

Elektron[®] 21 Direct Chill Strand Cast

Elektron 21 Direct Chill Strand Cast is the latest high-performance magnesium alloy specifically developed for demanding aerospace applications.

It is designed to provide superior mechanical properties and improved corrosion resistance with an operating temperature up to 200 °C.

Applications

Elektron 21 is the material of choice for transmission housings for commercial and military helicopters.

It is also a perfect fit for aircraft engine parts such as gearbox housings and covers, electronics casings.

Specifications

AMS	4431
UNS	M12310
ASTM	B80
ISO 16220	MC65410

Chemical composition

Zinc	0.2–0.5%
Neodymium	2.6–3.1%
Gadolinium	1.0–1.7%
Zirconium	0.4–1%
Magnesium	Balance

Quality control

Our material is selected internally using ultrasonic testing according to the AMS 2154A class AA.

100% of our materials go through a radiography inspection in a NADCAP facility to meet the AMS 2175A Grade B.

Physical properties⁽¹⁾

Specific gravity	1.82
Coefficient of thermal expansion	26.3 x 10 ⁻⁶ K ⁻¹
Specific heat	1086 J/kg-K
Electrical resistivity	94.6 nΩm
Modulus of elasticity	44.8 x 10 ³ MPa
Poisson's ratio	0.27
Melting range	545 °C–640 °C
Brinell hardness	65–75
Thermal Conductivity at different temperatures in Table 1.	

Design data

Minimum specification (A basis statistical):	
0.2% proof stress	145 MPa
Tensile strength	248 MPa
Elongation	3%
Corrosion resistance (ASTM B117)	40 mpy
	0.51 mg/cm ² /day

Table 1.

Temperature / °C	Thermal Diffusivity /mm ² /s	Specific Heat /J/(gK)	Thermal Conductivity /W/(mK)
25	45.79	0.98	80
100	49.24	1.02	90
150	51.04	1.05	95
200	51.92	1.07	99
250	51.70	1.10	101

Available dimensions

Rounds/Billets up to 225 mm diameter by 1,000 mm in length.

Rectangle/Slabs up to 250 mm by 700 mm by 1,000 mm in length.

Bigger sizes could be made upon special request.

Heat treatment

Castings are given a T6 heat treatment to obtain optimum mechanical properties.

Machining

Elektron 21 Direct Chill Strand Cast can be machined faster than any other metal and save precious time and reduce cost.

Please contact us for additional information on machining best practices for magnesium alloys.

Surface treatment

Standard conversion coatings, anodising and Plasma Electrolytic Oxidation (PEO) systems can be applied as a pre-treatment before primer and paints.

Flammability

Elektron 21 shows superior fire resistance compared to traditional magnesium alloys. Elektron 21 has demonstrated equivalent level of safety to Aluminium alloys (baseline) in aircraft passenger cabin occupancy.

It passes the following FAA/EASA Fire Tests:

- Oil Burner Flammability Test for Magnesium Alloy Seat Structure Chapter 25

Typical tensile properties at room temperature design data

Table 2.

0.2% proof of stress	160 MPa
Tensile strength	295 MPa
Elongation	7%
Corrosion resistance (ASTM B117)	13 mpy 0.16 mg/cm ² /day

Elevated temperature mechanical properties⁽¹⁾

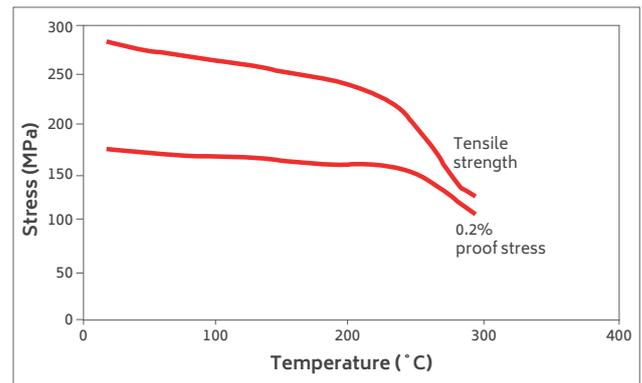


Figure 1. Effect of temperature on tensile properties.

Table 3. Room temperature tensile properties after long term heat exposure – Minimum of 3 test bars at each test condition.

Property	Room temperature tensile properties:		
	Initial	After 1,000 hrs @ 200 °C	After 3,000 hrs @ 200 °C
0.2% yield strength (MPa)	174	159	151
UTS (MPa)	295	266	250
Elongation (%)	5.5	6.3	6.3

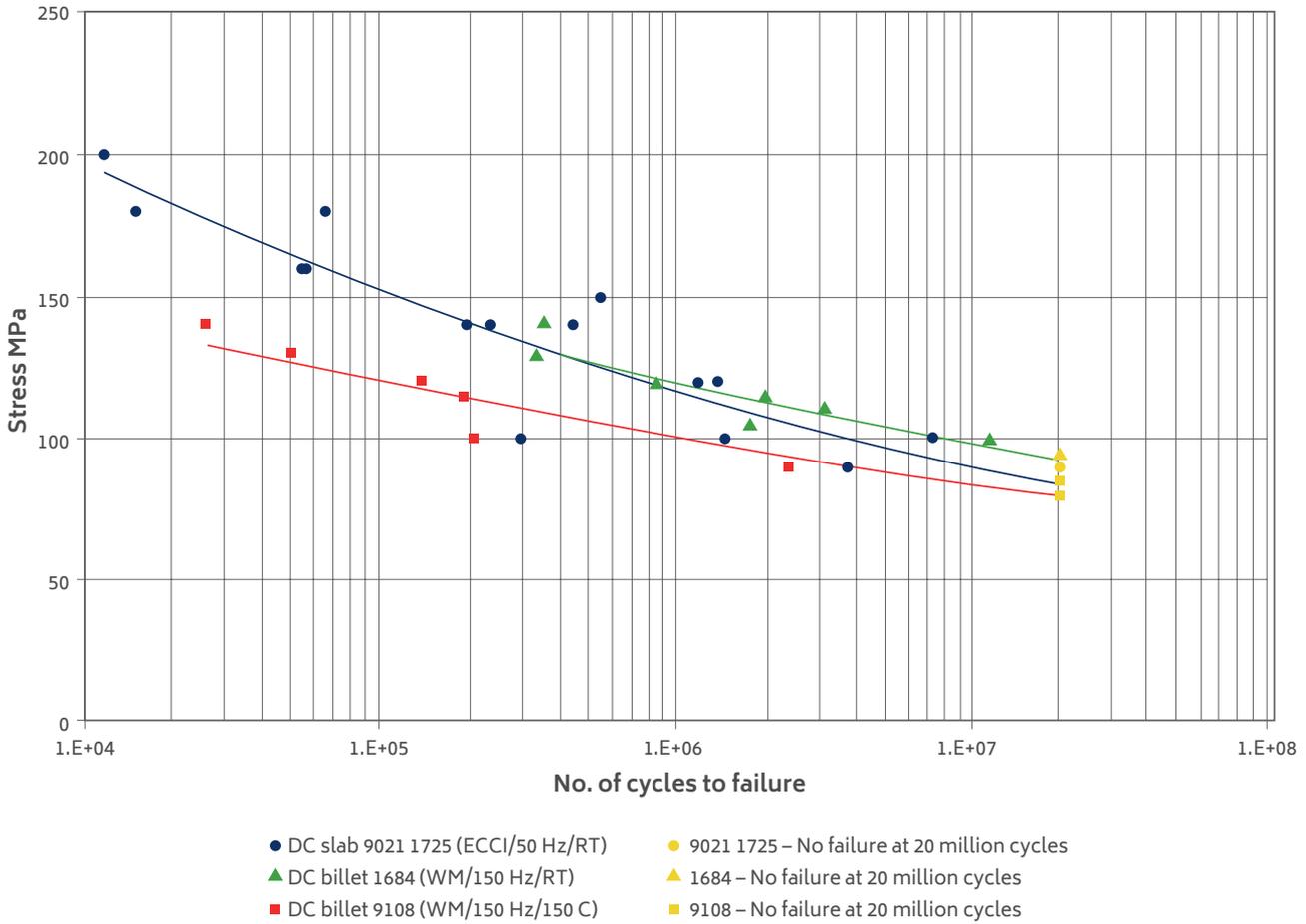


Figure 2. Fatigue curves for DC cast Elektron 21, tested at room and elevated temperature at rotating frequencies 50 Hz and 150 Hz adjusted to a run out of 20 million cycles.

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† The information contained within is meant as a guideline only.
 (a) Information taken from the sand cast version of Elektron 21 and considered to be equivalent for the Direct Chill Strand cast version.

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