Geosil® – ready to use Alkali Silicates for Geopolymers

17th GeopolymerCamp 2025

Joerg Lind
Wöllner GmbH
Phone +49 17 34 30 12 11
joerg.lind@woellner.de




Matthias Weiss
Wöllner GmbH
Phone +49 17 26 37 90 88
matthias.weiss@woellner.de

- Who we are
- Basic Facts about Alkali Silicates
- Geosil® - Silicate binders for Geopolymer-based system
- Influence of water and how to compensate
- Standardisation

COMPANY INTRODUCTION

Owned by Dr. Eduard Wöllner family foundation

Founded in 1896 – more than 125 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

$$Molar\ ratio: \frac{n\ SiO_2\ [mol]}{n\ Me_2O\ [mol]} = MR\ [-]$$

$$Weight\ ratio: \frac{w\ SiO_2\ [\%]}{w\ Me_2O\ [\%]} = WR\ [-]$$

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

Pros

+ 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

Cons

– 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 crystalisation

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® TB 10	Geosil® TB 30	Geosil® WB 10	Geosil® WB 30
Suitable for	Potassium silicate	sodium silicate	Potassium silicate	sodium silicate
Viscosity [mPa·s]	Ca. 20	Ca. 370	Ca. 20	Ca. 170
CLP - classification	H315 / H318	H315 / H318	H315 / H318	H315 / H318
CLP - label				
ADR - classification	none	none	none	none

Influence of water and how to compensate

Origin of water in geopolymeric systems

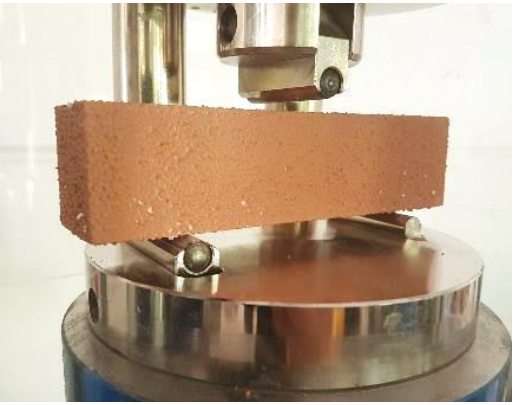
- Geosil®

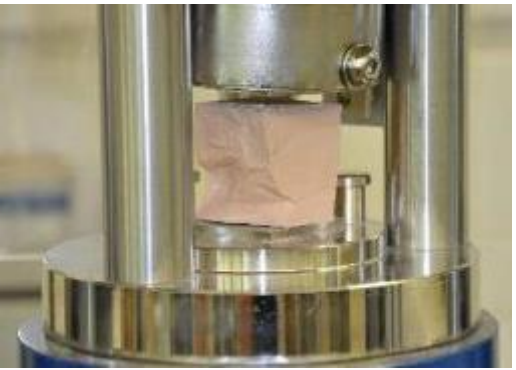
- Added on purpose to increase flowability / open time

- Gravel / fillers

Cracking

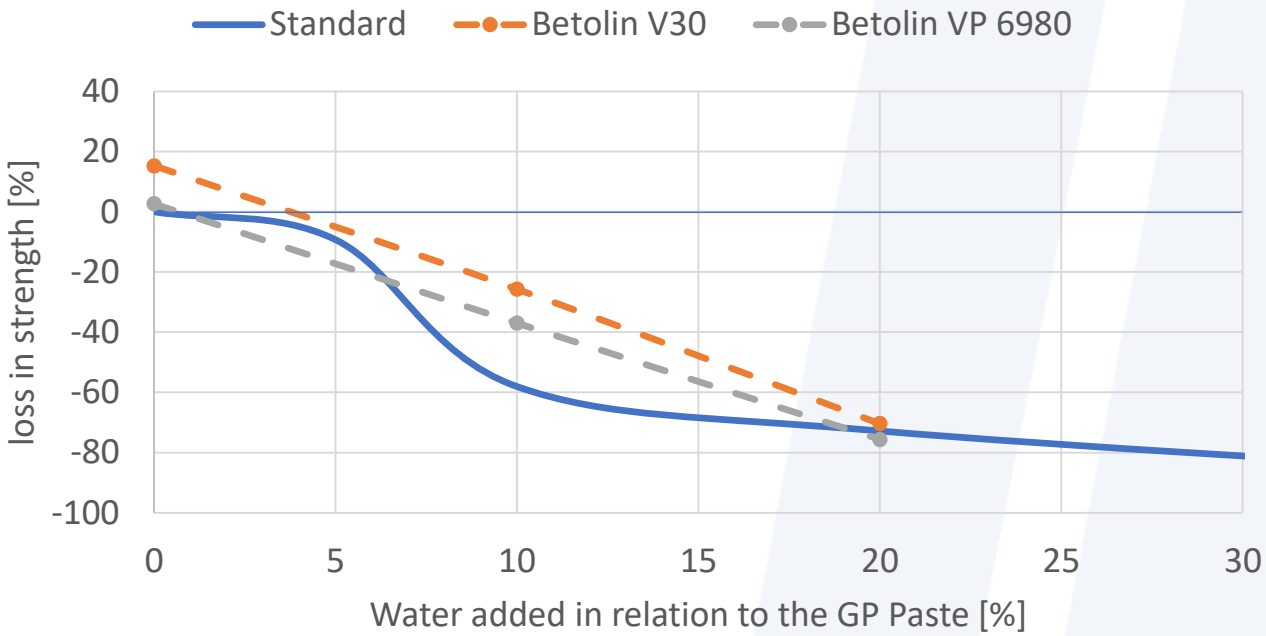
	Standard	Betolin V30	Betolin VP 6980
Sodium			
Potassium			

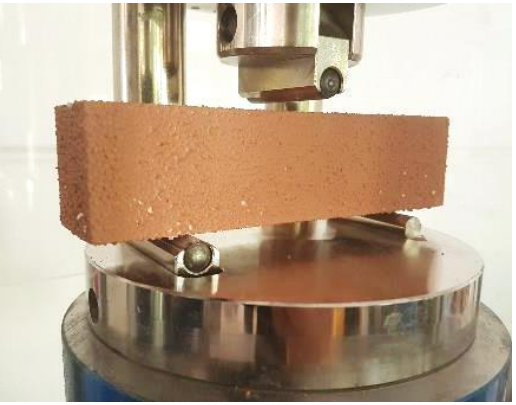


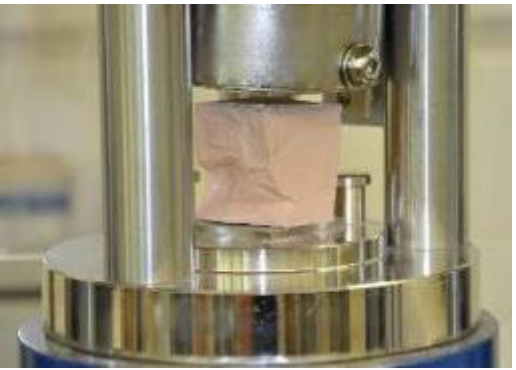


Water compensation - Sodium Geopolymer

Strength according to DIN EN 196-1

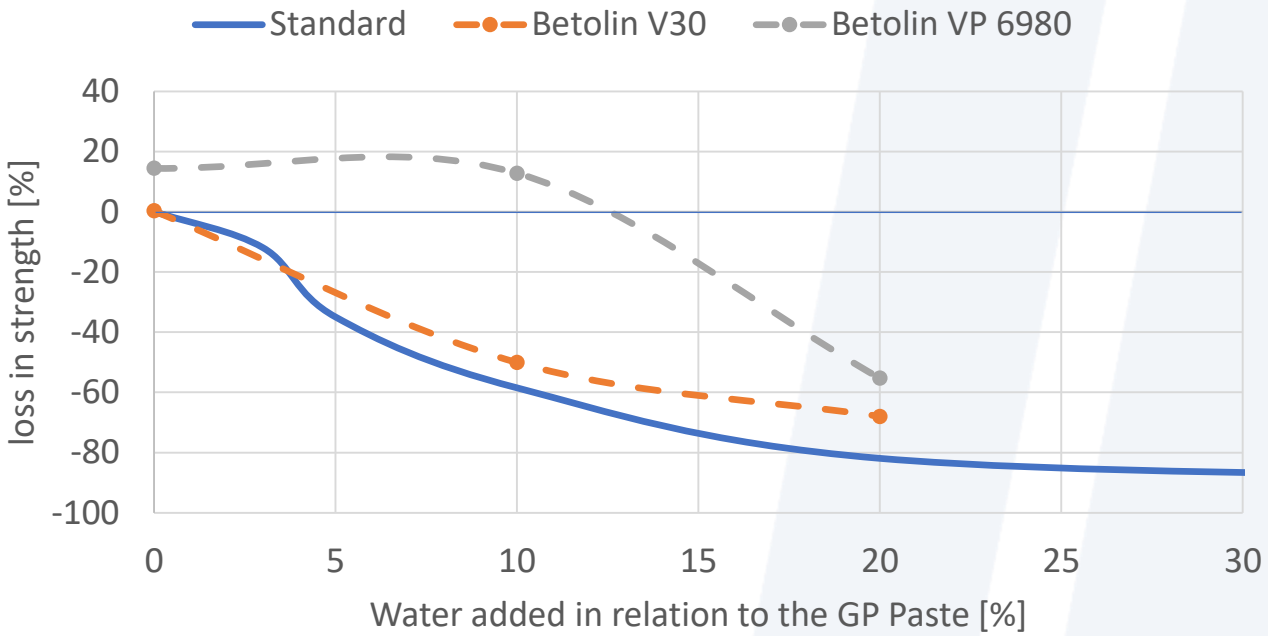






Water compensation - Potassium Geopolymer

Strength according to DIN EN 196-1



Standardisation

Common Concrete Standards

EN 771-3

EN 1992-1-1

EN15743

EN 1339

EN 13282-2

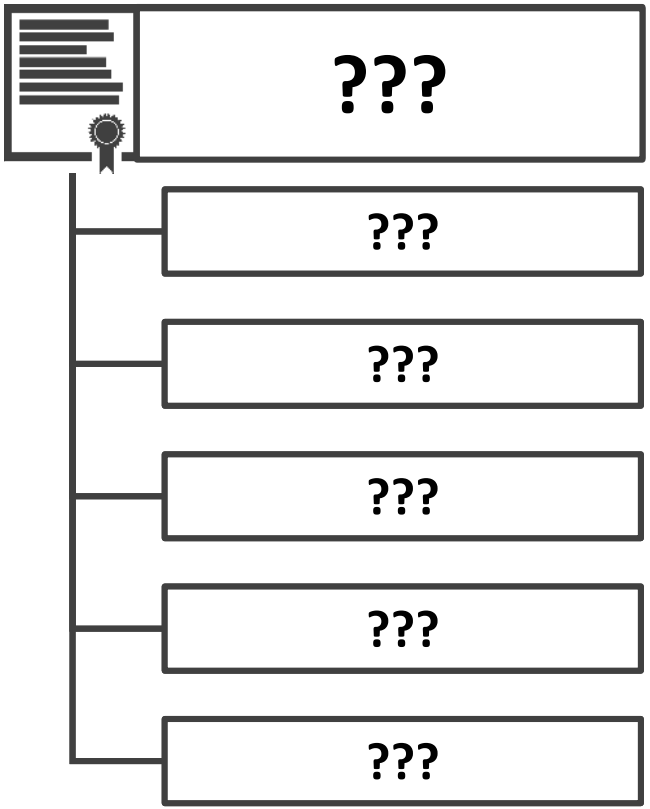
EN 206

NBN B 15-100

Common Concrete Standards

- **EN 197-1**
  - EN 196-1
  - EN 196-2
  - EN 196-3
  - ASTM C151/C151M
  - ASTM C 187

But what about Geopolymers?



But what about Geopolymers?

- 2022: Working Group AAM established under Belgian standard commission E104 “Concrete”.
- Grown to over 30 active members, also from NL, D, AT and SVN
  - Researchers, Producers, Federation representatives, Certification and verification experts
- Based on BSI Flex 350 for content and NBN B 15-105 for document structure and general procedures
- **Normative roadmap: 2 standard drafts**

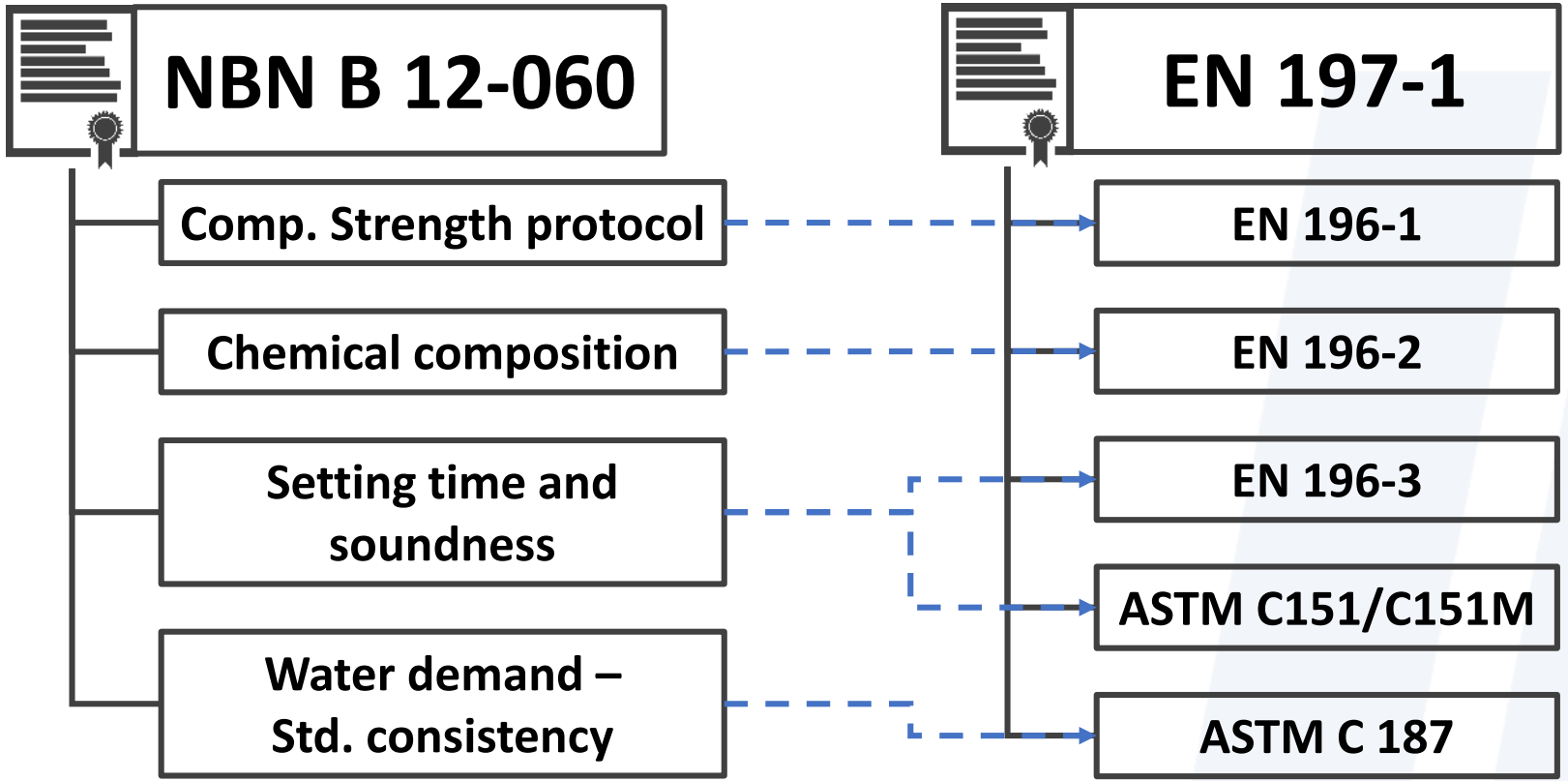
prNBN B 12-060* (binder)

prNBN B 15-112* (methods concrete testing)

*Standard numbers are arbitrary and have no meaning yet

prNBN B12-060

Composition, specifications and conformity criteria for alkali-activated materials



prNBN B12-060

Composition, specifications and conformity criteria for alkali-activated materials

Reference: NBN B 12-060 - for comments

Committee:	CRIC-OCCN/E104	**Type:**	NCIB (National Committee Internal Ballot)
Status:	Open		
Opening date:	2025-04-04	**Closing date:**	2025-05-12
Opened on:	2025-04-04 00:00		

Title: Please find the draft document of the future NBN B 12-060 - *Composition, specifications and conformity criteria for alkali-activated materials*.

Please note :

- the text has been drafted in English because the text is the outcome of an international collaboration,
- the text will be translated in French and in Dutch,
- the text will be placed in the appropriate template.

Please browse through the text and send us your comments.

NBN
BUREAU VOOR NORMALISATIE
BUREAU DE NORMALISATION


Happy Birthday Joseph

2005-2025


woellner
chemical solutions