

# Essence of Castable

**SECAR Plenium®** is an innovative engineered binder with built-in advanced formulation technology developed by Kerneos.

**SECAR Plenium®** extends the SECAR® range of refractory cements and brings new dimensions to castable formulation and manufacture:

- **SECAR Plenium®** will enable refractory producers to meet the latest challenges presented by increasingly demanding refractory formulation constraints.
- **SECAR Plenium®** is the key to integrating high final performance with ease of use that allows the Refractory Manufacturer to:
  - simplify the development process,
  - optimise formulations with fewer additives,
  - reduce production complexity with fewer components,
  - improve placing properties.



**SECAR Plenium®** is designed for the formulation of dense castables where a reduced lime content is desirable. Placing can be either by vibration or self-flow techniques. Recommended castable systems include:

- High Purity Alumina,
- Alumina Spinel,
- Alumina Magnesia,
- Low Cement systems containing Fume Silica or Alumina.

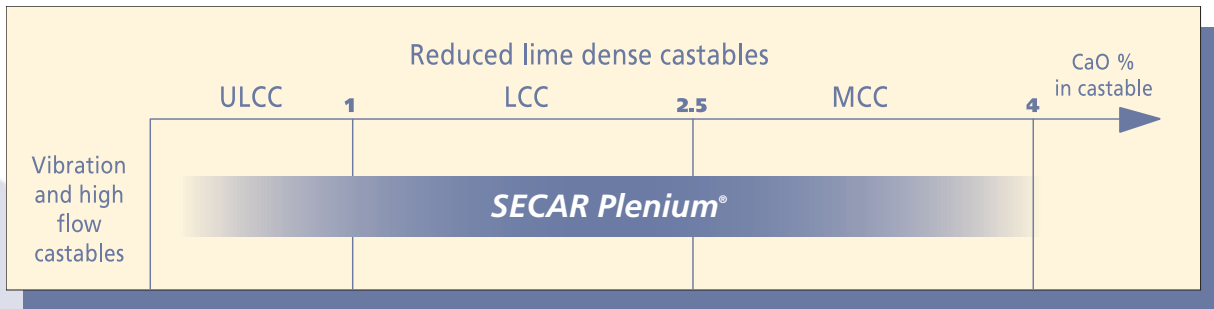
**SECAR Plenium®** enables the manufacture of low cement castables with normal placing characteristics without the addition of additives:

- **SECAR Plenium®** is completely compatible with all types of refractory fillers,
- **SECAR Plenium®** offers a high degree of compatibility with a wide range of additives.

### Choice of additives in recommended systems

ADDITIVES	High Purity Alumina	Alumina-Spinel	LCC Alumina-Alumina	LCC Fume Silica	Alumina-Magnesia
<b>FLUIDIFIERS</b> Phosphates Polycarbonates Polyacrylates Napthalenes Sulphonates	not needed	only for high flow		not needed	only for high flow
<b>SET MODIFIERS</b> Accelerators - lithium salts - sodium aluminates - nitrates Retarders - citrates - borates - carbonates	all types can be used				

## Technical positioning of *SECAR Plenium*<sup>®</sup>



Successful installation is a vital factor in achieving required refractory performance. *SECAR Plenium*<sup>®</sup> is the key to ease of placing in a wide range of environmental conditions:

- **High fluidity with reduced water demand**

Whatever the castable system, *SECAR Plenium*<sup>®</sup> reduces water demand and confers high fluidity, without affecting the safety of de-watering during initial heating.

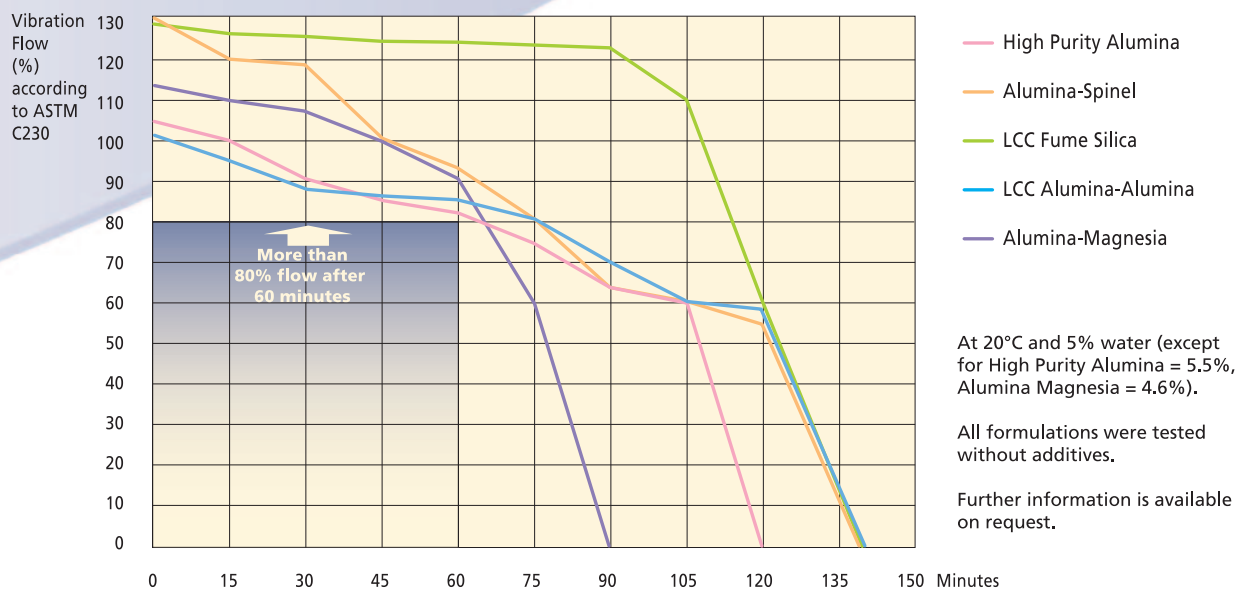
- **Good workability**

*SECAR Plenium*<sup>®</sup> provides stable flow and sufficient working time in critical installation conditions such as with the placing of alumina magnesia castables.

- **High reliability in installation**

*SECAR Plenium*<sup>®</sup> brings high reliability in installation due to its tolerance to a wide range of working temperatures and varying water contents.

### Flow profiles for various castables containing *SECAR Plenium*<sup>®</sup>





## Competitive advantage in high performing applications

The performance of **SECAR Plenium<sup>®</sup>** meets the demanding requirements of critical monolithic refractory applications thanks to its powerful combination of attributes:

- rapid hardening,
- consistently predictable demoulding time,
- fast mechanical strength development,
- excellent thermo-mechanical properties,
- volume stability.

The stable and predictable behavior of **SECAR Plenium<sup>®</sup>** is an additional success factor in critical applications. It is achieved through the inherent design features of the product and the performance of the newly engineered production line, a testament to Kerneos commitment to product quality excellence.

### **SECAR Plenium<sup>®</sup> competitive performance** *with a reference cement in each system*

Properties	High Purity Alumina	Alumina-Spinel	Alumina-Magnesia	LCC Alumina-Alumina or Fume Silica	
Hardening					As good
Mechanical Strength Development					Better
Thermo-mechanical Properties					Much better
Volume Stability					

### Chemical composition (%)

Al <sub>2</sub> O <sub>3</sub>	CaO	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	MgO	TiO <sub>2</sub>	soluble K <sub>2</sub> O+Na <sub>2</sub> O	SO <sub>3</sub>
79.5-82.5	16.2-17.8	<0.35	<0.2	<0.5	<0.3	<0.7	<0.3

Test method according to BS EN 196-2: Methods of testing cement; Chemical Analysis of Cement.  
Soluble K<sub>2</sub>O and Na<sub>2</sub>O determined by the standard ASTM C114.

### Fineness

Blaine specific surface (cm <sup>2</sup> /g)	Residue at 90 μm (%)
>8,000	<5

Test method according to EN-196-6: Method of testing cement; Fineness Determination.

### Workability (%)

Flow after 60 min.	Flow after 90 min.
60-80	50-70

Test method according the ASTM C230 flow table using a standard siliceous sand mortar.  
Composition of the sand mortar: cement 500g, sand 1,350g, water 160g (W/C=0.32)  
prepared according to EN 196-1.

### Setting time

Initial set (min.)	Final set (min.)
160-230	180-260

Composition of the mortar: cement 500g, sand 1,350g, water 160g (W/C=0.32)  
prepared according to EN 196-1.  
Setting time measurement according to NF P15-431: Vicat apparatus standard EN 196-3  
but using a 1,000g test weight; temperature 20°C, 70% relative humidity.

### Green strength

Age	Compressive strength (MPa)
24h	18-24

Test conditions according to EN 196-1.  
Composition of the sand mortar: cement 500g, sand 1,350g, water 160g (W/C=0.32)  
prepared according to EN 196-1.

### Mineralogical composition

Principal phases\*: CA, CA<sub>2</sub>, Aα

Secondary phases\*: C<sub>12</sub>A<sub>7</sub>,

\*C=CaO, A=Al<sub>2</sub>O<sub>3</sub>

### Other physical characteristics

Bulk Density: 700-800 kg/m<sup>3</sup>

Specific Gravity: 3.2-3.3 g/cm<sup>3</sup>

P.C.E.: 1,770-1,810°C

*This information is given for guidance only.*

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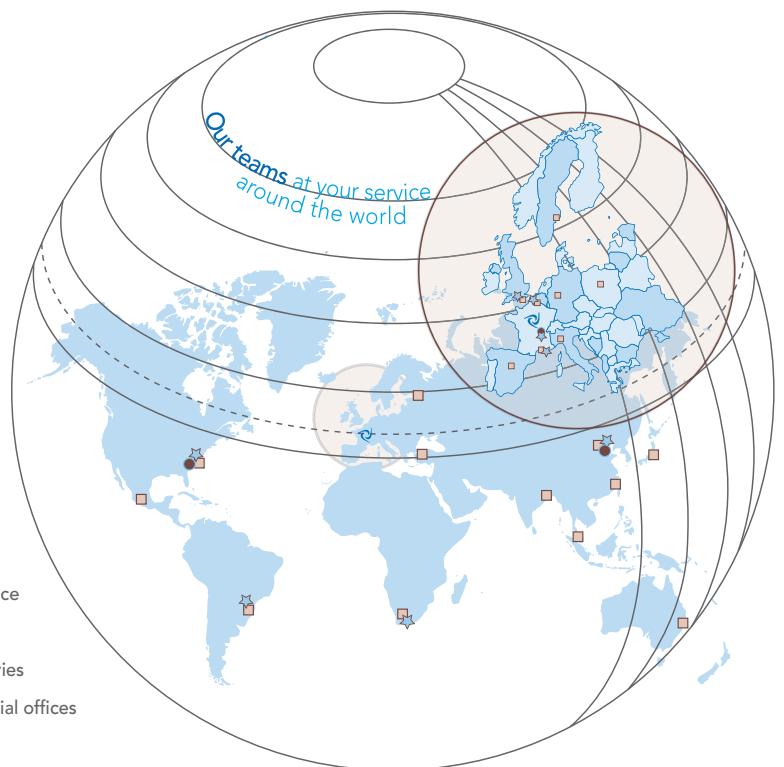
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