

MATERIAL DATASHEET

LASER MELTING OF METALS

3D PRINTING WITH METALS

In this process, metal powder is fused into an solid object. Our systems achieve very high levels of detail. We can produce your objects using stainless steel, tool steel, aluminium, Inconel, cobalt chrome, brass or copper that features high electrical conductivity and this enables new applications. All products are impermeable and feature high stability. Depending on the material, you can achieve wall thickness as thin as 0.4 mm.

MATERIAL				MS1 – 1.2709	PH1 – 1.4540	316L – 1.4404	CX	Zamak 5	AlSi10Mg
				tool steel	stainless steel			zink	aluminium
									
	Eigenschaften	Zustand	Einheit						
general properties	density, laser-melted	–	g/cm ³	8 – 8,1	7,7	7,9	7,7	6,2 – 6,4	2,67
mechanical properties**	tensile strength	„as built“	MPa	1.100 ± 100	1.200 ± 50	620 ± 50	1080	218± 40	410 ± 20
		„after heat treatment“	MPa	2.030 ± 70	min. 1.340	–	1.730 ± 10		340 ± 20
	yield strength (Rp 0,2%)	„as built“	MPa	1.000 ± 100	950 ± 150	490 ± 65	840	185 ± 15	250 ± 20
		„after heat treatment“	MPa	1.950 ± 70	min. 1.200	–	1.660 ± 10		220 ± 10
	elongation at break	„as built“	%	9 ± 4	17 ± 4	min. 30	14	1,5 ± 0,5	6 ± 2
		„after heat treatment“	%	4 ± 2	min. 10	–	6		7 ± 2
	elastic modulus	„as built“	GPa	–	–	–	–	28 ± 3	65 ± 5
		„after heat treatment“	GPa	–	–	–	–		65 ± 5
thermal properties	thermal conductivity	„as built“	HRC	33 – 37	30 – 35	85 [HRB]	–	61 – 64 [HV10]	120 [HBW]
		„after heat treatment“	HRC	53 ± 2	min. 40	–	50		–
	specific heat capacity	„as built“	W/(m*K)	–	13,7 ± 0,8	–	–	85	103 ± 5
		„after heat treatment“	W/(m*K)	–	15,7 ± 0,8	–	–		–
		„as built“	J/kg*K	450 ± 20	460 ± 20	–	–	389	–
		„after heat treatment“	J/kg*K	450 ± 20	470 ± 20	–	–		–
electrical properties	electrical conductivity (edge/core)	„as built“	MS/m	–	–	–	–	–	15 – 16
		„after heat treatment“	MS/m	–	–	–	–		–
typical process-related properties*	roughness after sandblasting (Ra/Rz)	–	µm	4 – 6,5/20 – 50	5 /25	3 – 7/20 – 40	5/26	4 – 6 / 25 – 35	7 – 10/50 – 60
	precision	–	mm	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %
	minimum wall thickness	–	mm	0,4	0,4	0,4	0,4	0,6	0,6

Dear customer, all information given is based on our knowledge and experience at the time of publication. In addition, the material properties can be influenced by component geometry, environmental influences and material additives. The stated material or component properties, as well as their suitability for specific applications, are neither agreed nor guaranteed, despite regular quality controls. The customer is responsible for checking the component properties and suitability for a specific application.

MATERIAL DATASHEET

LASER MELTING OF METALS

MATERIAL				RS-Copper	Pure-Copper	RS-Brass
				copper		brass
						
	Eigenschaften	Zustand	Einheit			
general properties	density, laser-melted	–	g/cm ³	8,7 – 8,9	8,9	8,2
mechanical properties**	tensile strength	„as built“	MPa	238 ± 15	220 ± 10	310 ± 30
		„after heat treatment“	MPa			–
	yield strength (Rp 0,2%)	„as built“	MPa	165 ± 20	140 ± 20	260 ± 10
		„after heat treatment“	MPa			–
	elongation at break	„as built“	%	20 ± 5	50 ± 10	8 ± 3
		„after heat treatment“	%			–
	elastic modulus	„as built“	GPa	95 ± 15	–	80 ± 5
		„after heat treatment“	GPa			–
thermal properties	thermal conductivity	„as built“	W/(m*K)	265	415 ± 10	–
		„after heat treatment“	W/(m*K)			–
	specific heat capacity	„as built“	J/kg*K	394	–	–
		„after heat treatment“	J/kg*K			–
electrical properties	electrical conductivity (edge/core)	„as built“	MS/m	50/32	57	8/8
		„after heat treatment“	MS/m			–
typical process-related properties*	roughness after sandblasting (Ra/Rz)	–	µm	8 – 9/40 – 50	8 – 9/40 – 50	7– 9 / 40 – 50
	precision	–	mm	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %	± 0,1 / ± 0,7 %
	minimum wall thickness	–	mm	0,6***	0,6***	0,6

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* These values can vary, depending on part geometry and dimensions.

** The mechanical properties can vary, depending on x-, y- and z-position of the test object and illumination parameters.

*** minimum wall thickness for media-tight components: 1 mm