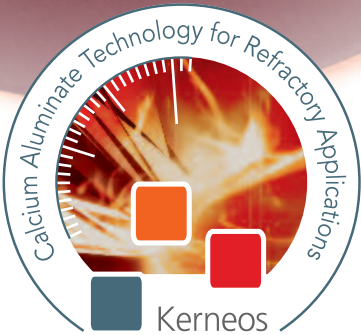


X SECAR Xeniom™



**A new binder system for
castables containing fume silica**

Secar Xeniom™ is a newly engineered binder system designed by Kerneos for a wide range of low cement castables.

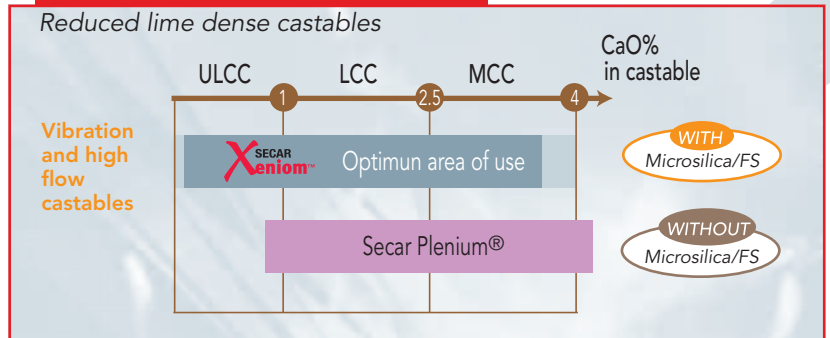
Secar Xeniom™ addresses the demand for high performance monolithics, which are nowadays required for key applications globally and where the route to formulate high performance castables becomes complicated.

Secar Xeniom™ aims to address these issues by offering multiple benefits based around reliability, user-friendliness, robustness and performance.

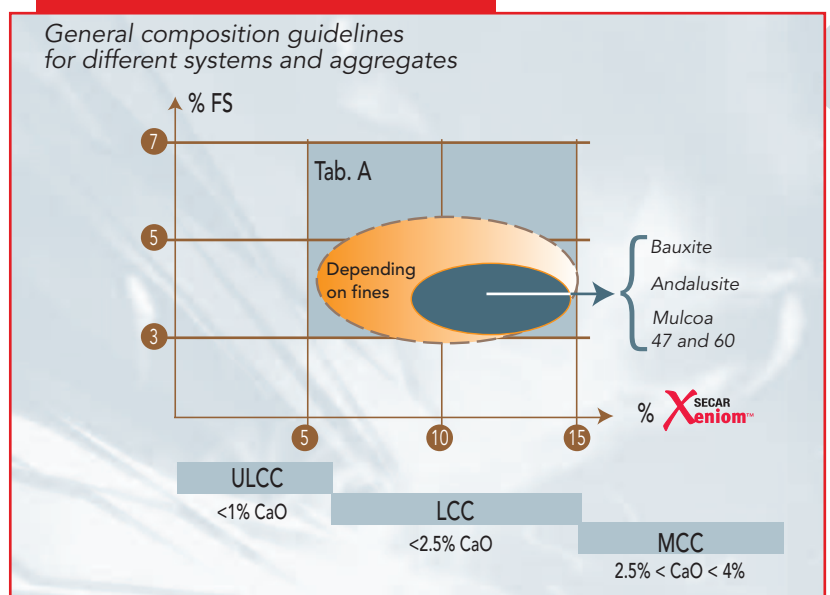
THANKS TO SECAR XENIOM™, FORMULATORS WILL BE ABLE TO:

- ◆ manage more easily the complex variations of raw materials and their impact on flow, working time and hardening,
- ◆ put more robustness into mixes produced,
- ◆ address raw material sourcing more efficiently with fewer components in the formulation and a broader choice of local raw materials,
- ◆ engage in a technical collaboration with the global network of Kerneos,
- ◆ deliver higher performance to ULCC and LCC fume silica castable systems.

SECAR XENIOM™: TECHNICAL POSITIONING



SECAR XENIOM™: SCOPE OF APPLICATIONS

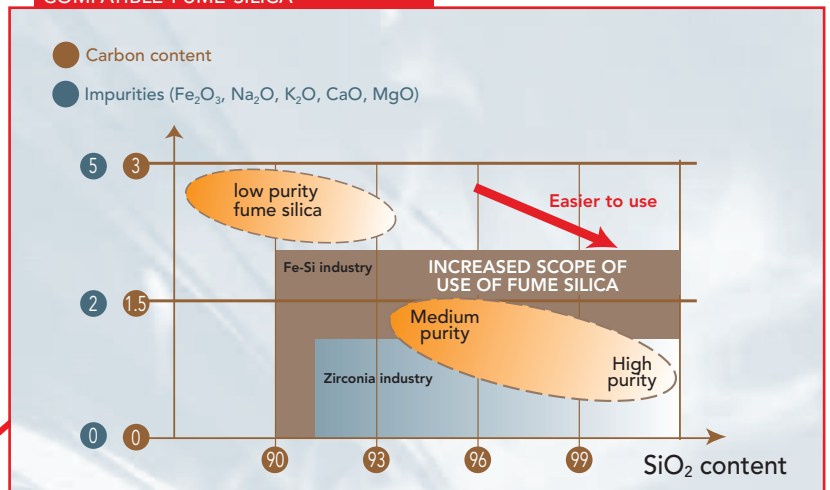


1 First, REGULARITY



Secar Xeniom™ is designed for the formulation of dense castable with reduced lime content. It works particularly well with a large number of fume silicas and copes successfully with the chemical variations of this fine filler from batch to batch and from different sources.

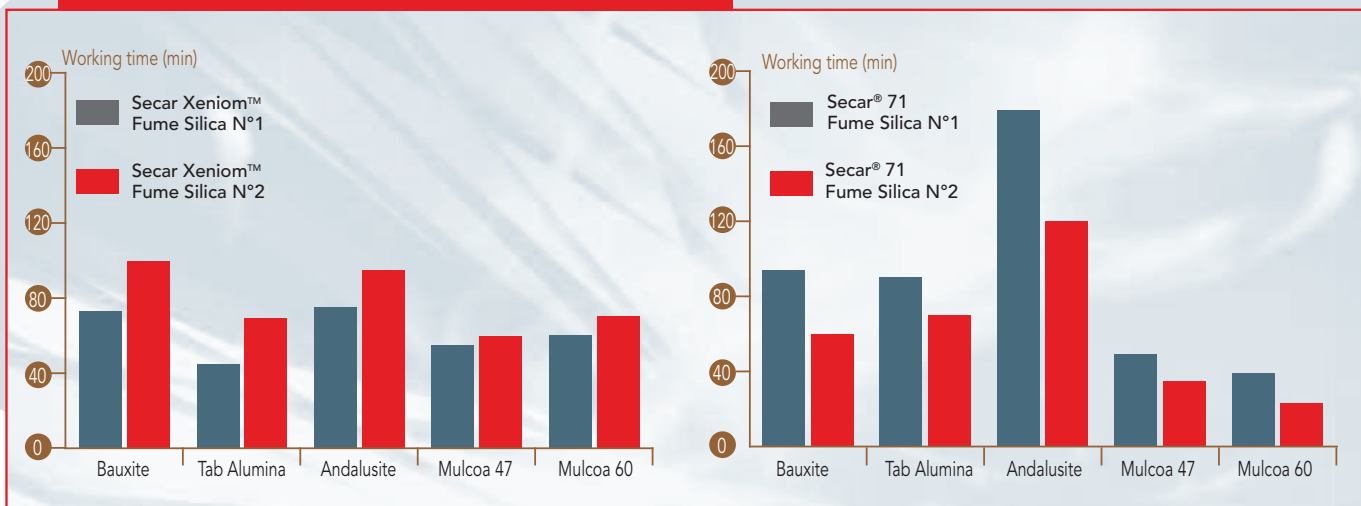
SECAR XENIOM™: WIDE RANGE OF COMPATIBLE FUME SILICA



As a mineral buffer, Secar Xeniom™ greatly facilitates the placing of castables allowing the creation of more stable systems that are less sensitive to fume silica lot variation. At the same time, other properties like setting time and hardening remain consistent.

Secar Xeniom™ based systems demonstrate more robustness towards changes in ambient temperature. This property enables to manage smoothly the seasonal transitions common in many regions (5 to 35°C).

WORKING TIME WITH DIFFERENT FUME SILICAS AND AGGREGATES



2 Second, SIMPLICITY



Secar Xeniom™ is a sophisticated formulation engine with one goal: to make development work easier!

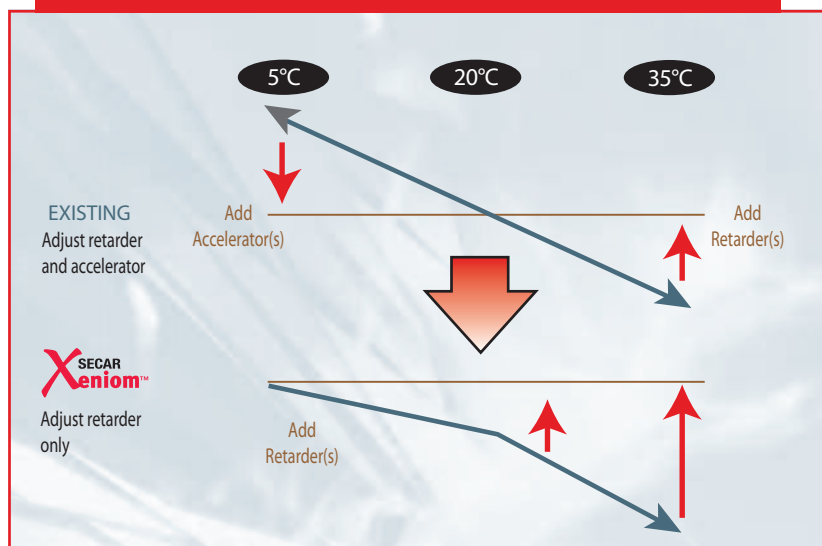
Secar Xeniom™ behaves well with traditional admixtures and can simplify many formulations, often requiring the use of fewer admixtures. It is well known that low dosage can be challenging to control effectively during production or on job site. Secar Xeniom™ is particularly suited to reduce such requirements.

Secar Xeniom™ is designed to exploit a single retarder logic, allowing the creation of systems convenient to adjust when the temperature varies. This is a significant improvement compared to the duo retarder / accelerator approach frequently used, which can be awkward to deal with.

Secar Xeniom™ reaches a proper flowability with low water addition and has been tested successfully with several kinds of mixers.

Secar Xeniom™ is, however, forgiving if excess of water is added and will tend to keep a similar level of performance in such circumstances.

SECAR XENIOM™: A DIFFERENT APPROACH TO ADMIXTURE ADJUSTMENT



Third, IMPROVED PERFORMANCE



Despite the focus on application and formulation ease, Secar Xeniom™ systems still meet the needs of the most demanding ULCC and LCC dense castables.

In term of green properties, Secar Xeniom™ shows good working time and rapid structure development, synonymous with high initial strength.

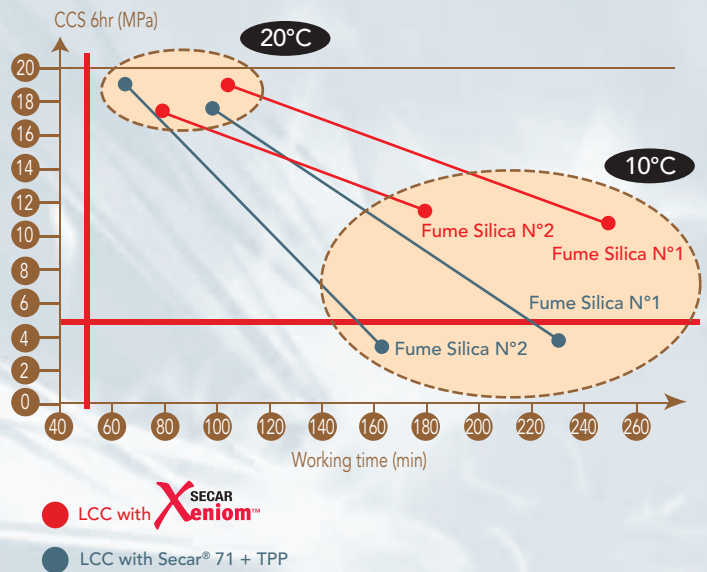
In term of high temperature properties, Secar Xeniom™ provides "best in class" hot mechanical strengths and abrasion resistance. Refractoriness under load is also better than traditional systems and improved permanent linear change is another feature of the product.

Secar Xeniom™ will give its best performance when new castables are designed from first principals and not when the product is just used to replace one product by the new product. A close cooperation with Kerneos is advised allowing access to the wide range of development testing conducted with many widely available raw materials that have been studied during the development of Secar Xeniom™.

For many years, the Secar® range has been Kerneos' commitment to quality stability, and wide availability supported by a high level dialogue allowing customers to meet their end-user requirements. Secar Xeniom™ inherits these qualities and goes one step further by offering a system aimed to efficiently work inside customer's R&D process and should allow the development of high performance castables quickly.

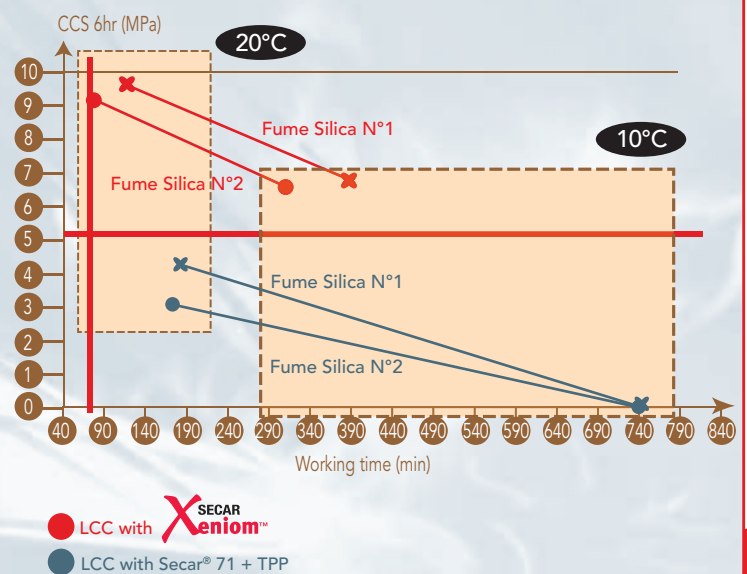
SECAR XENIOM™: ROBUSTNESS VS TEMPERATURE

Influence of temperature 10°C - 20°C, LCC Bauxite



SECAR XENIOM™: ROBUSTNESS VS TEMPERATURE

Influence of temperature 10°C - 20°C, LCC Andalusite



Analysis

TYPICAL VALUES

CHEMICAL COMPOSITION

Al ₂ O ₃	CaO	SiO ₂	Fe ₂ O ₃	MgO	TiO ₂	Na ₂ O+K ₂ O	SO ₃
82 – 85	14 – 16	< 0.35	< 0.3	< 0.5	< 0.3	< 0.7	< 0.3

Test method according to BS EN 196-2: methods of testing cement; chemical analysis of cement. K₂O and Na₂O soluble determined by the standard ASTM C114.

FINENESS

Blaine Specific Area (cm ² / g)	Residue at 90 μm
> 10,000	< 5

Test method according to EN 196-6: method of testing cement; fineness determination.

WORKABILITY

Initial flow	Flow after 30 min.
90 - 140%	90 - 140%

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

SETTING TIME

Initial set (min.)	Final set (min.)
35 – 60	45 - 70

Test method according to NF 15-330. Composition of the sand mortar: cement 500 g, sand 1,350 g, water 160 g (W/C = 0.32) prepared according to EN 196-1.

GREEN STRENGTH

Age	Compressive strength (MPa)
24h	14 - 20

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

MINERALOGICAL COMPOSITION

Principal phases¹: CA, CA₂, Aα

Secondary phases: C₁₂A₇

OTHER PHYSICAL CHARACTERISTICS

Bulk density: 0.7 – 0.9 g / cm³

Specific gravity: 3.2 – 3.3 g / cm³

PCE: 1,770 – 1,810°C

This information is given for guidance only.

1: C = CaO, A = Al₂O₃

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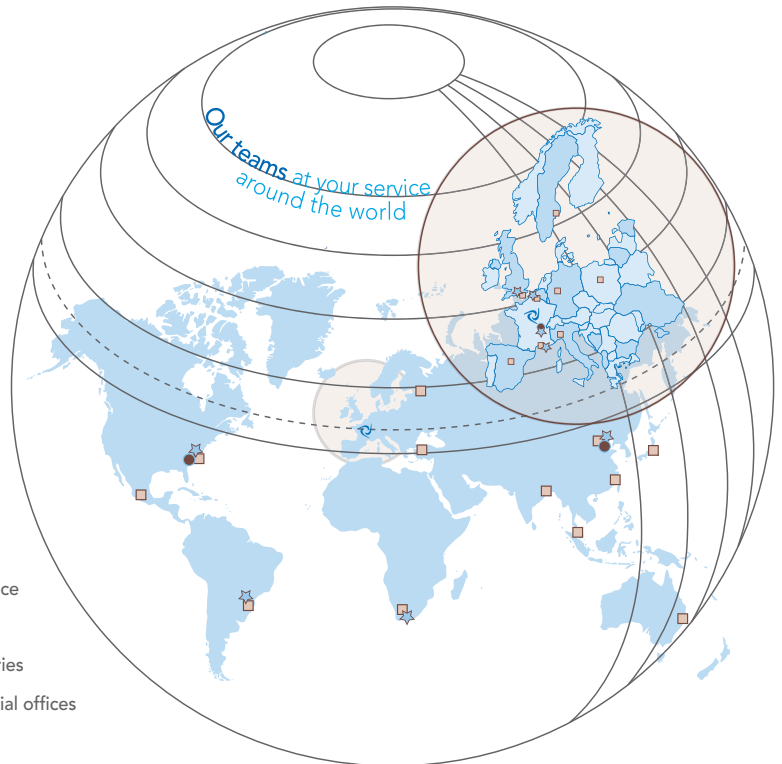
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