

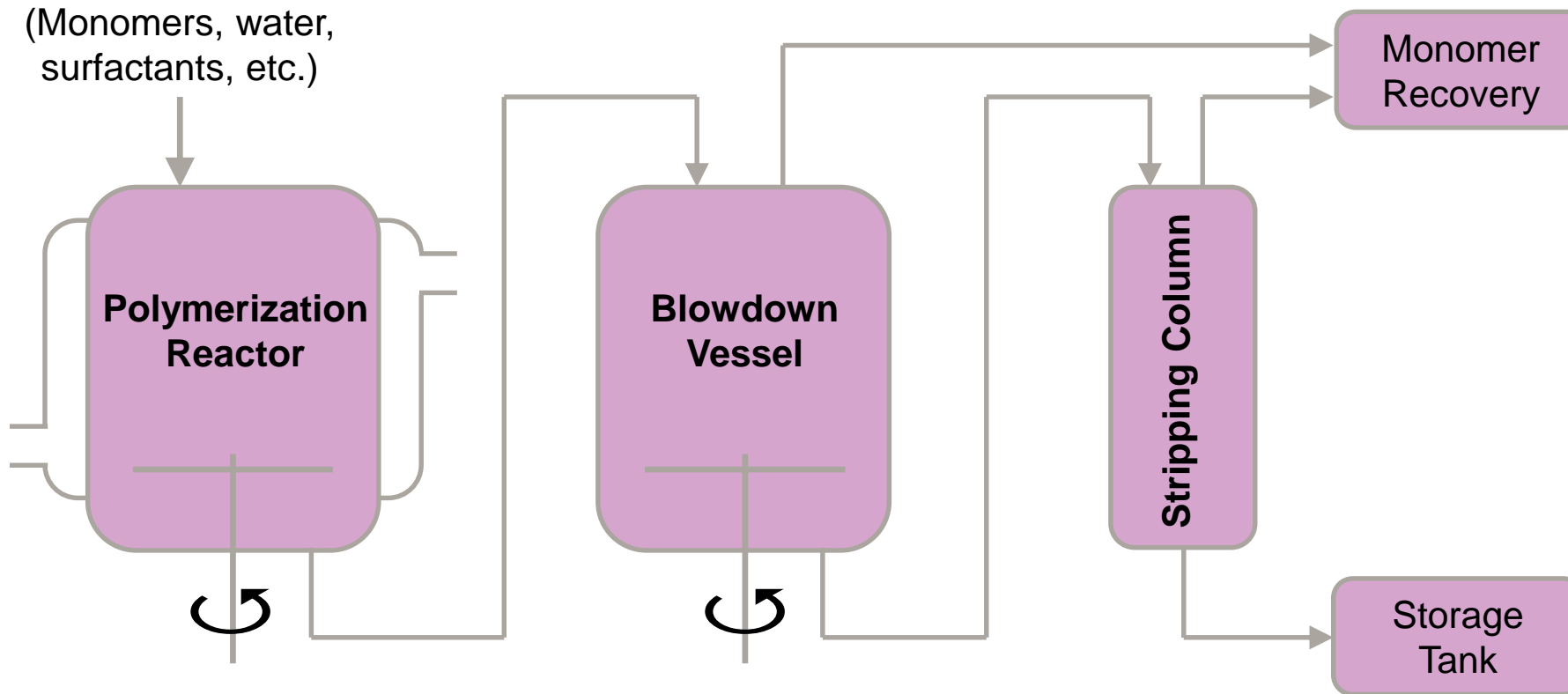
Antifoams for the production of PVC

BL Interface & Performance



We Offer Products for All Production Steps

TEGO® Antifoam application range



TEGO® Antifoam products reduce the cost of PVC Production

TEGO® Antifoam allows...

- Faster discharging and stripping
- Increased productivity / capacity
- Reduced production costs
- Reduced treating costs compared to standard antifoams

Example 1: TEGO® Antifoam Increases the Capacity of Production Equipment

Initial Situation

In the production at a customer the de-monomerization was the bottleneck of the whole process.

Improved Situation

By using TEGO® Antifoam he was able to increase the throughput from 9 m³/h to 11 m³/h .

→ Productivity increased by > 20%

Example 2: Effectivity of TEGO® Antifoam allows to Reduce Concentrations

Initial Situation

Customer used approx. 60 t/year of an organic antifoam (2.8 €/kg) with limited performance.

Improved Situation

Due to the high effectivity of TEGO® Antifoam (3.5 €/kg) he could reduce the annual demand to 35 t/year resulting in lower cost even at higher price of the antifoam.

➔ Antifoam costs reduced by 45.500 €/year

Type and Consumption of Antifoams Depends on the PVC Type

Suspension PVC (S-PVC)

- large PVC particles, initiator is soluble in the monomer
- foam is created by suspending aids like PVOH or cellulose
- antifoam consumption is around 100 ppm (based on dry PVC)

Mikro Suspension PVC (Mikro S-PVC)

- small PVC particles, initiator is soluble in the monomer
- foam is created by emulsifier
- antifoam consumption is around 300 ppm (based on dry PVC)

Emulsion PVC (E-PVC)

- small PVC particles, initiator is soluble in water
- foam is created by emulsifier
- antifoam consumption is around 300 ppm (based on dry PVC)

The Antifoam Performance can be Measured by the Sintered Glass Test



Lab equipment for sintered glass test

Preparation

- 1 liter surfactant solution in 2 liter cylinder
- Defined amount of prediluted antifoam is added

Procedure

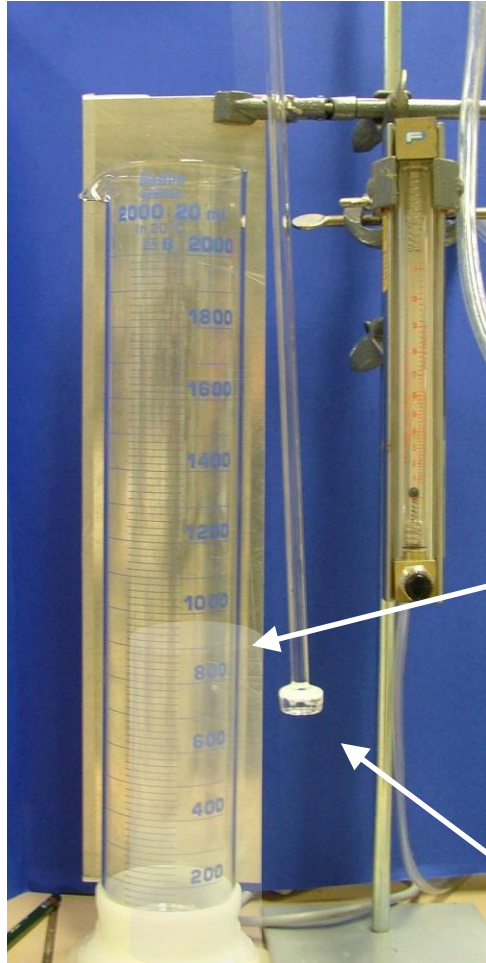
- Air is passed through the sintered glass (6 l/min)
- Foam is generated
- Time to reach 2 liter mark is noted
- Test is finished

Interpretation

The measured time is used as parameter to evaluate the defoamer performance. The longer the time the better the defoamer.

PVC defoamers are tested at 60 °C.

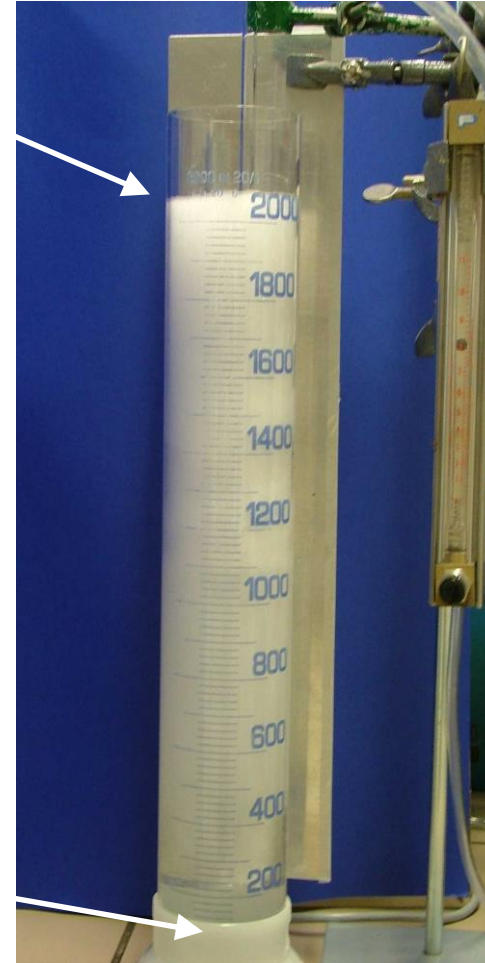
The Sintered Glass Test – That is What it Looks Like



Time is noted when foam reaches 2 l mark

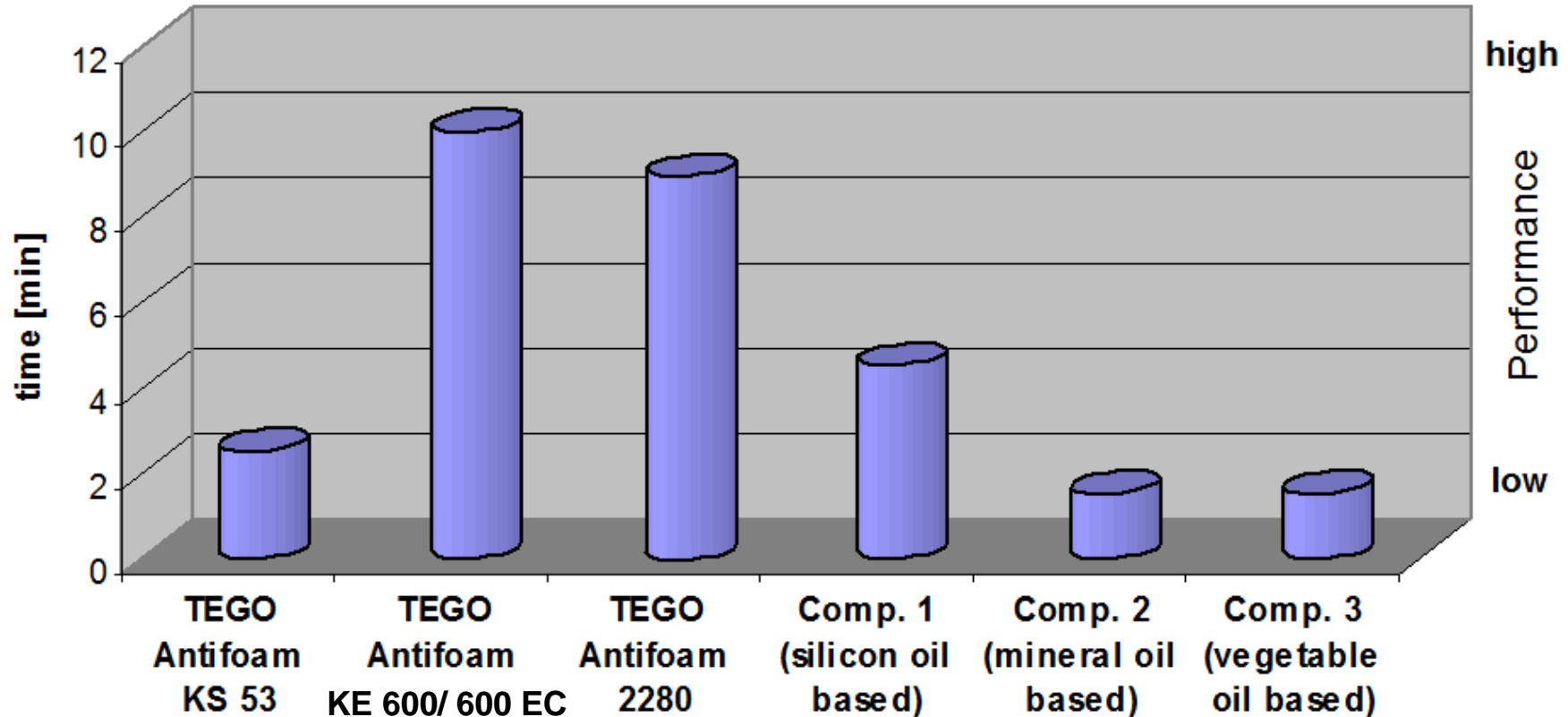
To start, the cylinder is filled with 1 l of surfactant solution + defoamer

Sintered glass



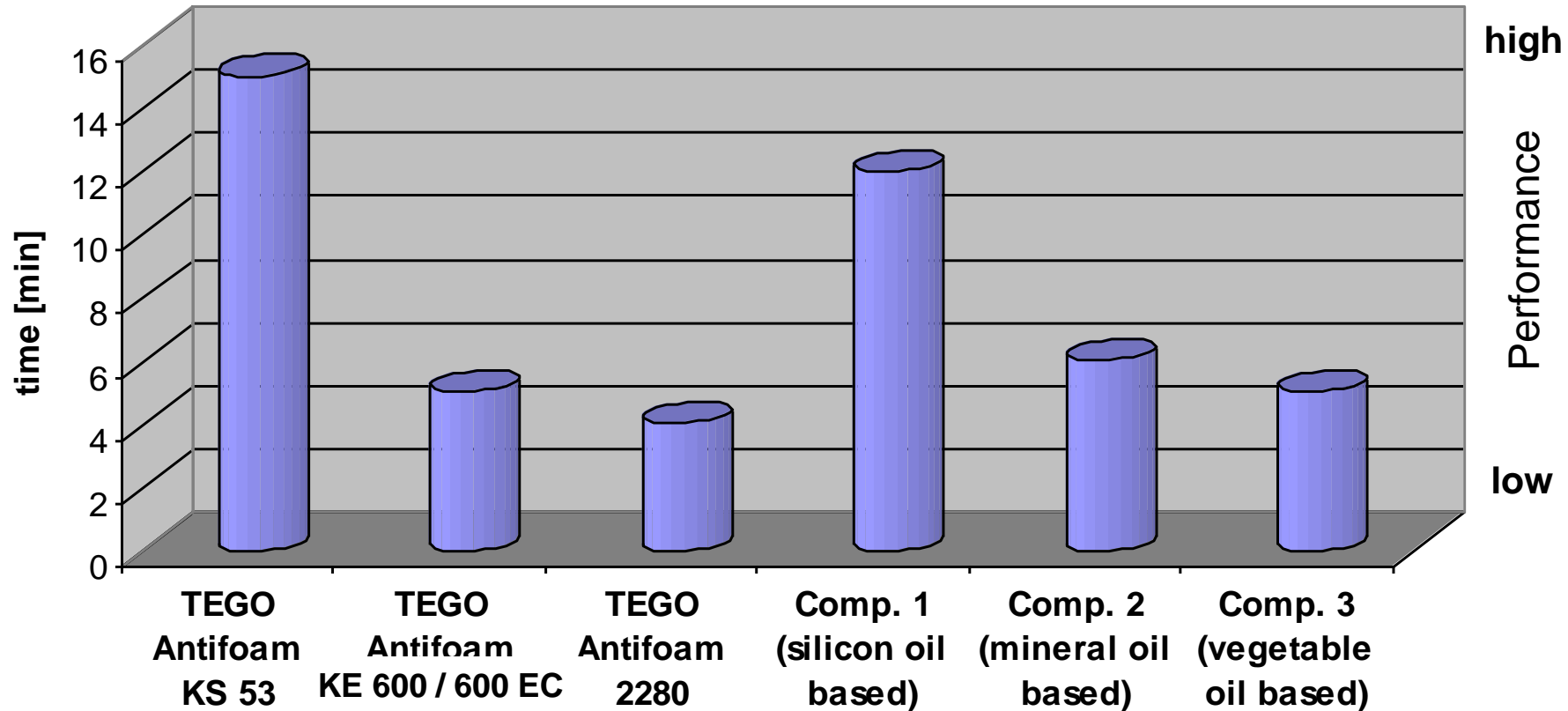
TEGO® Antifoam KE 600/ 600 EC & 2280 are perfect for S-PVC

0,1 % PVOH, standard for S-PVC
(sintered glass test)



TEGO® Antifoam KS 53 is Perfect for MS-PVC and E-PVC

1 % alkyl benzene sulfonate, standard for MS- and E-PVC
(sintered glass test)



Besides good antifoaming performance Antifoams need to be compatible to:

Production process

- Antifoam does not affect polymerization & work-up process
- Stability of suspension/emulsion is not influenced

Statutory regulations

- National chemical inventories
- Food contact regulations

Properties of the PVC resin in final application

- Fogging
- Welding
- Printability
- etc.

TEGO® Antifoam products are available for all Types of PVC & Production Steps

Process	Production step	TEGO® Antifoam KS 53	TEGO® Antifoam KE 600/600EC	TEGO® Antifoam 2280
S-PVC	Polymerisation	○	●	●
	Blow-down Stripping	○	●	●
Mikro S-PVC	Polymerisation	○	●	●
	Blow-down Stripping	●	○	○
E-PVC	Polymerisation	■	●	●
	Blow-down Stripping	●	○	○

● first recommendation
 ○ alternative recommendation
 ■ not recommended for this application

With our Antifoams Your Production Process is Safe

Inhibition of the polymerization

- Effect: polymerization yields no product or product with poor quality
- May occur in the production of E-PVC if antifoams are used containing double bonds
- **No effect with TA KE 600 & TA 2280, they contain no double bonds**

Destabilization of the slurry or latex

- Effect: separation of aqueous phase and polymeric particles
- Very seldom phenomenon which occurs only if very high amounts of antifoam are used (> 1%).
- ➔ **No effect at typical concentrations (0,03%) with our antifoams**

Antifoams Need to be Listed

Listing correlated to food contact

- Necessary to avoid limitations for final use of PVC grade
- Most important: FDA 175.300, European Regulation 10/2011

National chemical inventories

- Necessary to sell a product in countries with chemical inventories
- Inventories exist all over the world

Overview of Food Contact Inventories for our PVC Antifoams

	TEGO® Antifoam KS 53	TEGO® Antifoam KE 600 EC	TEGO® Antifoam 2280
Regulation 10/2011	●	●	●
FDA 175.300	●	●	●

➔ **Most of our products can be used for food contact applications**

10/2011: European Regulation relating to plastic materials and articles intended to come into contact with foodstuffs.

TEGO® Antifoam products for PVC are listed in all National Inventories



➔ Our products can be sold in every country of the world without limitations

The Different Final Applications of PVC Have Individual Requirements

Automotive industry: no fogging

Production of films: no haziness of clear films

Cable production: no increase of electrical conductivity

Production of window frames: welding properties

Packaging, cable, tubes: no effect on printability & foamability

TEGO® Antifoam products meet the Requirements of Most Applications

PVC property	TEGO® Antifoam KS 53	TEGO® Antifoam KE 600	TEGO® Antifoam 2280	Silicone oil based	Mineral oil based	Veget. oil based
Fogging behavior	●	●	●	●	■	●
Transparency of films	○	○	○	○	○	○
Electric resistance	○	○	●	○	○	○
Welding properties	●	●	●	■	●	●
Print- and foamability	●	●	●	■	●	●

- no influence observed
- influence unlikely (depending on defoamer dosage and the total PVC formulation)
- has a negative influence on the PVC



EVONIK

Leading Beyond Chemistry