



Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Elektron Tooling Plate

Datasheet : 484

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Elektron Tooling Plate

TOOLING PLATE is specially produced to provide a flat plate surface with moderate strength and ductility. The production process results in plate with exceptional dimensional stability in machining and remains stable over time. There is sufficient ductility for limited room temperature forming combined with weldability to allow the manufacture of a multitude of complex parts.

APPLICATIONS

Those applications requiring a flat surface or high dimensional stability benefit from the use of tooling plate. Typical uses include jigs, fixtures, optical benches, vibration test equipment and inspection gauges. Tooling plate is non-magnetic and has high electrical and thermal conductivity filling many material requirements in the electronics and computer industries.

DURABILITY

The high strength-to-weight ratio of magnesium minimizes damage to tools during "in use" handling, thereby increasing tool life. Original tolerances are unaffected, even after long use. Tooling plate is non-galling, with a low coefficient of friction, reducing wear over the lifetime of the tool. Alkaline cleaners will not affect the tolerances of toolplate fixtures, allowing cleaning without danger of damaging sensitive surfaces. As a rolled product, tooling plate is free of internal voids which could lead to premature failure.

DESIGN DATA

Minimum mechanical properties are not guaranteed.

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

0.2% Proof stress 130 MPa
Tensile strength 240 MPa
Elongation in 5.65 \pm A 10%

TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress 70 MPa

CHEMICAL COMPOSITION

Aluminum	3% nom.
Zinc	1% nom.
Magnesium	Balance

HEAT TREATMENT

Tooling plate is delivered in the thermally stabilized condition. User thermal processing is not required.

PHYSICAL PROPERTIES

Specific gravity	1.78
Coefficient of thermal expansion	$26.8 \times 10^{-6} \text{K}^{-1}$
Specific heat	$1040 \text{ Jkg}^{-1} \text{K}^{-1}$
Thermal conductivity	$76.9 \text{ Wm}^{-1} \text{K}^{-1}$
Electrical resistivity	92 n Ω m
Modulus of elasticity	$45 \times 10^9 \text{ Pa}$
Poissons ratio	0.35
Melting range	566-632°C

Tooling plate has an exceptional capacity for absorbing vibrational energy and dissipating it in the form of heat energy. This unique characteristic can be effectively utilized by designers for the attenuation of vibration and noise. A comparison with other engineering materials rates tooling plate very well in what can be a critical design factor.

SPECIFIC DAMPING CAPACITY

Cast pure magnesium	100%
Tooling Plate	49%
Gray Cast Iron	10%
Martensitic Stainless	8%
Ductile Iron	2%
Austenitic Stainless	1%
Aluminum 355-T6	0.4%
Titanium	<0.2%

OTHER PROPERTIES

WELDABILITY

Gas shielded metal arc and most other welding processes can be used successfully to produce welds with 95% of the parent plate strength. Generally weldments will require stress relief for dimensional stability, however, each application should be reviewed individually.

MACHINING

Tooling plate, like all magnesium alloy plate, 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 centimeter of metal removed varies from 9 to 14 watts per minute depending on machining operation. This compares favorably with other engineering materials.

TYPICAL MACHINE POWER

Tooling plate 11 w-min-1cm-3
Aluminum plate 20 w-min-1cm-3
Brass 25 w-min-1cm-3
Cast Iron 38 w-min-1cm-3
Mild Steel 69 w-min-1cm-3

Tooling plate has excellent dimensional stability during and after machining, even when machined extensively. This, coupled with the superior surface finish readily obtained in machining, makes tooling plate a strong candidate for dimension critical items.

SURFACE TREATMENT

All normal chromating, anodizing, plating, and finishing treatments have been successfully applied to tooling plate.

ELEKTRON TOOLING PLATE FLATNESS TOLERANCES

Maximum deviation from flat as measured by a straight edge placed on plate surface.

Specified Plate Gauge		Maximum allowed deviation from flat		
Over	Thru	in any 300mm	in any 1500mm	in any 2000mm
6.3	25mm	0.125mm	0.31mm	0.42mm
25	150mm	0.250mm		

Specified Plate Gauge		Typical tooling plate deviation from flat		
Over	Thru	in any 300mm	in any 1500mm	in any 2000mm
6.3	25mm	0.077mm	0.15mm	0.19mm
25	150mm	0.125mm	0.21	0.28

STANDARD DIMENSIONAL TOLERANCES FOR TOOLING PLATE

GAUGE TOLERANCES			WIDTH TOLERANCES			LENGTH TOLERANCES		
Specified Gauge		Tolerance	Specified Width		Tolerance	Specified Length		Tolerances
Over	Thru		Over	Thru		Over	Thru	
6.3	19mm	±0.25mm	0	250mm	+4.75mm	0	250	+4.75mm
19	32mm	±0.43mm	250	1220mm	+9.50mm	250	1220mm	+9.50mm
32	50mm	±0.64mm	1220	1825mm	+12.7mm	1220	1825mm	+12.70mm
50	75mm	±1.25mm	1825	1950mm	+15.9mm	1825	6000mm	+15.9mm
75	83mm	±1.65mm						
83	90mm	±2.00mm						
90	100mm	±2.80mm						
100	125mm	±3.20mm						
125	150mm	±3.40mm						
150	175mm	±3.705mm						

TOOLING PLATE STANDARD METRIC SIZES

6.35 x 1250 x 2500 mm	20 x 1500 x 4000 mm	50 x 1500 x 4000 mm
6.35 x 1250 x 4000 mm	25 x 1250 x 2500 mm	60 x 1250 x 2500 mm
10 x 1250 x 2500 mm	25 x 1250 x 4000 mm	60 x 1250 x 4000 mm
10 x 1250 x 4000 mm	25 x 1500 x 4000 mm	60 x 1500 x 4000 mm
12.7 x 1250 x 2500 mm	30 x 1250 x 2500 mm	75 x 1250 x 2500 mm
12.7 x 1250 x 4000 mm	30 x 1250 x 4000 mm	75 x 1250 x 4000 mm
12.7 x 1500 x 4000 mm	30 x 1500 x 4000 mm	75 x 1500 x 4000 mm
15 x 1250 x 2500 mm	40 x 1250 x 2500 mm	100 x 1250 x 2000 mm
15 x 1250 x 4000 mm	40 x 1250 x 4000 mm	125 x 1250 x 2000 mm
15 x 1500 x 4000 mm	40 x 1500 x 4000 mm	150 x 1250 x 1500 mm
20 x 1250 x 2500 mm	50 x 1250 x 2500 mm	
20 x 1250 x 4000 mm	50 x 1250 x 4000 mm	

Other sizes are available, subject to inquiry, up to a maximum per plate weight of 1300kg.

Maximum gauge: 250mm Maximum width: 1950mm Maximum length: 6000mm



Certificate No. FM12677

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