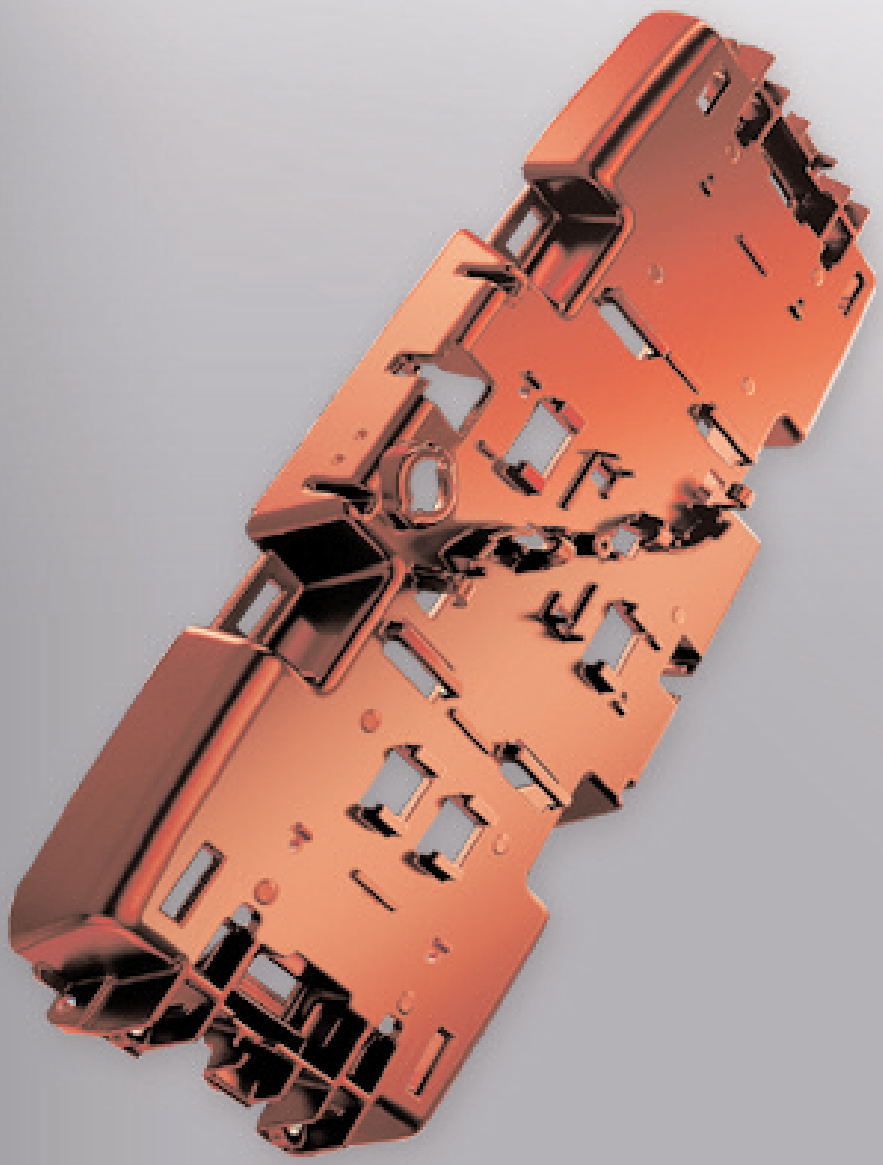
STIHL®

The material and its properties

Magnesium Diecasting



Magnesium alloys for diecasting make it possible to produce components with low weight at competitive manufacturing costs. Thin walls, dimensional accuracy, short casting cycles and a long die service life are typical advantages of magnesium diecastings. Further advantages include the excellent machinability, good attenuation and (EMI) shielding properties. High purity and advanced corrosion-proofing techniques allow our diecasting alloys to be used in corrosive environments, too.

EN-MB MgAl9Zn1(A) (AZ 91)

The most common diecasting alloy with outstanding casting properties and high mechanical strength. Typical applications: automotive parts, computer components, parts for mobile phones, sports equipment, covers and housings, components for chainsaws, manual tools, household appliances, etc.

EN-MB MgAl5Mn (AM 50) and EN-MB MgAl6Mn (AM 60)

This alloy is characterized by particularly high elongation and energy absorption with high mechanical strength and good casting properties. Typical applications are to be found in automotive engineering: seat frames, steering wheels, dashboard supports, fanwheels, etc.

EN-MB MgAl2Mn (AM 20)

High elongation combined with high impact strength is characteristic of this alloy. It is therefore typically used for safety components in motor vehicles.

Composition of pigs for diecasting magnesium

Alloy		% Al	% Mn	% Zn (max)	% Si (max)	% Cu (max)	% Ni (max)	% Fe (max)	Others max % each
EN-MB MgAl9Zn1(A)	EN-MB 21120	8.5-9.5	min. 0.17	0.45-0.90	0.05	0.025	0.001	0.004	0.01
EN-MB MgAl6Mn	EN-MB 21230	5.6-6.4	min. 0.23	max. 0.20	0.05	0.008	0.001	0.004	0.01
EN-MB MgAl5Mn	EN-MB 21220	4.5-5.3	min. 0.27	max. 0.20	0.05	0.008	0.001	0.004	0.01
EN-MB MgAl2Mn	EN-MB 21210	1.7-2.5	min. 0.35	max. 0.20	0.05	0.008	0.001	0.004	0.01

Diecast parts

Alloy		% Al	% Mn	% Zn (max)	% Si (max)	% Cu (max)	% Ni (max)	% Fe (max)	Others max % each
EN-MC MgAl9Zn1(A)	EN-MC 21120	8.3-9.7	min 0.10	0.35-1.00	0.10	0.030	0.002	0.005	0.01
EN-MC MgAl6Mn	EN-MC 21230	5.5-6.5	min 0.10	max. 0.20	0.10	0.010	0.002	0.005	0.01
EN-MC MgAl5Mn	EN-MC 21220	4.4-5.5	min 0.10	max. 0.20	0.10	0.010	0.002	0.005	0.01
EN-MC MgAl2Mn	EN-MC 21210	1.6-2.6	min 0.10	max. 0.20	0.10	0.010	0.002	0.005	0.01

Characteristic mechanical properties (at room temperature)

The values apply for test bars cast separately

Properties	Unit	EN-MC MgAl9Zn1(A) (AZ 91)	EN-MC MgAl6Mn (AM 60)	EN-MC MgAl5Mn (AM 50)	EN-MC MgAl2Mn (AM 20)
Tensile strength	N/mm^2	200 - 260	190 - 250	180 - 230	150 - 220
0.2 % proof stress	N/mm^2	140 - 170	120 - 150	110 - 130	80 - 100
Compression strength	N/mm^2	148	nm	113	74
Elongation at rupture	%	1 - 6	4 - 14	5 - 15	8 - 18
Modulus of elasticity	kN/mm^2	45	45	45	45
Shear modulus	kN/mm^2	17	nm	nm	nm
Brinell hardness	HBS 1/5	65 - 85	55 - 70	50 - 65	40 - 55
Impact strength acc. to Charpy, without notch	J	6	17	18	18

nm: not measured

The mechanical properties of an alloy depend very largely on the production method used and its variables.

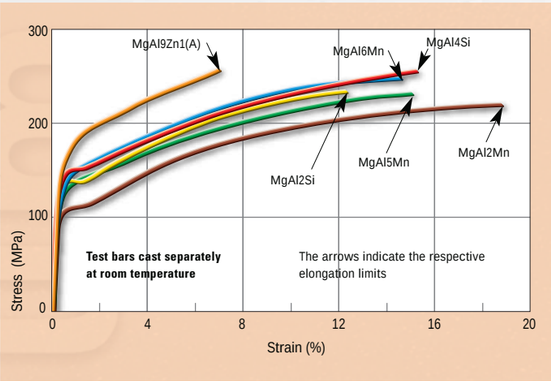
Characteristic physical properties

Properties	Unit	Temp.°C	EN-MC MgAl9Zn1(A) (AZ 91)	EN-MC MgAl6Mn (AM 60)	EN-MC MgAl5Mn (AM 50)	EN-MC MgAl2Mn (AM 20)
Density	g/cm^3	20	1.81	1.80	1.77	1.75
Liquidus temperature	°C		598	615	620	638
Initial melting temperature	°C		420-435	420-435	420-435	420-435
Coefficient of thermal expansion	µm/m·K	20-100	26.0	26.0	26.0	26.0
Heat of fusion	kJ/kg		370	370	370	370
Spec. thermal capacity	kJ/kg·K	20	1.02	1.02	1.02	1.02
Thermal conductivity	W/K·m	20	51	61	65	94
Electrical conductivity	MS/m	20	6.6	nm	9.1	13.1

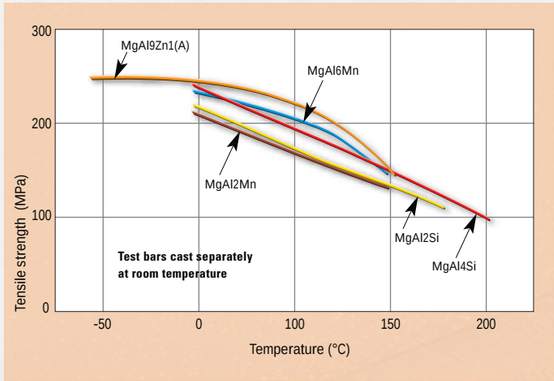
nm: not measured

The information and specifications can be found in: DIN EN 1753 and ASTM standards.
STIHL cannot accept any warranty or liability for the information contained in this brochure, which has been compiled to the best of our knowledge and belief.
Subject to printing errors.

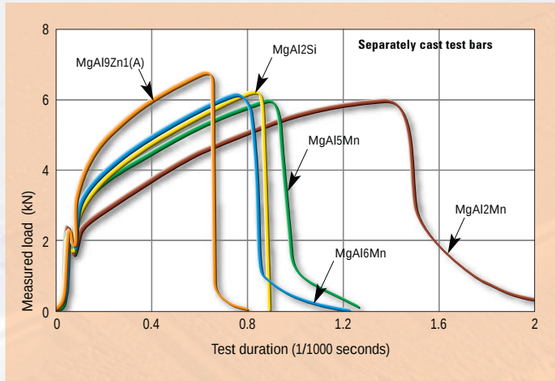
Stress-strain curves for diecasting magnesium alloys



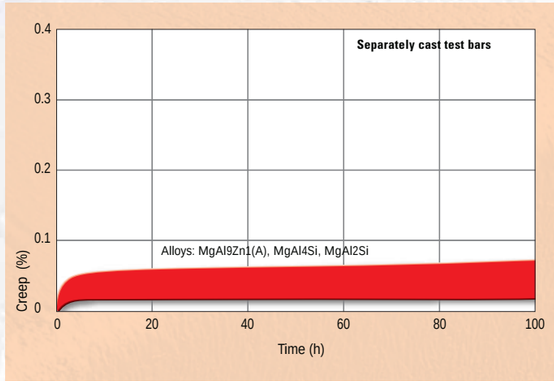
Tensile strength of diecasting magnesium alloys



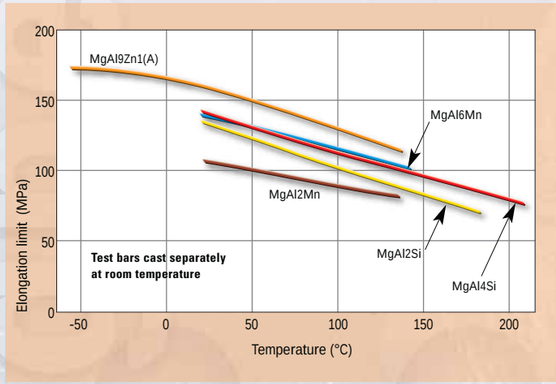
Impact test on test bars without notch at room temperature



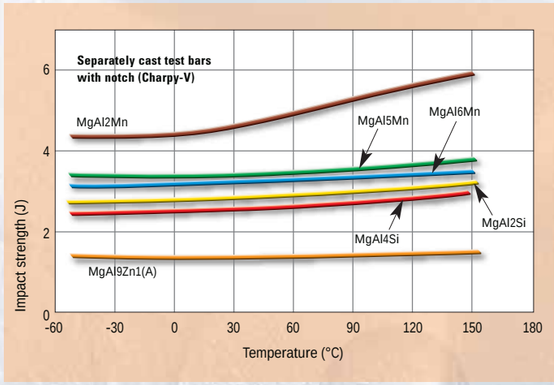
Creep of diecasting alloys at 100°C and 50 MPa



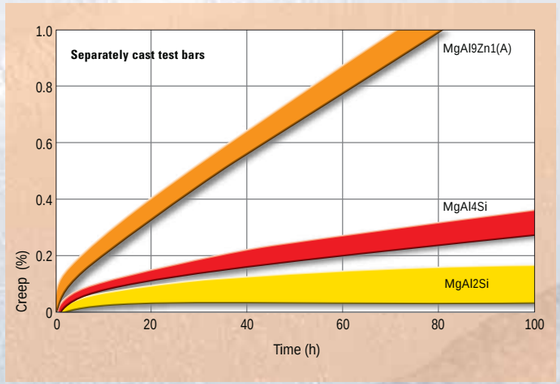
0.2 % proof stress of diecasting magnesium alloys



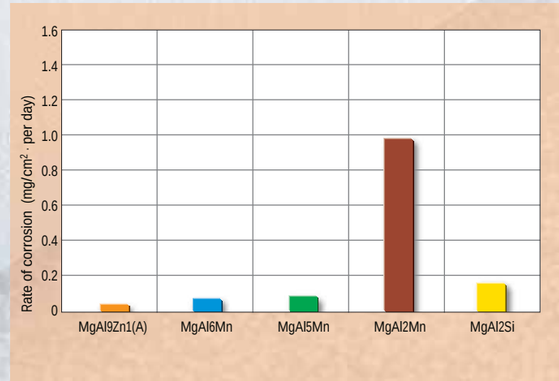
Impact strength of diecasting magnesium alloys



Creep of diecasting alloys at 150°C and 50 MPa



Salt spray test for corrosion resistance of diecasting alloys (ASTM B117)



Do you have more questions?

STIHL Magnesium Diecasting is your competent source of complete solutions cast-in-one.

ANDREAS STIHL AG & Co. KG
Andreas-Stihl-Straße
54595 Prüm-Weinsheim
Germany

You can contact us also by telephone

(Your contact person is Mrs. Richards-Hebben):

Phone: +49 (0) 65 51 13-4123

Fax: +49 (0) 65 51 13-1109

or you can write an email to: magnesium@stihl.de

ANDREAS STIHL AG & Co. KG
Badstraße 115
71336 Waiblingen
GERMANY