Castament®

A New Generation of Dispersants for Innovative Refractory Materials

Castament® FS 10
Castament® FS 20
Castament® FS 30
Castament® FS 40
Castament® FS 60
Castament® FW 10

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The family of plasticizers

*Castament®* **FS 10, FS 20, FS 30, FS 40, FS 60 and FW 10**

provide solutions for hydraulically binding advanced monolithic refractory materials to meet high-performance requirements in terms of flow, strength development and durability.

**General information on refractory/castable application**

The *Castament®* series consists of dry powder polymers based on polyethyleneglycole. These products have been developed to efficiently defloculate calcium aluminate cement particles, fines and aggregates to improve the rheological properties as well as the placing properties of castables in refractory application. High range water reduction and improved rheological behavior of the castable are important considerations to enhance the properties of refractory products.

**Following products may be formulated using Castament®:**

- Self-flowing low-cement castable mixes
- Shotcreting / gunning mixes, repair grouts and joint fillers
- Ramming and vibration mixes

**Benefit**

- Reduced water requirement
- Improved placement and installation
- Increased density and wear resistance
- Prolonged service life
- Reliable quality and performance

**Properties of Castament® Types**

- Efficient dispersing properties
- Excellent flowability / workability / pumpability
- Compatible with most other chemical additives
- Improved physical properties
- ISO 9001:2000 TQM
Binder System in Castable Application

Raw material source and characteristics of the Calcium Aluminate Cement (CAC) hydraulic binder, Reactive Alumina and Microsilica are important details for choosing the most effective Castament type for a specific recipe.

Where the different Castament® products are applied best is given in the following overview scheme.

Depending on CAC type, fines and climate there are different challenges for plasticizers to provide specific solutions to microsilica-free ULCC / LCC mix designs. Now three Castament® types are available to adjust the requirements of castable formulations with a binder matrix based on

➔ high alumina CAC (70 % Al₂O₃) and
➔ reactive aluminas

The Castament® types can be used to optimise Flow and Set Time / 24 h Cold Crushing Strength as seen in the diagram.
Profile of Castament®

Hydraulically setting mix designs focus on different application requirements. Calcium Aluminate Cement (CAC) type, fine materials and temperature determine the basic parameters. In addition different types of deflocculants have been developed in order to enable the adjustment of flow properties and water demand. Castaments diverse chemical characteristics provide additional possibilities to adjust the formulation to the application requirements.

1. Cement type and temperature give directions to the workability performance of Castament®

The following figures show the flow properties of castables prepared with different deflocculants at 20 °C and 35 °C as well as Cement CAC 1 respectively CAC 2.

Test Recipe

<table>
<thead>
<tr>
<th>Component</th>
<th>Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tabular Alumina</td>
<td>3 – 6 mm</td>
<td>25 %</td>
</tr>
<tr>
<td></td>
<td>1 – 3 mm</td>
<td>5 %</td>
</tr>
<tr>
<td></td>
<td>1 – 2 mm</td>
<td>10 %</td>
</tr>
<tr>
<td></td>
<td>0.5 – 1 mm</td>
<td>11 %</td>
</tr>
<tr>
<td></td>
<td>0.2 – 0.6 mm</td>
<td>6 %</td>
</tr>
<tr>
<td></td>
<td>0 – 0.2 mm</td>
<td>12 %</td>
</tr>
<tr>
<td></td>
<td>0 – 0.045 mm L</td>
<td>9 %</td>
</tr>
<tr>
<td>Reactive Alumina</td>
<td>Multi-modal</td>
<td>17 %</td>
</tr>
<tr>
<td>Cement (70 % Al₂O₃)</td>
<td>CAC 1 resp. CAC 2</td>
<td>5 %</td>
</tr>
<tr>
<td>Dispersant</td>
<td>Variable</td>
<td>0.2 %</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>4.2 %</td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAC 1, +20 °C / +68 °F

CAC 2, +20 °C / +68 °F

Flow [cm]
A slight decrease in flow is observed at 20 °C for all products which is more distinct at 35 °C. Both cements behaved differently. Similarly the time to reach the maximum heat of hydration changes by almost a factor of 10, which is consistent with the acceleration of cement hydration at elevated temperatures. 24-hour Cold Crushing Strengths also correlate with the retarding effect of different Castaments®.
2. Reactive Alumina impacts flow and retardation of Castament’s performance

Castament® can be used in many MS-free LCC recipes. The properties of a LCC recipe like free-flow, workability, set time and early strength are mostly defined by the type of cement and the fine materials like reactive alumina used. The binder components and the raw material sources influence the use of Castaments®.

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| Reactive Alumina        | Variable   | 17%        |
| Cement                  | CAC with 70 % Al₂O₃ | 5%          |
|                         | 100%       |            |

| Dispersant              | Castament® FS 60 or Castament® FS 30 | 0.2%        |
| Water                   |                                         | 4.4%        |

Flow as a Function of Time: Castament® FS 60

Heat of Hydration as a Function of Time: Castament® FS 60

Depending on the type of Reactive Alumina used (A = multi-modal, B = bi-modal, C = bi-modal, D = mono-modal) basic parameters like flow and set time can be adjusted by the addition of Castament®.
Storage Instructions for 
Castament®:

Due to the special polymer properties of the Castament® powder products there is a thermal sensitivity which may lead to physical softening of the powder at elevated temperatures. Castament® should therefore be stored dry and at temperatures not exceeding +40 °C / 104 °F. Do not double stack the pallets. The shelf life of Castament® is up to 1 year when properly stored.

Note

Furthermore, it is important to obey the relevant regional respectively national laws and regulations concerning safety, environmental protection, storage and transport. Also please follow the corresponding advice given in technical and material safety data sheets.

➔ For further information please contact our technical service, see our technical datasheets, or look at our web page for literature under www.degussa-cp.com.

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