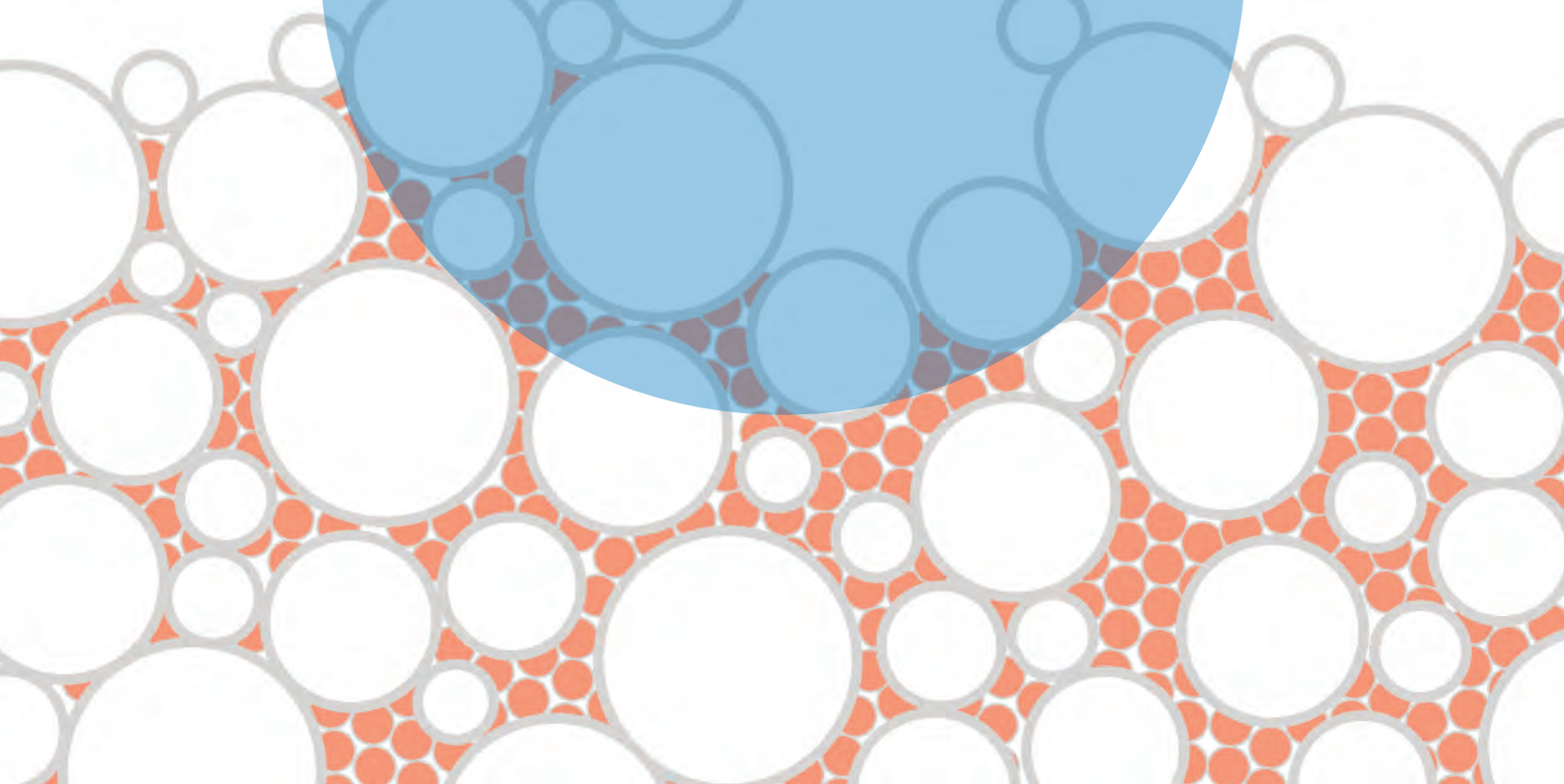


Dyckerhoff MIKRODUR®
...from the finest



d_{95} → **Dyckerhoff Rapid Hardening Cement
CEM I 52.5 R** ← d_{95}



Dyckerhoff MIKRODUR

Ultrafine binders in action worldwide

2



1. Seattle, USA,
Beacon Hill Tunnel,
pre-excavation-
grouting



2. Florida, USA,
Cape Canaveral,
stabilization



3. Lake Maracaibo,
Venezuela, oil well
squeeze (repair)
cementing



4. Berlin, Germany, Brandenburger Tor, underpinning



5. Moscow, Russia, St. Basil's Cathedral, masonry repair



8. Hassi-Messaoud, Algeria, light weight oil well cement slurries



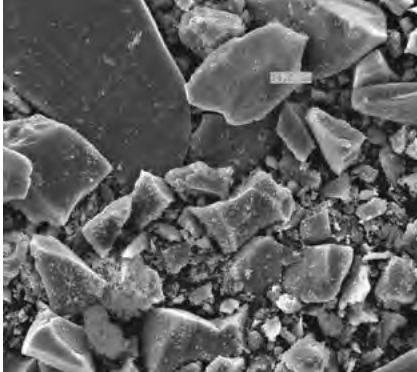
6. Tarko Sale, Russia/Siberia, underpinning of concrete piles



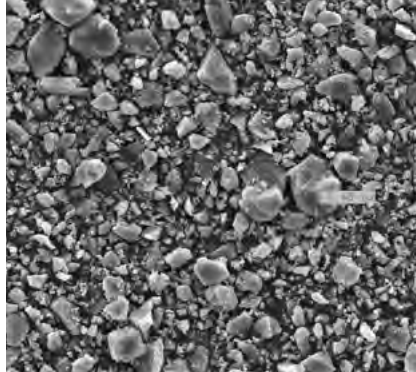
7. Muratlin, Turkey, Hydropower Station, ridge slot grouting

Dyckerhoff MIKRODUR

Description / Applications



Common blend of standard cement with ultrafine filler



MIKRODUR Grade F

Scanning Electron Microscope (SEM)-Shots (1000 x)

The specific surface area according to Blaine of both products is approx. 1200 m²/kg

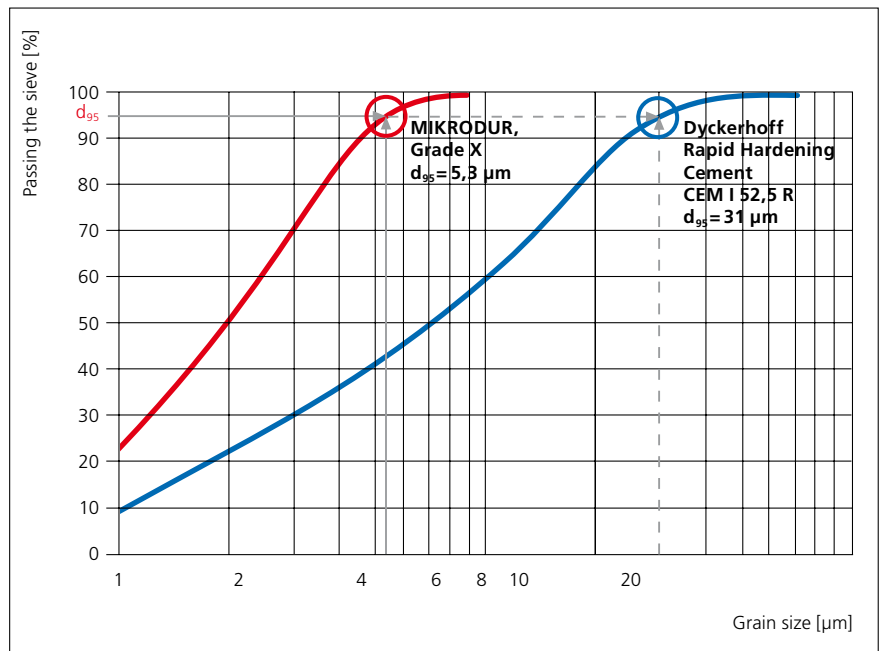
Description

Dyckerhoff MIKRODUR ultrafine binders are produced according to a patented production process (European Patent 696 558). The main components, blast furnace slag and Portland cement clinker, are separately grinded and classified to the requested grade. These fractions are blended with selected gypsum to a regulated setting according to fixed formulas in a batch mixer into Dyckerhoff MIKRODUR.

This process guarantees the unique, consistent quality of MIKRODUR ultrafine binders.

According to the European Standard EN 12715:2000 "Grouting" ultrafine binders are characterized through a steep, uniform grain size distribution. The maximum grain size-value d_{95} may not exceed 20 μm .

The specification of the specific surface area (Blaine) isn't significant for ultrafine binders as it gives no information about the maximum grain size, which is the key parameter for groutability.



The limitation of the maximum grain size d_{95} distinguishes ultrafine binders from standard cements. The d_{95} -value is essential for the choice of suitable binder for the following applications:

- Grouting of soils with consideration of the grain size distribution of the soil,
- Grouting into rock and concrete with consideration of the crack-size,

- Optimization of the grain size distribution of standard cements, mortars or well cements to improve their performance characteristics,
- Squeeze cementing to seal leakages in gas and oil wells.



Rock grouting



High performance mortar

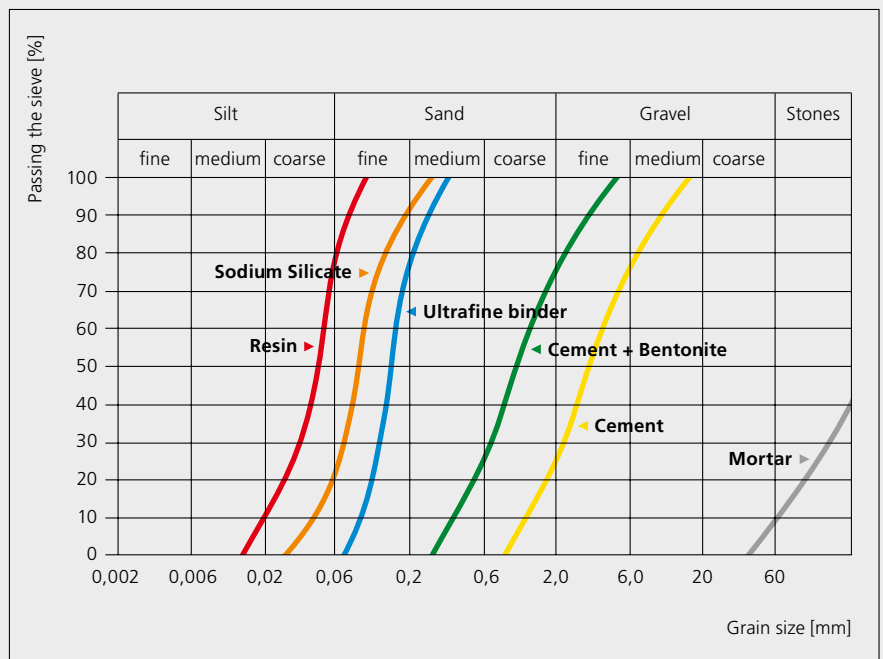


Concrete and masonry repair

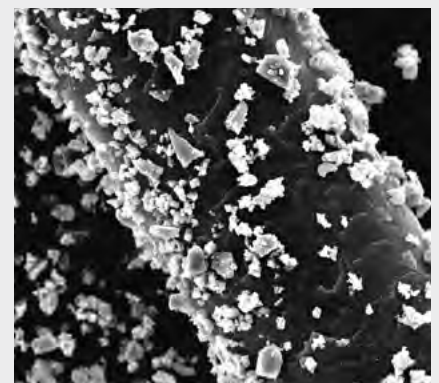
Applications

Ultrafine binders are mainly used for stabilization and/or waterproofing of soils where standard cements are not applicable due to their grain size. Ultrafine binders have significantly extended the range of soils being groutable with cements. Nowadays, soils with 80% of fine sand are groutable with suitable ultrafine binders.

- Furthermore, ultrafine binders are used
- for waterproofing and stabilization of rock in tunnelling,
 - for repair of concrete or mortar,
 - as a component for high performance concrete as a substitute for microsilica,
 - for remedial cementing of oil and gas wells,
 - to improve the early strength of light weight oil well cement slurries.



Limitations for the application of different grouting materials in soils.



Dyckerhoff MIKRODUR on human hair (SEM-shot)

Dyckerhoff MIKRODUR

Product Range / Packaging / Customer Services

6



Grouting tests at the job-site



Underpinning, Staatsbibliothek Berlin

Product Range

For more than 15 years Dyckerhoff has provided under the brand name MIKRODUR application-oriented ultrafine binders:

- MIKRODUR P based on Portland cement clinker providing fast strength development,
- MIKRODUR R based on granulated blast furnace slag providing high sulphate resistance and high final strength,
- MIKRODUR R/E plus based on granulated blast furnace slag providing high sulphate resistance and moderate final strength.

Dyckerhoff MIKRODUR is produced with reduced content of soluble chromium (VI) according to 2003/53/EC.

Dyckerhoff MIKRODUR does not contain harmful substances for groundwater (certificates are available)

Dyckerhoff MIKRODUR has been tested with admixtures of different producers.



Bottom sealing, district Berlin-Mitte

The shelf life of Dyckerhoff MIKRODUR, when dry stored and originally packed, is minimum 6 months.

Material safety data sheets of Dyckerhoff MIKRODUR inform about safety precautions during handling.

Properties of Dyckerhoff MIKRODUR can pointedly adapt to special requirements for the job site.



Installation for sand column test



R&D center "Wilhelm Dyckerhoff Institut"

Packaging

Dyckerhoff MIKRODUR is available in

- 25 kg bags
(3 layer paper bags with PE-coating)
- 1 mt jumbo bags
- silo truck
(Germany and neighbouring countries only)

You will find further technical information about Dyckerhoff MIKRODUR or other grouting binders like VARIODUR in our product leaflets.

Contact us!

Customer Services

Dyckerhoff provides technical support before, during and after the application of Dyckerhoff MIKRODUR ultrafine binders.

Therefore, our R&D Service Center in Wiesbaden is equipped to carry out several physical, chemical and engineering analysis.

Here is a short extract from our service program:

- Estimation of groutability of soil
- Formulation of grout
- Grouting tests with sand columns
- Support of grouting tests on site
- Chemical and physical analysis
- Microscopy

For further information and individual advice you can contact us at:

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Court of jurisdiction: Wiesbaden,
Federal Republic of Germany.