



# Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

# Elektron Wrought Alloys

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# Elektron Wrought Alloys

Typical Chemical Composition – Major Alloying Elements %	ELEKTRON Alloy	Tensile Properties <sup>B</sup>			Compressive Properties		Fatigue Properties <sup>D</sup>		Hardness	Description
		0.2% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation <sup>C</sup> (%)	0.2% Proof Stress (MPa)	Compressive Strength (MPa)	Unnotched (MPa)	Notched (MPa)		
Y 5.25 Nd 3.5 <sup>A</sup> Zr 0.5	WE54 Extruded bars and sections Precipitation treated Fully heat treated Forgings <sup>E</sup> Precipitation treated Fully heat treated	(180) (160)	(280) (250)	(6) (6)	- -	- -	- -	- -	75–95 75–95	High strength at elevated temperatures particularly in the fully heat treated condition.
Y 4.0 Nd 3.0 <sup>A</sup> Zr 0.5	WE43 Extruded bars Precipitation treated Fully heat treated Forgings <sup>E</sup> Precipitation treated Fully heat treated	(160) (130)	(245) (230)	(6) (7)	- -	- -	- -	- -	75–95 75–95	High strength aerospace alloy at elevated temperatures particularly in the fully heat treated condition.
Zn 3.0 Zr 0.6	ZW3 Extruded bars & sections 0–10 mm 10–100 mm Extruded forging stock 0–10 mm 10–100 mm Forgings <sup>E</sup>	200 225	280 305	8 8	- 200–250	- 385–465	- 110–135	- 85–95	65–75 65–75	High strength extrusion and forging alloy. Weldable under good conditions.
Al 6.0 Zn 1.0 Mn 0.3	AZM Extruded bars & sections & extruded forging stock 0–75 mm 75–150 mm Extruded tube Forgings <sup>E</sup>	180 160 150 160	270 250 260 275	8 7 7 7	130–180 115–165 130–180 130–165	370–420 340–400 -	125–135 -	90–95 -	60–70 55–65 60–70 60–70	General purpose alloy. Gas and arc weldable.
Al 8.5 Zn 0.5 Mn 0.12 min	AZ80 Extrusions Precipitation treated 0–6.3mm 6.3–60mm 60–130mm Forgings <sup>E</sup> Precipitation treated	205 230 205	325 330 310	4 3 1	- -	- -	- -	- -	60	High strength alloy for extrusions and forgings of simple design.
Al 3.0 Zn 1.0 Mn 0.3	AZ31 Sheet – soft - stabilized half hard Plate - stabilized half hard 6–25mm 25–75mm Extruded bars & sections & tubes 0–10mm 10–75mm	105–125 200	220 270	11 5	85 165	- -	- -	- -	50–65 -	Medium strength sheet and extrusion alloy. Good formability Weldable.
Al 3.0 Zn 1.0	Tooling Plate 6–150mm	(100)	(200)	(8)	-	-	-	-	-	
Zn 2.0 Mn 1.0	ZM21 Sheet – soft - half hard Plate 6–25 mm Extruded bars, sections & tubes 10 mm 10–75 mm Forgings <sup>E</sup>	(120) 165	220–265 250	10–12 5–8	- -	- -	- -	- -	- -	Medium strength sheet and extrusion alloy, easily formed. Fully weldable by argon arc process.
Zn 6.0 Zr 0.6	ZK60 Die Forgings <sup>E</sup> Precipitated treated Extruded bars & sections up to 1300mm <sup>2</sup> over 1300 to 1900mm <sup>2</sup> over 1900 to 3200mm <sup>2</sup> over 3200 to 6400mm <sup>2</sup> over 6400 to 16100mm <sup>2</sup> over 16100 to 25800mm <sup>2</sup>	180	290	6	-	-	-	-	-	High strength allow for forgings and extrusions

Approximate conversion factors 1 MPa=0.065 T.S.I.=0.145 K.S.I. Larger sizes than those shown above are available: when required, property levels will be by agreement.

- A. Includes primary neodymium with other heavy rare earths
- B. The tensile properties quoted are the specification minima for the first specification listed for that alloy and condition. Where a range is quoted the specification requirements depend on product thickness. Bracketed values are for information only.
- C. Elongation values are based on a gauge length of 5.65 √A, except in case of thin material where a gauge length of 50 mm may be used (see B.S. 2 L.500, 3370 and 3373). With the latter gauge length, elongation requirements for sheet and plate depend on thickness and a range of minima is quoted.
- D. Endurance values for 50x10<sup>6</sup> reversals in rotating bending-type tests; semi circular notch, radius 1.2mm; S.C.F. approx. 2.
- E. Forging properties quoted are those in the most favourable direction of flow; the manufacturer should be consulted on directionality.

# Magnesium Alloy Specifications

ELEKTRON Alloy Designation product form and condition	BRITISH		AMERICAN				GERMAN		FRENCH			EUROPEAN
	B.S. Series		ASTM Alloy Designation & Temper	ASTM	Federal	AMS	Aircraft Number	DIN 9715 Number	Commercial Designation	Air 9052	AFNOR	AECMA
	Aircraft	General Engineering										
WE54 Extruded bars & sections Forgings	-	-	WE54A-T6	-	-	-	-	-	-	-	-	-
	-	-	WE54A-T6	-	-	-	-	-	-	-	-	-
WE43 Extruded bars & sections Forgings	-	-	WE43A-T6	-	-	-	-	-	-	-	-	-
	-	-	WE43A-T6	-	-	-	-	-	-	-	-	-
ZW3 Extruded bars & sections & forging stock Forgings	2 L.505 & L.514	3373 MAG-E-151M	-	-	-	-	-	-	-	-	-	MG-P-43
	L.514	3372 MAG-E-151M	-	-	-	-	-	-	-	-	-	MG-P-43
AZM Extruded bars & sections & forging stock Extruded tube Forgings	L.512 & L.513	3373 MAG-E-121M	AZ61A-F	B107	QQ-M-31B	4350	W.3510	3.5612	M1	G-A6Z1	G-A6Z1	MG-P-63
	2 L.503 L.513	3373 MAG-E-121M 3372 MAG-E-121M	AZ61A-F AZ61A-F	B107 B91	WW-T-825B QQ-M-40B	- -	W.3510 -	3.5612 3.5612	M1 M1	G-A6Z1 G-A6Z1	G-A6Z1 G-A6Z1	MG-P-63 MG-P-63
AZ80 Extruded bars & sections Precipitation treated As-extruded Forgings Precipitation treated As-forged	-	-	AZ80A-T5	B107	QQ-M-31B	-	-	-	-	-	-	-
	-	-	AZ80A-F	B91	QQ-M-31B	-	-	-	-	-	-	-
	-	-	AZ80A-T5	B91	QQ-M-40B	4360	W.3515	3.5812	-	G-A7Z1	-	MG-P-61
	-	-	AZ80A-F	B91	QQ-M-40B	-	-	-	-	-	-	-
AZ31 Sheet - soft Sheet - half hard Plate - soft Plate - half hard Plate - three quarters hard Plate - extra flat Extruded bars & sections	-	3370 MAG-S-1110	AZ31B-O	B90	QQ-M-44B	4375	W.3504	3.5312	F3	G-A3Z1	G-A3Z1	MG-P-62
	-	-	AZ31B-H24	B90	QQ-M-44B	4377	-	-	-	-	-	-
	-	-	AZ31B-O	B90	QQ-M-44B	4375	-	-	-	-	-	-
	-	-	AZ31B-H24	B90	QQ-M-44B	4377	-	-	-	-	-	-
	-	-	AZ31B-H26	B90	QQ-M-44B	4376	-	-	-	-	-	-
	-	-	AZ31B-O	-	-	4382	-	-	-	-	-	-
	-	3373 MAG-E-111M	AZ31B-F	B107	QQ-M-31B	-	-	3.5312	F3	G-A3Z1	G-A3Z1	MG-P-62
	-	-	-	-	-	-	-	-	-	-	-	-
ZM21 Sheet - soft - half hard Plate Extruded bars, sections & tubes Forgings	-	3370 MAG-S-1310	-	-	-	-	-	-	-	-	-	-
	-	3370 MAG-S-131M	-	-	-	-	-	-	-	-	-	-
	-	3370 MAG-S-131M	-	-	-	-	-	-	-	-	-	-
	-	3373 MAG-E-131M	-	-	-	-	-	-	-	-	-	-
ZK60 Extruded bars & sections Precipitation treated As-extruded Forgings Precipitation treated As-forged	-	-	ZK60A-T5	B107	QQ-M-31B	4352	-	-	-	-	-	-
	-	-	ZK60A-F	B107	QQ-M-31B	-	-	-	-	-	-	-
	-	-	ZK60A-T5	B91	QQ-M-40B	4362	-	-	-	-	-	-
	-	-	ZK60A-F	B91	QQ-M-40B	-	-	-	-	-	-	-

# Physical Properties of Magnesium Wrought Alloys

Alloy	Specific gravity (20°C)	Coefficient of thermal expansion $10^{-6} \text{ K}^{-1}$ (20–200°C)	Thermal conductivity $\text{Wm}^{-1} \text{ K}^{-1}$ (20°C)	Electrical resistivity $\text{n}\Omega\text{m}$ (20°C)	Specific heat $\text{Jkg}^{-1} \text{ K}^{-1}$ (20–100°C)
WE54	1.85	24.6	52	173	960
WE43	1.84	26.7	51	148	966
ZC71	1.87	26.0	123	54	960
ZW3	1.80	27.1	125	70	960
AZM	1.80	27.3	79	143	1000
AZ80	1.80	26.0	78	145	1050
AZ31	1.77	26.0	96	100	1040
ZM21	1.78	26.0	125	70	1040
ZK60	1.83	27.1	121	57	990



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