

Material properties of CMMC-AMC20

All of the following mechanical and thermos-physical material properties were determined according to the standard test specifications and in most cases analysed as a function of temperature.

The actual chemical composition of matrix alloy regarding to DIN EN 1676:

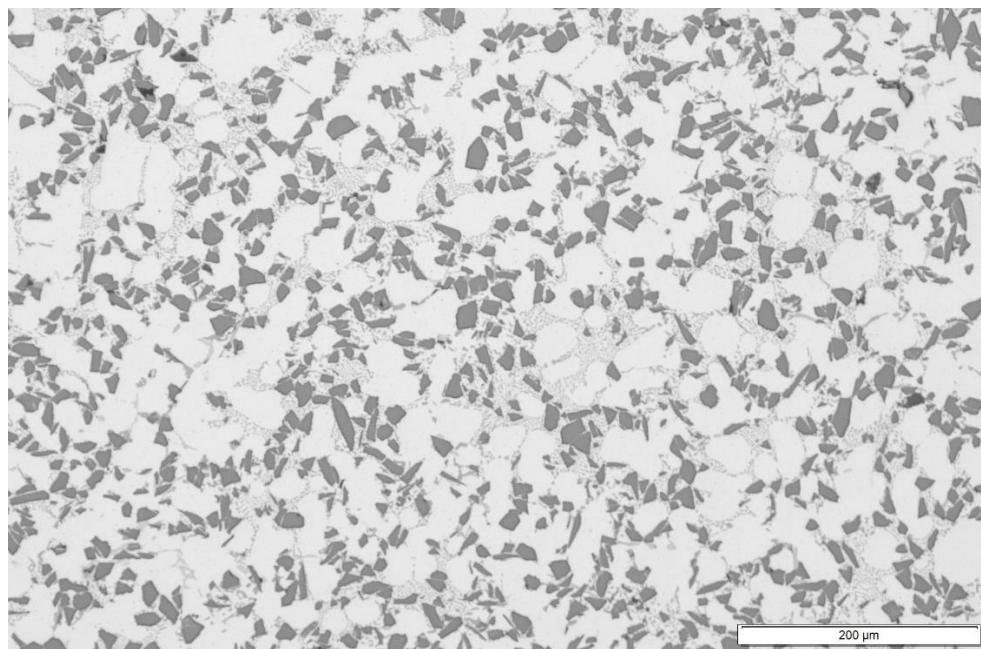
wt.-%	Si	Fe	Cu	Mn	Mg	Zn	Ti	Al
AlSi9Mg (EN AB- 43300)	9.0 – 10.0	<0.15 (0.19)	<0.03 (0.05)	<0.1	0.3 – 0.45 (0.25 – 0.45)	<0.07	0.15	bal.

SiC powder: F320

ds3 value max. (µm)	ds50 value (µm)	ds90 value min (µm)
42,63 (set point: <49)	31,06 (set point: 29,2±1,5)	17,21 (set point: >16,5)

The standard AMC alloy of CMMC GmbH is called CMMC-AMC20 and is composed by 80 vol.-% AlSi9Mg and 20 vol.-% SiC (F320).

Microstructure by die casting (magnification: 100x):



The following table summarized the properties of the standard CMMC-AMC20 alloy with the heat treatment condition T6 (solution annealing and artificial aging) in comparison to unreinforced aluminium alloy (the AMC matrix alloy) and grey cast iron.

	CMMC-AMC20 (AlSi9Mg/SiC/ F320/20p) (T6)	AlSi9Mg (T6) ¹ ²	EN-GJL-250 ³
ultimate tensile strength R_m (MPa)	> 270	> 230	> 250
strain (%)	0.3 ... 0.4	2.0	0.3 ... 0.8
Young's modulus (GPa)	90 ... 105	74 ... 83	103 ... 118
heat expansion coefficient (10^{-6} 1/K)	18 ... 20 (50 – 500 °C)	21	11.7 (20 – 200 °C)
thermal conductivity (W/(m*K))	156 ... 145 ... 153 (20 – 300 – 500 °C)	139 ... 168 (20 – 200 °C)	48.5 ... 44.5 (100 – 500 °C)
specific heat capacity (J/(g*K))	0.90 ... 1.30 (50 – 500 °C)	0.91	0.46 (20 – 500 °C)
density (g/cm³)	2.78	2.65	7.20
wear / abrasion (mm²)	0.02	0.5	0.08

¹ Aluminium Taschenbücher 1-3, Aluminium-Verlag

² <https://metallgiesserei.biz/werkstoffe/>

³ <https://www.dossmann-eisengiesserei.de/werkstoffe/gusseisen-mit-lamellengraphit/en-gil-250-gusseisen-sorte/>