ELEKTRON AZ31B SHEET, PLATE & COIL

AZ31B is a wrought magnesium base alloy with good room-temperature strength and ductility combined with corrosion resistance and weldability. Increased strength is obtained by strain hardening with a subsequent partial anneal (H24 and H26 tempers).

APPLICATIONS

Sheet and plate in AZ31B find application in medium strength service at temperatures below 150°C. Diverse uses including aircraft fuselage, concrete tools, cell phone/camera/notebook computer cases, speaker cones and textile machinery can all benefit from light weight AZ31B.

AZ31B is non-magnetic and has high electrical and thermal conductivity filling the requirements for RFI and EMI shielding in the electronics and computer industries.

Superplastic forming of AZ31B sheet at elevated temperatures allows production of a wide variety of intricate parts for automotive uses. Monocoque construction utilizing formed sheet can be adapted to many commercial applications.

SPECIFICATIONS

- UNS No. M11311
- AMS 4375
- AMS 4376
- AMS 4377
- AMS 4382
- ASTM B90

CHEMICAL COMPOSITION

Aluminum 2.5-3.5%

Zinc 0.7-1.3%

Manganese 0.20-1.0%

Magnesium Balance

PHYSICAL PROPERTIES

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

HEAT TREATMENT

No thermal treatment is available for increasing the strength of this alloy after fabrication.

DESIGN DATA

Specification minimum tensile properties.

AZ31B-O 0.5-1.5mm

0.2% Proof Stress	125MPa
Tensile Strength	220MPa
Elongation in $5.65\sqrt{A}$	10%

AZ31B-O 1.5-6.3mm

0.2% Proof Stress	105MPa
Tensile Strength	220MPa
Elongation in $5.65\sqrt{A}$	10%

AZ31B-O 6.3-75mm

0.2% Proof Stress	105MPa
Tensile Strength	220MPa
Elongation in $5.65\sqrt{A}$	8%

AZ31B-H24 0.5-6.3mm

0.2% Proof Stress	200MPa
Tensile Strength	270MPa
Elongation in $5.65\sqrt{A}$	5%

AZ31B-H24 6.3-9.5mm

0.2% Proof Stress	180MPa
Tensile Strength	260MPa
Elongation in 5.65√A	7%

AZ31B-H24 9.5-12.7mm

0.2% Proof Stress	165MPa
Tensile Strength	255MPa
Elongation in 5.65√A	7%

AZ31B-H24 12.7-25mm

0.2% Proof Stress	150MPa
Tensile Strength	245MPa
Elongation in 5.65√A	7%

AZ31B-H24 25-50mm

0.2% Proof Stress	135MPa
Tensile Strength	235MPa
Elongation in 5.65√A	7%

AZ31B-H24 50-75mm

0.2% Proof Stress	125MPa
Tensile Strength	235MPa
Elongation in 5.65√A	7%

AZ31B-H26 6.3-12.7mm

0.2% Proof Stress	180MPa
Tensile Strength	260MPa
Elongation in 5.65√A	5%

AZ31B-H26 12.7-25mm

0.2% Proof Stress	160MPa
Tensile Strength	255MPa
Elongation in 5.65√A	5%

AZ31B-H26 25-50mm

0.2% Proof Stress	145MPa
Tensile Strength	240MPa
Elongation in 5.65√A	5%

OTHER PROPERTIES

TYPICAL HARDNESS

O temper	67 Rockwell E
H24 temper	83 Rockwell E

WELDABILITY

Excellent weldability with gasshielded arc using AZ61A (preferred) or AZ92A filler rod; post weld stress relief is required to prevent stress corrosion cracking. Resistance welding is excellent.

MACHINING

AZ31B, like all magnesium alloy sheet and 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.

DENT RESISTANCE

Weight for weight, AZ31B-H24 has proven to be superior to competitive materials in its resistance to denting at moderate energy levels.

Dent Resistance of 1mm Gauge Sheet

Dent depth in mm from 25mm spherical radius indentor on 350mm span

	Impact Energy 0.34 J	Impact Energy 0.62 J	Impact Energy 1.25 J
AZ31B-H24	0.66	1.42	2.34
6061-T6	0.94	1.52	2.46
3003-H14	2.24	3.23	4.90
5052-H34	1.55	2.41	3.35
2024-T6	0.99	1.52	2.29
SAE 1010 Mild Steel	1.09	1.70	2.67

SURFACE TREATMENT

All the normal chromating, anodizing, plating, and finishing treatments are readily applicable. AZ31B also responds well to plasma electrolytic oxidation finishing.

CORROSION RESISTANCE

Continuous exposure for 2.5 years

Marine Atmosphere

AZ31B-H24	0.008 mg·cm^{-2}d^{-1}
Mild steel	0.323 mg·cm^{-2}d^{-1}

Industrial Atmosphere

AZ31B-H24	0.013 mg·cm^{-2}d^{-1}
Mild steel	0.055 mg·cm^{-2}d^{-1}

Rural Atmosphere

AZ31B-H24	0.006 mg·cm^{-2}d^{-1}
Mild steel	0.032 mg·cm^{-2}d^{-1}

AMBIENT TEMPERATURE MECHANICAL PROPERTIES FOR H24 TEMPER

TYPICAL TENSILE PROPERTIES 0.5-6mm

0.2% Proof stress	220 MPa
Tensile strength	290 MPa
Elongation in 5.65√A	13%

TYPICAL TENSILE PROPERTIES 6-10mm

0.2% Proof stress	200 MPa
Tensile strength	275 MPa
Elongation in 5.65√A	15%

TYPICAL TENSILE PROPERTIES 10-25mm

0.2% Proof stress	175 MPa
Tensile strength	265MPa
Elongation in 5.65√A	16%

TYPICAL TENSILE PROPERTIES 25-75mm

0.2% Proof stress	150 MPa
Tensile strength	255 MPa
Elongation in 5.65√A	13%

TYPICAL COMPRESSIVE PROPERTIES

0.2% Proof stress 0.5-6mm	180 MPa
0.2% Proof stress 6-10mm	160 MPa
0.2% Proof stress 10-25mm	120 MPa
0.2% Proof stress 25-50mm	95 MPa
0.2% Proof stress 50-75mm	85 MPa

TYPICAL SHEAR PROPERTIES

Ultimate stress 0.5-6mm	200 MPa
Ultimate stress 6-10mm	195 MPa
Ultimate stress 10-75mm	180 MPa

FRACTURE TOUGHNESS

K_IC 28 MPa√m

FATIGUE PROPERTIES

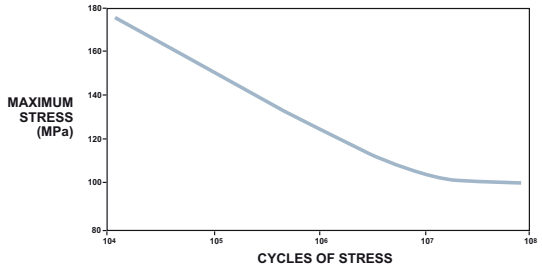

Figure 1. Cantilever bending fatigue test

ELEVATED TEMPERATURE MECHANICAL PROPERTIES FOR H24 TEMPER

TYPICAL TENSILE PROPERTIES

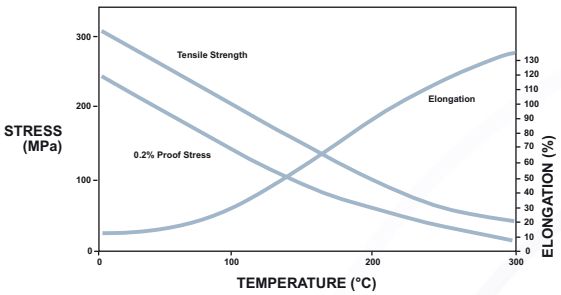

Figure 2. Effect of temperature on tensile properties

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CREEP PROPERTIES

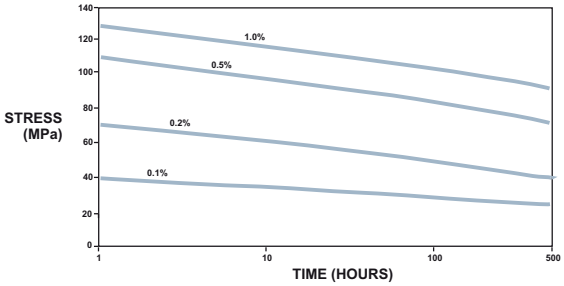

Figure 3. Stress/time relationship for specified creep at 100°C

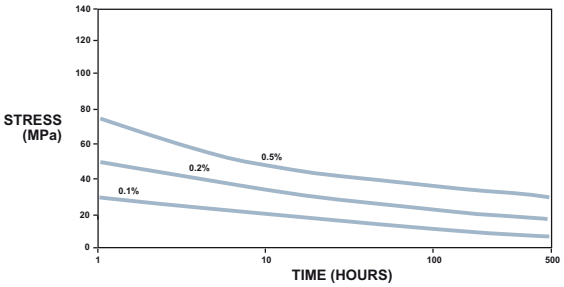

Figure 4. Stress/time relationship for specified creep at 150°C

†The information contained within is meant as a guideline only

Certificate No. FM12677

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