

Geosil[®] – ready to use Alkali Silicates for Geopolymers

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- Who we are
- Basic Facts about Alkali Silicates
- Geosil® - Silicate binders for Geopolymer-based system
- Geopolymer Accelerators
- Geopolymer Additives
- Laboratory Trials 1K-Geopolymer

COMPANY INTRODUCTION

Owned by Dr. Eduard Wöllner family foundation

Founded in 1896 – 130 years of experience

Head office in Ludwigshafen / Germany

Main product groups:

- industrial silicates
- raw materials and additives for paints, plasters and construction materials
- process chemicals for industrial water circuits

Approx. 150 employees

Annual turnover approx. 70 M€

Sites in Germany & Austria



Basic facts about alkali silicates





Basic facts about Alkali Silicates

- Glasses soluble in water, consisting of a combination of alkali metal oxide (Na_2O , K_2O , Li_2O) & silica (SiO_2) in varying proportions
- Alkali silicates are generally not distinct stoichiometric chemical substances
- No specific chemical formula for each product
- Common name = Waterglass
- Products available as solution and powder



Molar and weight ratio

$$\text{Molar ratio} : \frac{n \text{ SiO}_2 [\text{mol}]}{n \text{ Me}_2\text{O} [\text{mol}]} = MR [-]$$

$$\text{Weight ratio} : \frac{w \text{ SiO}_2 [\%]}{w \text{ Me}_2\text{O} [\%]} = WR [-]$$

Technical significant liquid Na, K & Li-silicates and mixtures thereof:

- Sodium silicate $MR = 1,7 - 4,0$
- Potassium silicate $MR = 1,0 - 4,0$
- Lithium silicate $MR = 2,5 - 5,0$



Geosil® - Silicate binders for Geopolymer-based systems



Geosil® - Silicate binders for geopolymeric systems

- Geosil® - products are not blends of standard alkali silicates with hydroxide
 - New production technology
 - Highest possible solid content & optimal Q-structure distribution
-
- + Ready-to-use solutions
 - + Many variations are possible
 - + User-friendly - no hydroxide handling
 - + High purity of raw materials
 - + Reproducible & controlled production process
 - + Storage stable solutions
- Limitation for some molar ratios: dangerous goods (ADR)
 - Molar ratio $< 1,7$ for sodium based products are not suitable due to limited shelf life / spontaneous crystallisation

Geosil® - Types

Product	Geosil® 14515	Geosil® 14517	Geosil® 34417
Alkali metal	potassium	potassium	sodium
Viscosity [mPa·s]	Ca. 20	Ca. 20	Ca. 430
CLP - classification	H290 / H314 (1B) / H318	H315 / H318	H315 / H318
CLP - label			
ADR - classification	Class 8 / packaging group II	none	none

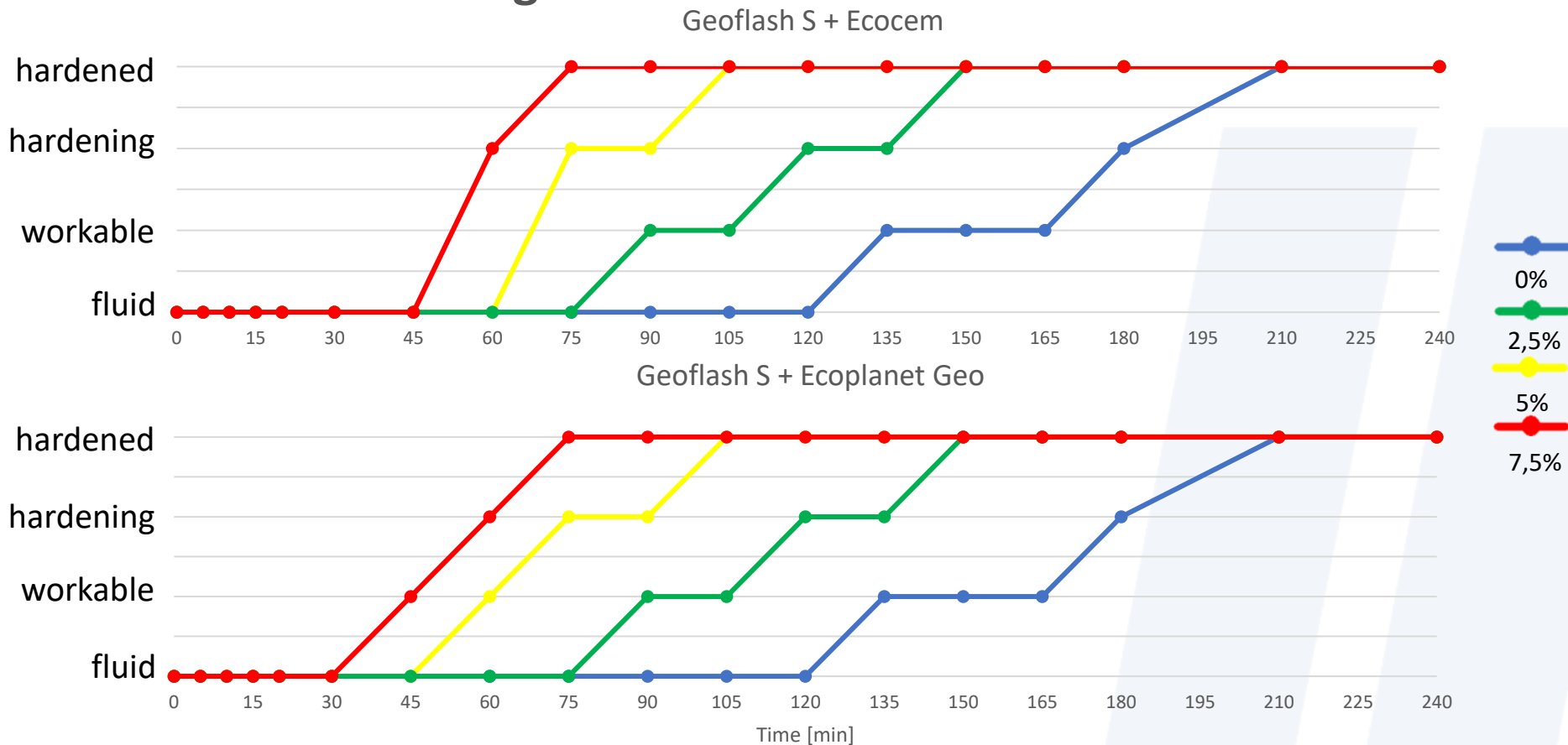
Geosil® - Types

Product	Geosil® WB 10	Geosil® WB 30
Suitable for	Potassium silicate	sodium silicate
Viscosity [mPa·s]	Ca. 20	Ca. 170
CLP - classification	H315 / H318	H315 / H318
CLP - label		
ADR - classification	none	none



Accelerators

Acceleration with Slag



Molar Ratio and Slag

MR: 1,0



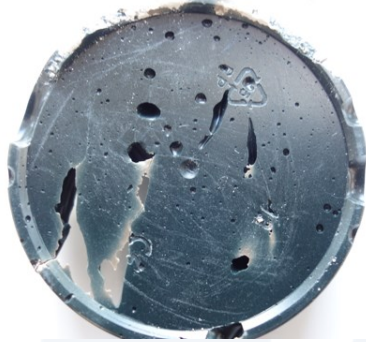
MR: 1,4



MR: 1,5



MR: 1,7



MR: 2,0



MR: 2,5



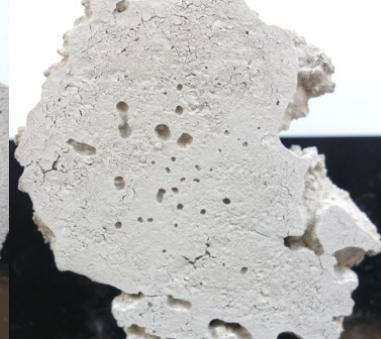
MR: 2,9

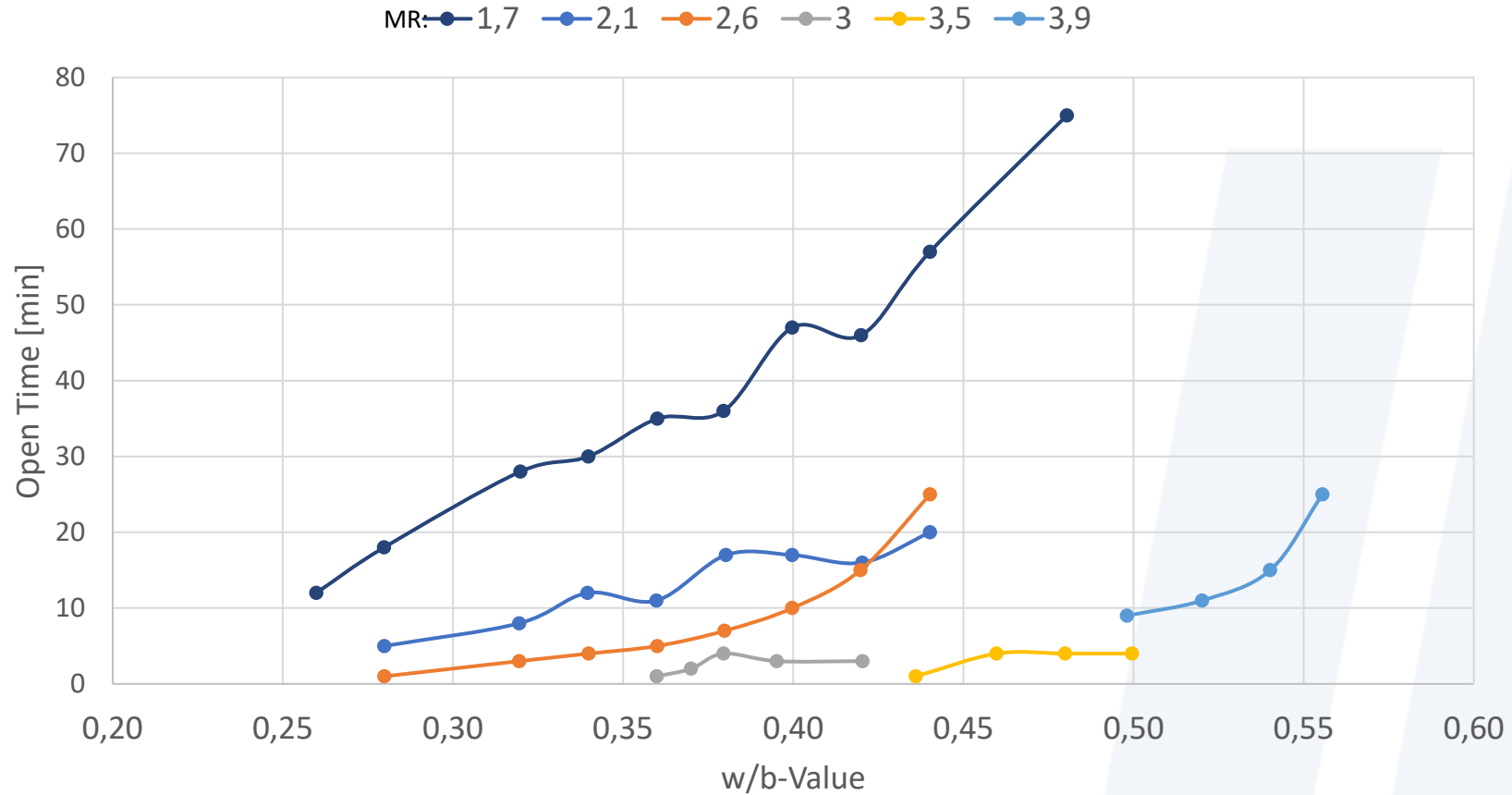


MR: 3,5



MR: 3,9





Screening Slag 1

Potassium silicate

Sodium silicate

MR:	1,0	1,7	2,6	3,9	1,7	2,1	3,5
Before water storage							
After water storage							
Result	OK	OK	Good	OK	OK	Bad	Bad

Screening Slag 2

Potassium silicate

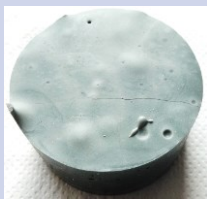
Sodium silicate

MR:	1,0	1,7	2,6	3,9	1,7	2,1	3,5
Before water storage							
After water storage							
Result	OK	OK	OK	Bad	OK	OK	Bad

Screening Slag 3

Potassium silicate

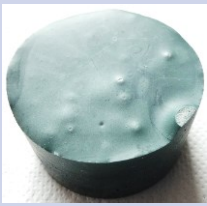
Sodium silicate

MR:	1,0	1,7	2,6	3,9	1,7	2,1	3,5
Before water storage							
After water storage							
Result	OK	OK	OK	bad	OK	good	bad

Screening Slag 4

Potassium silicate

Sodium silicate

MR:	1,0	1,7	2,6	3,9	1,7	2,1	3,5
Before water storage							
After water storage							
Result	OK	OK	Good	Good	OK	Good	Bad

Stabilisil® 19

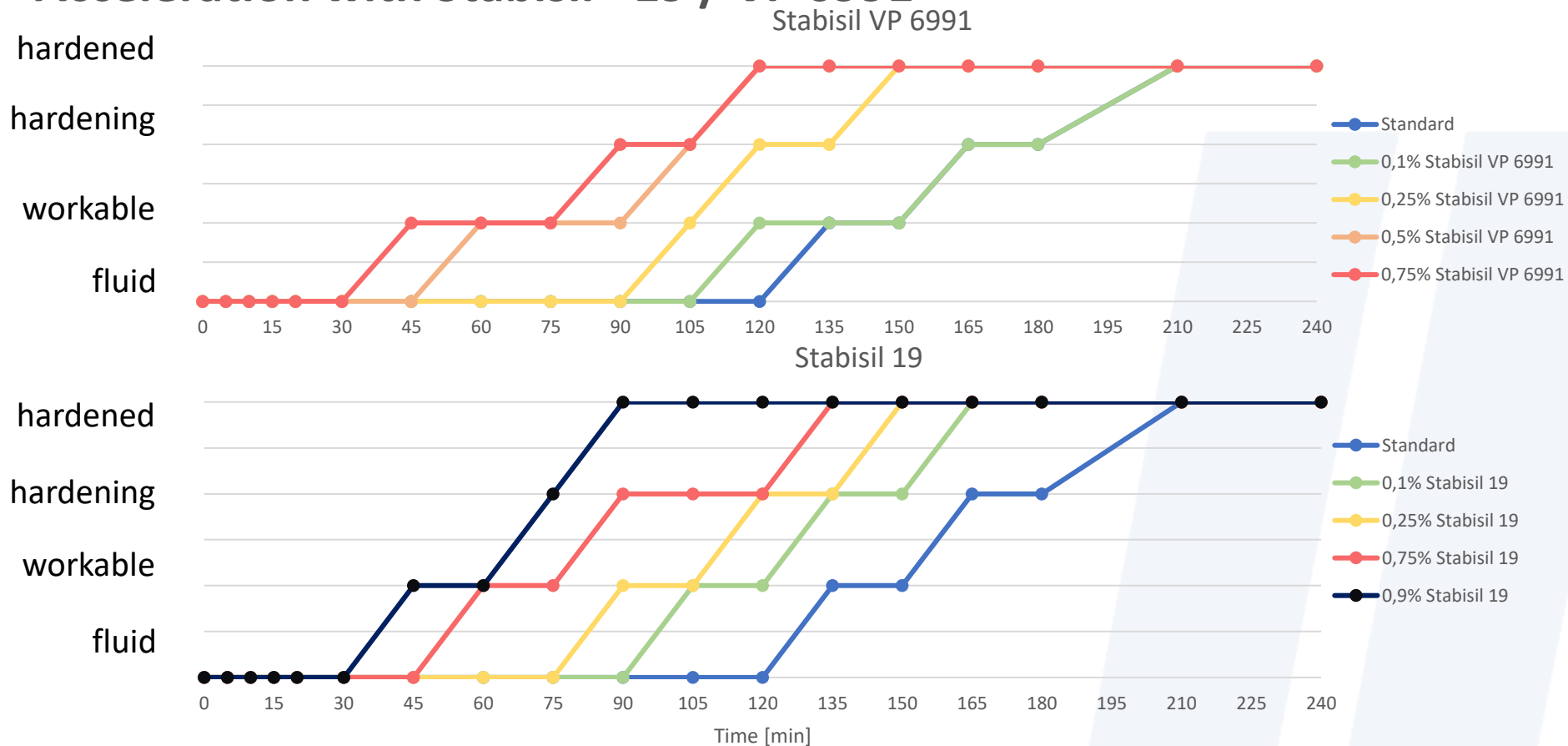
Stabilisil® VP 6991



Stabilisil® - Types

Product	Stabilisil® 19	Stabilisil® VP 6991
Suitable for	Potassium and sodium silicate	
Al ₂ O ₃ content [%]	19	54
Viscosity [mPa·s]	Ca. 120	NaN (powder)
CLP - classification	H290 / H314 / H318	H314 / H318
CLP - label		
ADR - classification	Class 8 / packaging group	none

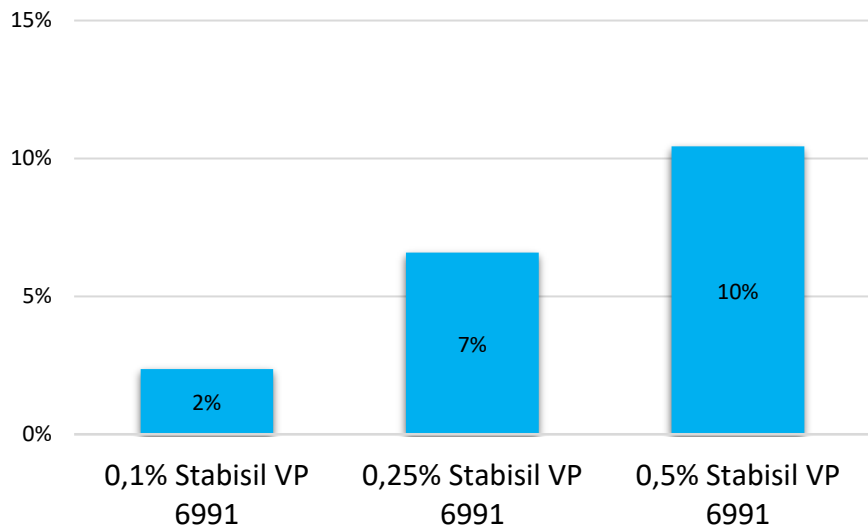
Acceleration with Stabasil® 19 / VP 6991



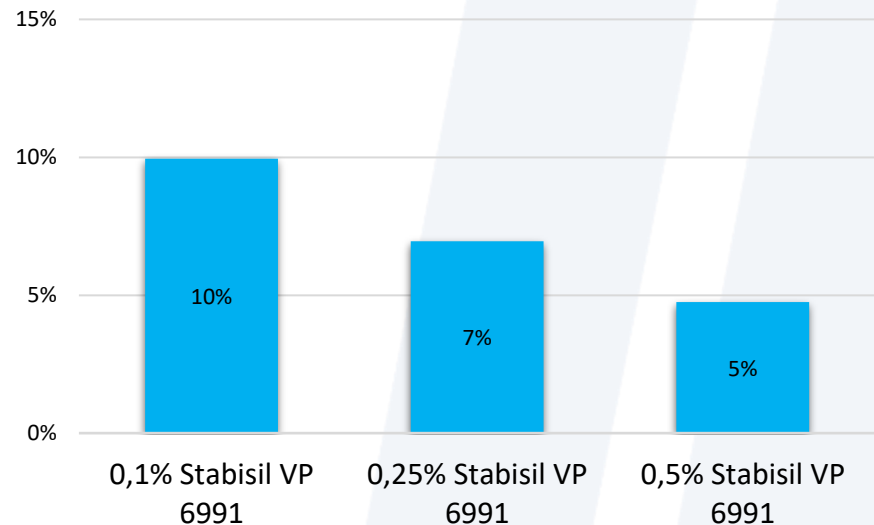
Stabilis® VP 6991

Relative strength

Tensile strength



Compressive strength



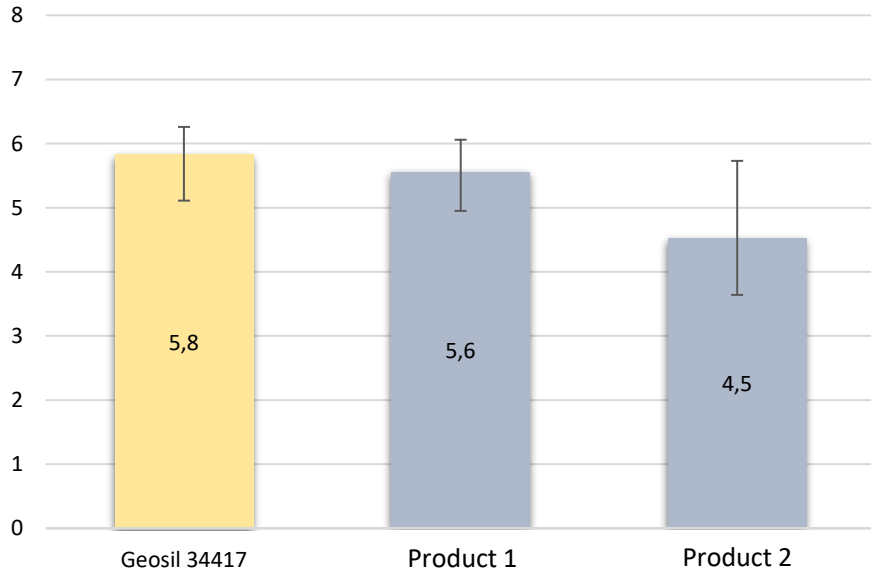
1K-Geopolymer



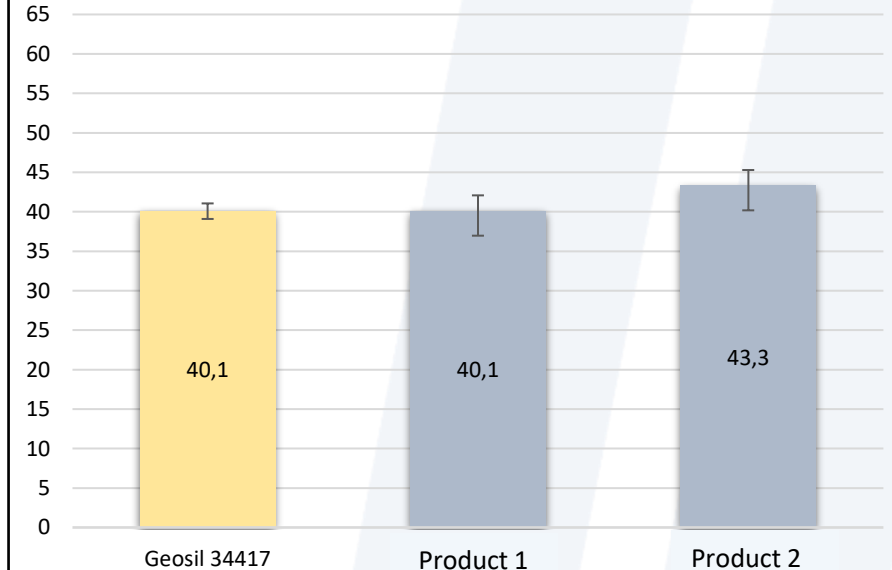
Strength comparison Geosil® 34417 vs. Laboratory products

Customer Recipe

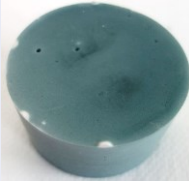
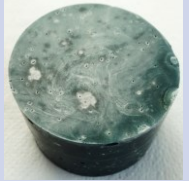
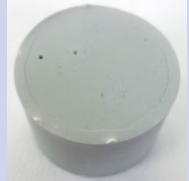
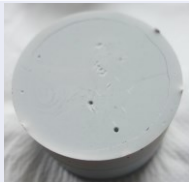
Tensile strenght [N/mm²]



Compressive strength [N/mm²]



Laboratory Products with different Slags

Laboratory Product	1	1	1	1	2	2
Slag	Slag 1	Slag 2	Slag 3	Slag 4	Slag 4	Ecoplanet Geo
After 7d curing						
After 28d curing						
After water storage						

Your expert in
woellner
silicates & special chemicals
chemical solutions

