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refractory solutions

Calcium silicate / graphite composites

CALCAST® CC 155 G4, G8, G16

CALCAST® CC155 G4, G8 and **G16** are calcium silicate/graphite composites, which combine the mechanical and physical properties of graphite and calcium silicate. The results are materials with tailored and improved properties in regard to several high temperature applications, especially when used in casting processes with liquid aluminium. **CALCAST® CC 155 G4, G8** and **G16** reduces dramatically the wetting with molten metal. After contact with the metal nearly zero attachments of metal residuals are present. This reduces the transport of oxides into the casted part as well as the overall consumption of metal alloy.
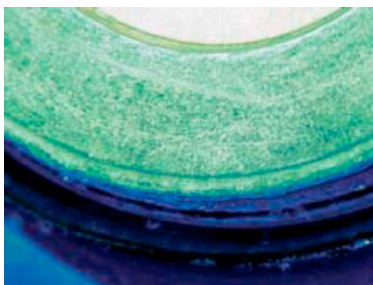
Thermal conductivity
The amount of graphite in the calcium silicate determines the properties of the material. Especially thermophysical properties like thermal conductivity and reversible thermal expansion are influenced by the anisotropic graphite crystals.

The thermal conductivity increases with increasing amount of graphite. Higher conductivities can result in faster casting processes. The conductivity is anisotropic, following the graphite lattice which has a parallel orientation to the board plane. With increasing oxidation of the graphite component the thermal conductivity decreases.

The reversible thermal expansion is reduced by the graphite. The amount of reduction is determined by the amount of graphite in the composite. It also depends on the amount of oxidation of the graphite component.

Oxidation characteristics
A significant oxidation of the graphite in air starts at 600 °C. Used in liquid aluminium however also after longer periods no significant oxidation of the components are observable.
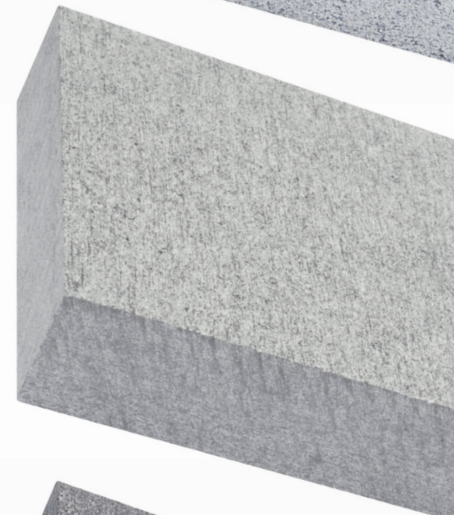
**CALCAST®
CC 155 G4**

**CALCAST®
CC 155 G8**

**CALCAST®
CC 155 G16**

Hot Face after > 100 drops

Wetting in liquid Aluminium
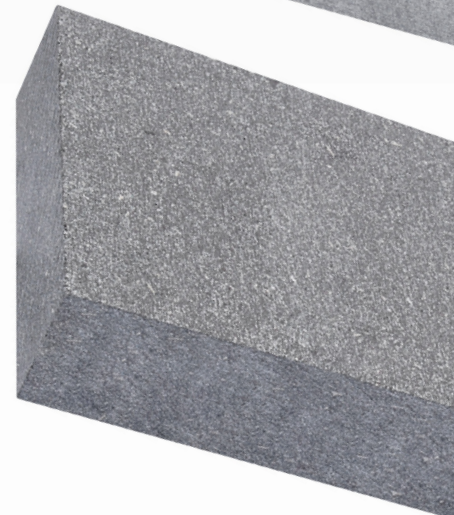
SPECIAL FEATURES

- no wetting with liquid non-ferrous metals
- increased thermal conductivity
- reduced thermal expansion
- low oil absorption
- precisely machineable

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Oil absorption & Self lubrication

The material stays not wettable, self lubricating and resistant against oil absorption. The oil absorption is reduced with increasing amount of graphite in comparison to standard calcium silicates. Coatings like boron nitride or graphite suspensions minimizes the oil uptake additionally.

Typical applications of **CALCAST CC 155 G4, G8, G16** are transfer- and transport-launders, ladles, bushings, hot top rings, transition plates and many more.
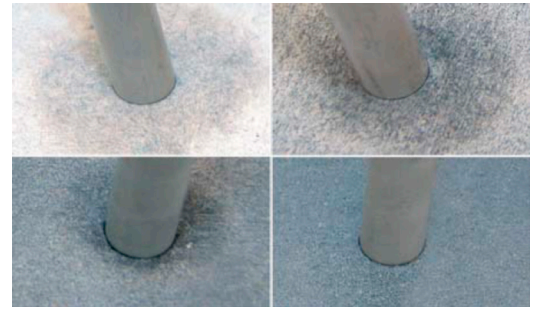
Oil traces on the surface after 144 h at room temperature

CALCAST®		Method	Unit	CC 155 G4		CC 155 G8		CC 155 G16	
Upper application limit temperature		EN 1094-6	°C	1,000		1,000		1,000	
Bulk density (± 10%)		EN 1602	kg/m³	1,150		1,100		1,050	
Open porosity (in acc. with standard)		EN 993-1	%	55		55		60	
Compression strength		EN 826	MPa	24		22		18	
Flexural strength		EN 12089	MPa	11		10		9	
Shrinkage after 12 h		EN 1094-6							
Length and width	750 °C		%	0.30		0.25		0.27	
Thickness	750 °C			0.80		0.80		0.75	
Thermal conductivity λ at t_m		EN 993-15		⊥	//	⊥	//	⊥	//
	400 °C		W/(m K)	0.64	0.62	1.22	2.59	1.80	4.55
⊥ perpendicular to board plane	600 °C			0.52	0.59	0.93	2.06	1.34	3.52
// parallel to board plane	800 °C			0.37	0.39	0.62	0.87	0.86	1.35
Thermal expansion coefficient	20 °C - 750 °C	EN 13471		⊥	//	⊥	//	⊥	//
⊥ perpendicular to board plane									
// parallel to board plane			$K^{-1} \times 10^{-6}$	6.7	6.2	5.9	4.7	6.5	6.2
Chemical composition									
Calcium silicate hydrate			%	95		91		83	
Graphite				4		8		16	
R_xO_x (R=Fe, Ti, K, Na)				1		1		1	
Annealing loss			%	10		12		22	
Dimensions									
		Tolerances							
Standard sizes	Length	± 3	mm	1,250					
	Width	± 3	mm	1,000					
	Thickness	0/+0.8	mm	12.7/19.1/25.4/31.8/38.1/50.8/76.2/101.6					
	Surfaces machined.								
Other dimensions are available on request.									

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

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