



# PRODUCT DATA SHEET

## EFA-Füller<sup>®</sup> D4

Pulverised fly ash (PFA) according to EN 450-1 for concrete according to EN 206-1

### Origin

Fly ash EFA-Füller<sup>®</sup> D4 is produced in the hard coal-fired power plant Datteln 4 of Uniper Kraftwerke GmbH.

### Properties

Due to a boiler temperature of about 1.300 °C the mineralogical components of the pulverised hard coal are melting and become spherical and amorphous. This makes EFA-Füller<sup>®</sup> D4 to a fine-grained, ball-shaped pozzolanic binder. Its chemical and mineralogical composition is comparable with natural pozzolans like volcanic ashes. Its main chemical components are as follows in mess-%:

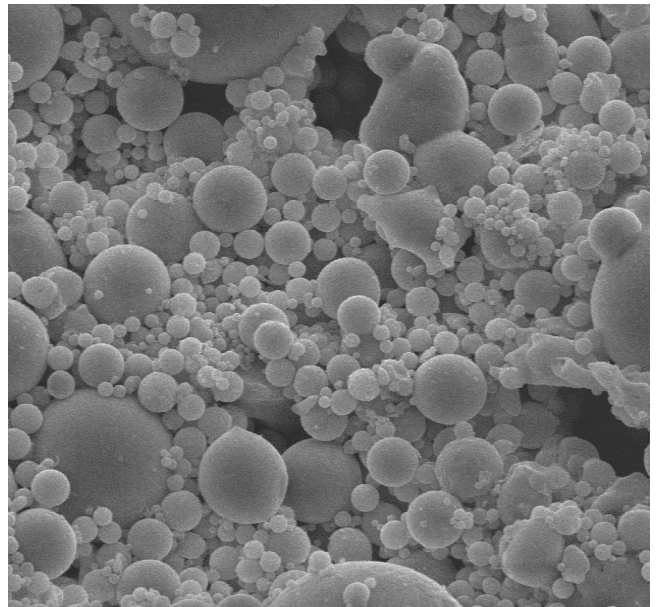
### Benefits

SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO, Na <sub>2</sub> O, K <sub>2</sub> O
47 - 57	20 - 28	5 - 13	3 - 10	1 - 3

- Reduction of cement
- Reduction of the water demand of the binders
- Improved workability of fresh concrete including pumping capability
- Increased compactability of fresh concrete
- Reduction of the hydration temperature, e.g. for mass concrete
- Reduced efflorescence of the concrete
- Increased resistance against chemical attacks on concrete, e.g. sulphate, chloride, sea water
- Reduced risk of a alkali-silica-reaction in conjunction with alkali-sensitive aggregates

### Certificates

- EU countries: EC certificate (CE-mark)



scale: 1000:1

### Use in concrete

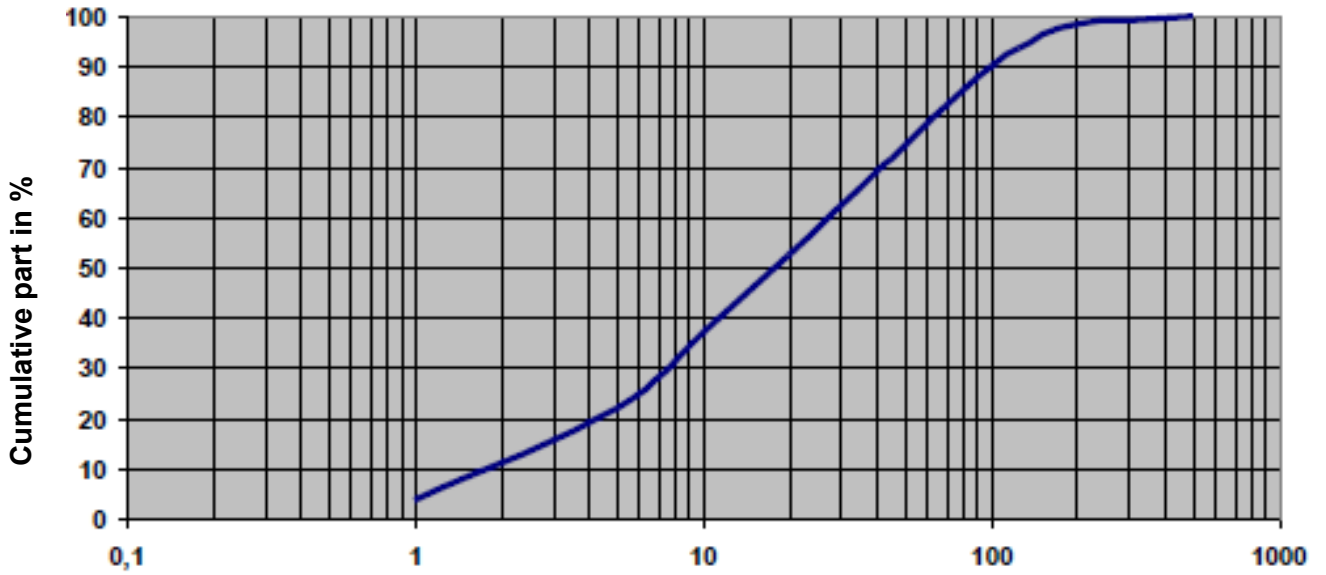
Due to different national technical regulations each country has its own rules for the application of PFA in concrete and cement. In Europe PFA is mainly applied according to the k-value concept. The k-value is a benchmark of the performance of PFA in relation to cement. It varies depending on national standards, type of cement and environmental conditions. Alternatively PFA is used in concrete based on performance concepts. PFA can substitute 25 % of the cement and more.

### Characteristic values

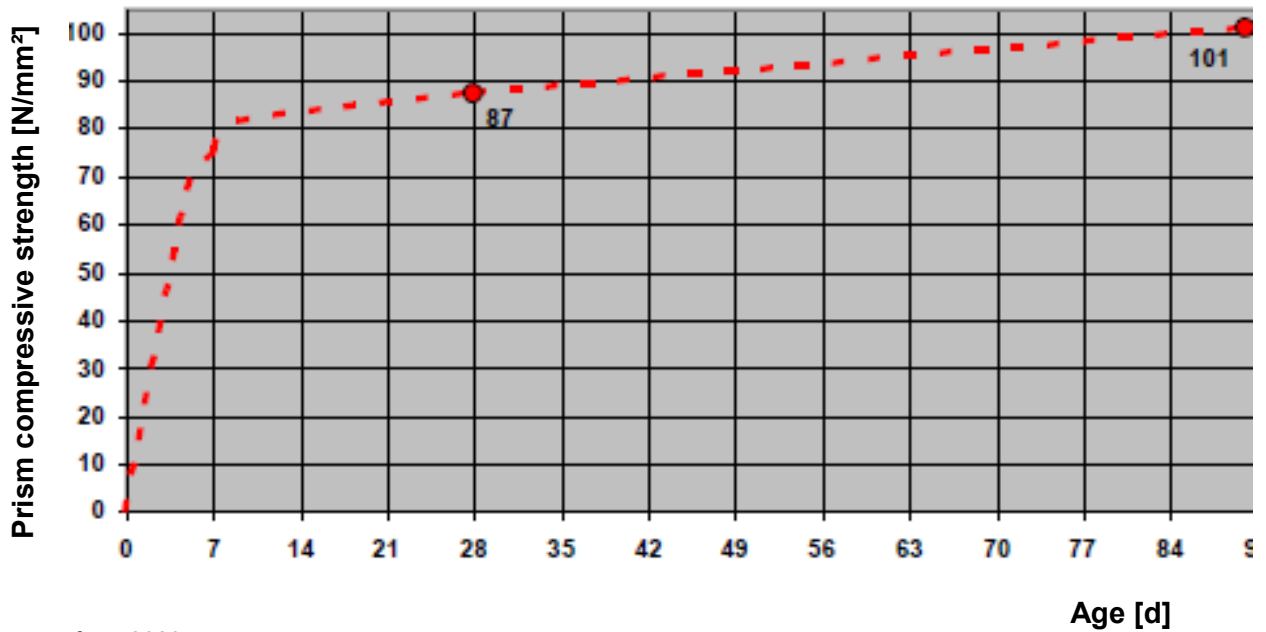
Loss on ignition category A:	≤ 5 % by mass
Fineness > 45 µm:	20 ± 10 % by mass
Na <sub>2</sub> O equivalent *	3,1 % by mass
Bulk density *	1.07 t/m <sup>3</sup>
Particle density:	2.30 ± 0.20 t/m <sup>3</sup>

\* average of the year 2020

Particle size distribution \*



Strength development\* (according to EN 196 - 1)



\* average from 2020

**Certification body**  
Ibac  
institut für Bauforschung  
RWTH Aachen

**Producer**  
Uniper Kraftwerke GmbH  
Kraftwerk Datteln 4  
Im Löringhof 10  
45711 Datteln

<b>EFA-Füller® D4</b> <b>Pulverised Fly Ash according EN 450-1</b>
<b>CE</b>
1077 – CPR – 426010101

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Type II addition for concrete according to EN 206-1