OTTO FUCHS

TECHNICAL INFORMATION
MATERIALS
MAGNESIUM



» LOW SPECIFIC WEIGHT
» GOOD HOT FORMABILITY
» LOW RESIDUAL STRESSES
» EXCELLENT MACHINABILITY

MAGNESIUM COMPONENTS FROM OTTO FUCHS

Wrought magnesium alloys are the ideal material for extremely light components.

The OTTO FUCHS magnesium production programme includes open-die and closed-die forgings weighing up to 300 kg. The largest projectable area is 20,000 cm^2, with a maximum length of 5,000 mm and a maximum width of 2,000 mm.

Furthermore, OTTO FUCHS uses magnesium to produce extruded profiles, bars with a diameter of up to 200 mm, tubes with a diameter of up to 220 mm, solid and hollow profiles as well as welding rods and wires up to 13 m in length.

ADVANTAGES OF MAGNESIUM

» low specific weight
» good hot formability
» low residual stresses
» excellent machinability

AREAS OF APPLICATION

» **Aerospace industry**
structural elements, gearbox housings, payload carrier profiles
» **Automotive and transport industry**
components for motor racing, wheels for racing motorbikes
» **Industrial technology**
components for textile and printing machines, compressors and pumps for rotors

COMPARISON OF STANDARDS

OTTO FUCHS Designation	Material Code	Aerospace WLB	USA Designation	USA ASTM	USA UNS No.	England BS	France AIR 9052	European AECMA
MA30	MgAl3Zn	–	AZ31C	B90, B107	M11312	MAG-E-111	–	–
MA39	MgAl3Zn	3.5314	AZ31B	B90, B91	M11311	MAG-E-111	G-A3 Z1	MG-P-62
MA64	MgAl6Zn	3.5614	AZ61A	B91, B107	M11610	MAG-E-121M	G-A6 Z1	MG-P-63
MA84	MgAl8Zn	3.5714	AZ80A		M11800	2L 121	(G-A7 Z1)	MG-P-61
ZK30 [1]	MgZn3Zr	–	ZK30		–	MAG-E-151	–	MG-P-43
ZK60 [1]	MgZn6Zr	–	ZK60A	B107, B275	M16600	MAG-E-161	–	–
WE43 [2]	–	–	WE43C		M18434	–	–	–
WE54 [2]	–	–	WE54		M18410	–	–	–

MECHANICAL PROPERTIES [3]

OTTO FUCHS Designation	$R_{p0,2}$ [MPa]	R_m [MPa]	A_5 [%]	Fatique strength max. [MPa] R=–1; K_t=1; 10^7 cycles	Typical Material Properties
MA30	150 – 170	230 – 250	10	120	good weldability, excellent machinability
MA39	150 – 170	230 – 250	10	130	good weldability and machinability
MA64	180 – 200	260 – 280	8 – 10	140	
MA84	200 – 230	280 – 320	6 – 10	150	good weldability and machinability, good heat resistance
ZK30 [1]	200 – 230	290 – 310	7 – 10	150	good machinability and heat resistance
ZK60 [1]	220 – 250	300 – 330	7 – 10	160	
WE43 [2]	150 – 170	265 – 300	10	150	good machinability, excellent heat resistance
WE54 [2]	190 – 220	275 – 320	10	160	

[1] Manufacturer's reference Company Dow/USA, purchase of casting material
[2] Manufacturer's reference Company MEL/GB, purchase of casting material
[3] The listed tensile test characteristics apply to the fibre direction. Due to the crystal structure, the shown magnesium alloys have 30 % to 50 % lower $Rp_{0.2}$ values transversely to the fibre under tensile load and longitudinally to the fibre under compressive load than under tensile load parallel to the fibre.
[4] 4 % Y + 3 % S.E.
[5] 5,25 % Y + 3,5 % S.E.

OTTO FUCHS SOLUTIONS WITH WROUGHT MAGNESIUM ALLOYS

The designer can choose from a wealth of economical design options for die forgings and extruded products.

To further improve corrosion resistance, we have developed a special continuous casting technology. This enables us to produce alloys with a high degree of purity, i. e. with the lowest Fe and Ni-contents (high-purity quality).

We have more than eight decades of experience in producing and processing this material.



Gearbox Cover
1.000 mm x 560 mm x 220 mm; 43,0 kg



Payload Fairing Extrusion Ariane
3,7 m; 13,6 kg



Textile Machine Profile
43,8 mm x 32,5 mm; 1,392 kg/m

PHYSICAL PROPERTIES

OTTO FUCHS Designation	Specific Weight [g/cm³]	Elastic Modulus [10³ MPa]	Thermal Expansion Coefficient [1/K]	Thermal Conductivity at 20° C [W/m K]
MA30	1,77	45	26,0 x 10^{-6}	98
MA39	1,77	45	26,0 x 10^{-6}	98
MA64	1,80	47	27,3 x 10^{-6}	79
MA84	1,80	47	27,0 x 10^{-6}	51
ZK30 [1)]	1,80	45	27,1 x 10^{-6}	128
ZK60 [1)]	1,83	45	26,0 x 10^{-6}	121
WE43 [2)]	1,84	44	26,7 x 10^{-6}	51
WE54 [2)]	1,85	44	24,6 x 10^{-6}	52

CHEMICAL COMPOSITION

OTTO FUCHS Designation	Al [%]	Zn [%]	Mn [%]	Zr [%]
MA30	3,00	1,00	0,10	–
MA39	3,00	1,00	0,35	–
MA64	6,30	1,00	0,20	–
MA84	8,00	0,50	0,20	–
ZK30 [1)]	–	3,00	–	0,6
ZK60 [1)]	–	6,00	–	0,6
WE43 [2)]	–	–	[4)]	0,5
WE54 [2)]	–	–	[5)]	0,5

NOTE

Due to their electrochemical potential, magnesium alloys are sensitive to contact corrosion and must therefore be protected by insulating interlayers when in direct contact with other metals.

General corrosion resistance is only given under specific circumstances. An inorganic and/or organic corrosion protection should be applied.

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