Tensile strength: 500 N/mm²

Construction material: Silicon tombac

Process: Pressure die casting

Silicon tombac provides new opportunities

Breuckmann

Pressure die casting using silicon tombac – The technical and economical alternative

This is a construction material with a high solidity. It is also known under the names of JAKUSIL, OLKUSIL and TOMBASIL. This alloy is very suitable for thin-walled and highly-stressed structural parts.

Brass is a collective term for the group of alloys with the main components copper and zinc. A brass alloy with a copper content of over 70% is also referred to as **tombac**. Our **silicon tombac** is an alloy with a high copper content made from the components copper (CU), zinc (Zn) and silicon (Si). It is standardised under the EN 1982 Standard with the designation CuZn16Si4-C.

Material number:	**CC761S / 2.0492.05**
Abbreviated designation:	**CuZn16Si4-C**
Composition conforming to the Standard:	**Copper (Cu) : 78.0 – 83.0 %**
	Silicon (Si) : 3.0 – 5.0 %
	Zinc (Zn) : Remainder

Metallurgy:

Si strongly influences the CU-ZN alloy by limiting the solubility of Zn in Cu in the α-area. In the α-brass, up to 4% Si can be dissolved in the solid solution. As the Zn content increases, the solubility of the Si in α-solid solution decreases. In the case of CuZn16Si4, the highest level of Si is alloyed with the highest possible Zu content. This is why the quick cooling rate of pressure die and permanent mould casting is significant. The α-phase crystallised Si is supersaturated. This effect is of practical importance: The higher mechanical values for pressure die and permanent mould casting when compared to sand casting are explained by the supersaturation of the primary, non-disintegrated α-solid solution.

Material properties:

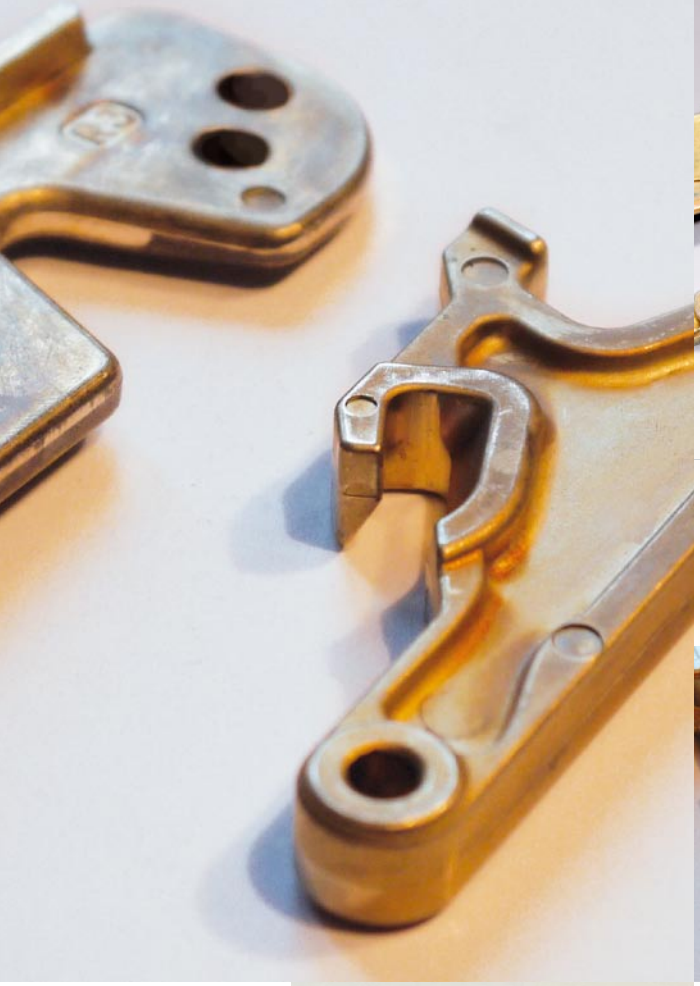
Tensile strength Rm	(N/mm^2)	500
Yield point Rp 0,2	(N/mm^2)	300
Strain at failure A	(%)	8-15
Hardness	(HB10)	130
E-module	(N/mm^2)	122,000
Shear strength	(N/mm^2)	290
Bending fatigue strength Rbw at 10^8 load change	(N/mm^2)	± 150
Electric conductivity	(MS/m)	3
Thermal conductivity	W/(m*K)	34
Permeability	(μ)	1.01
Coefficient of linear expansion (25° ... 300°C)	(10^{-6}/K)	18
Density	(kg/dm^3)	8.3
Melting range	(°C)	850-900

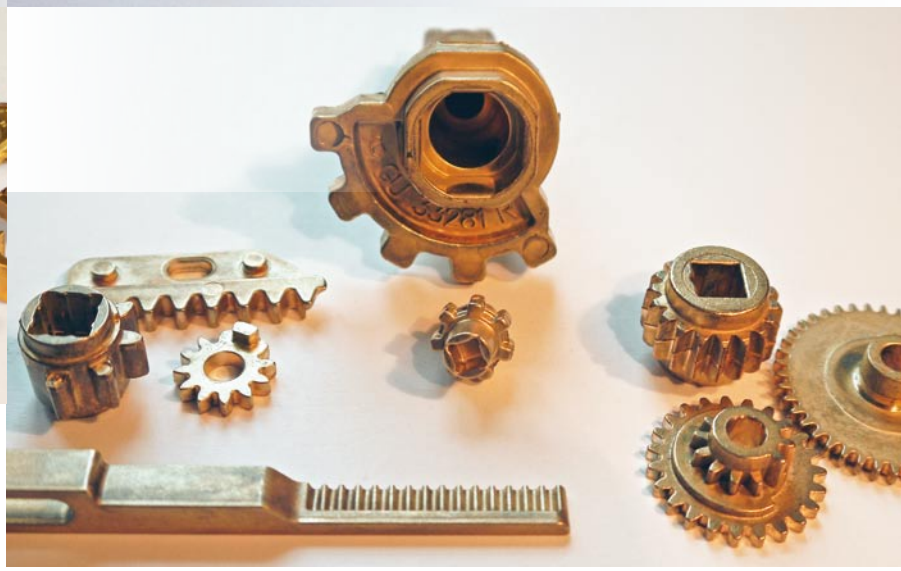
The strength properties are largely maintained even at temperatures of up to 200°C. When compared to many cast iron materials, the almost constant toughness with a slightly increasing solidity at low temperatures of up to -200°C has proven to be advantageous.

Corrosion resistance	Good resistance to corrosion and resistance to seawater. The resistance to water, seawater, acids and alkalis is better than with copper. Salt spray test according to DIN 50021: Some discolouration is to be seen after 1,064 hours, but no corrosion. Not resistant to ammonia.
Storage properties	Good friction and storage/ failsafe properties when subject to moderate stress.
Heat resistance	Constant up to 200°C
Cold resistance	At -200°C slightly increased solidity.
Weldability	Can be welded using the WIG process. Arc welding, pressure resistance welding, resistance spot welding are conditionally applicable.
Solderability	Good soft soldering and hard soldering, however the casting surface must be prepared using mechanical processing or chemical treatment.
Surface treatment	Suitable for mechanical polishing, highly electroplatable
Machinability	Easily machined using carbide tools

Comparison of the processes:

	Silicon tombac	Aluminium	Zinc	unalloyed steel	stainless steel
Method	Pressure die casting	Pressure die casting	Pressure die casting	Fine die casting	Fine die casting
Tensile Strength Rm (N/mm^2)	500	240-310	280-350	410-450	450-650
Yield point Rp (0.2 N/mm^2)	300	140-240	220-250	200-210	175-200
Strain at failure A (%)	8-15	0.5-3	2-5	25	30
Density (kg/dm^3)	8.3	2.7	6.7	7.9	7.9
Hardness (HB)	130	80-120	85-105	140	130-200
Corrosion resistance	yes	no	no	no	yes
Failsafe running functions	yes	conditionally	conditionally	no	no
Mechanical machinability	very good	very good	good	good	poor
Heat treatment	no	no	no	yes	yes





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