

Additives for reactive adhesives

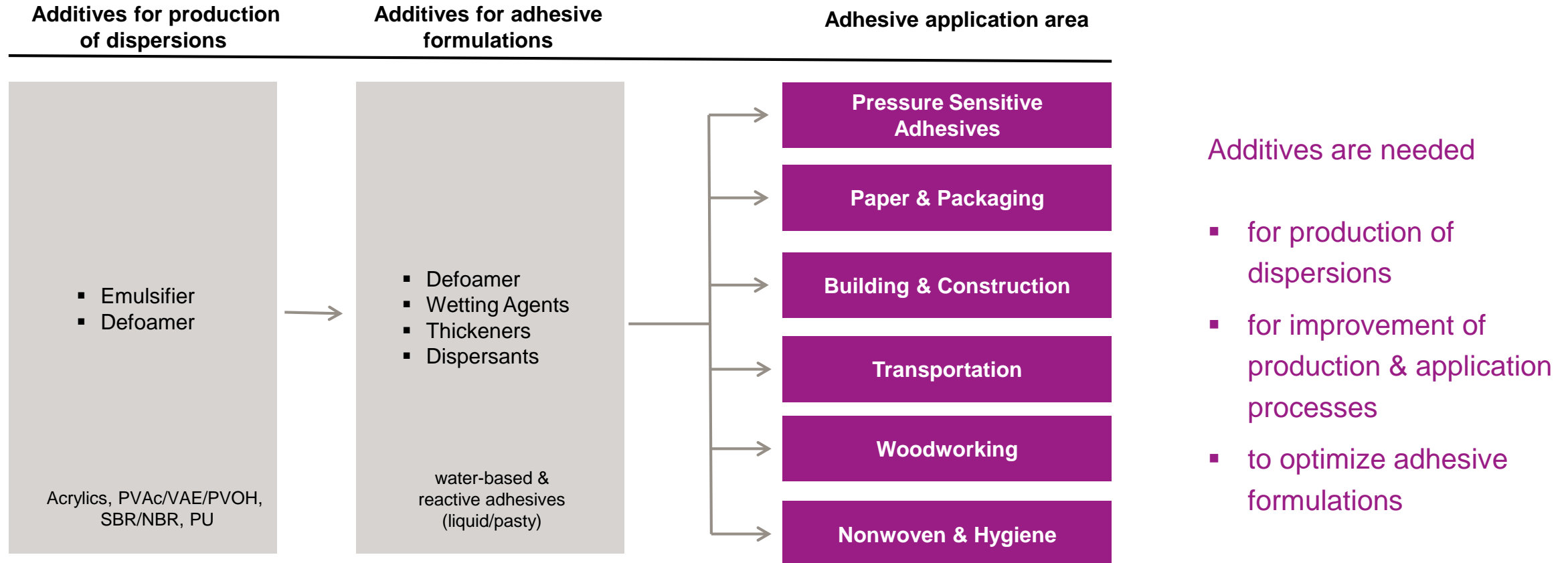
April 2020

Interface & Performance – Our product portfolio for adhesives & sealants

TEGOPAC® Polymer ST	Silane-modified polymers	Reactive Adhesives & Sealants	Water-based Adhesives & Sealants	Defoamers	TEGO® Antifoam	
Modifier OH Polymer OH Crosslinker	Condensation curing silicones			Dispersants	TEGOMER® ZetaSpense®	
Polymer VS Catalyst Crosslinker VQM	Addition curing silicones			Wetting agents	SURFYNOL® TEGOPREN®	
ALBIDUR® ALBIFLEX® ALBIPOX®	Reactive resin modifiers			Thickeners	TEGO® Rheo	
TEGOMER®	Reactive siloxanes / UV curing silicones			Emulsifiers	TEGO® SHO TEGO® SMO REWOPOL®	
NANOPOX® NANOCRYL®	Nanosilica concentrate			Solvent-based Adhesives & Sealants	Dispersants	TEGOMER® TEGOPREN®
TEGOMER® TEGOPREN® TEGO® Antifoam	Dispersants/Deaerators				Deaerators	TEGO® Antifoam

Binders & additives for adhesives & sealant applications

Our additives are the link between production, formulation & application



Dispersing agents for adhesive formulations

Dispersing agent	Chemical base	delivered as	Ionogenicity	Dispersion of					Application area
				Chalk	Talc	Glass or polymeric fiber	micronized filler	organic pigments	
TEGOMER® DA 626	Polymeric nature	≥ 98% active concentrate	Nonionic	•	•		•	•	PUR, Epoxide, Vinyl ester, UP resins *
TEGOMER® DA 640	Polyether phosphate	30% active solution	Anionic	•	•				water-based systems
TEGOMER® DA 646	Modified Polyether	100% active concentrate	Nonionic			•	•		water-based systems, PUR, Epoxide, SMP
TEGOMER® DA 850	Polymeric nature	40% active solution	Nonionic	•	•			•	water-based systems
ZETASPERSE® 3100	Polymeric nature	40% active solution	Anionic	•	•		•	•	water-based systems
ZETASPERSE® 3600	Polymeric nature	52% active solution	Anionic	•	•		•	•	water-based systems
ZETASPERSE® 3800	Polymeric nature	40% active solution	Nonionic	•	•		•		water-based systems
CARBOWET® 103	Alcohol ethoxylate	100% active concentrate	Nonionic	•	•		•		SMP
CARBOWET® 106	Alcohol ethoxylate	100% active concentrate	Nonionic	•	•		•		SMP
TEGOPREN® 6875	Alkyl modified siloxane	100% active concentrate	Nonionic	•	•		•	•	Epoxide, Vinyl ester, UP resins *

• recommended

* unsaturated Polyester

TEGO® Antifoam D 3020 & SURFYNOL® AS 5000 can be used as dispersing agents for SMP-based (reactive) systems, too.

For moisture curing reactive adhesive & sealant formulations water-free additives (100% active substance) are needed!

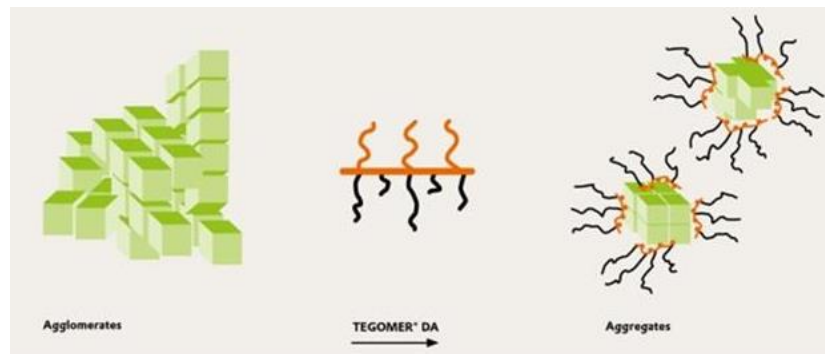
Dispersing additives

Dispersing agents are surface-active ingredients, which ease the incorporation of pigments and fillers into a liquid. Agglomerates are broken up by shearing whereby new surfaces are created. The surfaces are wetted by dispersing agents which stabilize the aggregates of pigments or fillers.

Dispersing agents have an amphiphilic structure which combines the following requirements:

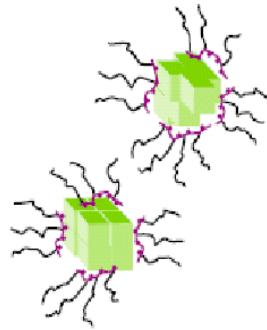
- dispersants must be capable of being strongly adsorbed onto the particle surface and therefore possess specific anchoring groups.
- the molecule must contain polymeric chains that give steric stabilization in the required system.

Dispersing agents can provide ionic stabilization if they contain anionic or cationic structure elements.



What benefits can we achieve with our dispersants?

- Improved stability of dispersions without settlement
- Improved mechanical properties
- Lower viscosities for easier processing
- Strong viscosity reduction in highly-filled formulations
- Higher filler loading



CaCO₃ filler in latex dispersion



without
dispersant additive



with
dispersant additive

Dispersing additives in SMP-based formulations (reactive systems)

For moisture curing reactive adhesive & sealant formulations water-free additives (100% active substance) are needed!

TEGOMER® DA 646: small viscosity reduction already with 1% additive*; viscosity reduction with 1% and 2% additive* is similar

CARBOWET® 103 & CARBOWET® 106:

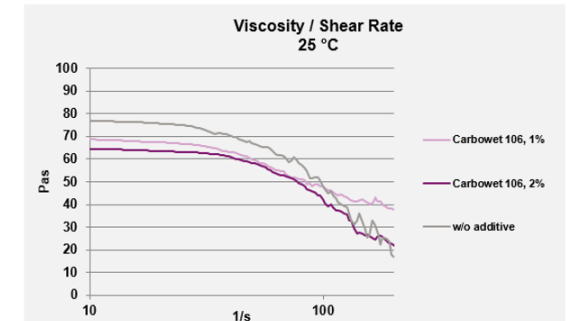
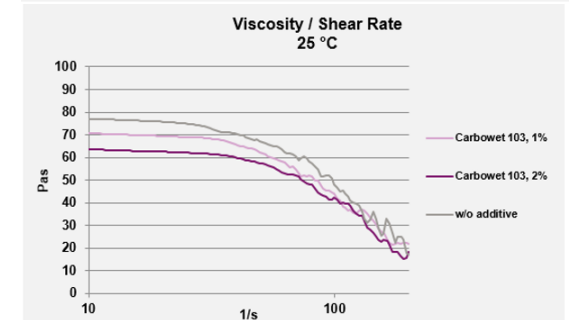
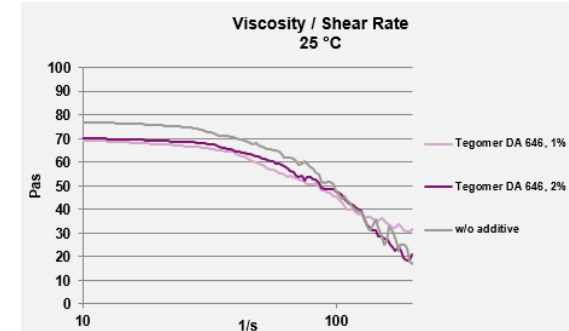
2% additive is needed to reach good viscosity reduction; with 1% additive* only a small viscosity reduction detected

Test system:

SMP-based liquid formulation, highly filled (approx. 50% ATH (Apyral 40 CD))

Tegopac® Bond 170 / Tegopac® RD 2 [g]	Dispersing additive [g]	AoP* [%]	Apyral 40 CD [g]
25,9 / 18,6	0	0	50,65
25,9 / 18,6	0,51	1	50,65
25,9 / 18,6	1,01	2	50,65

* = active on pigment/filler



Defoamer/deaerators for reactive adhesives

Defoamer	Chemical base	delivered as	for systems based on
SURFYNOL® DF 178	Polysiloxane + acetylenic gemini	100% active	Silane-modified polymers (SMP)
TEGOPREN® 5863	Polyether siloxane	100% active	Silane-modified polymers (SMP)
TEGO® Antifoam D 3944	Polymeric mixture, with a tip of silicone	100% active	Silane-modified polymers (SMP), PUR, Epoxide
TEGO® Antifoam D 2340	polymer solution in mineral oil, with a tip of silicone	15% active	PUR, Epoxide, Acrylate
TEGO® Antifoam D 2315	Polyether siloxane	100% active	PUR, Epoxide, Acrylate

For moisture curing reactive adhesive & sealant formulations water-free additives are needed!

Additives for low viscous SMP-based formulations – defoaming/deaeration

- during application of a liquid membrane by pouring or spreading (with a roller/brush), it is possible that air bubbles are included into the sealant layer
- because of formulation viscosity and a relatively short open time (skin formation takes place approx. 30-60 minutes after application of the moisture curing membrane formulation), such air bubbles can be include
- the air bubbles disturb the optical aspects of such a sealing layer. In some cases also negative effects on adhesive properties are possible.



Additives for low viscous SMP-based formulations – defoaming/deaeration

	Guiding formulation liquid membrane
	in wt %
TEGOPAC® Bond 170	25,90
TEGOPAC® RD2	18,60
Apyral 40 CD (ATH)	49,65
TiO2	0,50
Additive „Defoaming/Deaeration“	1 - 2
Antioxidant/UV-Absorber	1,5
Dynasytan VTMO	1,10
Dynasytan AMMO	0,95
Dynasytan 1146	0,40
TIB KAT 223 (catalyst)	0,40
	100,00

PBB 143-2

- a screening with different additives took place in a plasticizer-free liquid membrane formulation
- 1-2 % of defoaming/deaeration additive was added

For moisture curing reactive adhesive & sealant formulations water-free additives (100% active substance) are needed!

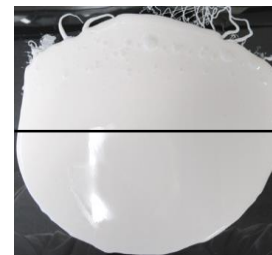
Additives for low viscous SMP-based formulations – defoaming/deaeration

	w/o additive	TEGO® Antifoam D 3944 1,5%	TEGO® Antifoam D 3944 2,0	Surfynol® DF 178 1%	Surfynol® DF 178 2%	Surfynol® DF 178 : TEGO® Antifoam D 3944 (1 : 1) 1%	Surfynol® DF 178 : TEGO® Antifoam D 3944 (1 : 1) 2%	Tegopren® 5863 1%	Tegopren® 5863 2%	Tegopren® 5863 : TEGO® Antifoam D 3944 (1:1), 1,5%
	PBB 177-1	PBB 177-3	PBB 173-5	PBB 177-4	PBB 177-5	PBB 177-6	PBB 177-7	PBB 177-9	PBB 177-10	PBB 181-8
“Top area”	-	- / +	+	- / +	+	- / +	+	- / +	- / +	+
“Bottom area”	+	+	- / +	+	+	+	+	- / +	- / +	- / +

- bad, many bubbles
 - / + medium, a few bubbles
 + good, no/nearly no bubbles

Decrease of air bubbles in a SMP-based liquid membrane formulation is possible with:

- SURFYNOL® DF 178: quantity of 1% is needed, best results with 2%
- TEGO® Antifoam D 3944: quantity of 1.5% is needed, best results with 2%
- Combination SURFYNOL® DF 178: TEGO® Antifoam D 3944 (ratio 1:1): quantity of 1% is needed, best results with 2 %
- only TEGOPREN® 5863: no convincing results
- Combination TEGOPREN® 5863 : TEGO® Antifoam D 3944 (ratio 1:1): good results with 1.5%



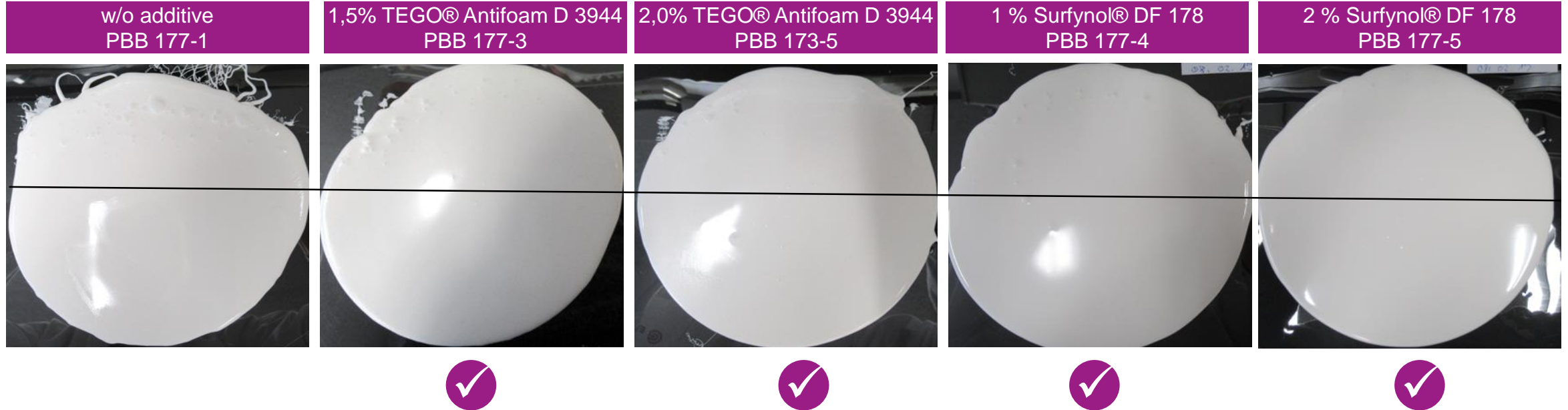
“Top area”:

liquid formulation is poured onto a substrate, additional treatment with a tooth-scraper takes place 1 min after application to bring in additional air bubbles

“Bottom area”:

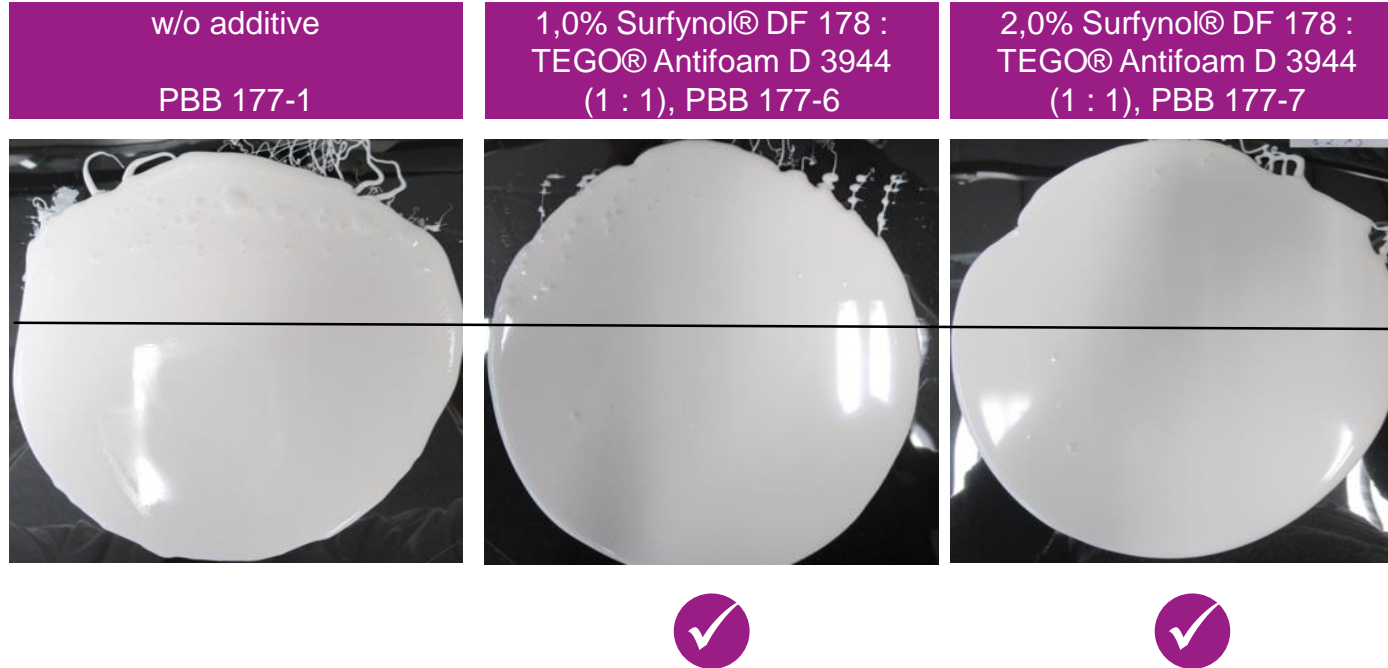
liquid formulation is poured onto a substrate, no additional treatment

Additives for low viscous SMP-based formulations – defoaming/deaeration



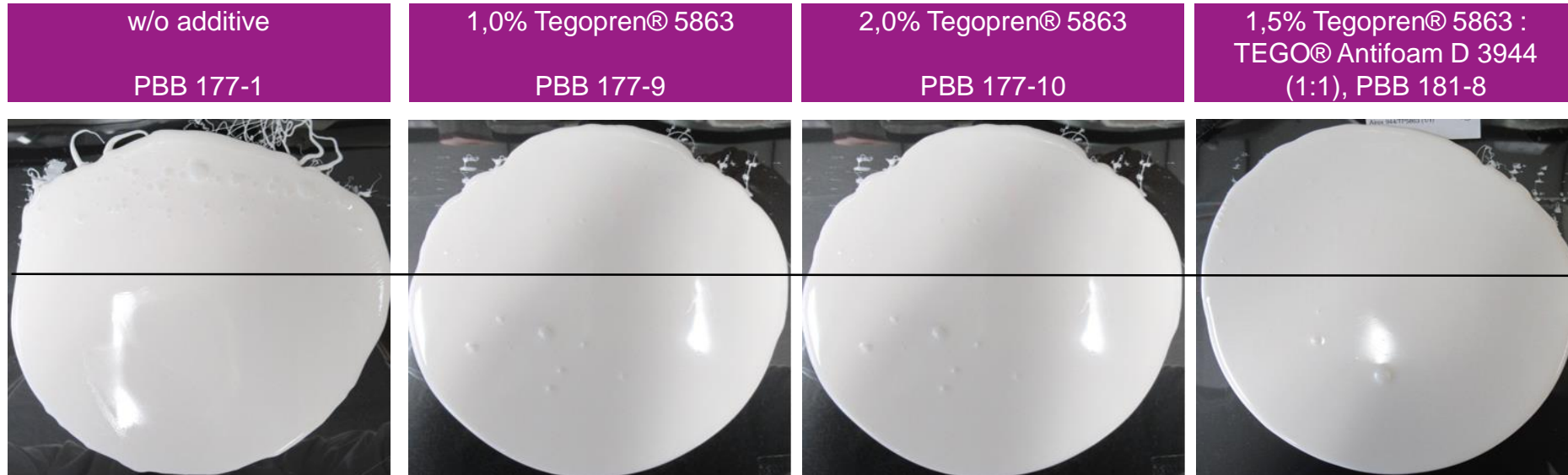
Decrease of air bubbles in a SMP-based liquid membrane formulation is possible adding SURFYNOL® DF 178 to the formulation. A minimum quantity of 1 % is needed, best results were observed with 2 % or with a combination of SURFYNOL® DF 178 and TEGO® Antifoam D 3944 (ratio 1:1).

Additives for low viscous SMP-based formulations – defoaming/deaeration



Decrease of air bubbles in a SMP-based liquid membrane formulation is possible adding SURFYNOL® DF 178 to the formulation. A minimum quantity of 1 % is needed, best results were observed with 2 % or with a combination of SURFYNOL® DF 178 and TEGO® Antifoam D 3944 (ratio 1:1).

Additives for low viscous SMP-based formulations – defoaming/deaeration



Decrease of air bubbles in a SMP-based liquid membrane formulation is possible by adding 1,5% of a combination of TEGOPREN® 5863 and TEGO® Antifoam D 3944 (ratio 1:1).

Addition of TEGOPREN® 5863 only shows no convincing results.

Never underestimate the power of the perfect additive!





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