



Elektron Wrought Alloys

Typical chemical composition – major alloying elements %	Elektron alloy	Tensile properties ^a			Compressive properties		Fatigue properties ^d		Hardness	Description
		0.2% proof stress (MPa)	Tensile strength (MPa)	Elongation ^c (%)	0.2% proof stress (MPa)	Compressive strength (MPa)	Unnotched (MPa)	Notched (MPa)	v.p.n.	
Y 5.25 Nd 3.5 ^A Zr 0.5	WE54 Extruded bars and sections									High strength at elevated temperatures particularly in the fully heat treated condition.
	Precipitation treated Fully heat treated	(180) (160)	(280) (250)	(6) (6)	– –	– –	– –	– –	75–95 75–95	
	Forgings ^e									
	Precipitation treated Fully heat treated	(165) (170)	(310) (260)	(4) (6)	– –	– –	– –	– –	– –	
Y 4.0 Nd 3.0 ^A Zr 0.5	WE43 Extruded bars									High strength aerospace alloy at elevated temperatures particularly in the fully heat treated condition.
	Precipitation treated Fully heat treated	(160) (130)	(245) (230)	(6) (7)	– –	– –	– –	– –	75–95 75–95	
	Forgings ^e									
	Precipitation treated Fully heat treated	(155) (165)	(285) (265)	(6) (6)	– –	– –	– –	– –	– –	
Zn 3.0 Zr 0.6	ZW3 Extruded bars and sections									High strength extrusion and forging alloy. Weldable under good conditions.
	0–10 mm	200	280	8	–	–	–	–	65–75	
	10–100 mm	225	305	8	200–250	385–465	110–135	85–95	65–75	
	Extruded forging stock									
	0–10 mm	195	280	8	–	–	–	–	65–75	
	10–100 mm	205	290	8	–	–	–	–	65–75	
	Forgings ^e	205	290	7	165–215	370–440	–	–	60–80	
Al 6.0 Zn 1.0 Mn 0.3	AZM Extruded bars and sections and extruded forging stock									General purpose alloy. Gas and arc weldable.
	0–75 mm	180	270	8	130–180	370–420	125–135	90–95	60–70	
	75–150 mm	160	250	7	115–165	340–400	–	–	55–65	
	Extruded tube	150	260	7	130–180	–	–	–	60–70	
	Forgings ^e	160	275	7	130–165	340–400	115–125	80–90	60–70	
Al 8.5 Zn 0.5 Mn 0.12 min	AZ80 Extrusions									High strength alloy for extrusions and forgings of simple design.
	Precipitation treated									
	0–6.3 mm	205	325	4	–	–	–	–		
	6.3–60 mm	230	330	3	–	–	–	–		
	60–130 mm	205	310	1	–	–	–	–		
	Forgings ^e									
	Precipitation treated	200	290	6	–	–	–	–	60	
Al 3.0 Zn 1.0 Mn 0.3	AZ31 Sheet – soft	105–125	220	11	85	–	–	–	50–65	Medium strength sheet and extrusion alloy. Good formability Weldable.
	– stabilized half hard	200	270	5	165	–	–	–	–	
	Plate – stabilized half hard									
	6–25 mm	150–180	250–260	7	165	–	–	–	–	
	25–75 mm	125–135								
	Extruded bars, sections and tubes									
	0–10 mm	150	230	8	–	–	–	–	50–65	
	10–75 mm	160	245	10	–	–	–	–	50–60	
Al 3.0 Zn 1.0	Tooling Plate									
	6–150 mm	(100)	(200)	(8)	–	–	–	–	–	
Zn 2.0 Mn 1.0	ZM21 Sheet – soft	(120)	220–265	10–12	–	–	–	–	–	Medium strength sheet and extrusion alloy, easily formed. Fully weldable by argon arc process.
	– half hard	165	250	5–8	–	–	–	–	–	
	Plate									
	6–25 mm	(120)	220	8–10	–	–	–	–	–	
	Extruded bars, sections and tubes									
	10 mm	150	230	8	–	–	–	–	50–65	
	10–75 mm	160	245	10	–	–	–	–	50–60	
	Forgings ^e	125	200	9	–	–	–	–	–	
Zn 6.0 Zr 0.6	ZK60 Die Forgings									High strength allow for forgings and extrusions.
	Precipitated treated	180	290	6	–	–	–	–	–	
	Extruded bars and sections up to 1300 mm ²	250	310	3	205	–	–	–	–	
	over 1300 to 1900 mm ²	250	310	3	195	–	–	–	–	
	over 1900 to 3200 mm ²	250	310	3	170	–	–	–	–	
	over 3200 to 6400 mm ²	235	310	5	160	–	–	–	–	
	over 6400 to 16100 mm ²	235	310	5	150	–	–	–	–	
over 16100 to 25800 mm ²	215	295	5	140	–	–	–	–		

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 50 x10⁶ reversals in rotating bending-type tests; semi circular notch, radius 1.2 mm; 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 and temper	ASTM	Federal	AMS	Aircraft number	DIN 9715 number	Commercial designation	Air 9052	AFNOR	AECMA
	Aircraft	General engineering										
WE54 Extruded bars and sections Forgings	-	-	WE54A-T6	-	-	-	-	-	-	-	-	-
WE43 Extruded bars and sections Forgings	-	-	WE43A-T6	-	-	-	-	-	-	-	-	-
ZW3 Extruded bars and sections and forging stock Forgings	2 L.505 & L.514	3373 MAG-E-151M	-	-	-	-	-	-	-	-	-	MG-P-43
AZM Extruded bars and sections and 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
AZ80 Extruded bars and sections Precipitation treated As-extruded Forgings	-	-	AZ80A-T5 AZ80A-F	B107 B91	QQ-M-31B QQ-M-31B	-	-	-	-	-	-	-
AZ80 Extruded bars and sections Precipitation treated As-forged	-	-	AZ80A-T5 AZ80A-F	B91 B91	QQ-M-40B QQ-M-40B	4360	W.3515	3.5812	-	G-A7Z1	-	MG-P-61
AZ31 Sheet – soft	-	3370 MAG-S-1110	AZ31B-O	B90	QQ-M-44B	4375	W.3504	3.5312	F3	G-A3Z1	G-A3Z1	MG-P-62
Sheet – half hard	-	-	AZ31B-H24	B90	QQ-M-44B	4377	-	-	-	-	-	-
Plate – soft	-	-	AZ31B-O	B90	QQ-M-44B	4375	-	-	-	-	-	-
Plate – half hard	-	-	AZ31B-H24	B90	QQ-M-44B	4377	-	-	-	-	-	-
Plate – three quarters hard	-	-	AZ31B-H26	B90	QQ-M-44B	4376	-	-	-	-	-	-
Plate – extra flat	-	-	AZ31B-O	-	-	4382	-	-	-	-	-	-
Extruded bars and sections	-	3373 MAG-E-111M	AZ31B-F	B107	QQ-M-31B	-	-	3.5312	F3	G-A3Z1	G-A3Z1	MG-P-62
ZM21 Sheet – soft	-	3370 MAG-S-1310	-	-	-	-	-	-	-	-	-	-
– half hard	-	3370 MAG-S-131M	-	-	-	-	-	-	-	-	-	-
Plate	-	3370 MAG-S-131M	-	-	-	-	-	-	-	-	-	-
Extruded bars, sections and tubes	-	3373 MAG-E-131M	-	-	-	-	-	-	-	-	-	-
Forgings	-	3372 MAG-F-131M	-	-	-	-	-	-	-	-	-	-
ZK60 Extruded bars, sections and tubes	-	-	ZK60A-T5	B107	QQ-M-31B	4352	-	-	-	-	-	-
Precipitation treated As-extruded	-	-	ZK60A-F	B107	QQ-M-31B	-	-	-	-	-	-	-
Forgings	-	-	ZK60A-T5	B91	QQ-M-40B	4362	-	-	-	-	-	-
Precipitation treated As-forged	-	-	ZK60A-F	B91	QQ-M-40B	-	-	-	-	-	-	-

Physical properties of magnesium wrought alloys

Alloy	Specific gravity (20°C)	Coefficient of thermal expansion 10 ⁻⁶ K ⁻¹ (20–200°C)	Thermal conductivity Wm ⁻¹ K ⁻¹ (20°C)	Electrical resistivity nΩm (20°C)	Specific heat Jkg ⁻¹ 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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