



ELEKTRON[®] MSR-B

ELEKTRON MSR-B is a high strength magnesium casting alloy developed by Magnesium Elektron to have good ambient and elevated temperature properties whilst retaining good foundry characteristics.

It is a fully heat treatable magnesium alloy containing silver and rare earth metals. It is pressure tight, weldable and may be used up to temperatures of 200°C.

APPLICATIONS

The alloys will be of interest to designers requiring good retention of properties at elevated temperatures for aerospace, automotive and military applications.

SPECIFICATIONS

AECMA MG-C-51
AFNOR G-Ag2.5TR
MOD DTD 5035A
UNS M18220
ISO 16220 MC65210

CHEMICAL COMPOSITION

Silver	2.0-3.0%
Rare Earths	2.0-3.0%
Zirconium	0.4-1.0%
Magnesium	Balance

HEAT TREATMENT

The alloy is used in the T6 heat treated condition ie. 8 hours at 525°C hot water or polymer quench age for 16 hours at 200°C.

PHYSICAL PROPERTIES

Specific gravity	1.82
Coefficient of thermal expansion	$26.7 \times 10^{-6} \text{K}^{-1}$
Thermal conductivity	$113 \text{Wm}^{-1}\text{K}^{-1}$
Specific heat	$1000 \text{Jkg}^{-1}\text{K}^{-1}$
Electrical resistivity	68 nΩm
Modulus of elasticity	44.1 GPa
Poissons ratio	0.3
Melting range	550-640°C
Damping Index	0.4
Vickers hardness	80-105

DESIGN DATA

Minimum specification tensile properties	
0.2% Proof stress	185 MPa
Tensile strength	240 MPa
Elongation	2%

OTHER PROPERTIES

CASTABILITY

Fine grained and pressure tight with good casting characteristics.

PATTERN MAKERS SHRINKAGE FACTOR

1.3%

WELDABILITY

Weldable by the tungsten arc inert gas process (TIG) with a filler rod of a similar composition. Castings should be heat treated after welding.

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MACHINING

ELEKTRON MSR-B 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

All the normal chromating, anodising and finishing treatments are applicable.

CORROSION RESISTANCE

ASTM B117 Salt spray test

Corrosion rate 5.6 mg/cm²/day
430 mpy

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

0.2% Proof stress 205 MPa
Tensile strength 266 MPa
Elongation in 5.65ΩA 4%

TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress 165-200 MPa
Ultimate strength 310-385 MPa

TYPICAL SHEAR PROPERTIES

Ultimate stress 152 MPa

FRACTURE TOUGHNESS

K_{IC} 14.9 MPa m^{1/2}

FATIGUE PROPERTIES

Rotating bend fatigue test

Endurance Limit MPa	Stress Reversals 5 × 10 ⁷
Unnotched	100 - 110

ELEVATED TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

	0.2% Proof stress (MPa)	Tensile strength (MPa)	Elongation (%)
100 °C	195	230	15
150 °C	182	208	19
200 °C	165	185	24
250 °C	122	160	30

CREEP STRENGTH

Stress (MPa) to produce specific creep strains

	Hours	01.%	0.2%	0.3%
150 °C	10	-	-	-
	100	-	-	-
	500	-	135	160
	1000	-	123	151
200 °C	10	102	-	-
	100	74	86	103
	500	54	65	83
	1000	46	56	72
250 °C	10	43	-	-
	100	26	34	41
	500	14	22	27
	1000	10	16	21

† The information contained within is meant as a guideline only

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