MT AEROSPACE

An OHB Company

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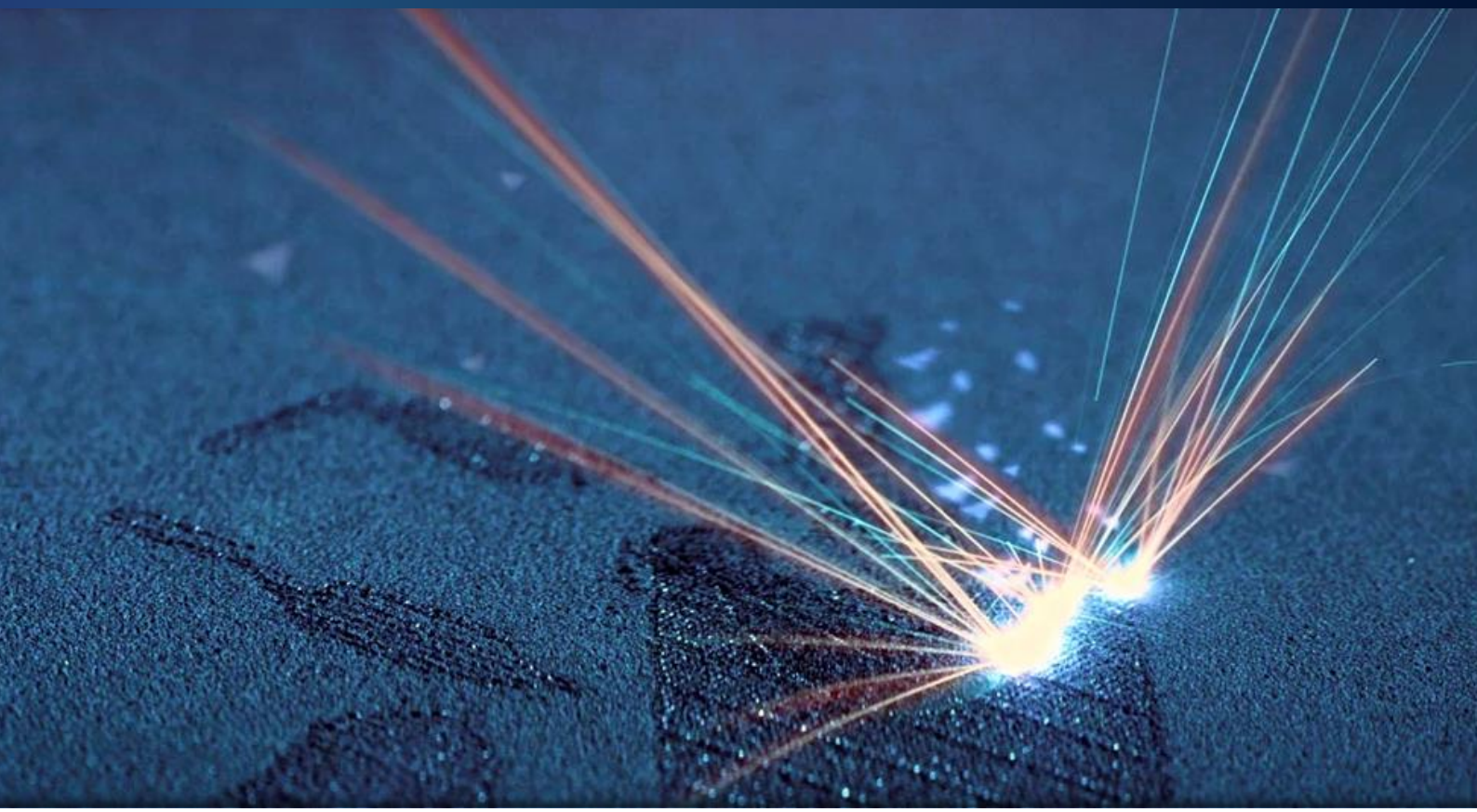
Material Data Sheet



- SRA - Stress Relief Annealing
- DA - Direct Aging
- SA - Solution Annealing
- STA - Solution Treated and Aged
- HT - Heat Treatment
- W.i.p. - work in progress

MT AEROSPACE
An OHB Company

Overview

Processes performed according to guidelines of the MT Aerospace quality management manual - aerospace industry

- SRA - Stress Relief Annealing
- DA - Direct Aging
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MT AEROSPACE
An OHB Company

AlSi10Mg

Features:

- substitute for casted aluminum components
- highest variation of heat treatment conditions & mechanical properties
- high build-up rates
- low cost production

Chemical Composition

Al	Si	Fe	Cu	Mn	Mg	Zn	Ti	Ni	Pb	Sn	Other
Balance	9-11	≤ 0,55	≤ 0,05	≤ 0,45	0,20-0,45	≤ 0,10	≤ 0,15	≤ 0,05	≤ 0,05	≤ 0,05	0,15

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HV]
EOS M290-1	60µm	SRA	175	280	10	w.i.p.
		STA-T6	245	310	8	w.i.p.
EOS M300-4	60µm	As-Built	225	430	5	133
		SRA	175	280	8	70
		DA	270	450	3,5	140
		SA	135	230	17	67
		STA-T6	245	310	9	91

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M290-1	60µm	STA-T6	65	~2,67	173 ± 10
EOS M300-4	60µm	STA-T6	72	~2,67	173 ± 10

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MT AEROSPACE
An OHB Company

A20X

Features:

- high strength aluminum alloy
- temperature resistant up to 250°C
- high surface quality
- perfect for technical applications & high performance

Chemical Composition

Al	Cu	Mg	Ag	Ti	B	Si	Fe	Others max
Balance	4,2 - 5,0	0,2 - 0,33	0,6 - 0,9	3,0 - 3,85	1,25 - 1,55	≤ 0,10	≤ 0,08	≤ 0,17

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
EOS M290-1	40µm	STA	390	460	8	w.i.p.

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M290-1	40µm	STA	~72	~2,86	140 ± 10

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Ti-6Al-4V Grade 23

Features:

- high strength titanium alloy - substitute for forged titanium
- highest specific strength
- great fatigue properties & surface quality
- ELI - standard

Chemical Composition

Ti	Al	V	O	N	C	H	Fe	Y	Other
Balance	5,5-6,5	3,5-4,5	≤ 0,13	≤ 0,05	≤ 0,08	≤ 0,012	≤ 0,25	≤ 0,005	≤ 0,5

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
EOS M290-1	60µm	As-Built	1100	1250	7	39
		SRA	1100	1180	7	36
FormUp 350	60µm	SRA	1050	1120	7	w.i.p.

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M290-1	60µm	SRA	~105	~4,45	~6,8
FormUp 350	60µm	SRA	~105	~4,45	~6,8

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Ti-6Al-4V Grade 5

Features:

- high strength titanium alloy - substitute for forged titanium
- highest specific strength
- lightweight
- great fatigue properties

Chemical Composition

Ti	Al	V	O	N	C	H	Fe	Y	Other
Balance	5,5-6,75	3,5-4,5	≤ 0,20	≤ 0,05	≤ 0,08	≤ 0,015	≤ 0,30	≤ 0,005	≤ 0,4

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
EOS M400-4	60µm	SRA	1100	1180	7	w.i.p.

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M400-4	60µm	SRA	~105	~4,45	~6,8

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MT AEROSPACE
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IN718

Features:

- resistant against oxidation up to 1000°C
- highly corrosion resistant from cryo up to high temperature range
- great surface quality
- good weldability & high strength

Chemical Composition

Ni	Cr	Nb	Mo	Ti	Al	Co	Cu	C	Si & Mn	P & S	Fe
50-55	17-21	4,75-5,5	2,8-3,3	0,65-1,15	0,2-0,8	≤ 1,0	≤ 0,3	≤ 0,08	≤ 0,35	≤ 0,015	Balance

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
EOS M400-4	40µm	As-Built	630	980	33	29

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M400-4	40µm	SRA	~180	~8,20	~12

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MT AEROSPACE
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IN625

Features:

- temperature resistant up to 700°C in use
- highly corrosion resistant
- great surface quality
- good weldability & high strength

Chemical Composition

Ni	Cr	Nb	Mo	Ti	Al	Co	Ta	C	Si & Mn	P & S	Fe
Balance	20-23	3,15-4,15	8-10	≤ 0,4	≤ 0,4	≤ 1	≤ 0,05	≤ 0,1	≤ 0,5	≤ 0,015	≤ 5

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
FormUp 350	50µm	SRA	705	970	35	w.i.p.

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
FormUp 350	50µm	SRA	~180	~8,20	~11,2

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K500 - Monel

Features:

- temperature resistant up to 480°C
- Corrosion resistant to seawater, hydrofluoric acid, sulphuric acid
- good thermal conductivity compared to other nickel alloys
- good weldability

Chemical Composition

Ni	Fe	C	Mn	Si	Cu	Al	Ti	P & Zn	S	Pb	Sn
≥ 63	0,5-2,0	≤ 0,18	≤ 1,5	≤ 0,5	27-33	2,3-3,15	0,35-0,85	≤ 0,02	≤ 0,01	≤ 0,006	≤ 0,006

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HV]
EOS M290-1	60µm	As-Built	430	640	36	194
		SRA	420	640	29	193
EOS M300-4	60µm	As-Built	390	630	38	192
		SRA	385	635	30	190
EOS M400-4	60µm	As-Built	420	640	35	195
		SRA	425	650	30	196

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M290-1	60µm	SRA	~180	~8,50	~17,4
EOS M300-4	60µm	SRA	~180	~8,50	~17,4
EOS M400-4	60µm	SRA	~180	~8,50	~17,4

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MT AEROSPACE
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M789

Features:

- high strength maraging steel / tooling steel
- highly corrosion resistant
- highly polishable
- good weldability

Chemical Composition

C	Cr	Mo	Ni	Ti	Al	Fe
≤ 0,02	12,20	1,0	10	1,0	0,6	Balance

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
EOS M300-4	60µm	STA	1760	1880	6,8	w.i.p.

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
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Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M300-4	60µm	STA	~190	~8,10	~13,1

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MT AEROSPACE
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1.4404 / 316L

Features:

- corrosion resistant steel
- high elongation
- wide ranging application
- direct substitute for many industrial products

Chemical Composition

Fe	Cr	Ni	Mo	C	Al
Balance	17-19	13-15	2,25-3,0	≤ 0,03	≤ 0,1

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HV]
EOS M290-1	40µm	SRA	510	630	29	w.i.p.
EOS M300-4	40µm	As-Built	520	620	34	187
		SRA	490	610	28	186
EOS M300-4	80µm	As-Built	490	640	35	193
		SRA	485	650	28	194

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M290-1	40µm	SRA	~170	~8,20	~11,2
EOS M300-4	40µm	SRA	~170	~8,20	~11,2

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MT AEROSPACE
An OHB Company

1.2709

Features:

- high strength maraging steel
- used for toolings or high-performance components
- good surface quality
- good weldability

Chemical Composition

Fe	Ni	Co	Mo	Ti
Balance	17-19	8,5-10	4,5-5,2	0,8-1,2

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
EOS M300-4	40µm	STA	1790	1830	3	w.i.p.
EOS M300-4	40µm	DA	1290	1480	11	w.i.p.

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
EOS M300-4	40µm	STA	~188	~8,10	~14,2

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MT AEROSPACE
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Ti-6Al-4V Grade 23 - DED

Features:

- high strength titanium alloy - substitute for forged titanium
- highest specific strength
- High DED melting capacity
- High productivity & 5-Axis-Production

Chemical Composition

Ti	Al	V	O	N	C	H	Fe	Y	Other
Balance	5,5-6,75	3,5-4,5	≤ 0,20	≤ 0,05	≤ 0,08	≤ 0,015	≤ 0,30	≤ 0,005	≤ 0,4

wt.-% - reference values acc. to data-sheet, variations possible

Mechanical Properties

Machine	Layer Height [µm]	HT Condition	YS [MPa]	UTS [MPa]	A [%]	Hardness [HRC]
Beam M400	700µm Productivity	SRA	869	931	10	29
	700µm Quality	SRA	960	1030	6	32

Test specimen according to DIN 50125, cylindrical shape, vertical printed, fully machined, tested at room temperature
Notice: values are valid for 95th percentile

Physical Properties

Machine	Layer Height [µm]	HT Condition	Y.Modulus [GPa]	Density [g/cm³]	Thermal Conductivity [W/m K] - RT
Beam M400	700µm	SRA	~115	~4,42	~6,8

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