

paintistanbul TURKCOAT CONGRESS

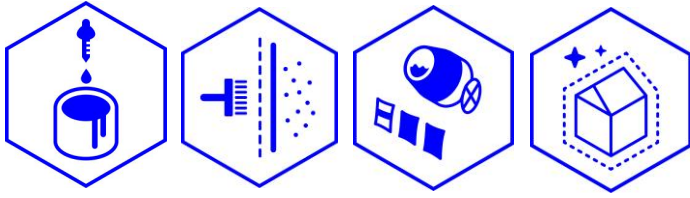
Products & Application Fields for the
Construction & Coatings Industry

Dr. Alexander Hofer

Rudolf GmbH

100 years old company which comes from the textile industry.
At the headquarter, nearly 400 employees in production,
service-, application- and R&D-laboratories; several
production halls, 2 high-bay warehouses and administrative
buildings.





RUDOLF worldwide – Construction & Coatings



1.880
Employees



50
Locations



16
Production
Sites



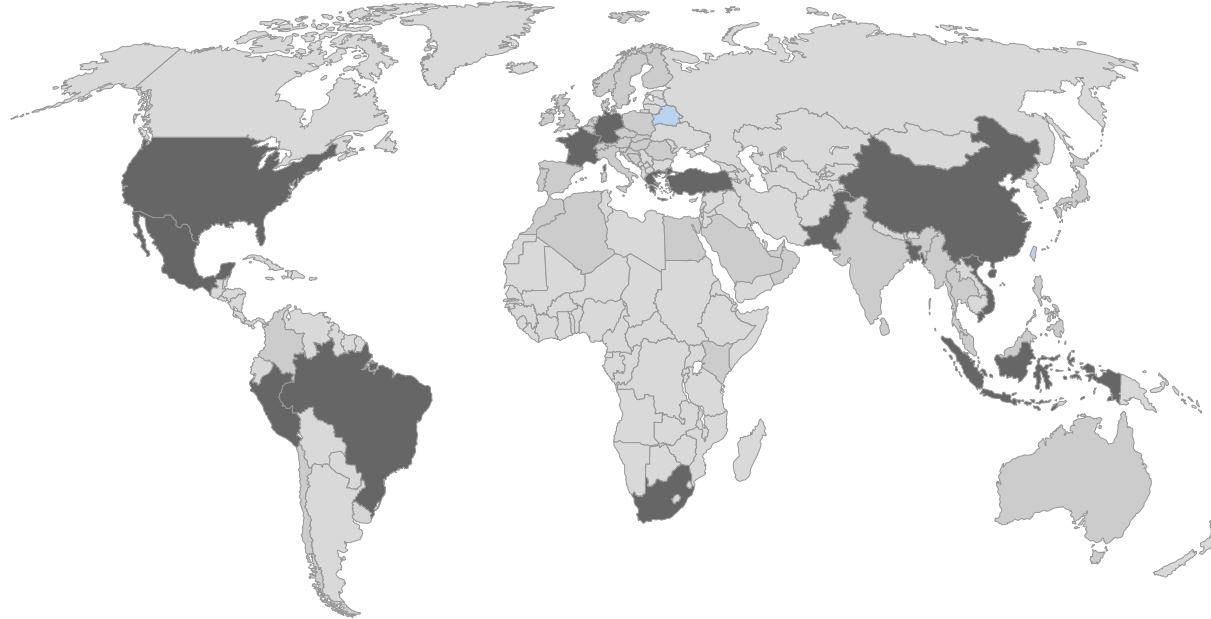
100 Years
4th generation
family-owned
business



> 5.000
Customers



> 2700
Products



Rudolf Nantong
(2nd site in China)



Rudolf USA



Rudolf Germany



Rudolf Duraner Turkey



Rudolf Indonesia

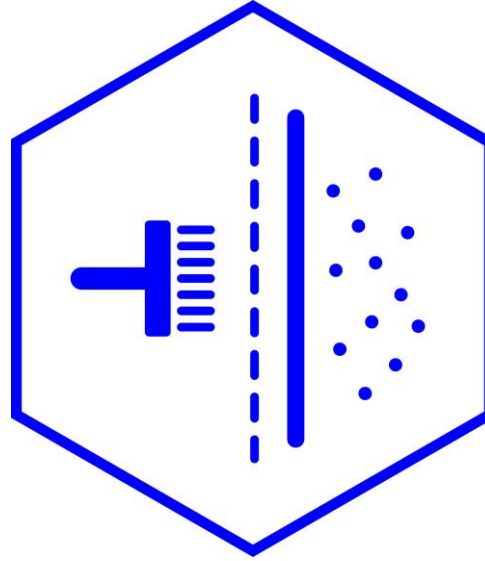


Introduction – BU Construction & Coatings



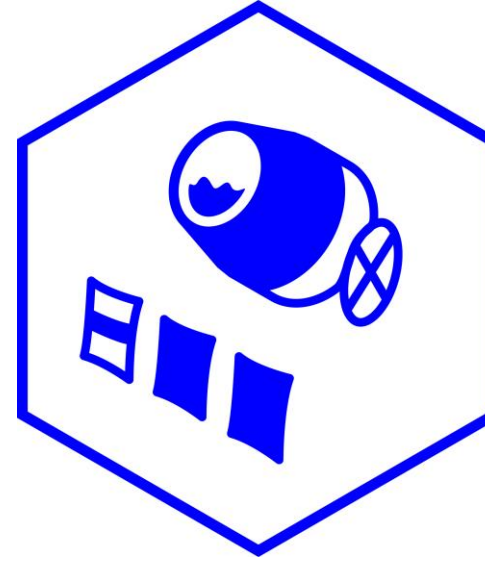
Paint Additives

Additives for paste-like masonry coatings



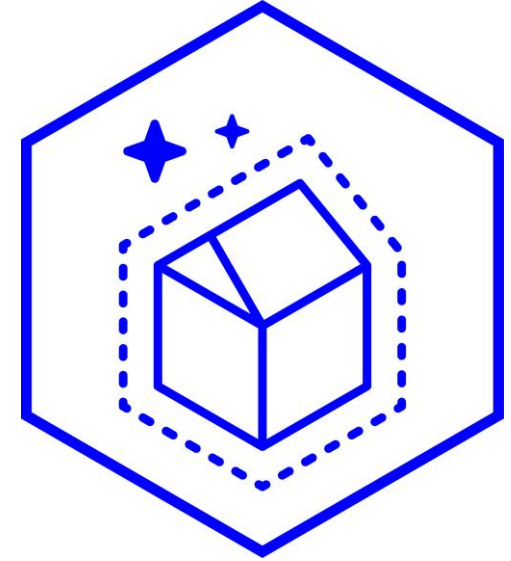
Surface Protection

Impregnating agents for mineral substrates



Dry-Mix Additives

Powder Additives for mineral building systems



Coating Additives

Multi-functional additives for all kind of coatings

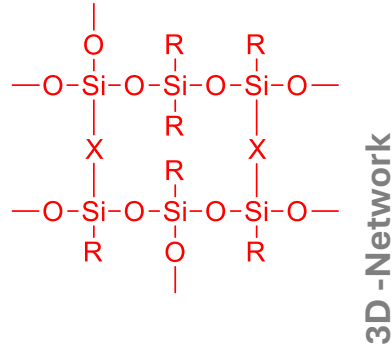


How to protect buildings against water?

Binder

Silicone resins

Base material of every formulation



Co-binder in silicone resin emulsion paints and plaster

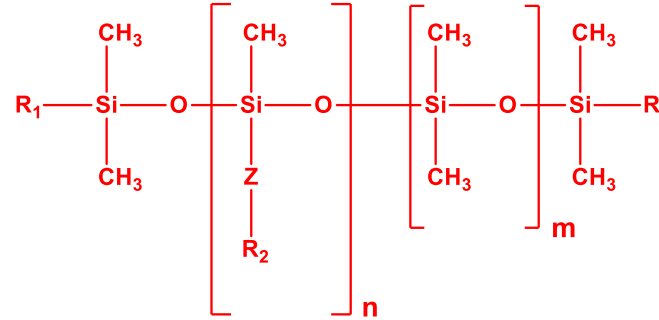
- RUCOSIL B-TF
- RUCOSIL B-TF 60

Architectural coatings

Additives

Silicone fluids

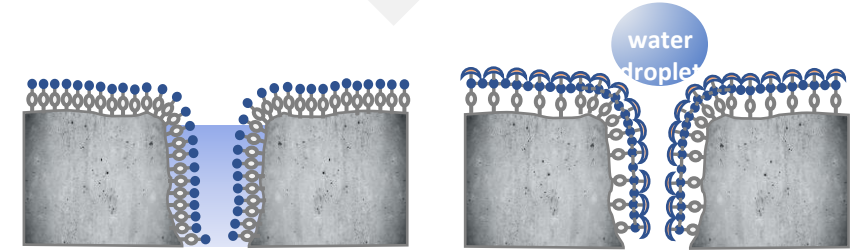
Low dosage ingredient to realize a certain property



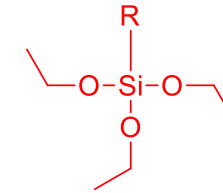
Hydrophobizing **additives** for water-based masonry coatings

- RUCOSIL B-HA
- RUCOSIL B-LS
- RUCOSIL B-HS

Impregnation



capillary pore

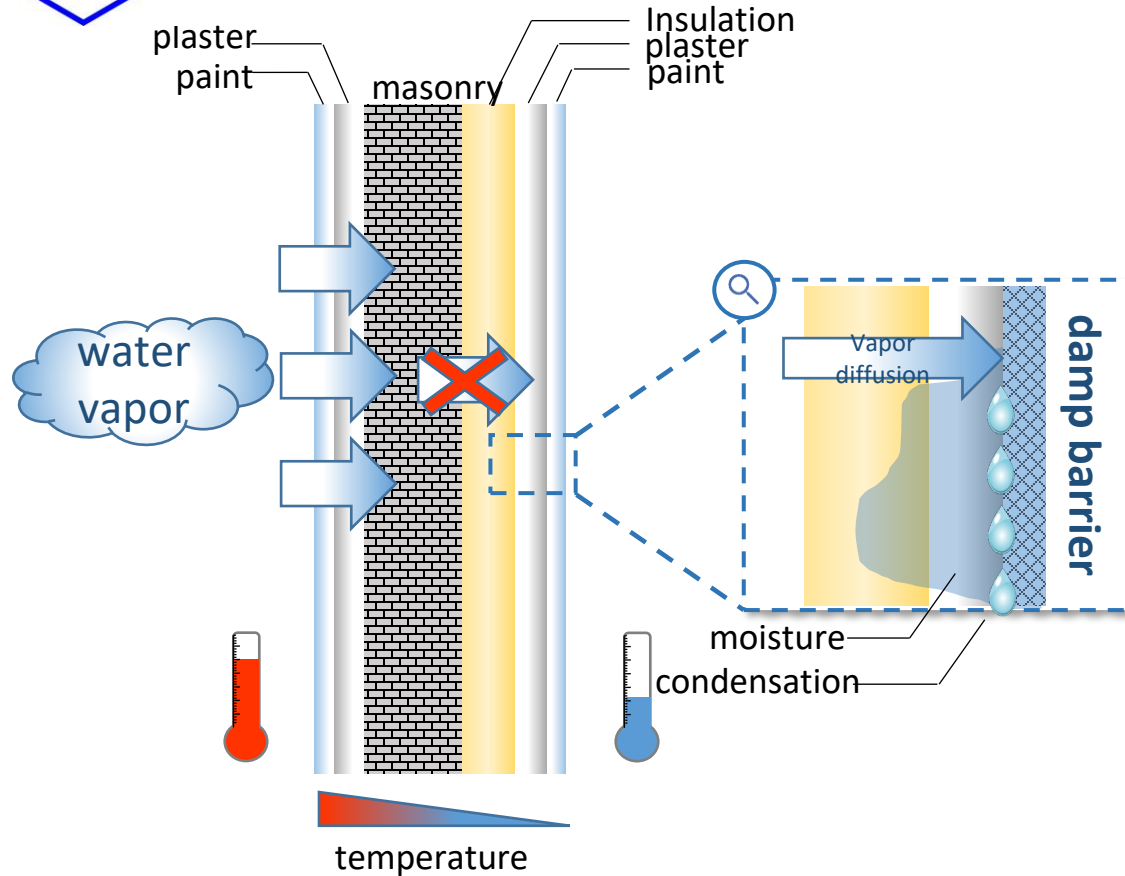


R = hydrophobic group

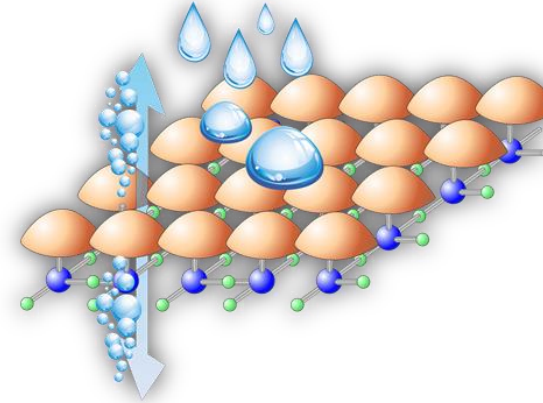
- RUCOSAN B-WB
- RUCOSAN B-OS
- RUCOSAN B-SR 100
- RUCOSAN B-SB 100
- RUCOSAN B-CM 25
- RUCOSAN B-CM 40



Binders for Coatings & Plasters – Facade Paint



“Walls have to breathe!”



RUCOSIL B-TF

Polysiloxane resin

50 %

water

Milky, white, liquid

RUCOSIL B-HA

Functional polysiloxane

50 %

water

milky, white, liquid

RUCOSIL B-LS

Functional polysiloxane

100 %

solvent-free

clear, liquid, viscous

RUCOSIL B-HS

Functional polysiloxane

100%

solvent-free

clear, liquid, viscous



Enhancing Architectural Coatings with the Right Additives

Paint Additives



Water Repellency



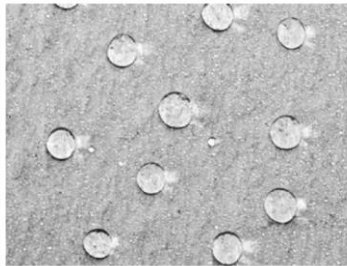
Early Water Resistance



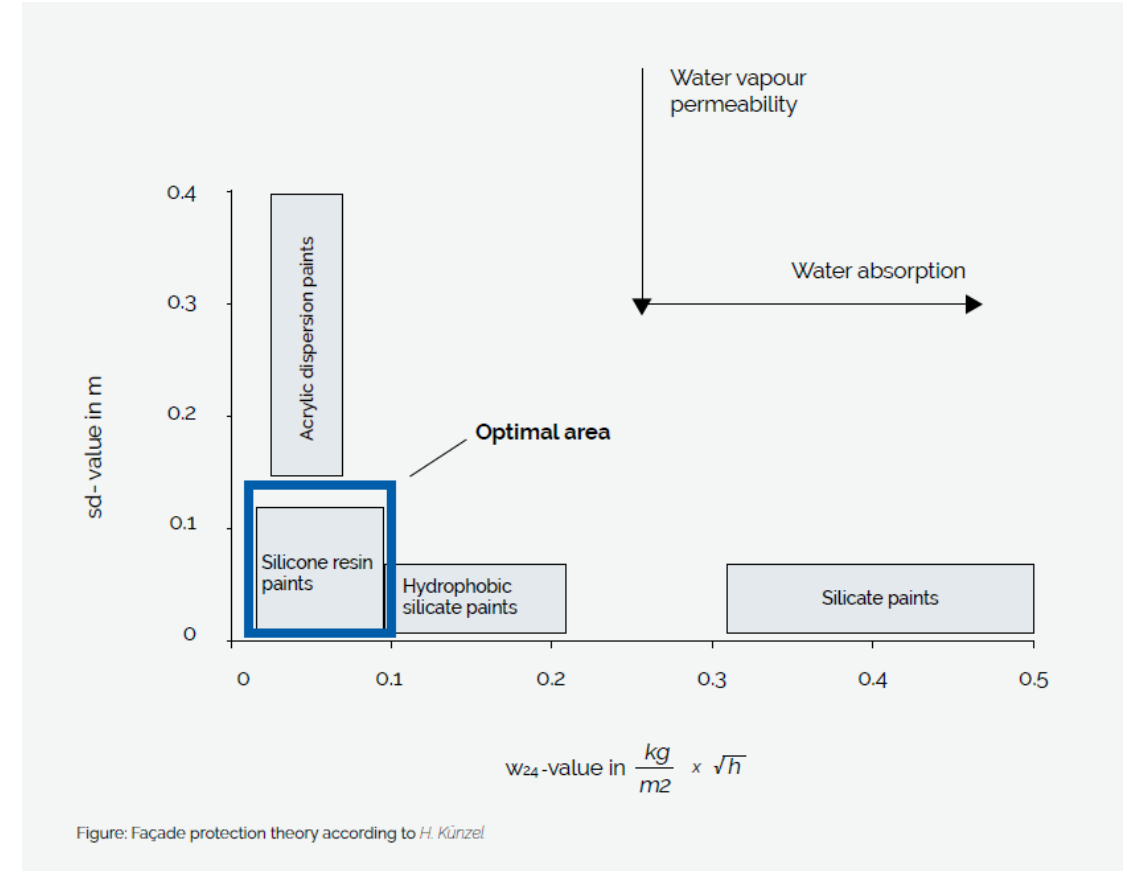
Water Vapour Permeability



Improved Processability and Properties

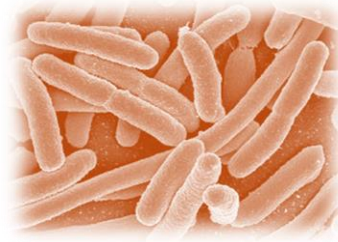
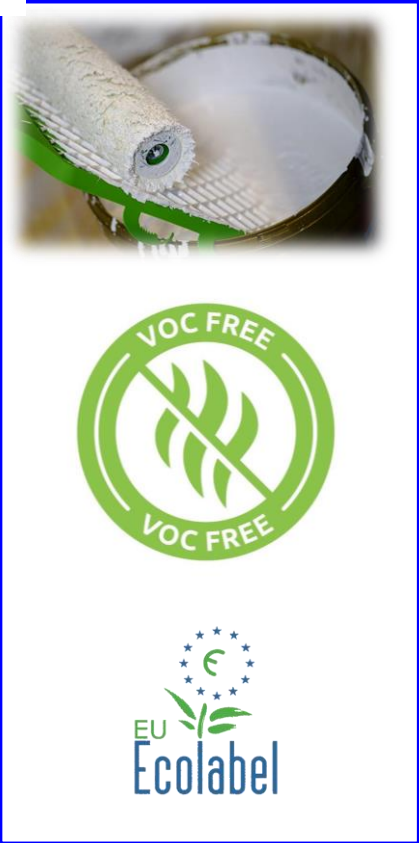


Hydrophobic Paint Conventional Paint





Special Functional Additives



Preservatives
**RUCOCIDE
B-AG and B-AL**



PCE-
Defoamer
**RUCOSIL
EPV 3803
and
EPV 3870**

Formaldehyde
scavenger
**RUCOSIL B-
FF and B-FF
100**



pH-Stabilizer
**RUCOSIL
EPV 3559**



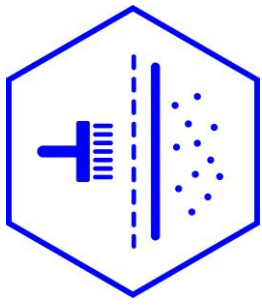
**Special
functional
Additives**

Open time
extender
**RUCOSIL B-
OZ
and EPV 3659**



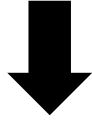
Tannin
barrier
**RUCOSIL
EPV 3547**



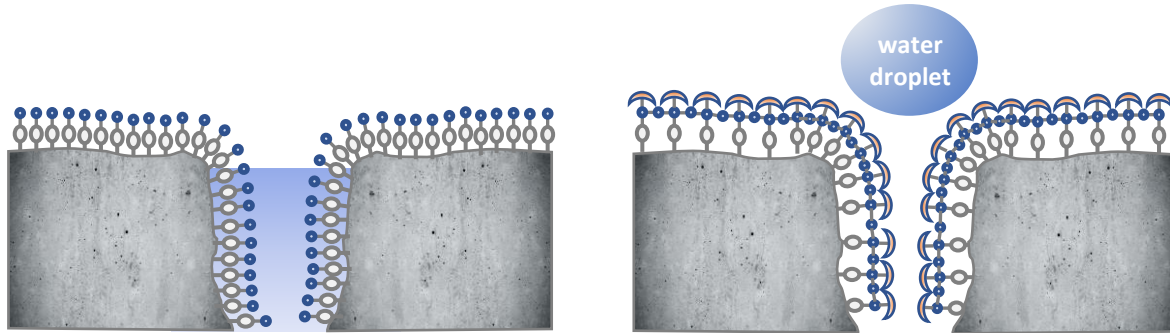


Hydrophobization of Cement Products & Mineral Substrates

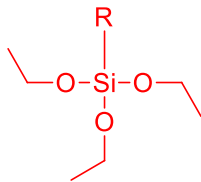
Impregnation



Treatment method of a **final** product or **admixture** for special products



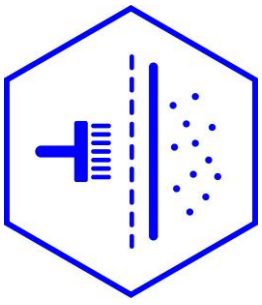
capillary pore



R = hydrophobic group

- RUCOSAN B-WB
- RUCOSAN B-OS
- RUCOSAN B-SR 100
- RUCOSAN B-SB 100
- RUCOSAN B-CM 25
- RUCOSAN B-CM 40





Impreganting Agents for Cement-Based Products

Hydrophobic Properties

Integral Hydrophobisation



RUCOSAN B-OS
RUCOSAN B-SB 100
RUCOSAN B-WB

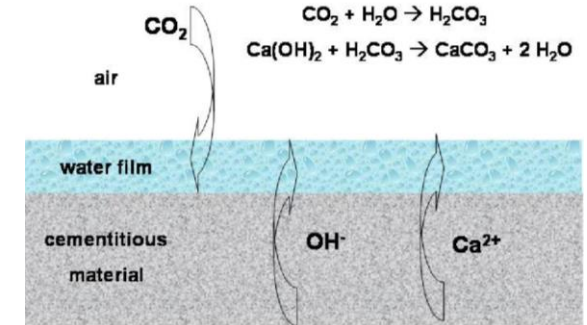


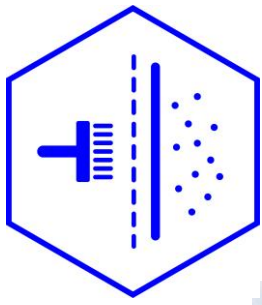
**Only for
non-load
bearing parts**

Surface Post-treatment



RUCOSAN B-SR 100
RUCOSAN B-SB 100
RUCOSAN B-OS
RUCOSAN B-WB
RUCOSAN B-CM





Hydrophobization of Cement Products & Mineral Substrates



Precast Concrete



Concrete paving stones



Fiber cement boards



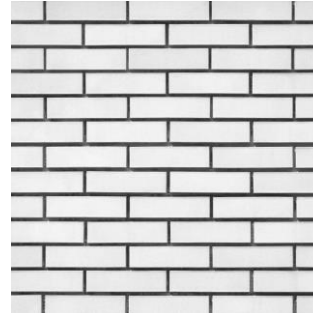
Brick mortar



Ready Mix Concrete



Aerated Concrete



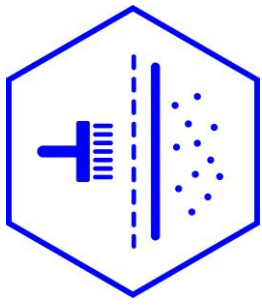
Sand-lime bricks



Clay & concrete roof tiles

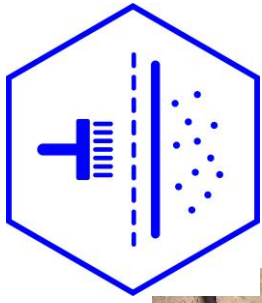


Natural stones like granite
or marble



Hydrophobization of Cement Products & Mineral Substrates

Concrete Protection	Surface Treatment				Concrete Admix		
RUCOSAN	B-WB	B-SR 100	B-CM 40	B-CM 25	B-OS	B-SB 100	B-WB
Technical Information							
Chemical basis	Silanes / mod. polysiloxanes	Silanes / mod. polysiloxanes	Silanes / mod. polysiloxanes	Silanes / mod. polysiloxanes	Silanes	Silanes / mod. polysiloxanes	Silanes / mod. polysiloxanes
Active substance	50 %	100 %	40 %	25 %	100 %	100 %	50 %
Solvent	Water	Solvent-free	Isoparaffin hydrocarbons	Isoparaffin hydrocarbons	Solvent-free	Solvent-free	Water
Diluent	Water	Org. solvents	Undiluted	Undiluted	Org. solvents	Org. solvents	Water
Appereance	Milky, white, liquid	Clear, liquid, viscous	Creamy, white	Creamy, white	Clear, liquid	Clear, liquid	Milky, white, liquid
Benefits	Perfect for standard and reinforced concrete	Perfect for standard and reinforced concrete	User-friendly one-step application	User-friendly one-step application	Recommendend for non-load-bearing applications	Recommendend for non-load-bearing applications	Recommendend for non-load-bearing applications with excellent miscibility
Applications							
Hydrophobic Impregnation of concrete	●	●	●	●			
Concrete admixture: integral treatment	●				●	●	●

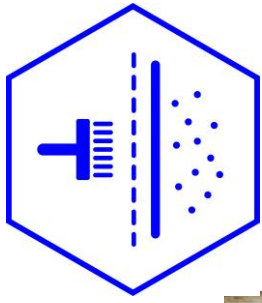


Rising Moisture in Masonry

"The problem of rising moisture gets obvious in nearly every city when you walk around with open eyes"

Moisture in the masonry favors the growth of algae and salt efflorescence





Injection Cream – Hydrophobic Damp Barriers

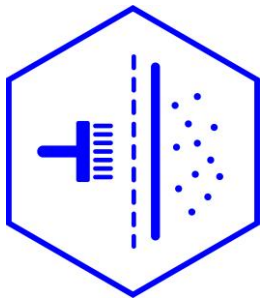


Picture: borehole injection

Ready to use
B-CM 80
Technical information
Silanes / mod. polysiloxanes
80 %
Water
Undiluted
Creamy, white

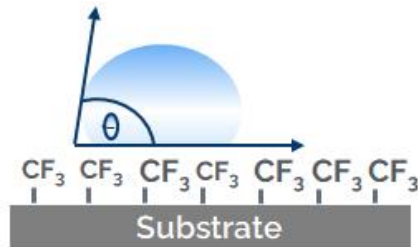
Certified functionality by



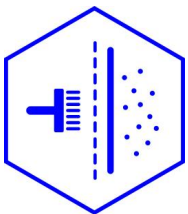


Stain-repellent Fluorocarbon Impregnating Agents

Surface treatment of marble with **RUCOTEC B-FO 6** performs very well to protect the natural stone from olive oil, water, balsamic vinegar, red wine and coffee.

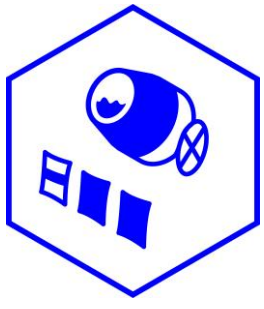


	blank value			RUCOTEC B-FO 6 (5%)			RUCOTEC B-FO 6 (10%)			RUCOTEC B-FO 6 (15%)		
	1 h	5 h	24 h	1 h	5 h	24 h	1 h	5 h	24 h	1 h	5 h	24 h
after application												
after contact time												



Stain-repellent Fluorocarbon Impregnating Agents (PFOA- and PFOS-free)

Surface Treatment	solvent-based				water-based			
RUCOTEC	B-FL 6	B-FO 6	B-FI 6	B-FS solv.	B-FW 6	B-FN 6	B-FP	B-FS 6
Chemical Basis	Fluorocarbon resin	Fluorocarbon resin	Fluorocarbon resin	Fluorocarbon resin & silanes/ polysiloxanes	Fluorocarbon resin	Fluorocarbon resin	Preparation of fluorosilanes	Fluorocarbon resin & silanes/ polysiloxanes
Active Substance	25 %	20 %	27 %	35 %	27 %	25 %	14 %	37 %
Solvent	Isopropyl acetate	Isoparaffin	Isopropyl alcohol	Isoparaffin	Water	Water	Water	Water
Diluent	Polar solvents like Isopropyl and butyl acetate	Aliphatic, non-polar solvents like white spirit or isoparaffines	Isopropanol/Isopropylacetate	Aliphatic, non-polar solvents like white spirit or isoparaffines	Water	Water	Water	Water
Ionic Character	-	-	-	Slightly cationic	Cationic	Non-ionic	Cationic	Slightly cationic
Benefits	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change • High penetration depth 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change • High penetration depth 	<ul style="list-style-type: none"> • Strong oil- and stain repellency • No color change • High penetration depth

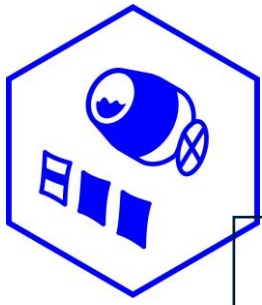


DRY-MIX Additives



RUCOMIN®
Powder additives for
mineral building
materials



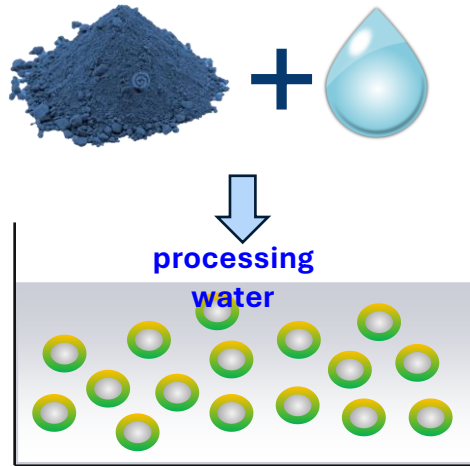


Hydrophobization Powder – RUCOMIN B-PW

Step 1: Dry mixing



Step 2: Mixing with water



“The carrier gets dissolved in the processing water and the active ingredients equip the cement mixture with hydrophobic properties.”



“The modified mortar, grout or cement – mixture can be processed as usual.”

RUCOMIN B-PW

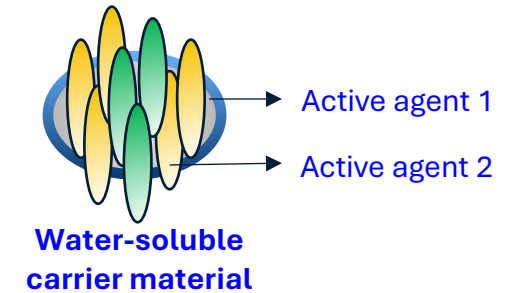
Silicone-hydrophobising powder for cement

70 %

solid

yellowish powder

Product scheme

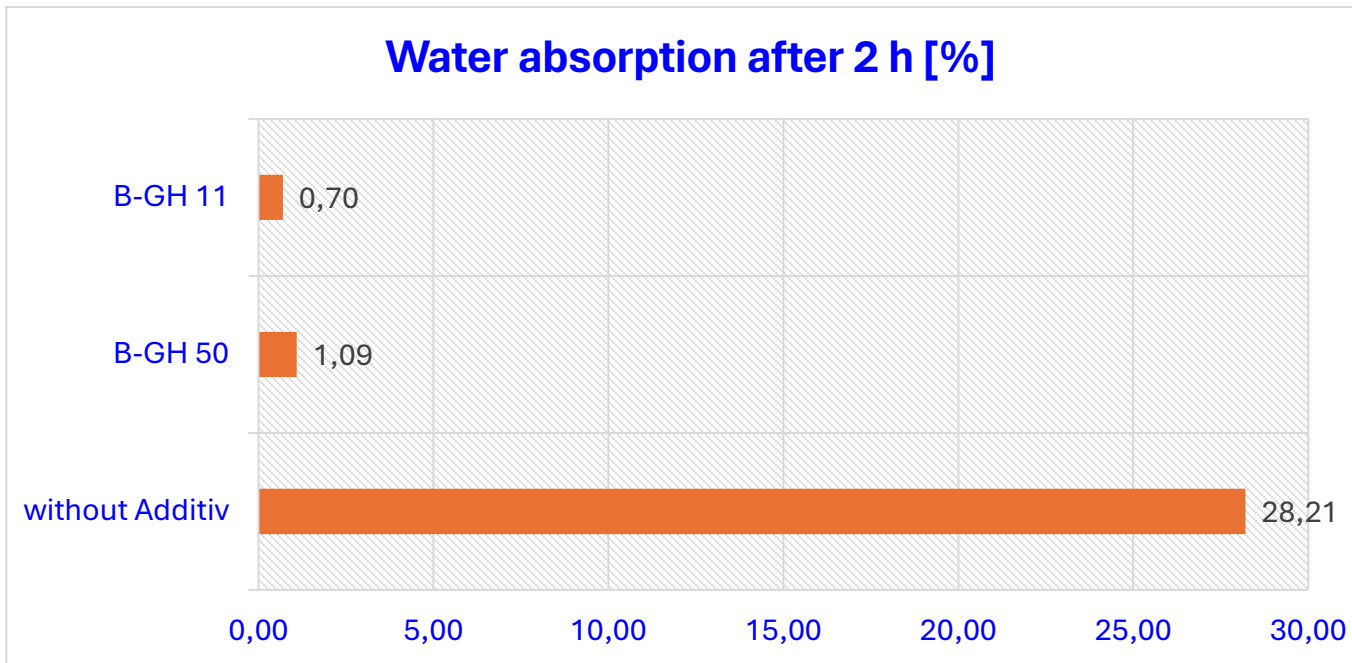




Gypsum Hydrophoization – RUCOMIN B-GH 50 & B-GH 11

➤ Functional siloxane on inorganic carrier

- sump time was 3 min
- Drying 5 days by RT further 5 days at 40°C





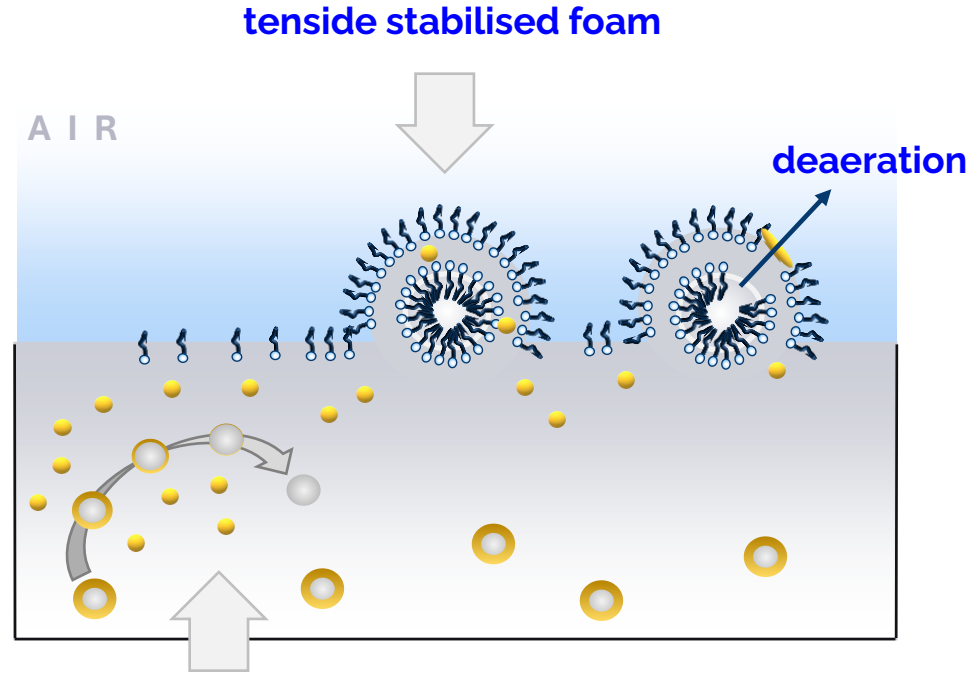
Powder Defoamer – RUCOMIN B-PM & B-PM 24



cement
mixture



processing
water



Evolution of the active defoamer agent

“Foam and bubble formation can have negative influence on the optical but also on the mechanical properties of concrete products. Therefore, accurate defoaming and deaeration is essential to guarantee highest performance of your products.”

RUCOMIN B-PM

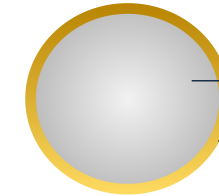
Powder Defoamer

100 %

solid

white powder

Product scheme

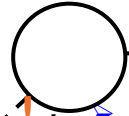


inorganic carrier

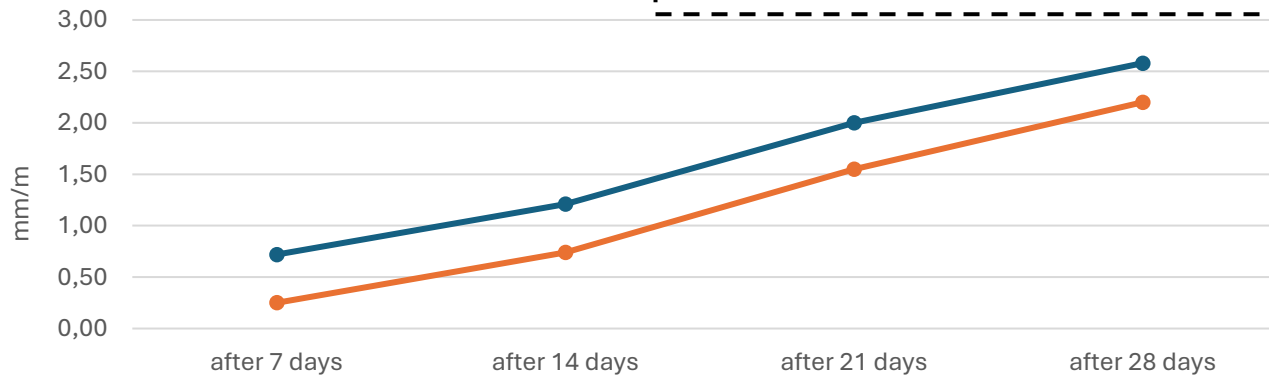
coated defoamer
agent



Anto-Shrinkage Agent – RUCOMIN B-SA 50



- Volume reduction of hardened cement paste, mortar or concrete due to the reduction of the moisture content of the hardened cement paste
- Shrinkage is a characteristic property of cement



— without additive — with 1 % additive

RUCOMIN B-SA 50

Chemical basis	Glycols on an inorganic carrier
Active substance	50 %
Appearance	White powder





Coating Additives



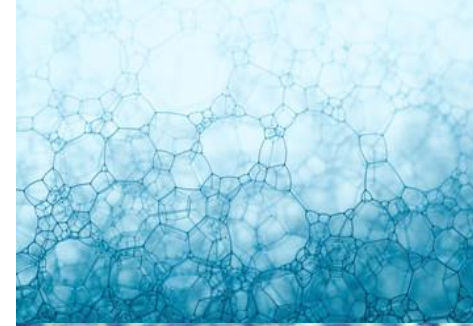
RUCOLAC B-200
Wetting- & Dispersing
Agents



RUCOLAC B-300
Surface Additives



RUCOLAC B-400
Special Additives



RUCOLAC B-500
Defoamers



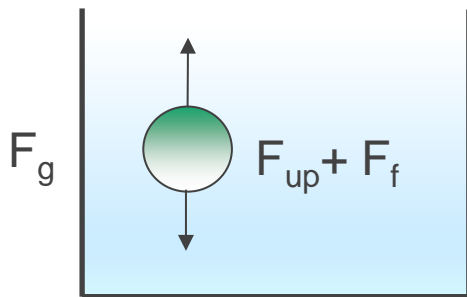
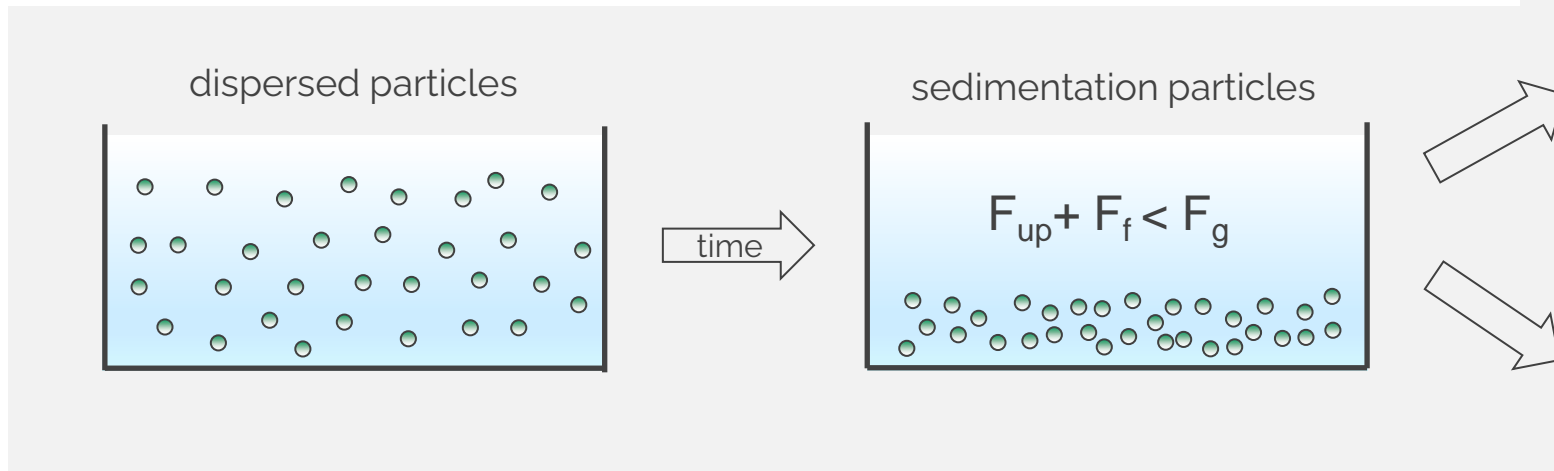
RUCOLAC B-600
Hydrophobising
Additives



RUCOLAC B-700
Binders and
Crosslinkers

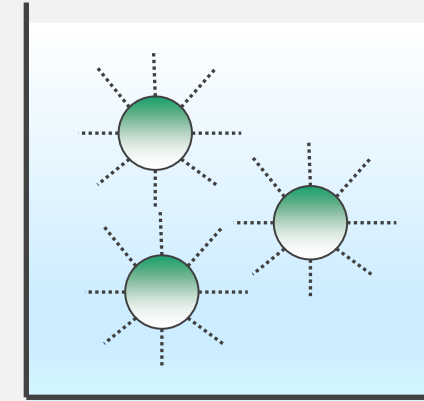


Technology of Particle Stabilisation



F_f friction force (interaction)
 F_g gravity
 $F_{up} + F_f = F_g \longrightarrow$ stable dispersion
Additional:
particle – particle interactions
electronical interactions for charged particles

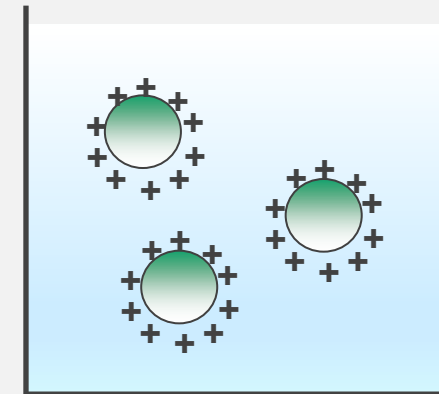
sterical stabilisation



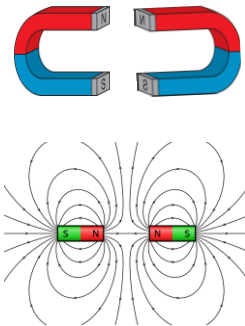
entropic reasons



electrostatic stabilisation



repellent forces





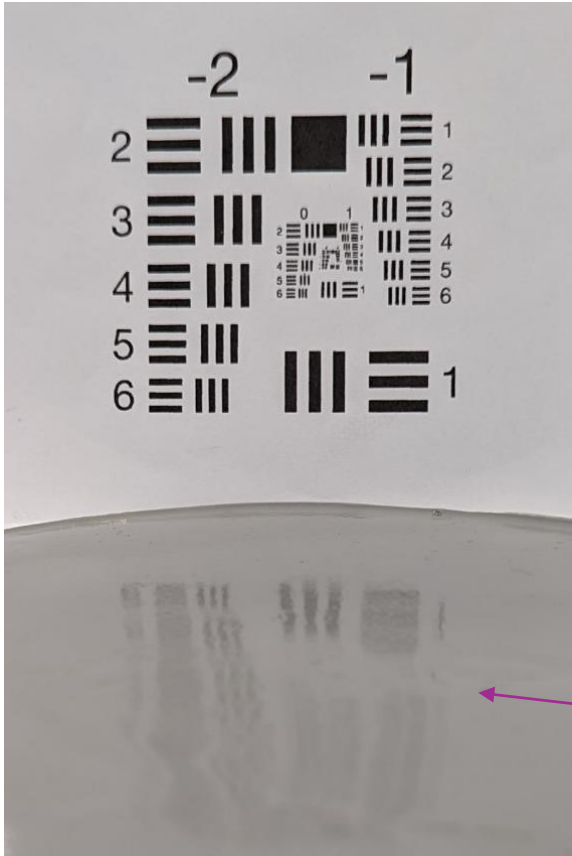
Guide Formulation – 2 pack PU Flooring

Pos.	Raw Material	Amount	Product	Supplier
1	ALBODUR 904	28,4	polyol	Alberdingk Boley
2	RUCOLAC B-542	0,4	air release agent	RUDOLF GMBH
3	RUCOLAC B-568	0,3	defoamer	RUDOLF GMBH
4	RUCOLAC B-233	1	wetting and dispersing agent	RUDOLF GMBH
5	Microsil M6	46,65	extender	
6	Zeolithpoeder	4		
7	Orisil 200	0,25	anti settling agent	
8	Pasta L50	3	pigment	
9	Desmodur VL50	16		
Total:		100		

Pos.	Raw Material	Amount	Product	Supplier
1	ALBODUR 904	28,4	polyol	Alberdingk Boley
2	RUCOLAC B-542	0,5	air release agent	RUDOLF GMBH
3	RUCOLAC B-568	0,3	defoamer	RUDOLF GMBH
4	RUCOLAC B-201	0,3	wetting and dispersing agent	RUDOLF GMBH
5	Microsil M6	46,05	extender	
6	Zeolithpoeder	4		
7	Orisil 200	0,25	anti settling agent	
8	Pasta L50	3	pigment	
9	Desmodur VL50	16		
Total:		100		

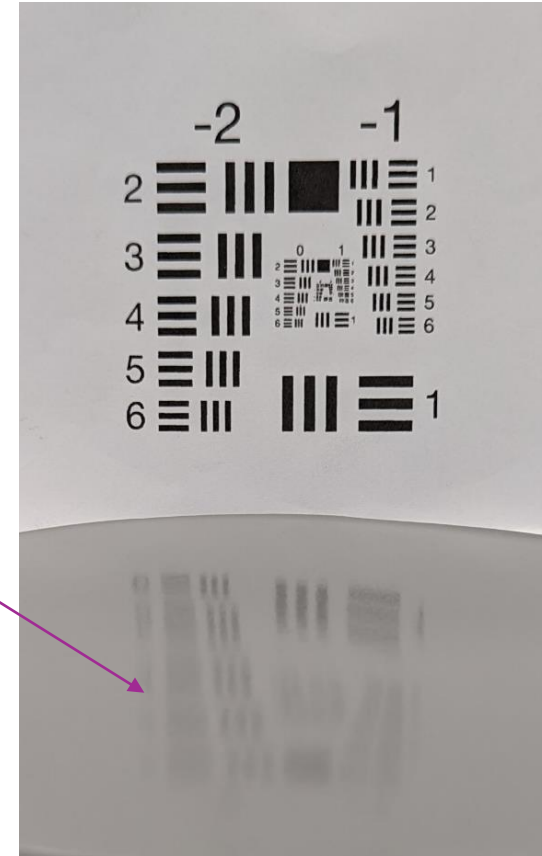


Guide Formulation – 2 pack PU Flooring



Blind value

Reflective
image very
hazy



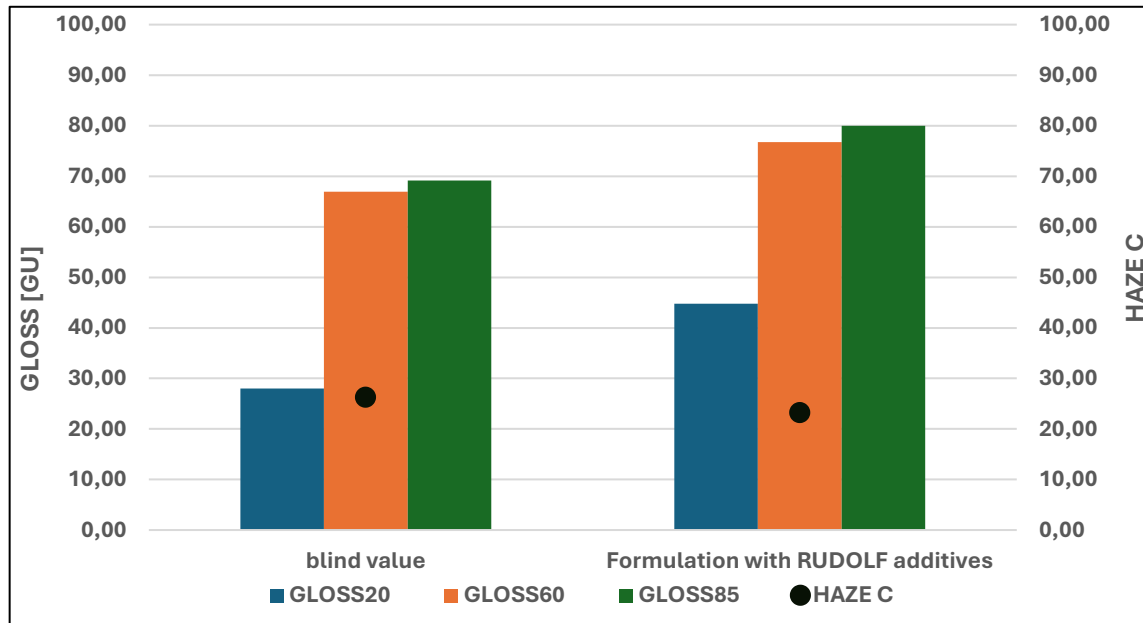
Reflective
image much
clearer

Formulation with RUDOLF additives

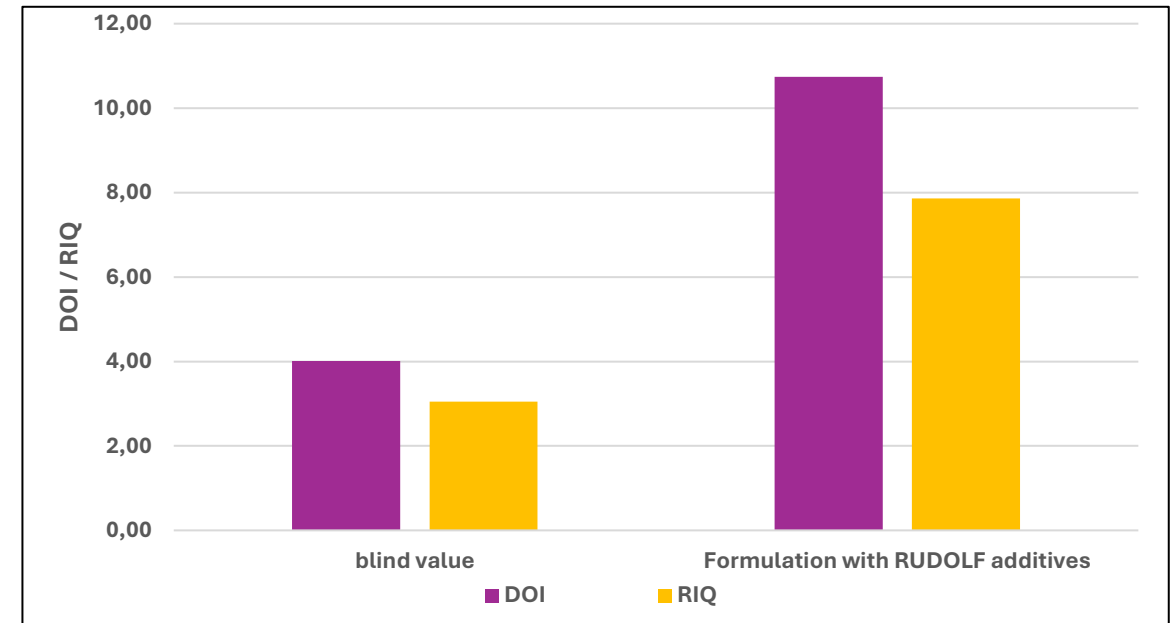


Guide Formulation – 2 pack PU Flooring

Gloss measurements at 20°/60°/85°. Haze, Distinctness of Image (DOI) and Reflected Image Quality (RIQ)



➤ **HAZE C:** Higher values are an indication of poorer surface quality.

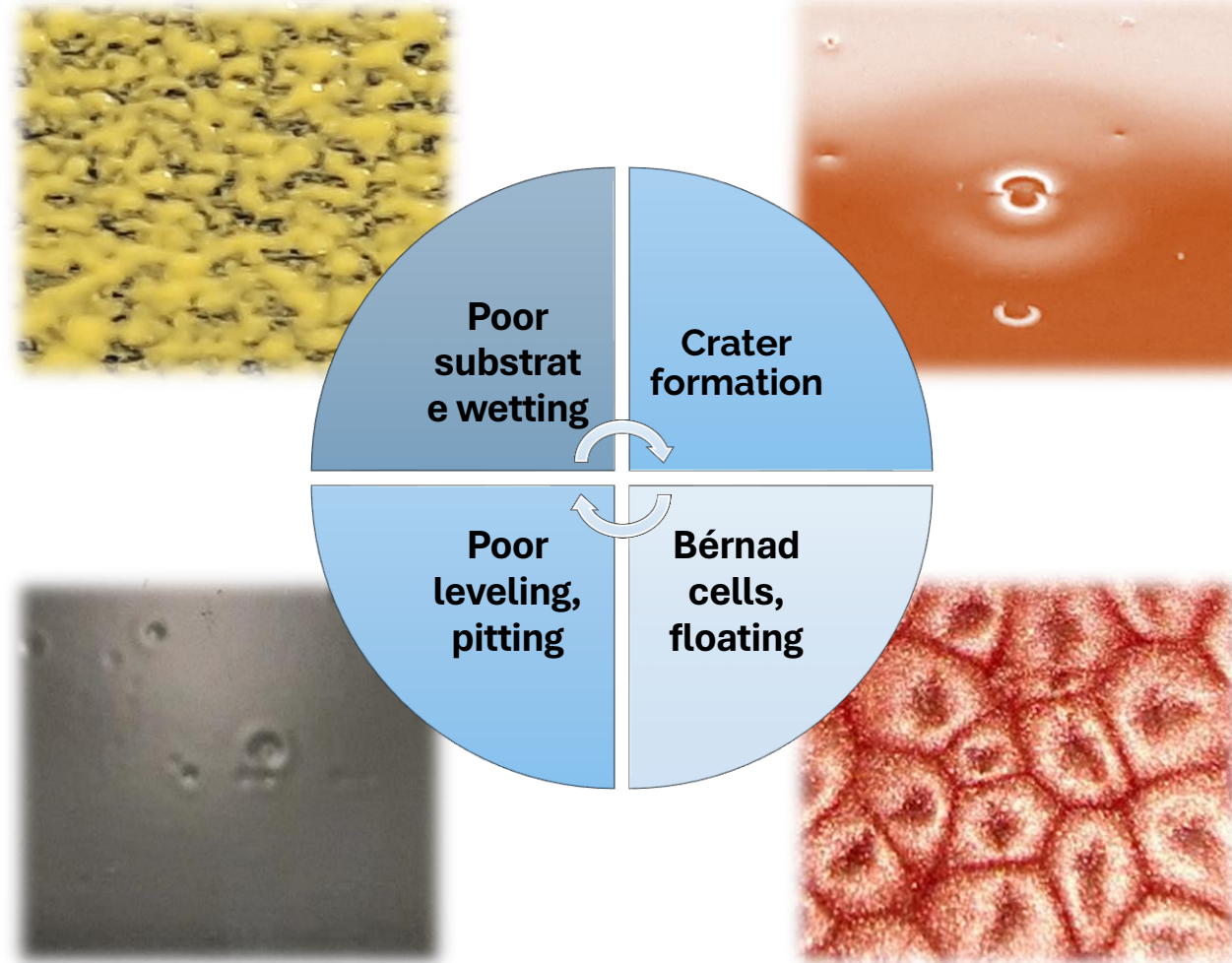


A surface with a perfect, undistorted image gives a value of 100.

- **DOI:** The lower the value, the less clear the image
- **RIQ:** The lower the value, the more pronounced the surface structure and the less clear the image.



RUCOLAC B-300 Series: Surface Additives





Substrate Wetting

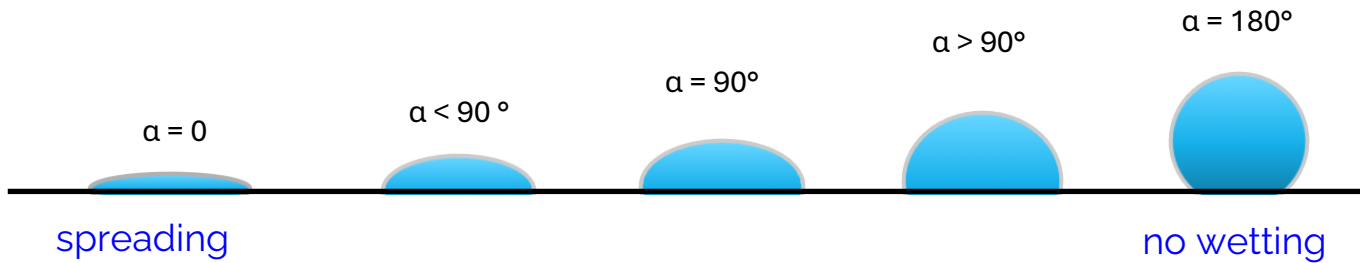
Contact angle is representative for wettability

Poor substrate wetting

Liquid	σ [mNm ⁻¹]
Hexamethyl disiloxane	16
n-Octane	21
2-Propanol	22
Acetone	24
Butylacetate	26
Toluene	29
Butylglykole	30
Dioxane	37
Water	73

Substrate	σ [mNm ⁻¹]
PTFE	20
Polypropylene	28 – 35
Polyethylene	30 – 36
Polycarbonate	35 – 37
Polyester	40 – 45
Aluminium (untreated)	33 – 35
Steel (phosphated)	43 – 46
Stahl (untreated)	29
Glas	73

Binder	σ [mNm ⁻¹]
Poly(meth)acrylate	32 – 41
Alkyd resins	33 – 60
Polyvinylacetate	36
Polyvinylalcohol	37
Melamin resins	42 – 58
Epoxide resins	45 – 60
Chlorine rubber	57

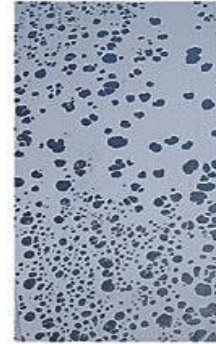
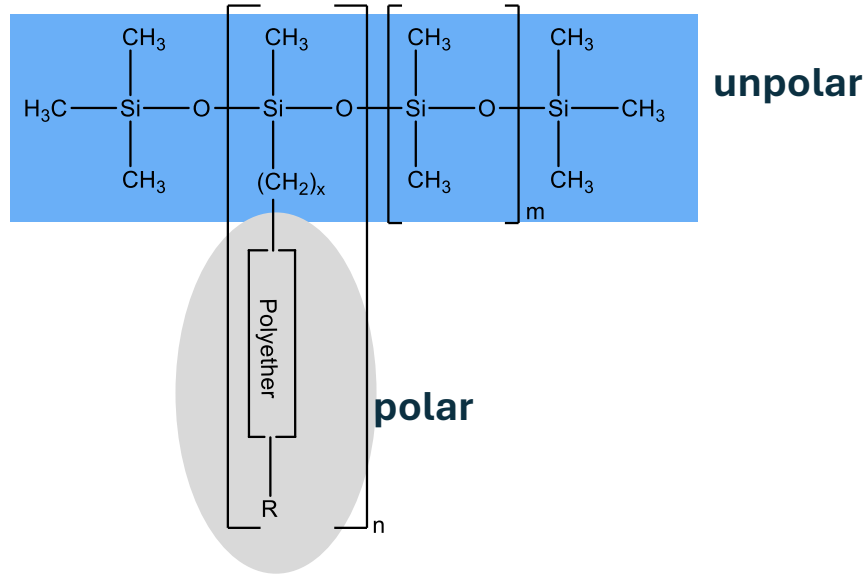


A good wetting can be realised if the **surface tension of the coating is lower** than the **surface tension of the substrate**



RUCOLAC B-300 Series: Surface Additives

Polyether modified polysiloxane



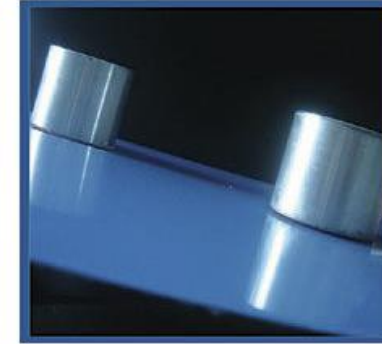
Substrate wetting

B-350 Series
Surface wetting



Flow and leveling

B-320 Series
Leveling &
Surface Tension
reduction



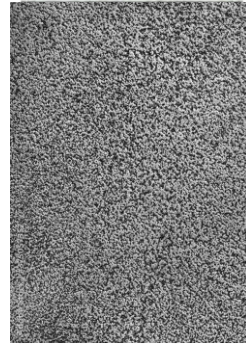
Surface slip

B-310 Series
Leveling & Slip



Defoaming/
air release

B-500 Series
B-538
Defoamer



Hammer
finish

B-403 Hammer
additive

Increasing Molecular Weight (g/mol)

„**Polyether modified siloxanes** are surface active molecules which have a **polar and un-polar segment** and allows them **orientate** within a liquid media. “



Surface Additives – The Solution to Surface Defects

**RUCOLAC
B-310 Series**

Leveling and slip



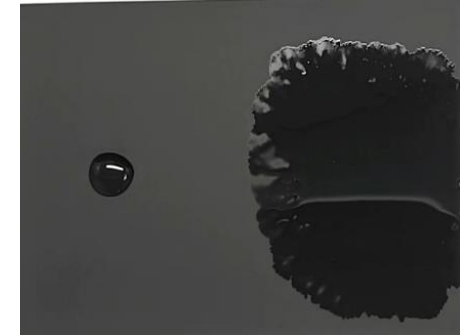
**RUCOLAC
B-320-340 Series**

Leveling & surface tension reduction

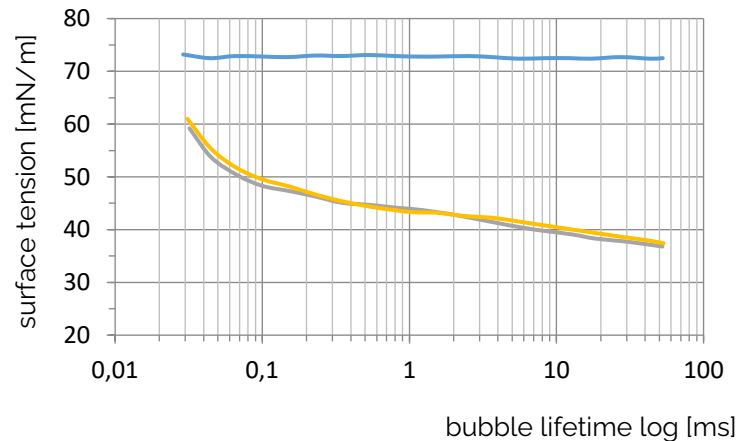


**RUCOLAC
B-350 Series**

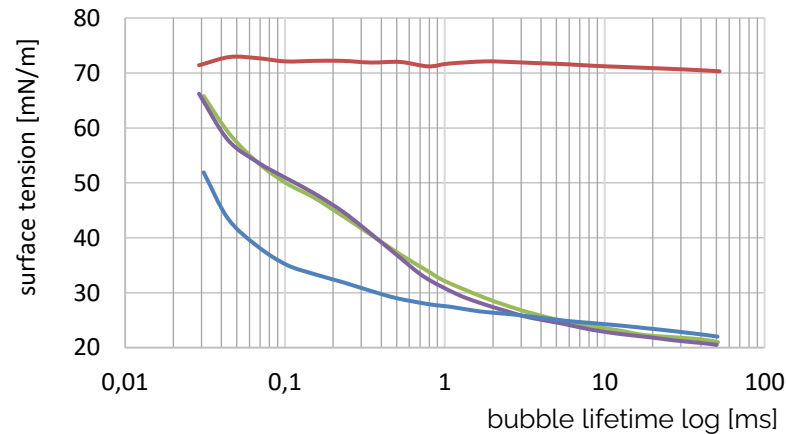
Substrate wetting



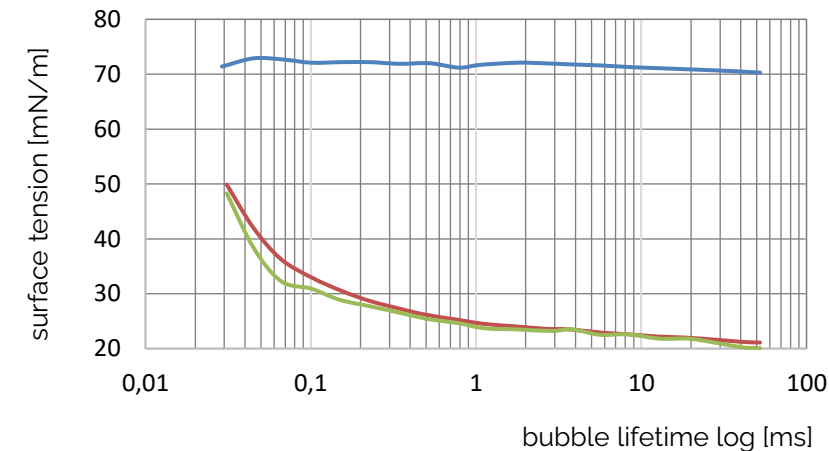
Dynamic surface tension of slip additives



Dynamic surface tension of leveling additives



Dynamic surface tension of substrate wetting additives

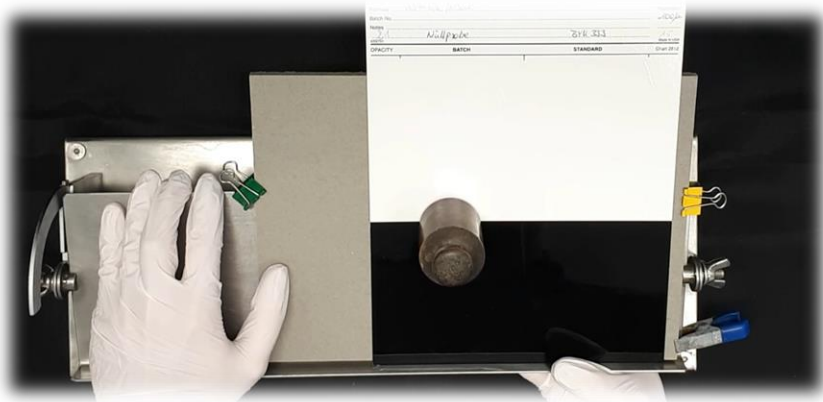




Case Study: Slip & Surface Smoothness

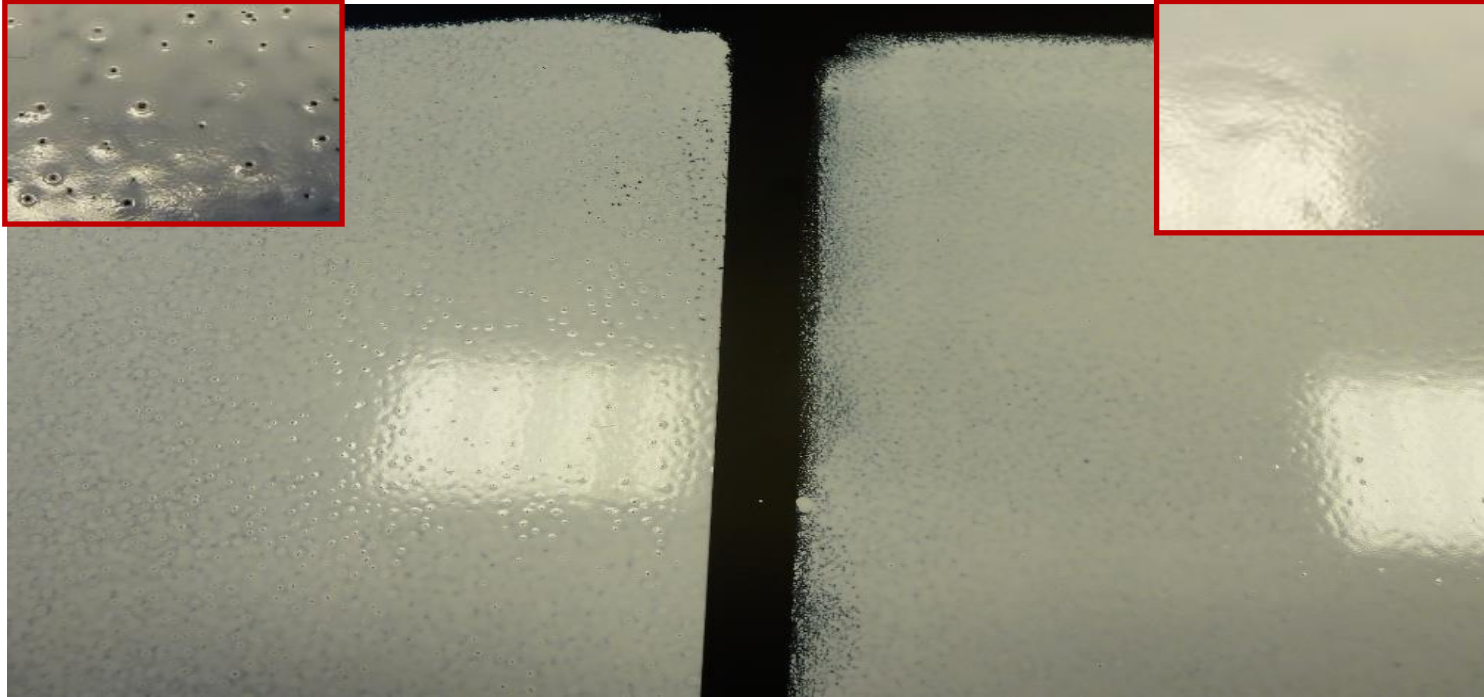
- Silicone additives improve the **slip** of surfaces
- Smoother surfaces give the coating properties such as better **scratch resistance**, **lower susceptibility to soiling**, **easier cleaning** and better results in terms of **block resistance**

	sample	blank 1	B-311	B-312	B-313	B-314	competitor	competitor	competitor
Path length 13 cm	angle [°]	19-20	7-8	15-16	16-17	10	16-17	15-16	15-16





RUCOLAC B-500 Series: Defoamer



without defoamer

with defoamer

- **Foam** can occur in **all liquid coating systems** (especially in aqueous systems)
- It can cause **surface defects** for example **craters and pinholes**
- **Air bubbles and foam** can also occur **during the production process** or when the **coating is applied** (dissolver, syringes)



RUCOLAC B-500 Series: Defoamers & Deaerators

RUCOLAC B-510 Series

Mineral oil defoamer

RUCOLAC B-520 Series

Plant oil defoamer

RUCOLAC B-530-550 Series

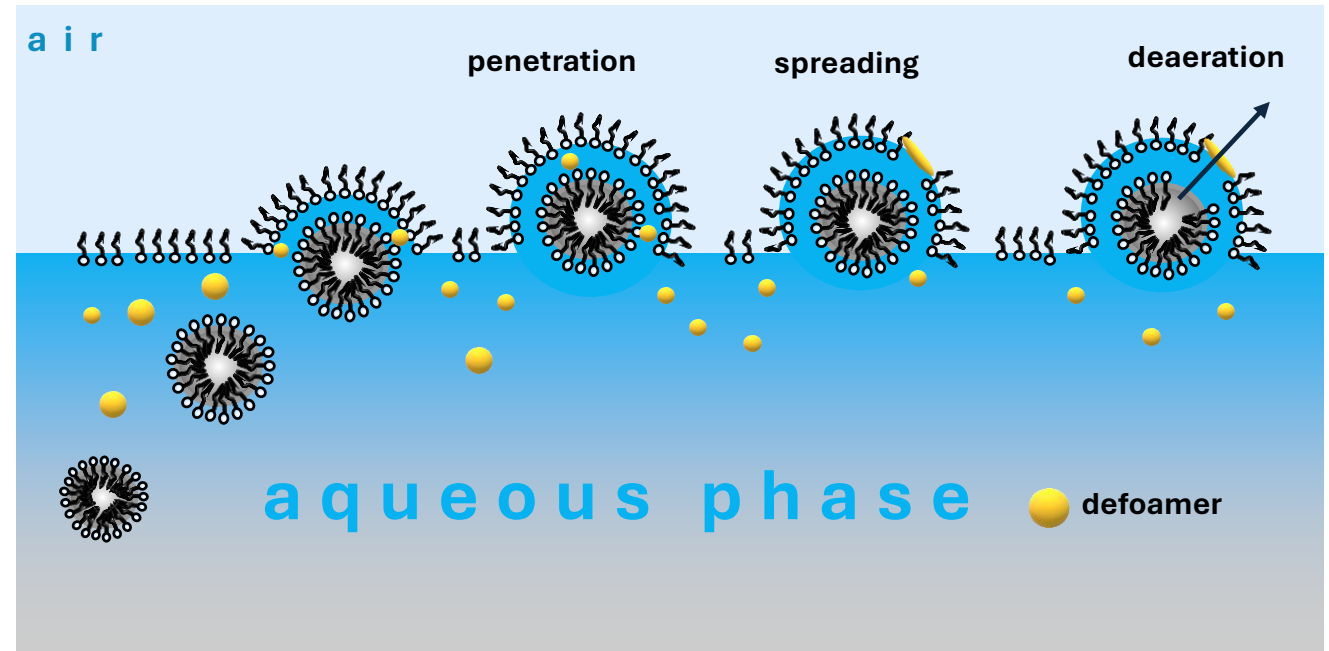
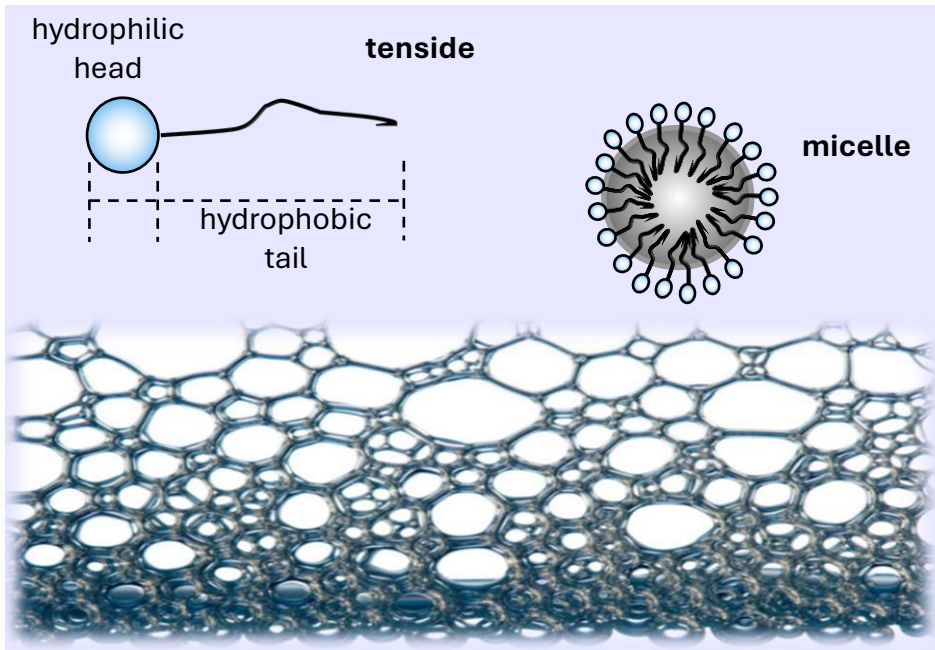
Silicone oil defoamer

RUCOLAC B-560 Series

Silicone-free defoamer

RUCOLAC B-590 Series

Fluorine-containing defoamer



Thank you!

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