Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Elektron EQ21

Datasheet : 464

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Elektron EQ21

ELEKTRON EQ21 is a high strength magnesium casting alloy developed by Magnesium Elektron to have good ambient and elevated temperature properties whilst still 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.

ELEKTRON EQ21 may be used to replace ELEKTRON MSR-B with a cost saving since the silver content is reduced to 1.3%-1.7% compared with 2.0% - 3.0% in ELEKTRON MSR-B. The lower silver content reduces the cost of the basic metal content in castings and improves the price stability.

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-C64001
AMS 4417
ASTM B80-90 EQ21A-T6
BS 2970 MAG 13-TF
UNS M18330

CHEMICAL COMPOSITION

Silver	1.3-1.7%
Rare Earths	1.5-3.0%
Copper	0.05-0.10%
Zirconium	0.4-1.0%
Magnesium	Balance

HEAT TREATMENT

The alloy is used in the T6 heat treated condition ie:
8 hours at 520°C,
hot water or polymer quench,
age for 16 hours at 200°C.

PHYSICAL PROPERTIES

Specific gravity	1.81
Coefficient of thermal expansion	$26.7 \times 10^{-6} K^{-1}$
Thermal conductivity	$113 Wm^{-1} K^{-1}$
Specific heat	$1000 Jkg^{-1} K^{-1}$
Electrical resistivity	68.5 nΩm
Modulus of elasticity	44 GPa
Poissons ratio	0.3
Melting range	540-640°C
Damping Index	0.22
Vickers hardness	80-105

DESIGN DATA

Minimum specification tensile properties
BS 2970 MAG13-TF

0.2% Proof stress	175 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 welded in the T4 or T6 condition and given the following post weld heat treatment:
1 hour at 505°C,
quench,
followed by 16 hours at 200°C.

MACHINING

ELEKTRON EQ21 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	$3.7 mg/cm^2/day$
	285mpy

AMBIENT TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

0.2% Proof stress	195 MPa
Tensile strength	261 MPa
Elongation	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}	16.4 MPa $m^{1/2}$

FATIGUE PROPERTIES

Rotating bend fatigue test

Endurance Limit MPa	Stress Reversals $5x10^7$
Unnotched	100 - 110
Notched	60 - 70

ELEVATED TEMPERATURE MECHANICAL PROPERTIES

TYPICAL TENSILE PROPERTIES

	0.2% Proof stress (MPa)	Tensile strength (MPa)	Elongation (%)
100°C	189	230	10.0
150°C	180	211	16.0
200°C	170	191	16.0
250°C	152	169	15.0

CREEP STRENGTH

Stress (MPa) to produce specific creep strains

	Hours	0.1%	0.2%	0.3%
150°C	10	149	-	-
	100	138	155	-
	500	128	140	155
	1000	123	134	152
200°C	10	109	-	-
	100	78	95	116
	500	57	73	88
	1000	-	62	76
250°C	10	46	-	-
	100	29	36	42
	500	17	24	29
	1000	-	19	24

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