



Magnesium Elektron

SERVICE & INNOVATION IN MAGNESIUM

Magnesium Casting Alloys

Datasheet : 440

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Magnesium Casting Alloys

Typical Chemical Composition – Major Alloying Elements %	Magnesium Alloy	Tensile Properties ¹			Compressive Properties		Fatigue Properties ³		Hardness	Description
		0.2% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation ² (%)	0.2% Proof Stress (MPa)	Ultimate Strength (MPa)	Unnotched (MPa)	Notched (MPa)	v.p.n.	
Y 5.25 Nd and other heavy rare earth metals 3.5 Zr 0.5	ELEKTRON WE54 Solution and precipitation treated Sand cast Chill cast	185 185	255 255	2 2	167–175 -	410 -	95–100 -	- -	90–105 -	High strength at elevated temperatures.
Y 4.0 Nd and other heavy rare earth metals 3.0 Zr 0.5	ELEKTRON WE43 Solution and precipitation treated Sand cast Chill cast	172 172	220 220	2 2	187 -	323 -	85 -	- -	85–105	Excellent retention of strength after long exposure at 250°C. Good castability, weldable.
Nd 2.7 Gd 1.3 Zn 0.3 Zr 0.6	ELEKTRON 21 Solution and precipitation treated Sand cast	145	248	2	(156)	(348)	(115–120)	-	(70–80)	High strength alloy. Good corrosion resistance, good castability.
Rare earth metals 3.0 Zn 2.5 Zr 0.6	ELEKTRON ZRE1 Precipitation treated Sand cast Chill cast	95 100	140 155	3 3	85–120 -	275–340 -	66–75 -	50–55 -	55–70 -	Creep-resistant up to 250°C. Excellent castability. Pressure tight and weldable.
Zn 4.2 Rare earth metals 1.3 Zr 0.7	ELEKTRON RZ5 Precipitation treated Sand cast Chill cast	135 135	200 215	3 4	130–150 -	330–365 -	90–105 -	75–90 -	60–80 -	Easily cast, weldable, pressure tight, with useful strength.
Ag 1.5 Nd rich rare earth metals 2.0 Zr 0.6 Cu 0.07	ELEKTRON EQ21 Solution and precipitation treated Sand cast Chill cast	175 185	240 240	2 2	165–200 -	310–385 -	100–110 -	60–70 -	80–105 -	Heat-treated alloys with high yield strength up to 200°C. Pressure tight and weldable.
Ag 2.5 Nd rich rare earth metals 2.5 Zr 0.6	ELEKTRON MSR-B Solution and precipitation treated Sand cast Chill cast	185 185	240 240	2 2	165–200 -	310–385 -	100–110 -	60–70 -	80–105 -	
Ag 2.5 Nd rich rare earth metals 2.0 Zr 0.6	ELEKTRON QE22 Solution and precipitation treated Sand cast Chill cast	175 175	240 240	2 2	165–200 -	310–385 -	100–110 -	60–70 -	80–105 -	
Al 8.0 Zn 0.5 Mn 0.3	ELEKTRON A8 As cast Sand cast Chill cast Solution treated Sand cast Chill cast	(85) (85) 80 80	140 185 200 230	2 4 7 10	75–90 -	280–340 -	75–85 -	58–65 -	55–70 -	General purpose alloy. Good founding properties. Good ductility, strength and shock resistance. Also available as a high purity grade.
Al 9.5 Zn 0.5 Mn 0.3	ELEKTRON AZ91 As cast Sand cast Chill cast Solution treated Sand cast Chill cast Solution and precipitation treated Sand cast Chill cast	(95) (100) 80 80 120 120	125 170 200 215 200 215	- 2 4 5 - 2	85–110 -	280–340 -	77–85 -	58–65 -	60–75 -	General purpose alloy. Good founding properties. Suitable for pressure die castings.
Al 9.0 Zn 0.5 Mn 0.3	AZ91D Die cast	160	230	3	160	-	100	-	-	
Al 5.0 Mn 0.5	AM50A Die cast	110	200	10	-	-	-	-	-	
Al 6.0 Mn 0.5	AM60B Die cast	130	220	8	-	-	-	-	-	

Approximate conversion factors 1 MPa=0.065 T.S.I.=0.145 K.S.I.

The tensile properties quoted are the specification minima for the first specification listed for that alloy and condition. The ranges given are the specified minima; bracketed values are for information only.

1. The values quoted are for separately cast test bars and may not be realised in certain portions of castings.
2. Elongation values are based on a gauge length of $5.65\sqrt{A}$, except in the 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.

3. Endurance values for 50×10^6 reversals in rotating bending-type tests; semi-circular notch, radius 1.2 mm, S.C.F. approx. 2.

Magnesium Casting Specifications

Physical Properties of Magnesium Casting Alloys

Magnesium Alloy	Specific gravity (20°C)	Coefficient of thermal expansion 10^{-6} 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)
ELEKTRON WE54	1.85	24.6	52	173	960
ELEKTRON WE43	1.84	26.7	51	148	966
ELEKTRON 21	1.82	26.7	86	94.6	997
ELEKTRON ZRE1	1.80	26.8	100	73	1050
ELEKTRON RZ5	1.84	27.1	109	68	960
ELEKTRON MSR-B	1.82	26.7	113	68	1000
ELEKTRON QE22	1.82	26.7	113	68	1000
ELEKTRON A8	1.81	27.2	84	134	1000
ELEKTRON AZ91	1.83	27.0	84	141	1000
ELEKTRON C	1.81	27.2	84	134	1000



Certificate No. FM12677

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