaces can be achieved and 5 to 10 times longer tool life can be expected.

SURFACE TREATMENT

The surface protection of Elektron 43 is dependent on the service conditions where the material will be operating. In dry conditions, with limited exposure to moisture, Elektron 43 can be left bare or lightly oiled. A protective coating solution should be given to application in more demanding environments. Elektron 43 can be protected by a variety of coatings that include chromating, anodizing, plating, e-coat, paint, and plasma electrolytic oxidation (PEO). It is recommended to prepare the magnesium surface by cleaning and pre-treatment (conversion coating) using traditional non-ferrous methods prior to e-coat or paint. There are commercially available pre-treatments that are a non-chromate based chemistry which result in good adhesion of the paint system. For further guidance on surface protection, contact Luxfer MRP.



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