NEW SIKA ®VISCOCRETE® POWDERS

HIGH PERFORMANCE PLASTICIZERS

BUILDING TRUST

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SIKA DRYMIX ADDITIVES

MILESTONES

BUILDING TRUST

SIKA DRYMIX ADDITIVES
MILESTONES

2000 Start development of **Sika ViscoCrete Powders** (PCE-based superplasticizer)

2004 Start production of polymer powders, predominantly for **cementitious systems** (VC-111 P / 120 P / 125 P)

2007 Release of Sika ViscoCrete-225 P with improved efficiency, absorption and compatibility with **sulfates** and retarders

2009 Fusion with Tricosal → Product line extension by **Retardan** gypsum retarders

2010 Release of Sika ViscoCrete-425 P for improved slump life of cementitious systems; start development of **customized** additive solutions

2011 Start production of polymer powder **mixtures**; Release of Retardan-200 P with improved efficiency in gypsum binder retardation

2015 Release of new Sika ViscoCrete Powders (VC-150 P / 430 P / 510 P / 520 P) with improved performance in a wide range of applications, including an 'Allrounder' (VC-510 P) and products for high-temperature conditions (VC-510 P / 520 P) 2007

2017 Introduction of Sika PowerPack-10 MF, -15 MF and -20 MF as replacement for Melamine

SIKA® VISCOCRETE® POWDERS TECHNOLOGY

POWDERED SUPERPLASTICIZERS/HIGH-RANGE WATER REDUCERS (HRWR)

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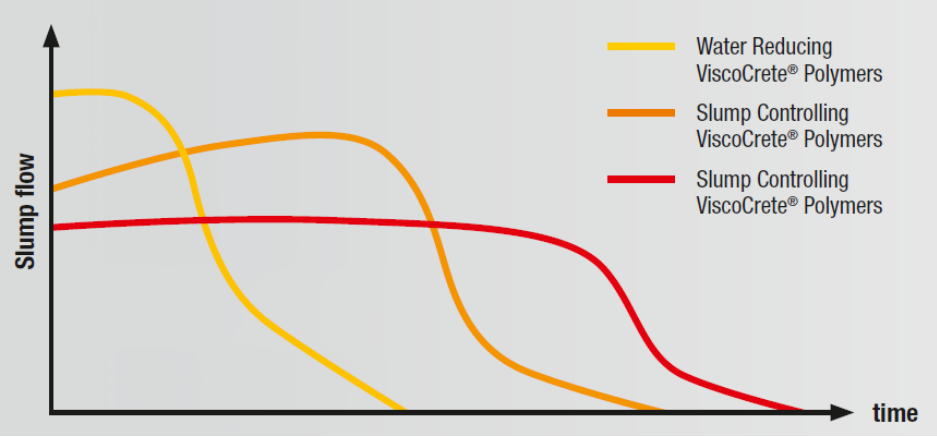
SIKA VISCOCRETE POWDERS
KEY SUCCESS FACTORS

- Tailor-made designs for specific requirements
- High water reduction
- High liquefaction
- Strength increase
- Shrinkage reduction
- No release of formaldehyde (unlike MFS)
- No release of ammonia (unlike casein)
- Improved cost performance for overall formulation cost reduction (additives & binders)



Principle consistency curves of PCE-based superplasticizers

Note:

Typically, powdered superplasticizers do **not contain defoamers.** This enables the adjustment of the air content of the mixed final mortar, according to application and performance requirements.

SIKA VISCOCRETE POWDERS
PRODUCT PORTFOLIO (APPLICATIONS)

Application system	Typical applications	Binder type	Sika ViscoCrete						
			111 P	125 P	150 P	225 P	430 P	510 P	520 P
Cementitious mortars	Self-compacting concrete (SCC), industrial floors	CEM I, R (rapid)	★	★	★★	★	★	★★	
		CEM I, N (normal)	★	★	★★	★	★	★★	★
		CEM II, S (slag)	★	★	★★	★★	★★	★★	
		CEM II, LL (limestone)	★	★	★★	★	★★	★★	★★
	Self-levelling underlayments (SLU), grouts	Ternary binder system, pH > 11.5			★★	★★		★★	★★
		Ternary binder system, pH < 11,5			★★	★★	★	★★	★★
Calcium sulfate / gypsum based mortars	Self-levelling screed (SLS)	Thermal anhydrite (FGD)			★		★	★★	★
		Synthetic anhydrite		★	★	★	★★	★★	★
		Natural anhydrite			★	★	★	★★	★
	Self-levelling screeds / underlayments (SLS/SLU), plasters	Alpha-hemihydrate, pH > 11.5			★★	★★	★	★★	★★
		Alpha-hemihydrate, pH < 11,5			★	★★	★	★★	★★
		Beta-hemihydrate, FGD			★	★★	★	★★	★
		Beta-hemihydrate, natural			★	★★	★	★★	★

new new new new

★★ recommended
★ suitable

SIKA VISCOCRETE POWDERS
PRODUCT PORTFOLIO (PERFORMANCE)

Performance	Sika ViscoCrete						
	111 P	125 P	150 P (NEW)	225 P	430 P (NEW)	510 P (NEW)	520 P (NEW)
High initial flow			✓	✓	✓	✓	✓
Long flow retention (open time)	✓	✓	✓	✓	✓	✓	
Low sulfate sensitivity			✓	✓	✓	✓	✓
Compatibility with retarders (fruit acids)			✓	✓	✓	✓	✓
Fast dispersing effect (short mixing)		✓	✓	✓	✓	✓	✓
Low set-retardation		✓	✓	✓		✓	✓
High early strength development		✓			✓	✓	✓
Low early shrinkage	✓	✓				✓	✓

Notes:

- All VC-Powders are pure polycarboxylate ethers (PCE)
- They are free of formaldehyde and ammonia and do not include a defoamer
- An additive compound may be targeting for your specific application. Please contact our Technical Service Department for more information and advice.

VC-POWDERS LAB-SCREENING 2014/15

SUMMARY

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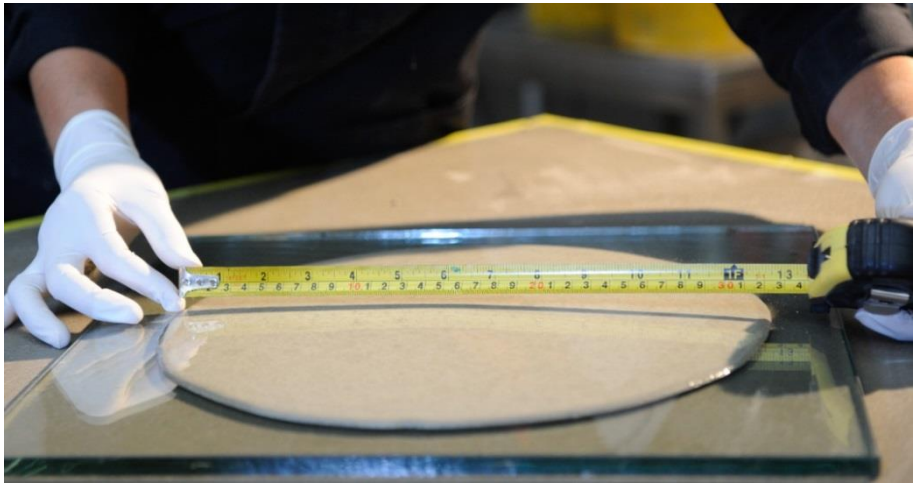
VC-POWDERS LAB-SCREENING 2014/15
INTRODUCTION



Test volume

- 13 PCEs: old and new VC-Powders vs. main competitor products
- 13 mortar systems
- > 300 mixes
- > 3000 data
- 1000 hours lab work

Mortar test systems

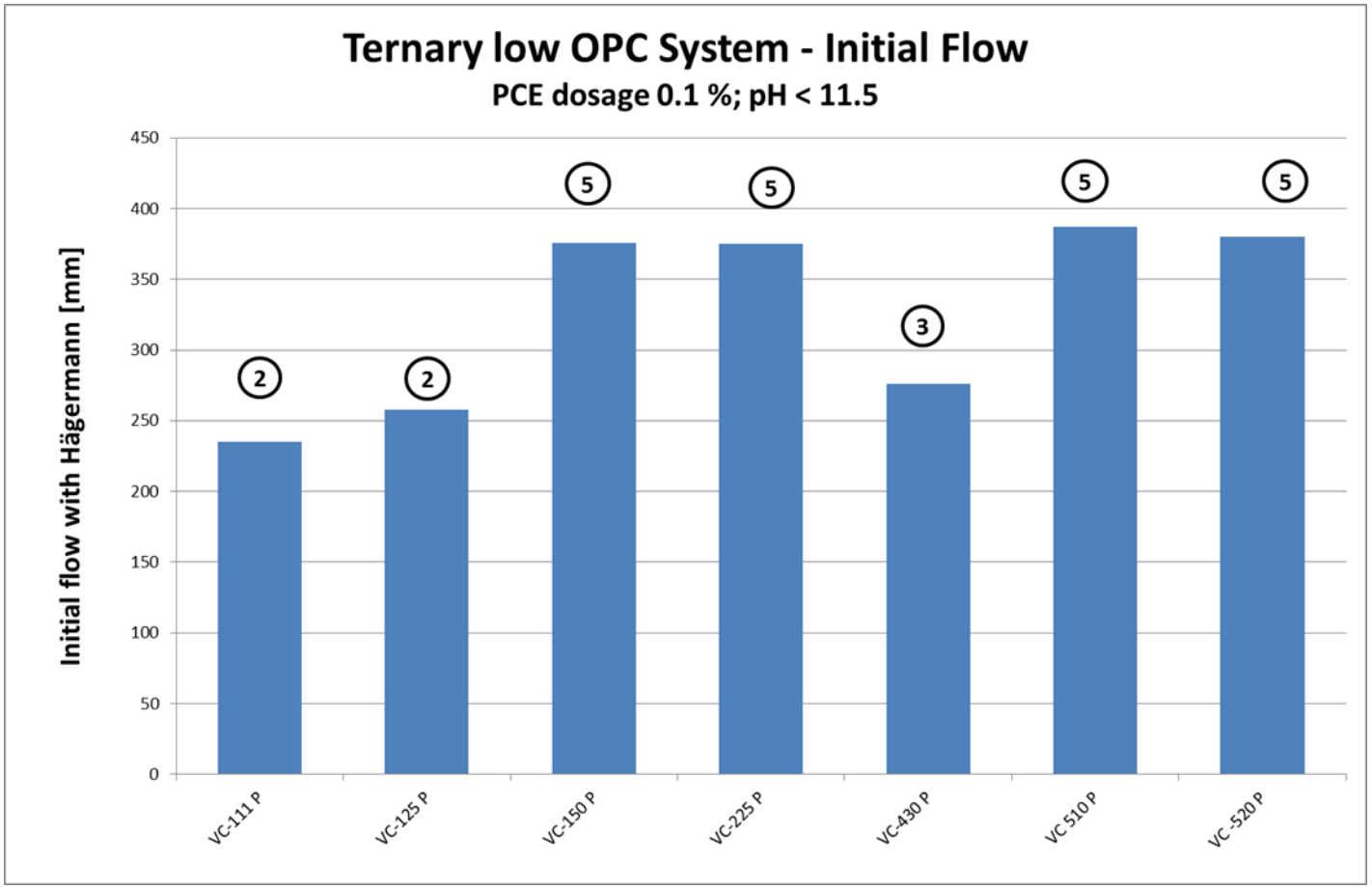
- 4 cements in SCC system
- 2 ternary binder systems as SLU
- 3 anhydrite screeds
- 2 alpha-hemihydrate SLUs
- 2 beta-hemihydrates (FGD and natural)

VISCOCRTE-POWDERS LAB-SCREENING
EXAMPLE: SLU BASED ON TERNARY BINDER (CAC-C$-OPC)

Table 1. *SLU dry-mix formulation in %*

Component	%
Portland cement (CEM I 42.5R)	4.00
Calcium aluminate cement	16.00
Alpha hemihydrate	5.00
Sand 0.1-0.4 mm	44.00
Limestone filler	29.xx
Redispersible powder	1.50
Activator Lithium carbonate	0.06
Retarder combination	0.12
Stabilizer combination	0.06
Superplasticizer	variable
Defoamer	0.05

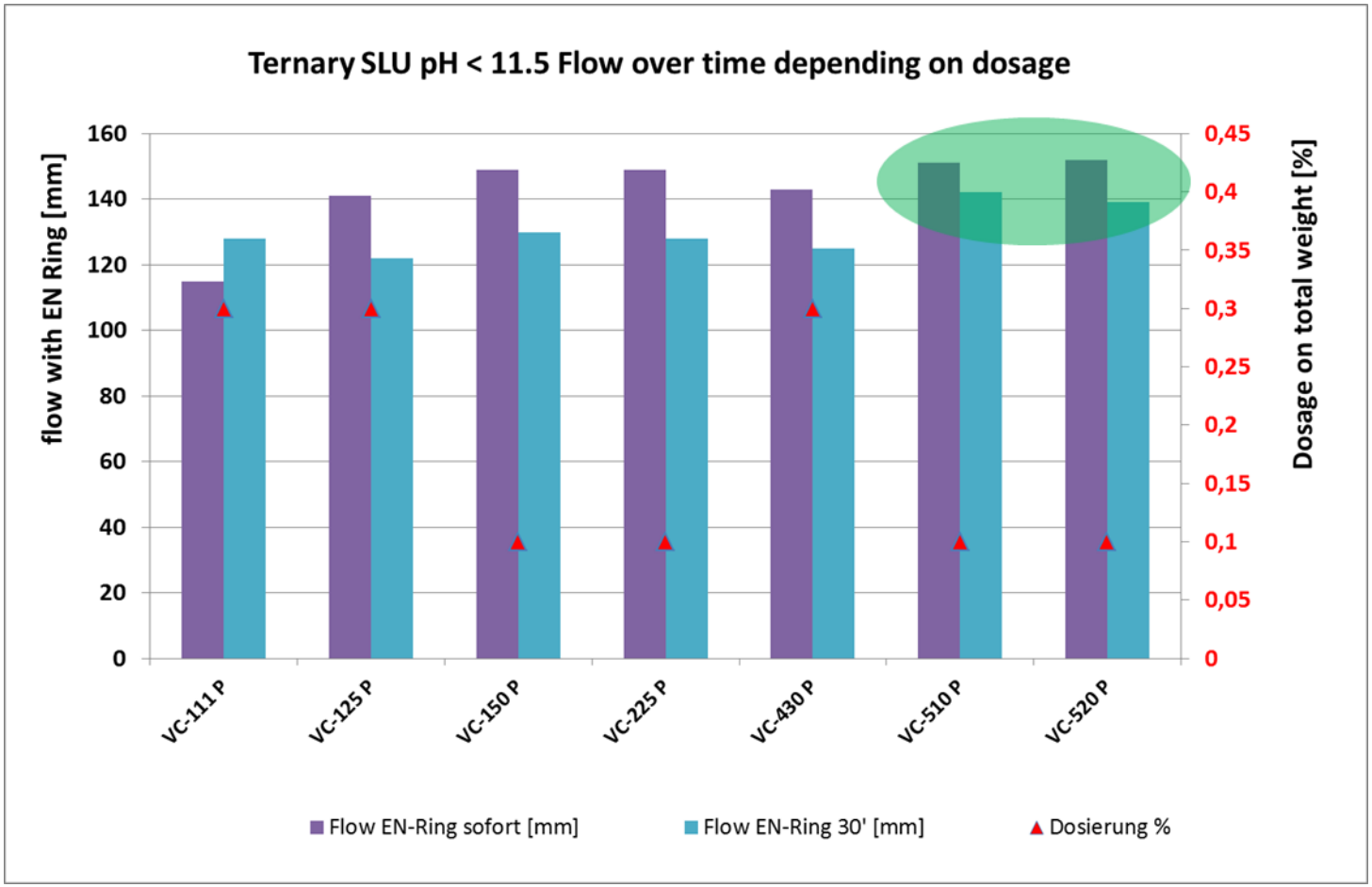
TERNARY SLU – LOW OPC, PH <11,5
INITIAL FLOW



ViscoCrete-510 and 520 P offer comparable initial flow.

TERNARY SLU – LOW OPC, PH <11,5

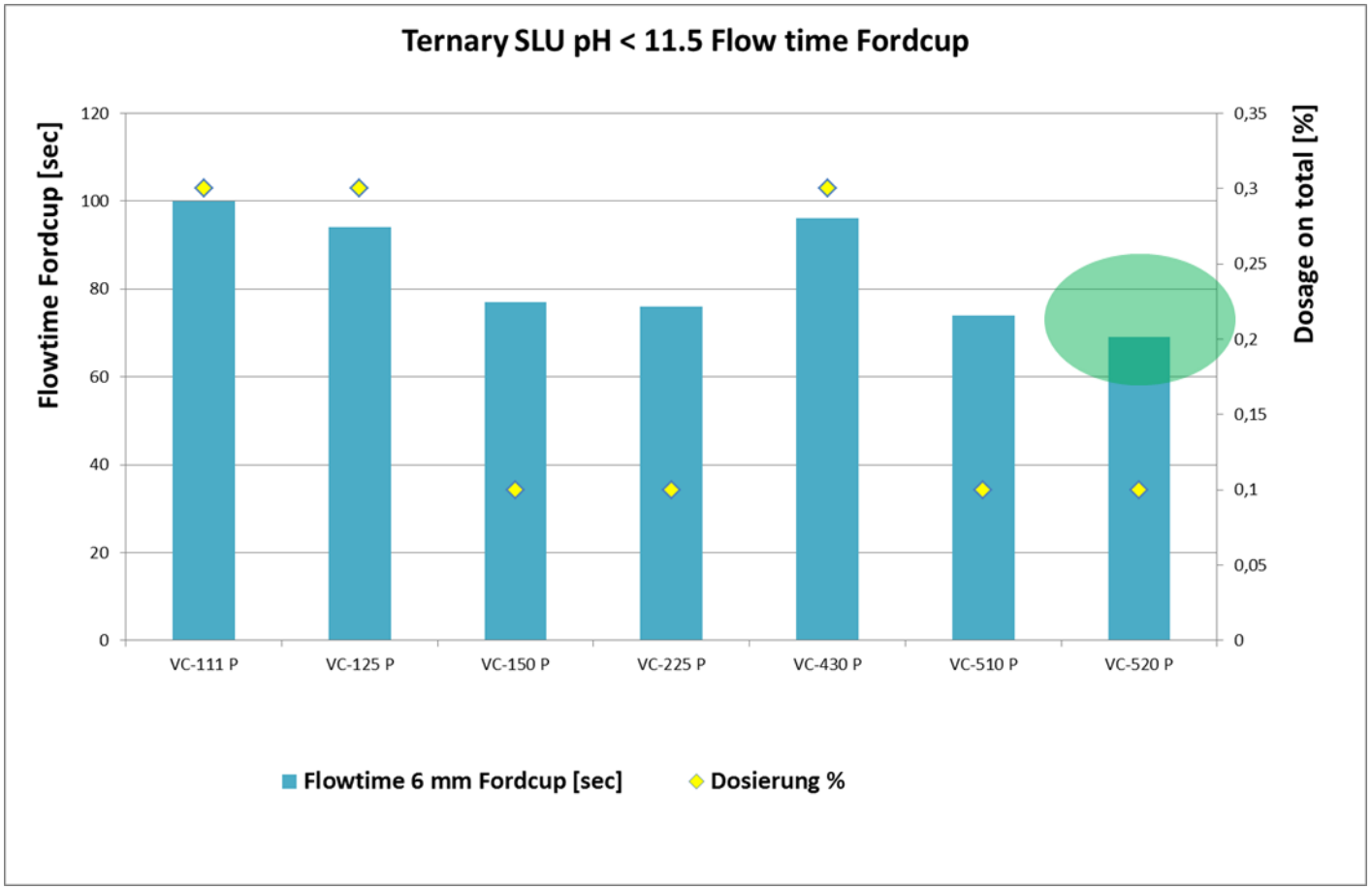
SLUMP LIFE



ViscoCrete-510 P and -520 P provide the best slump life

TERNARY SLU – LOW OPC, PH <11,5

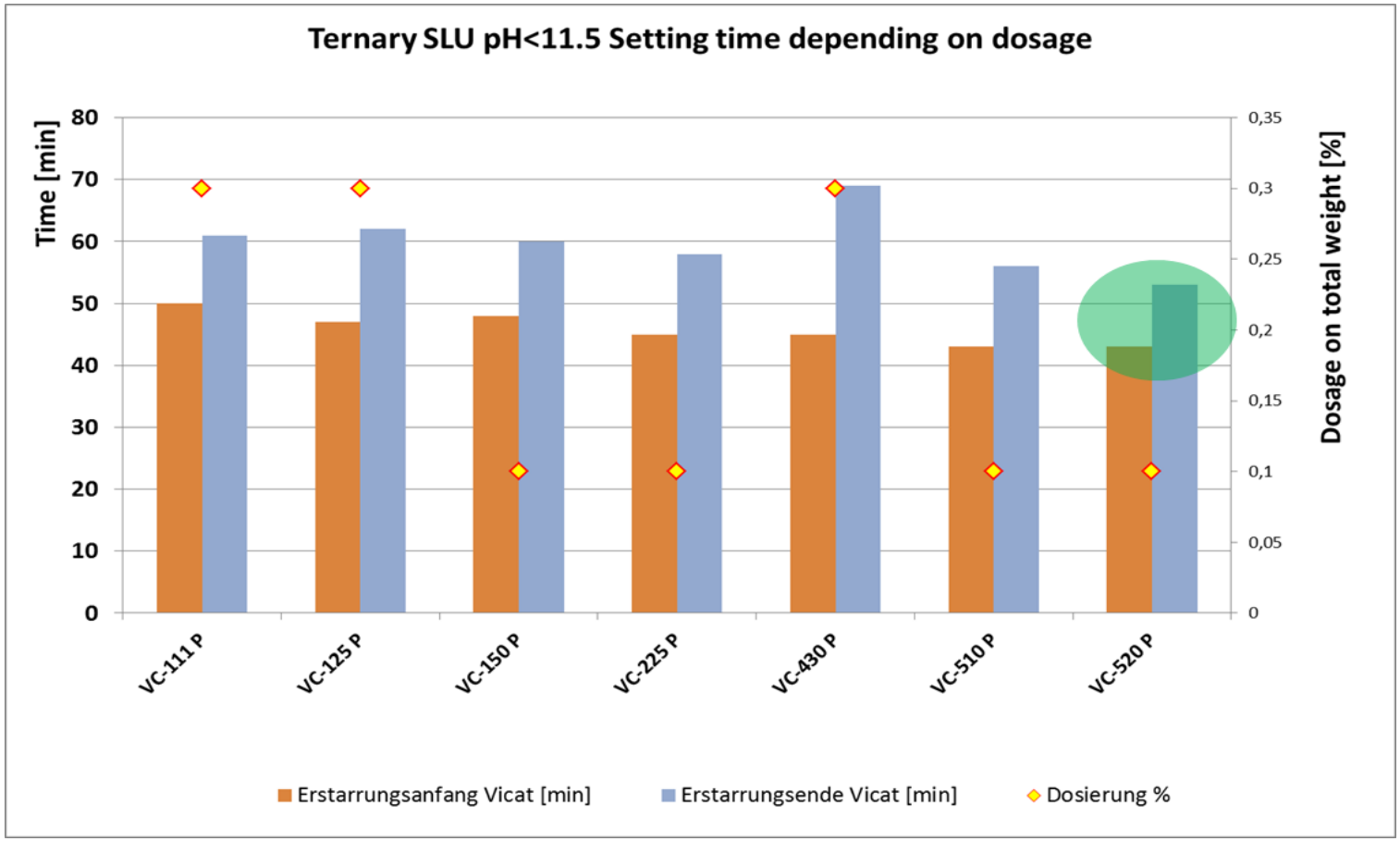
FLOW TIME



ViscoCrete-520 P offer the lowest flow time

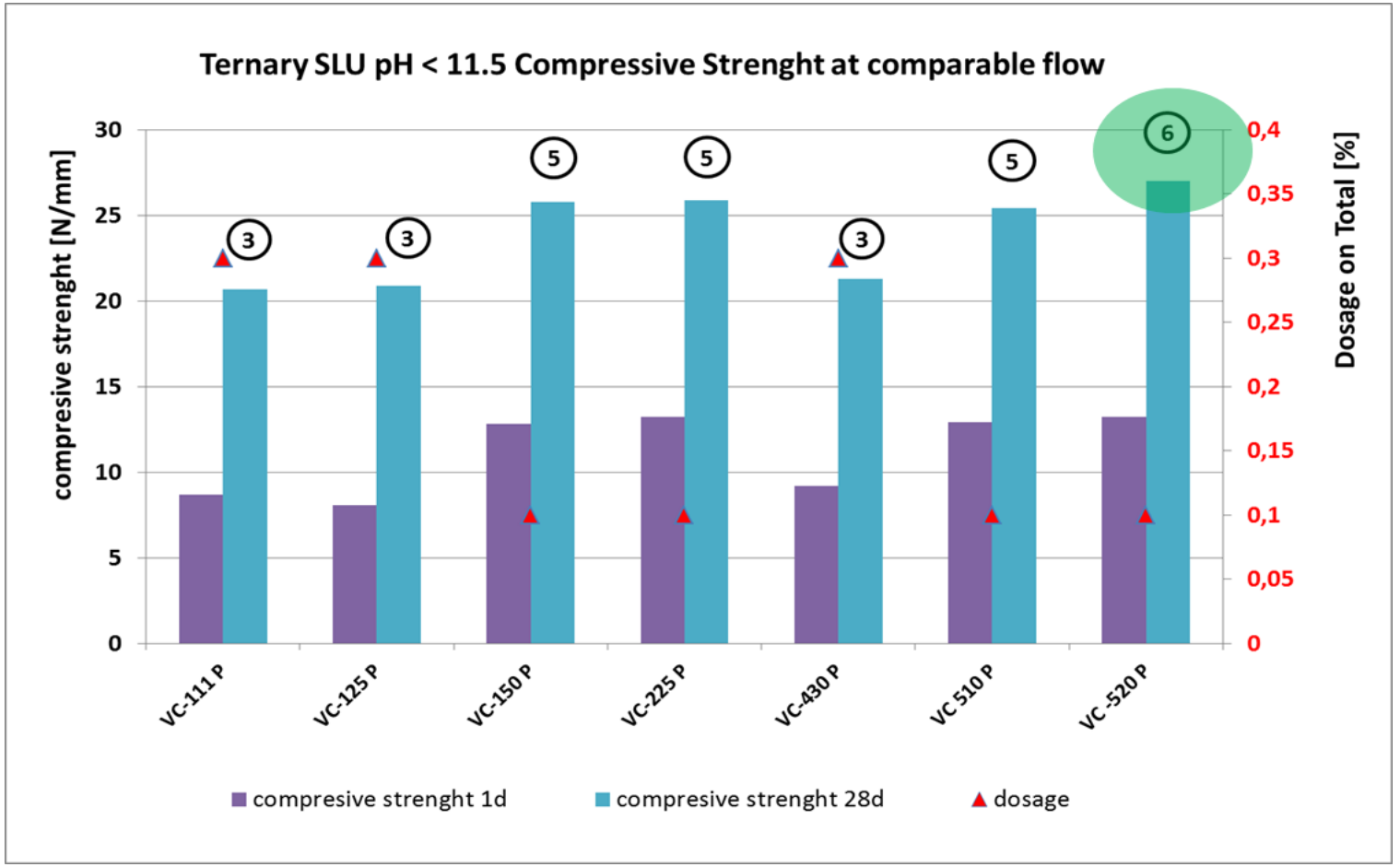
TERNARY SLU – LOW OPC, PH <11,5

SETTING TIME



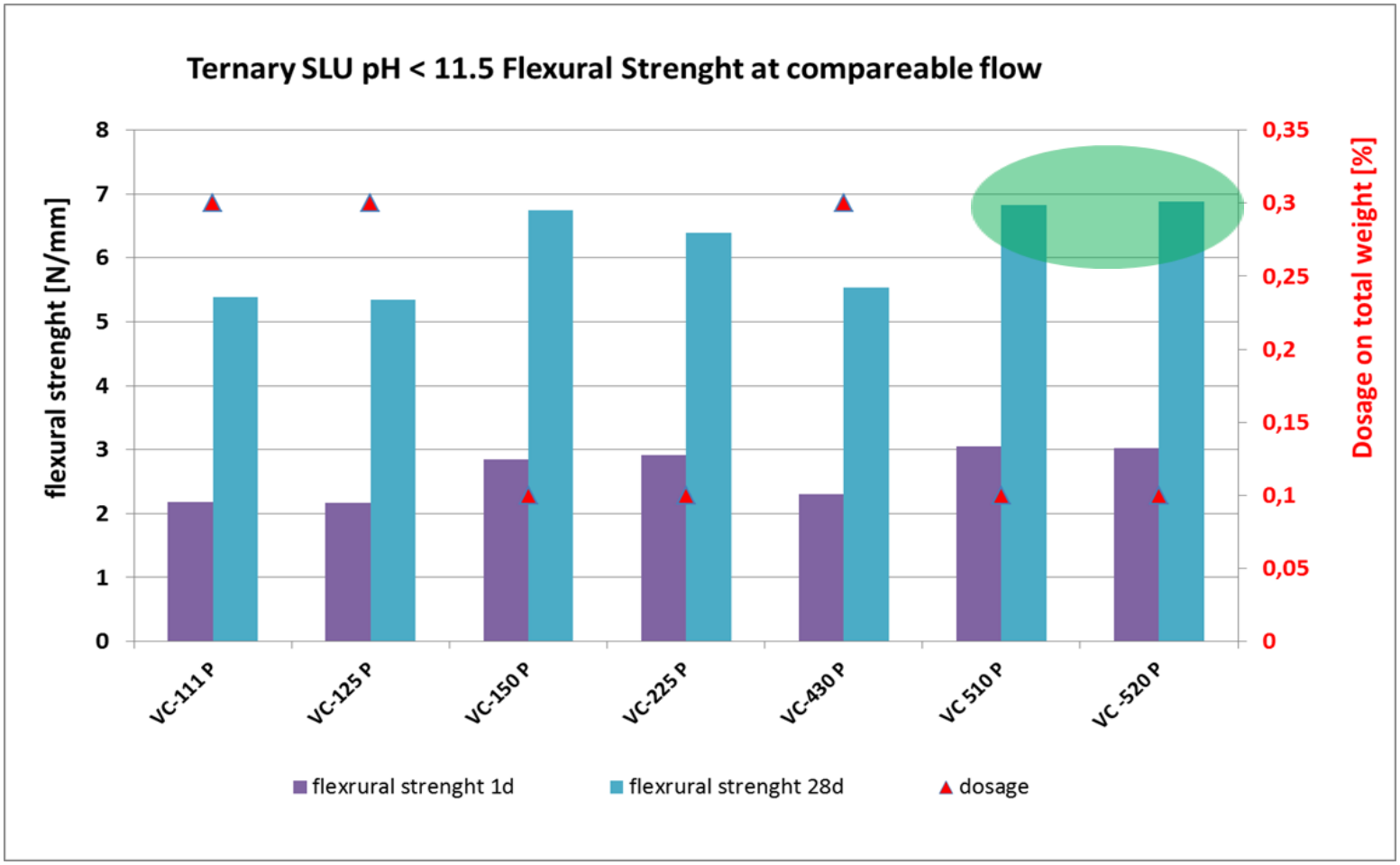
ViscoCrete-520 P shows the lowest retardation of all ViscoCrete products

TERNARY SLU – LOW OPC, PH <11,5
COMPRESSIVE STRENGTH



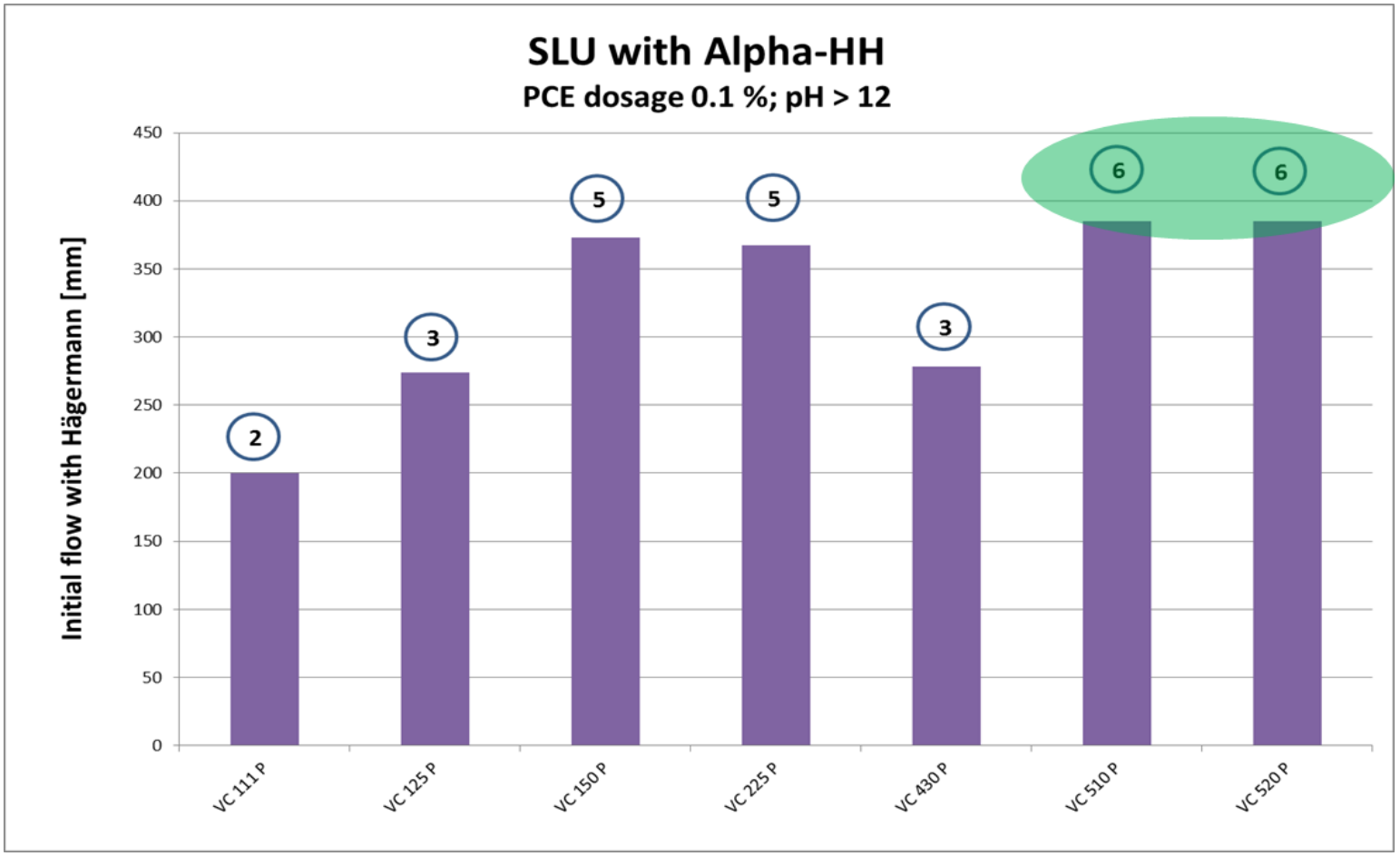
ViscoCrete-520 P provide the highest compressive strength

TERNARY SLU – LOW OPC, PH <11,5
FLEXURAL STRENGTH



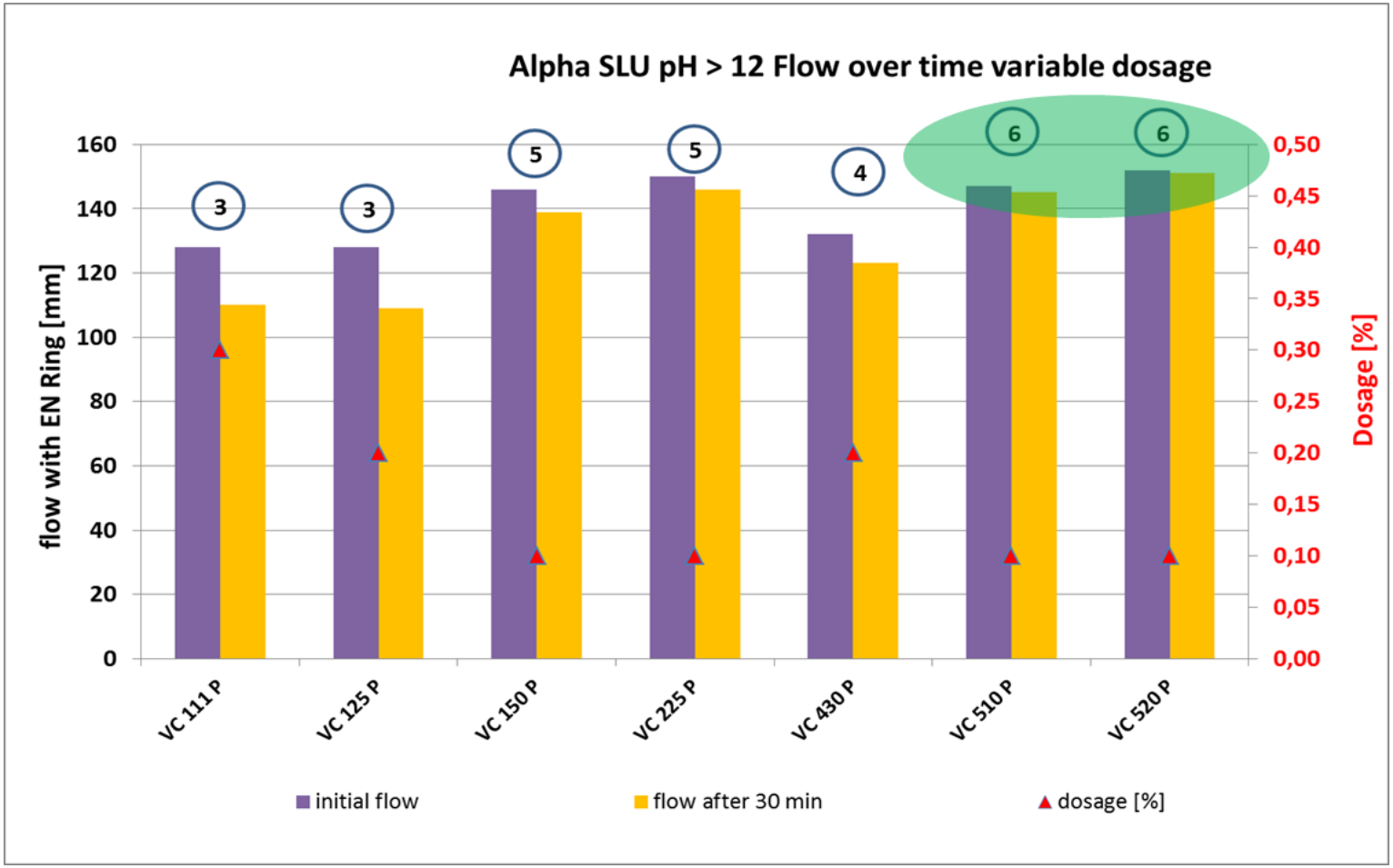
VC-510 P and VC-520 P give similar flexural strenght

ALPHA-HH SLU - PH >12
INITIAL FLOW



ViscoCrete-520 P shows the highest initial flow, followed by VC-225 P and VC-510 P.

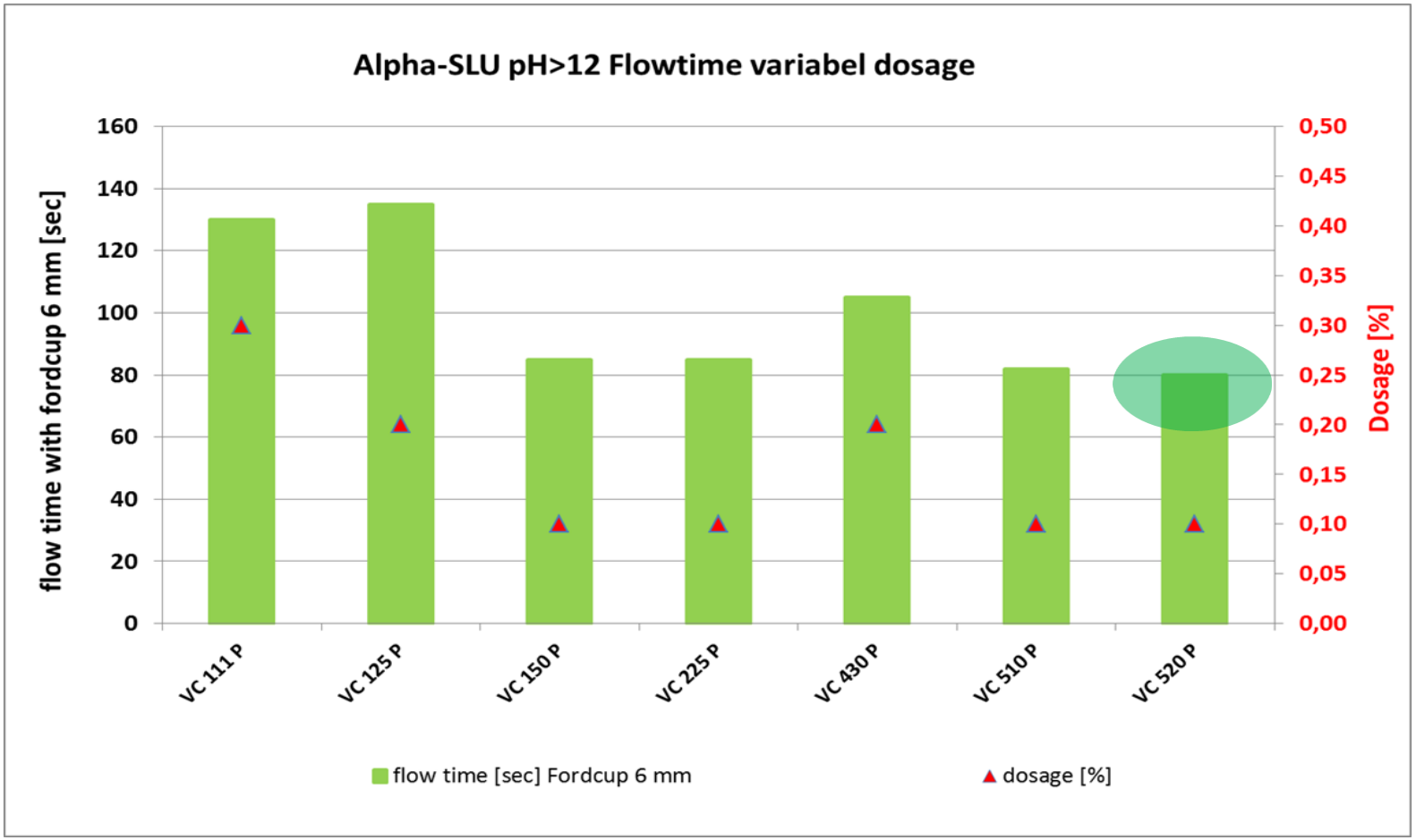
ALPHA-HH SLU – PH > 12
SLUMP LIFE



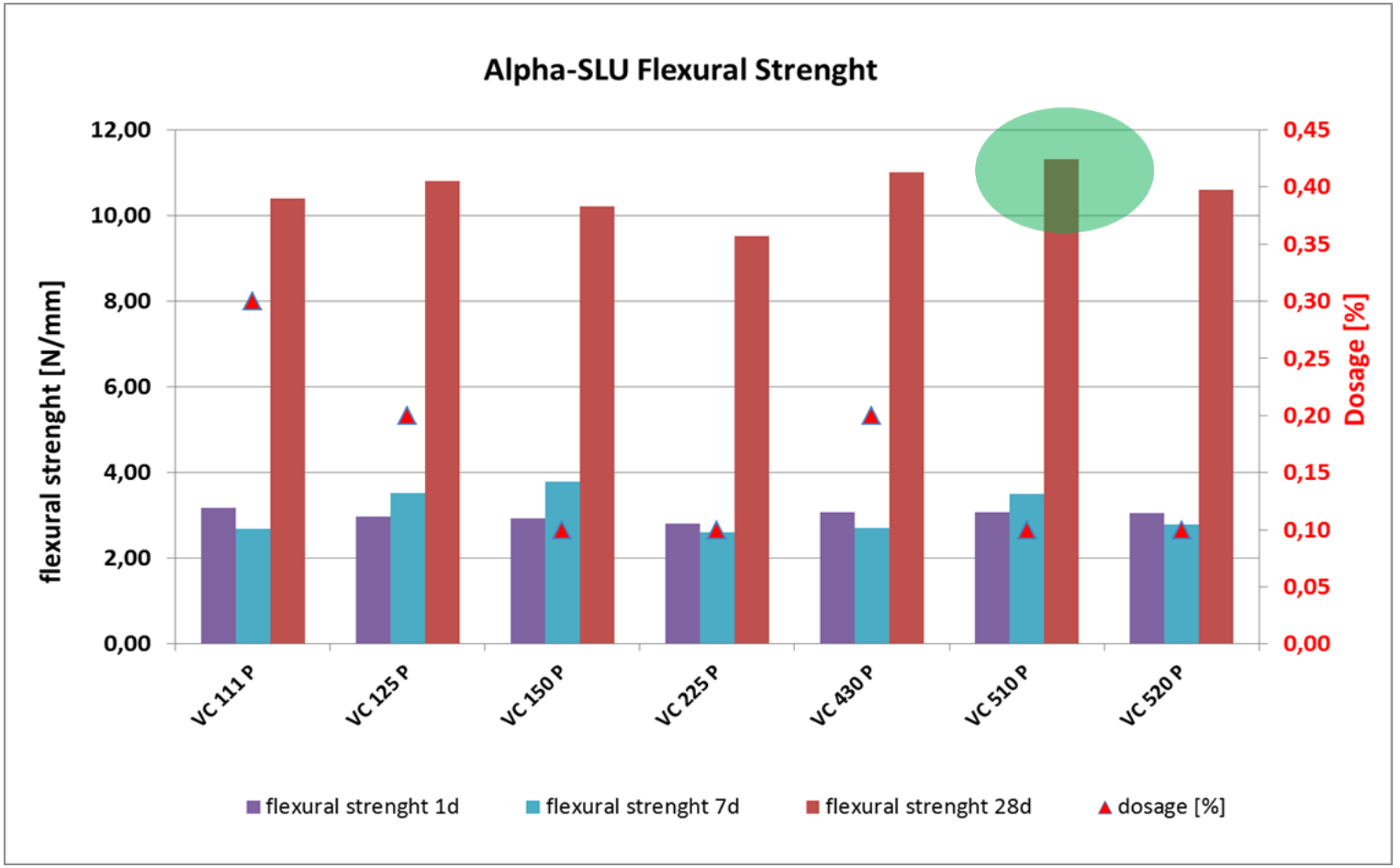
ViscoCrete-510 P and -520 P give the best slump life.

ALPHA-HH SLU – PH > 12

FLOW TIME

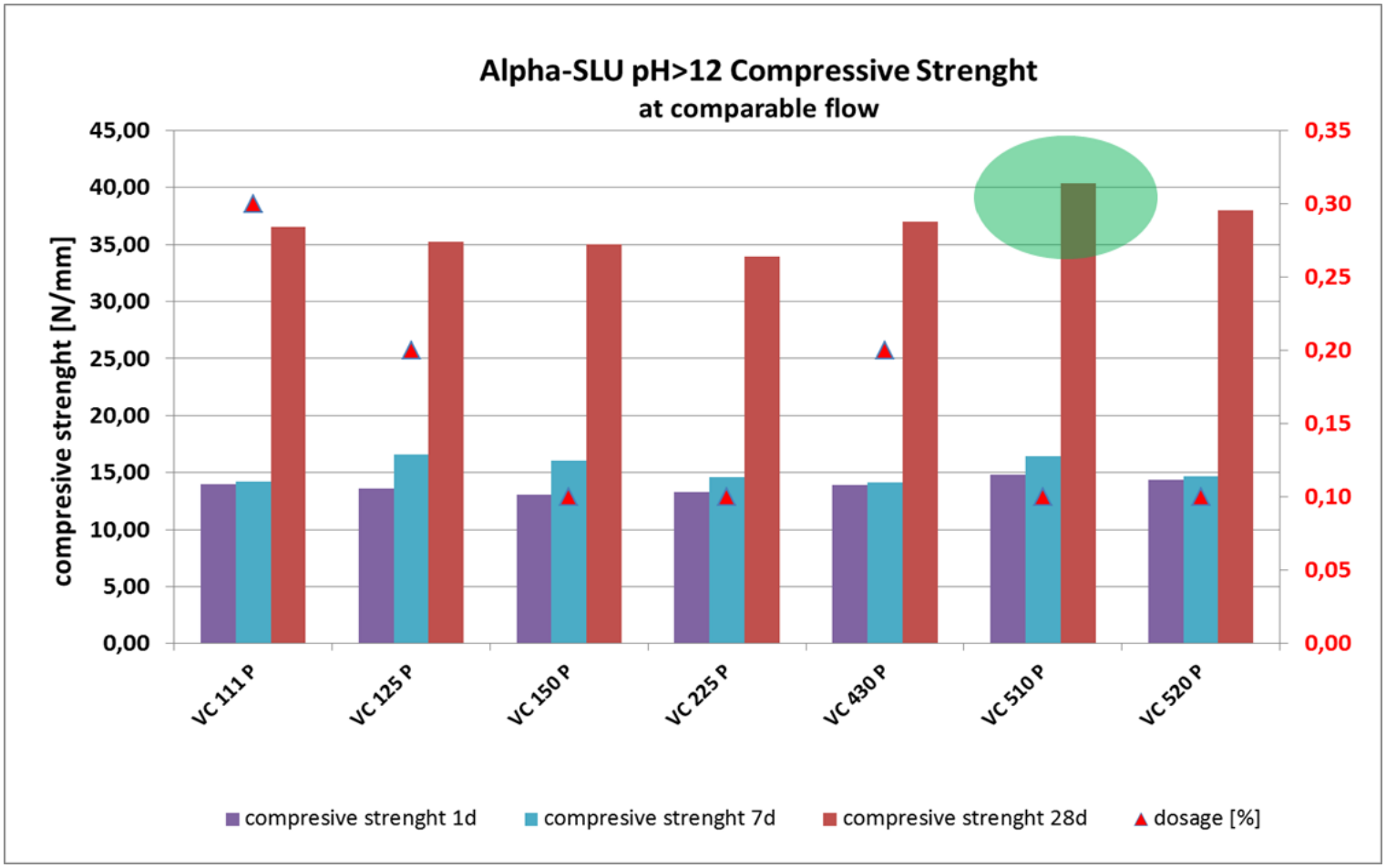


ALPHA-HH SLU – PH > 12
FLEXURAL STRENGTH



VC-510 P offers the highest flexural strength

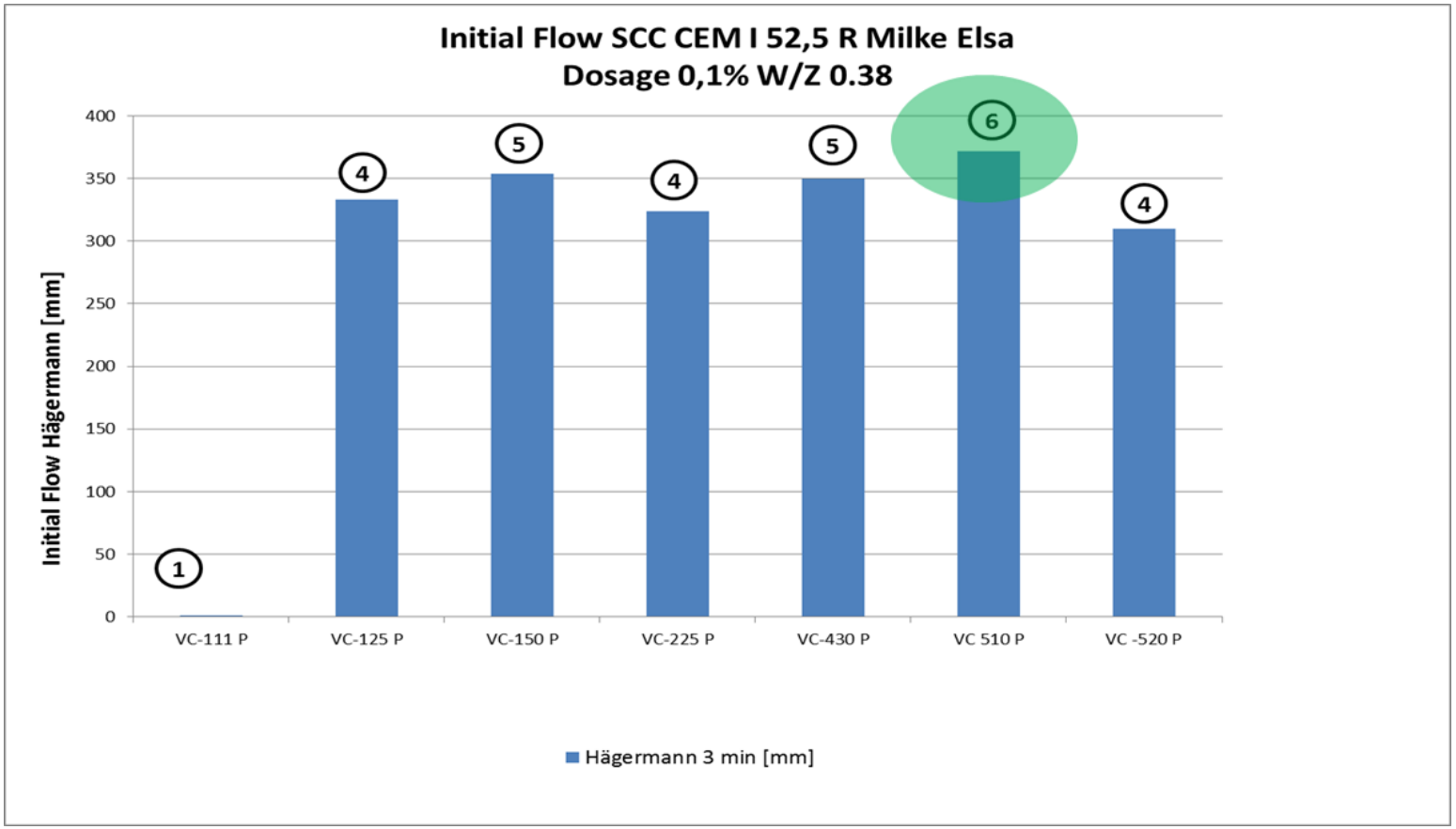
ALPHA-HH SLU – PH > 12
COMPRESSIVE STRENGTH



VC-510 P gives the best strength

SCC CEM I 52,5 R MILKE ELSA

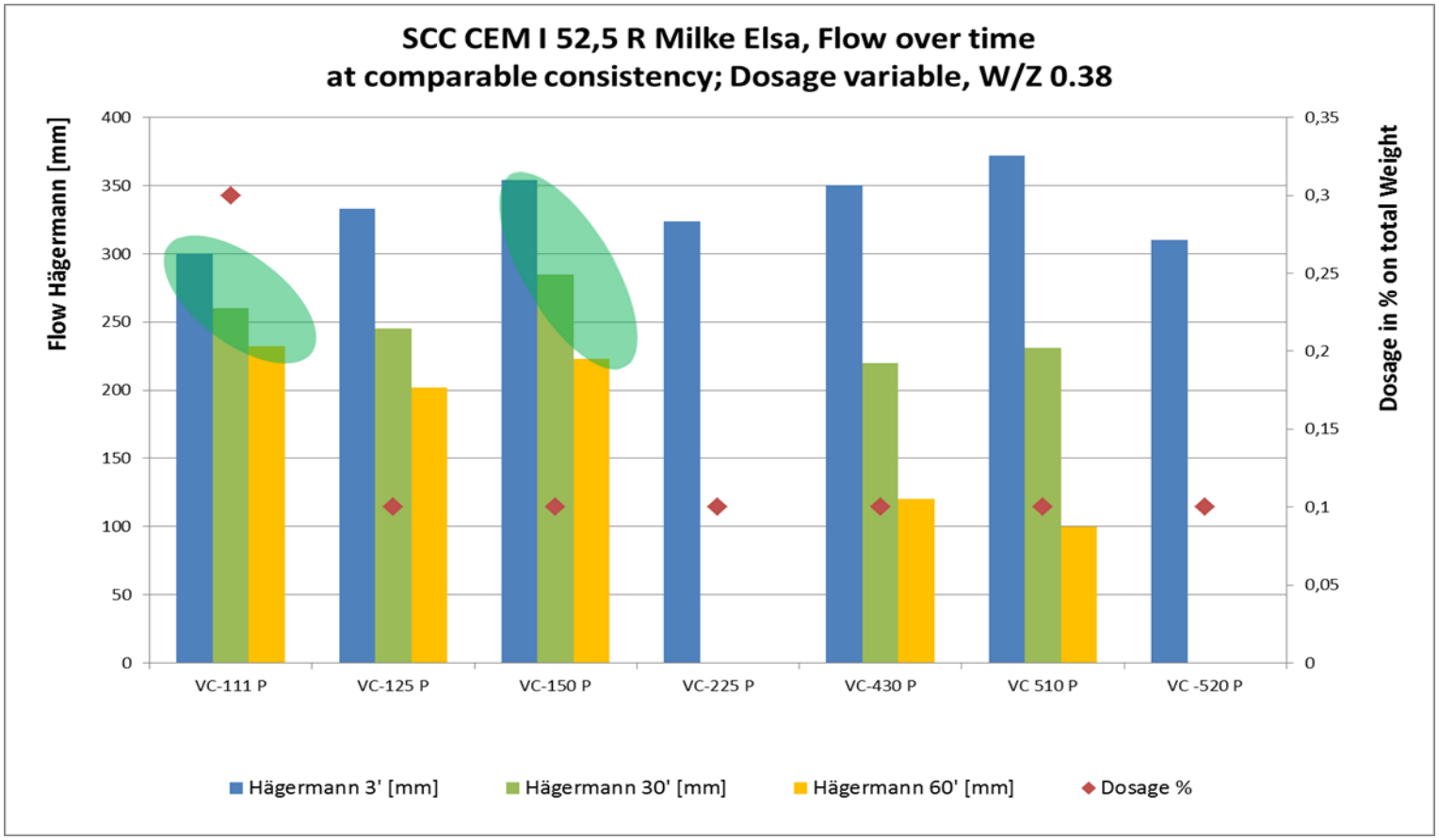
INITAL FLOW



ViscoCrete-510 P provides the highest initial flow

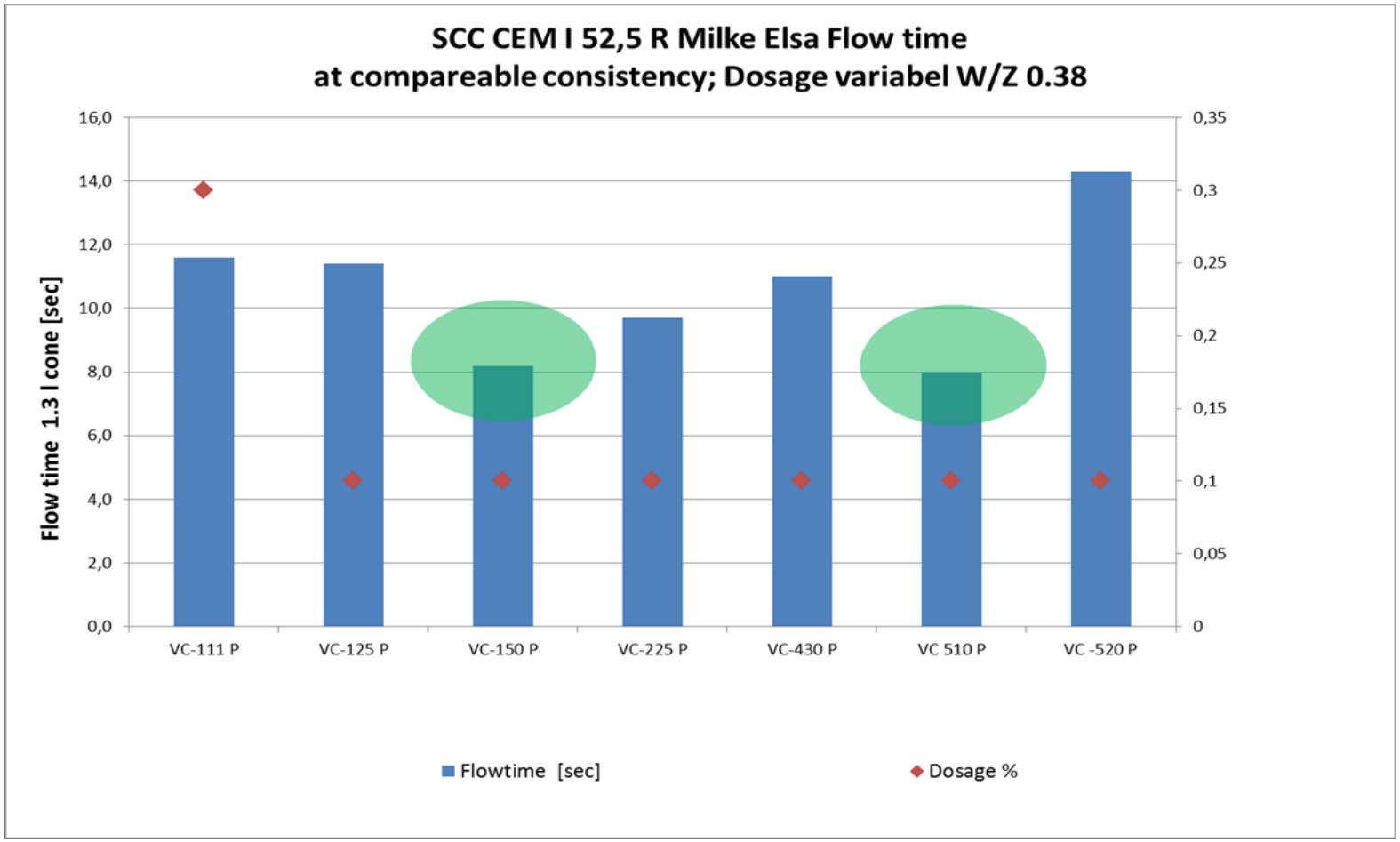
SCC CEM I 52,5 R MILKE ELSA

SLUMP LIFE



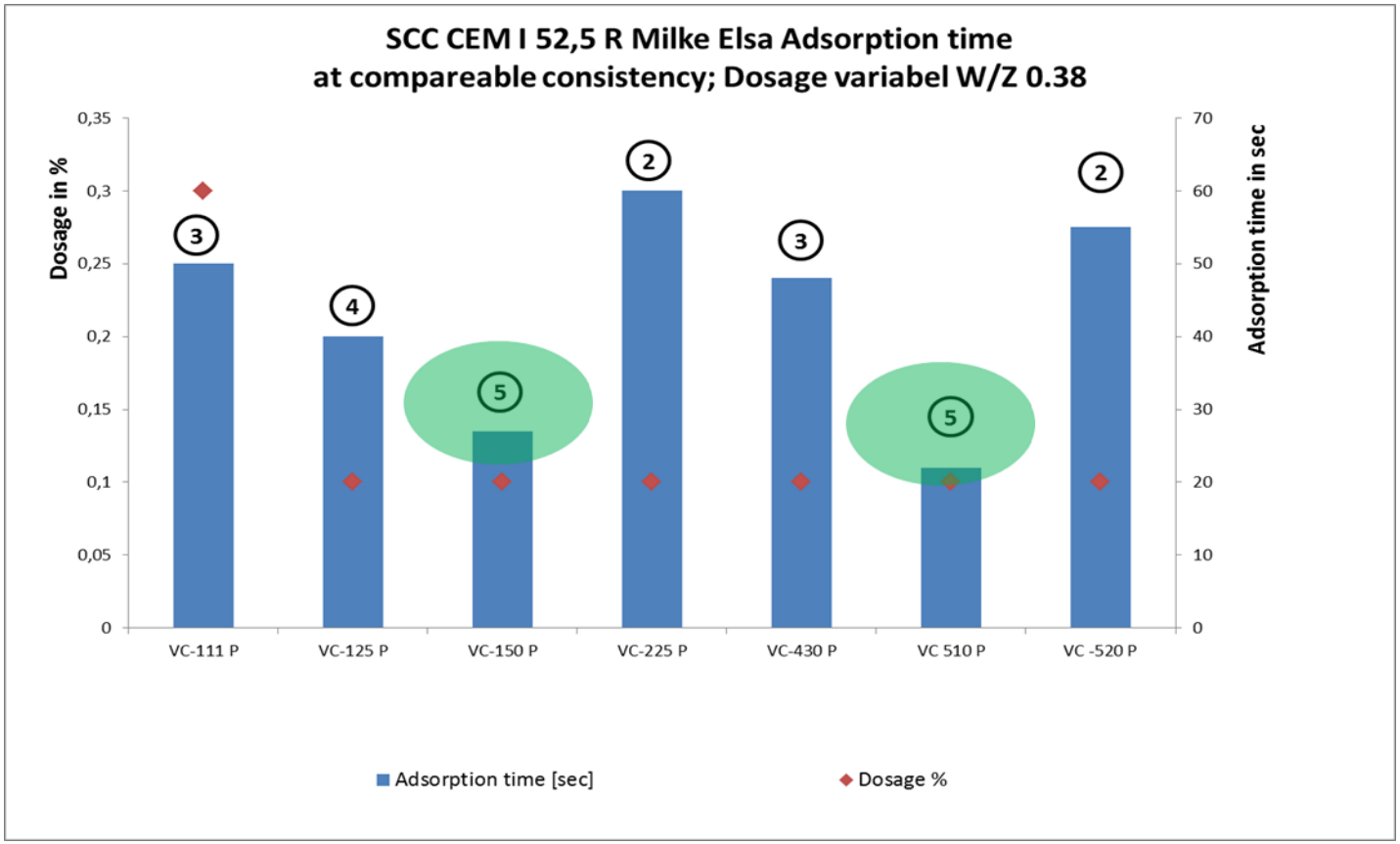
ViscoCrete-111 P gives (dosage 3-times) the best slump life followed by VC-150 P und 510 P.

SCC CEM I 52,5 R MILKE ELSA
FLOW TIME



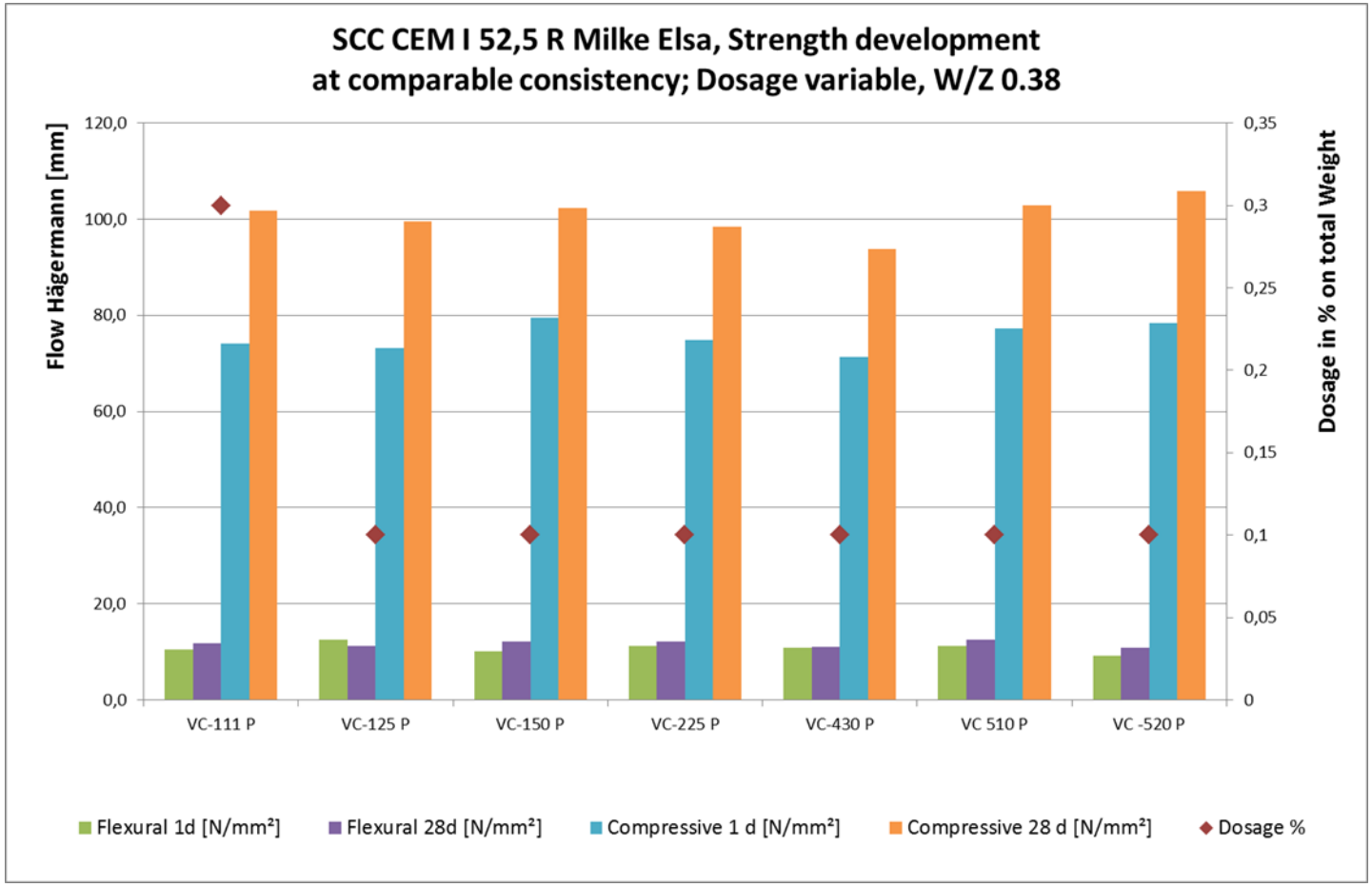
Flow time of VC-150 P and VC-510 P with 1,3 l cone is best

SCC CEM I 52,5 R MILKE ELSA
ADSORPTION TIME



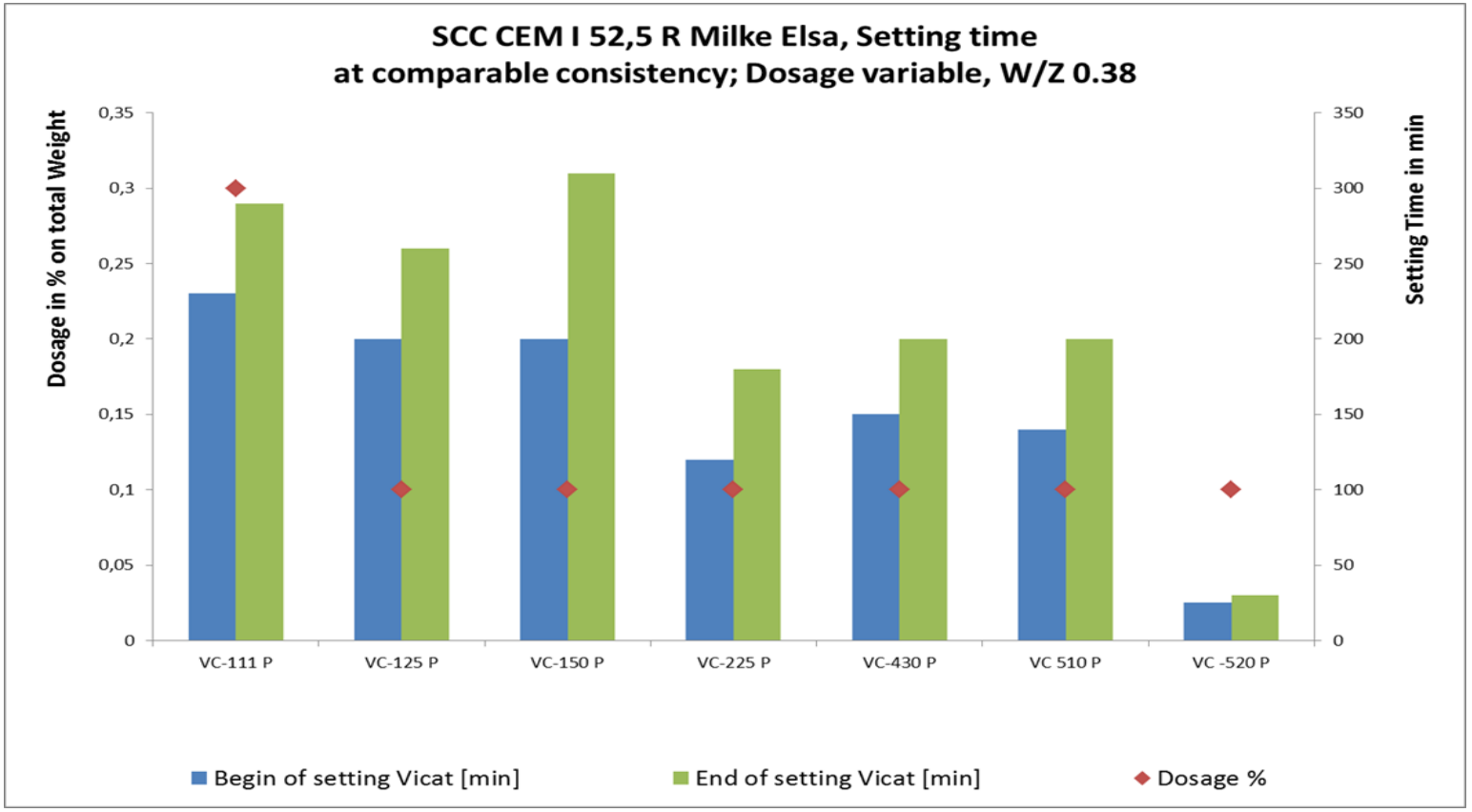
VC-150 P and VC-510 P offer similar adsorption time

SCC CEM I 52,5 R MILKE ELSA
STRENGTH



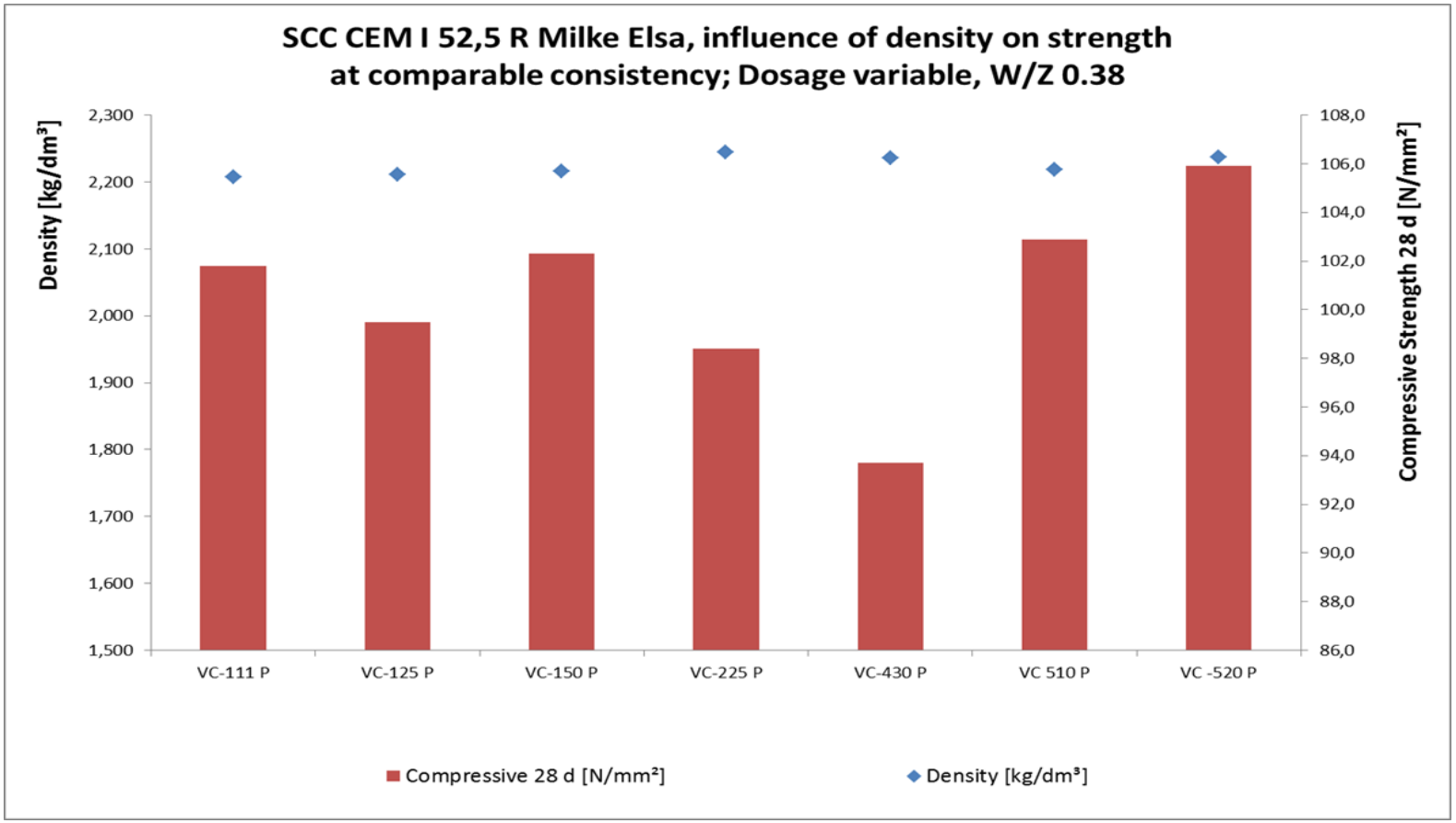
All strength values are in a good or very good range

SCC CEM I 52,5 R MILKE ELSA
SETTING TIME



Setting time of VC-520 is very short; in contrast VC-150 gives the longest retardation; ranking not possible because sometimes a short slump life is required

SCC CEM I 52,5 R MILKE ELSA
COMPRESSIV STRENGTH VS. DENSITY



VC-510 P and VC-520 P seem to defoam a little better
Higher density result in slightly better strength values

VISCOCRETE-POWDERS LAB SCREENING

SUMMARY

	Cementitious system with:																				ternary SLU									
	CEM I 52,5 R Milke Elsa					CEM I 52,5 N Rohrdorf					CEM II/A-S 42,5 N Leimen					CEM II/A-LL 32,5 R Schelklingen					high OPC pH> 12					high CAC pH< 11,5				
	I	L	T	C	A	I	L	T	C	A	I	L	T	C	A	I	L	T	C	A	I	L	T	C	F	I	L	T	C	F
VC 111P	1	5	4	4	3	2	4	5	5	2	2	5	3	3	2	3	5	3	3	3	2	2	1	X	X	2	4	3	3	3
VC 125 P	4	4	4	4	4	3	6	4	4	2	2	5	4	4	4	4	5	3	2	2	2	3	1	X	X	2	4	3	3	3
VC 150 P	5	4	6	5	5	5	2	3	3	4	5	6	6	4	5	5	5	4	4	5	3	5	2	5	5	5	4	4	5	5
VC 225 P	4	1	5	4	2	5	2	5	3	3	5	2	5	4	6	5	3	4	2	4	5	4	4	5	5	5	4	4	5	4
VC 430 P	5	3	4	4	3	4	4	4	5	2	3	5	5	6	3	5	5	5	5	4	2	4	1	X	X	3	4	3	3	3
VC 510 P	6	3	6	5	5	6	2	4	3	4	5	6	6	4	5	5	5	5	3	2	4	5	3	5	5	5	6	4	5	5
VC 520 P	4	1	1	5	2	4	1	4	3	4	5	1	4	4	4	5	3	5	2	6	6	4	6	6	6	5	6	5	6	5

	Anhydrite flow screed												α-Hemi-Hydrate SLU										β-Hemi-Hydrate								
	thermic				synthetic				natural				pH > 12					pH < 11,5					FGD				natural				
	Raddipur Casea				CAB 30 Lanxess				Micro A Casea				Knauf AGLM					Knauf AGLM					Rigips Brieselang				Keramod 125 Casea				
	I	L	C	F	I	L	C	F	I	L	C	F	I	L	C	F	D	I	L	C	F	D	I	D	BS	ES	I	D	BS	ES	
VC 111P	1	5	6	5	2	5	3	2	1	5	4	4	2	4	5	5	2	1	5	5	4	2	1	1	6	6	1	2	6	6	194
VC 125 P	2	5	5	4	3	6	4	4	2	6	6	5	3	3	4	5	4	2	6	4	3	2	2	1	5	4	2	2	4	4	207
VC 150 P	3	5	5	4	4	5	3	3	3	4	5	5	5	5	4	4	6	4	5	4	4	5	4	3	5	5	4	3	4	4	261
VC 225 P	6	4	2	2	5	3	4	3	6	3	2	3	5	5	3	3	6	5	6	6	4	6	5	6	5	3	6	6	3	3	248
VC 430 P	3	5	4	4	4	5	4	4	3	5	4	3	3	4	5	5	4	3	5	4	4	4	3	3	5	5	3	2	3	3	223
VC 510 P	6	4	5	5	6	3	4	4	6	3	5	4	6	6	6	6	6	5	5	4	4	6	6	6	5	5	5	6	5	5	289
VC 520 P	5	5	3	3	5	3	4	3	5	4	3	4	6	6	5	5	6	6	6	1	5	6	5	5	2	2	4	4	3	2	249

I Initial Flow (at constant dosage)
L Slump Life   after-wetting
T Flowtime
C Compressive Strength
F Flexural Strength
A Adsorption
S Shrinkage
D Dosage

Rating:
5…6 Good to very good effect
3…4 Satisfying / useful effect
1…2 No or bad effect
X= not tested

Top Ranking of ViscoCrete-510 P = Allrounder-Product

SUMMARY PCE SCREENING
PART 1: CEMENTS

I Initial Flow (at constant dosage)
L Slump Life ▒ after-wetting
T Flowtime
C Compressive Strength
F Flexural Strength
A Adsorption
S Shrinkage
D Dosage

Rating:
5…6 Good to very good effect
3…4 Satisfying / useful effect
1…2 No or bad effect
X= not tested

	Cementitious system with:																			
	CEM I 52,5 R Milke Elsa					CEM I 52,5 N Rohrdorf					CEM II/A-S 42,5 N Leimen					CEM II/A-LL 32,5 R Schelklingen				
	I	L	T	C	A	I	L	T	C	A	I	L	T	C	A	I	L	T	C	A	
VC 111P	1	5	4	4	3	2	4	5	5	2	2	5	3	3	2	3	5	3	3	3	67
VC 125 P	4	4	4	4	4	3	6	4	4	2	2	5	4	4	4	4	6	3	2	2	74
VC 150 P	5	4	6	5	5	5	2	3	3	4	5	6	6	4	5	5	5	4	4	5	91
VC 225 P	4	1	5	4	2	5	2	5	3	3	5	2	5	4	6	5	3	4	2	4	74
VC 430 P	5	3	4	4	3	4	4	4	5	2	3	5	5	6	3	5	5	5	5	4	84
VC 510 P	6	3	6	5	5	6	2	4	3	4	5	6	6	4	5	5	5	5	3	2	90
VC 520 P	4	1	1	5	2	4	1	4	3	4	5	1	4	4	4	5	3	5	2	6	68

VC-150 and VC-510 P are the top performers for cement based systems

Top Products: VC-150 and VC-510 P

SUMMARY PCE SCREENING
PART 2: TERNARY BINDERS

I Initial Flow (at constant dosage)
L Slump Life ▒ after-wetting
T Flowtime
C Compressive Strength
F Flexural Strength
A Adsorption
S Shrinkage
D Dosage

Rating:
5…6 Good to very good effect
3…4 Satisfying / useful effect
1…2 No or bad effect
X= not tested

	ternary SLU										
	high OPC pH> 12					high CAC pH< 11,5					
	I	L	T	C	F	I	L	T	C	F	
VC 111P	2	2	1	X	X	2	4	3	3	3	20
VC 125 P	2	3	1	X	X	2	4	3	3	3	21
VC 150 P	3	5	2	5	5	5	4	4	5	5	43
VC 225 P	5	4	4	5	5	5	4	4	5	4	45
VC 430 P	2	4	1	X	X	3	4	3	3	3	23
VC 510 P	4	5	3	5	5	5	6	4	5	5	47
VC 520 P	6	4	6	6	6	5	6	5	6	5	55

ViscoCrete-520 P is the best PCE for ternäry systems.

ViscoCrete-520 P is the PCE for ternary Systems.

SUMMARY PCE SCREENING
PART 3: ANHYDRITE

I Initial Flow (at constant dosage)
L Slump Life ▒ after-wetting
T Flowtime
C Compressive Strength
F Flexural Strength
A Adsorption
S Shrinkage
D Dosage

Rating:
5…6 Good to very good effect
3…4 Satisfying / useful effect
1…2 No or bad effect
X= not tested

	Anhydrite flow screed												
	thermic				synthetic				natural				
	Raddipur Casea				CAB 30 Lanxess				Micro A Casea				
	I	L	C	F	I	L	C	F	I	L	C	F	F
VC 111P	1	5	6	5	2	5	3	2	1	5	4	4	43
VC 125 P	2	5	5	4	3	6	4	4	2	6	6	5	52
VC 150 P	3	5	5	4	4	5	3	3	3	4	5	5	49
VC 225 P	6	4	2	2	5	3	4	3	6	3	2	3	43
VC 430 P	3	5	4	4	4	5	4	4	3	5	4	3	48
VC 510 P	6	4	5	5	6	3	4	4	6	3	5	4	55
VC 520 P	5	5	3	3	5	3	4	3	5	4	3	4	47

ViscoCrete-510 P is recommended for anhydrite systems

SUMMARY PCE SCREENING
PART 4: ALPHA-HEMIHYDRATE

I Initial Flow (at constant dosage)
L Slump Life ▒ after-wetting
T Flowtime
C Compressive Strength
F Flexural Strength
A Adsorption
S Shrinkage
D Dosage

Rating:
5…6 Good to very good effect
3…4 Satisfying / useful effect
1…2 No or bad effect
X= not tested

	α-Hemi-Hydrate SLU										
	pH > 12					pH < 11,5					
	Knauf AGLM					Knauf AGLM					
	I	L	C	F	D	I	L	C	F	D	R
VC 111P	2	4	5	5	2	1	5	5	4	2	35
VC 125 P	3	3	4	5	4	2	6	4	3	2	36
VC 150 P	5	5	4	4	6	4	5	4	4	5	46
VC 225 P	5	5	3	3	6	5	6	6	4	6	49
VC 430 P	3	4	5	5	4	3	5	4	4	4	41
VC 510 P	6	6	6	6	6	5	5	4	4	6	54
VC 520 P	6	6	5	5	6	6	6	1	5	6	52

ViscoCrete-510 P and 520 P provide both a very good performance in Alpha-HH Self Levelling Underlayments. With 520 P strength was lower.

SUMMARY PCE SCREENING
PART 5: BETA-HEMIHYDRATE

I Initial Flow (at constant dosage)
D Dosage
BS Beginning of setting
ES End of setting

Rating:
5…6 Good to very good effect
3…4 Satisfying / useful effect
1…2 No or bad effect

	β-Hemi-Hydrate								
	FGD				natural				
	Rigips Brieselang				Keramod 125 Casea				
	I	D	BS	ES	I	D	BS	ES	R
VC 111P	1	1	6	6	1	2	6	6	29
VC 125 P	2	1	5	4	2	2	4	4	24
VC 150 P	4	3	5	5	4	3	4	4	32
VC 225 P	5	6	5	3	6	6	3	3	37
VC 430 P	3	3	5	5	3	2	3	3	27
VC 510 P	6	6	5	5	5	6	5	5	43
VC 520 P	5	5	2	2	4	4	3	2	27

ViscoCrete-510 P gives the best performance

VISCOCRETE-POWDERS LAB-SCREENING
CONCLUSIONS

- **VC-150 P** has excellent performance in **OPC-based applications**

- **VC-430 P** first choice for **blended cements, thermic and synthetic anhydrite**
  → High initial flow and long flow retention (open time)
  → High robustness regarding changing sand qualities

- **VC-510 P** has excellent performance in the widest range of applications (‘**Allrounder**’)

- **VC-520 P** first choice for **ternary binder systems** and **alpha-hemihydrate**
  → Good performance at low and high pH
  → Very low viscosity and good mortar stability

- **VC-510 P and VC-520 P** preferred options for **high-temperature conditions** (hot climate and/or transportation in big-bags and storage in additive silo)
  → Higher melting point and dilution option to reduce caking risk during storage and dosing

THANK YOU FOR YOUR ATTENTION

BUILDING TRUST