Facilitate Solids Handling In Rigid PU Foam With Our Tailored ORTEGOL® DA Dispersing Agents

ANPE 6ª Conferenza Nazionale Poliuretano Espanso rigido
Target: Zero Emission

May 2024 I Emanuele Barisoni

EVONIK
Leading Beyond Chemistry

Our new ORTEGOL® DA dispersing agent series contributes to Evonik's sustainability roadmap

We constantly work on making our additives safer for you and the environment while improving their performance

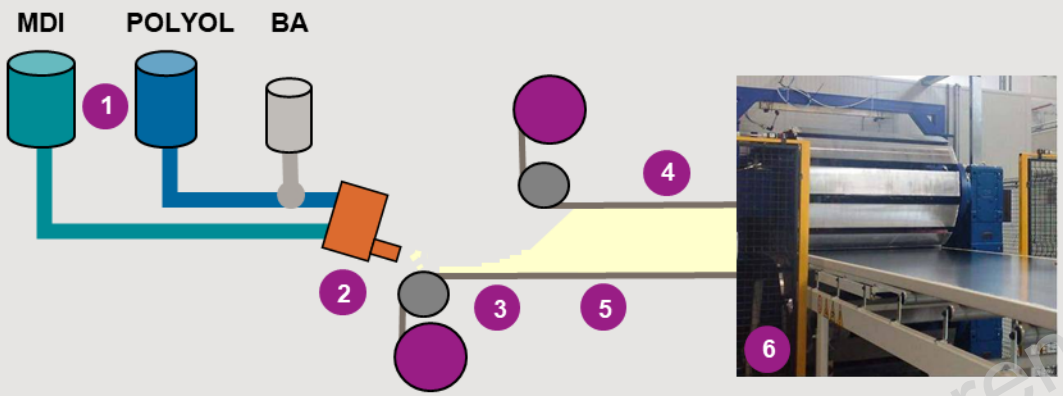
- **Improving Product Carbon Footprint (PCF)** by..
  - Optimizing production processes and usage of renewable energy
  - Developing products with bio-based and recycled content
- Establishing **Life Cycle Assessment** (LCA)
- Anticipating **regulatory changes** and adjusting our offerings

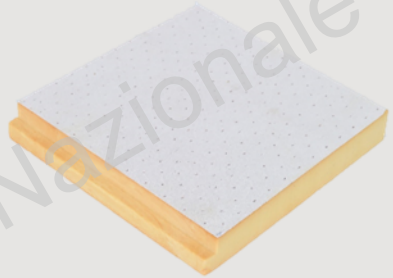
Stricter regulations for chemicals and new requirements for PU formulations

- Regulatory pressure on common flame retardants (FRs) like TCPP → Solid FRs as alternative?
- Recycling quotes coming for construction materials → Higher use levels of recycled solids in rigid PU foam?

Solids additives require special handling during blending and storage of the polyol blend as well as during the production of PU foam

Production of PU panels



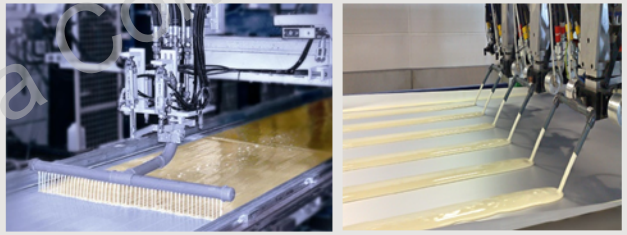


1. Raw mat. tanks
2. Mixing head(s)
3. Lay down table
4. Top facer
5. Bottom facer
6. Heated double belt conveyor

Critical areas & effects

FR containing polyol blend

- Long storage times
  → Sedimentation / Aggregation



Application of mixed A/B through fine nozzles

- Aggregation → Clogging

FR containing PU panels

- Irregular foam properties
  e.g flame retardancy

Dispersing agents can address the different issues which can occur during a PU production process

Dispersing agents…

...as specialized additives address specific requirements when using solids

Why do we need dispersing agents?

Avoid sedimentation and aggregation of solids

- Sedimentation decreases uniform particle distribution and homogeneous blend quality
- Sedimentation can cause stirring issues in tanks
- Aggregation can lead to clogged valves and nozzles during production

Optimized particle distribution

- Uniform distribution in the polyol blend translates to uniform distribution in the final foam

Optimized shelf life & higher stability of solid containing blends

- Solid containing polyol blends offer higher shelf life

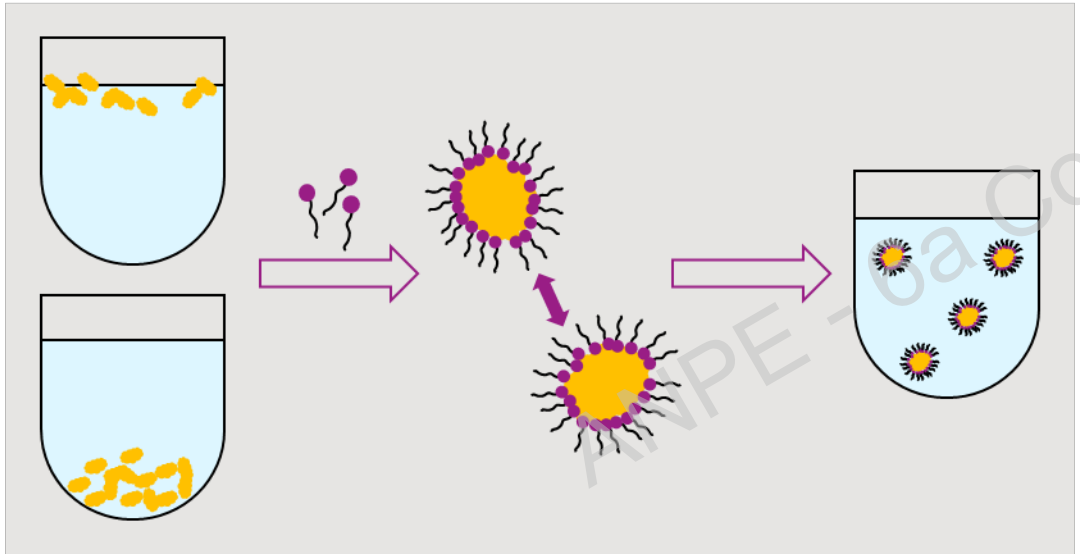
Optimized redispersibility

- Eased redispersibility upon prolonged storage through stirring possible

How do dispersing agents work?

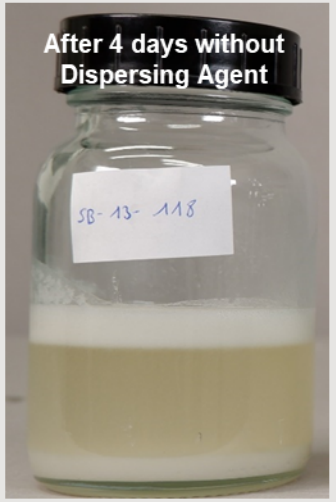
Three functions of a dispersant…

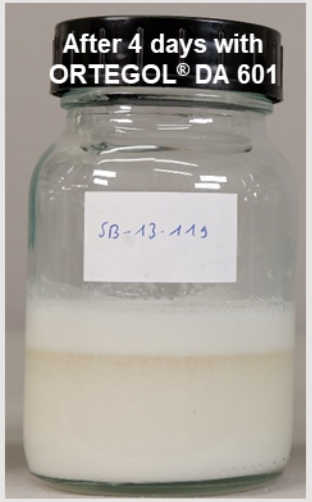
1. Wetting of the particles (replacing air by liquid)
2. Dispersing of particles (break-up of aggregates)
3. Stabilization of particles (prevent flocculation during storage)



… leading to…

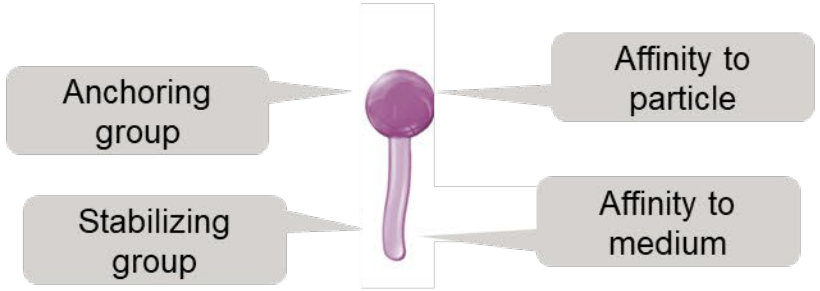
- Decreased sedimentation velocity = higher stability
- Decreased foam formation due to air inclusion through mixing
- Increased fluffiness of the sediment





Evonik offers longtime experience and support

How do dispersing agents work?



- Suitable anchor groups are depending on particle surface e.g., organic-, inorganic surface
- Slight structural surface variations can make different dispersing agents necessary

Experience is key!

Many years of experience with dispersing agents at Evonik

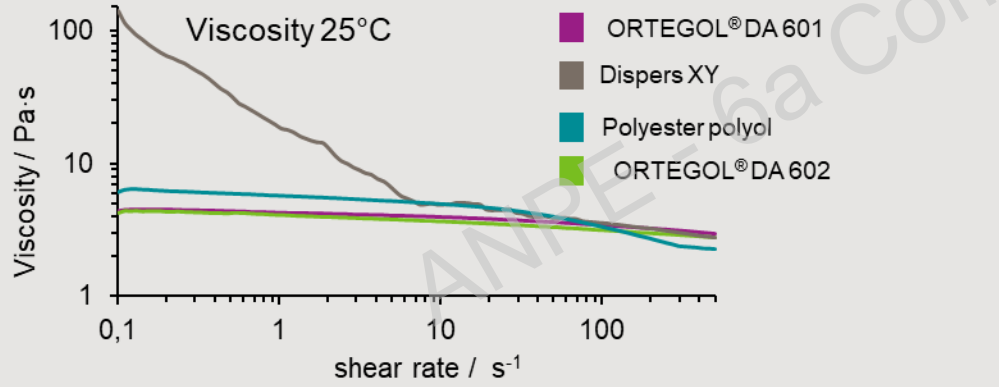
- Development of new dispersing agents
- Production of dispersing agents
- Know-How of structure-effect relations
- Analytical support

Evonik offers analytical support for evaluation of dispersing agents

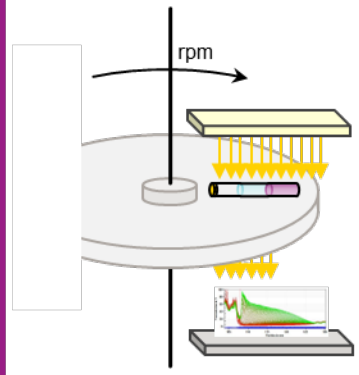
Analytical tools

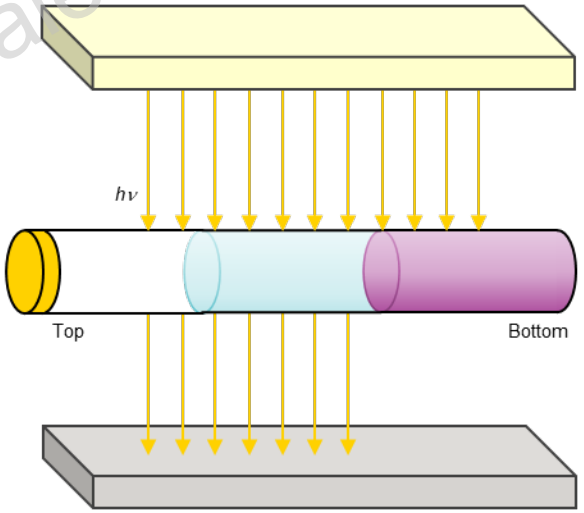
- Evaluation of sedimentation velocity
- Viscosity measurements
- Evaluation of foam properties
  - Insulation
  - Flame retardancy - B2 & cone tests

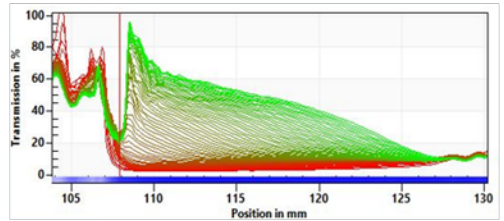
Viscosity



Sedimentation velocity







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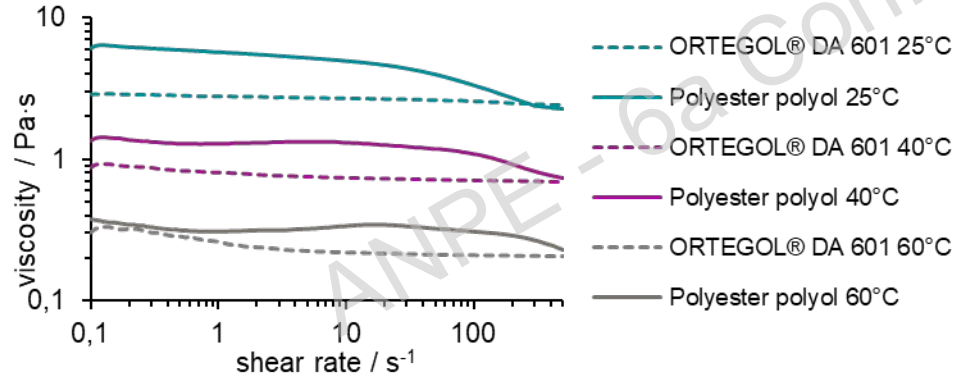
Solutions for dipersing solid flame retardants in rigid PU

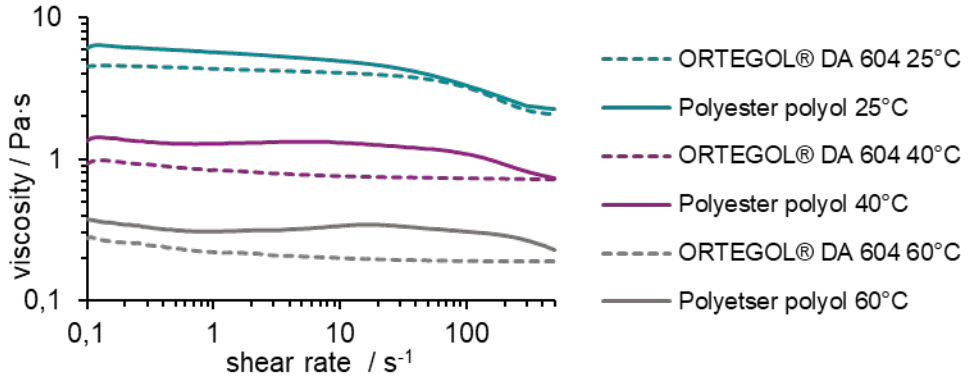
Foam quality & viscosity

Foam quality

Dispersing agents from ORTEGOL® DA6xx series don't effect foam quality

Visocosity





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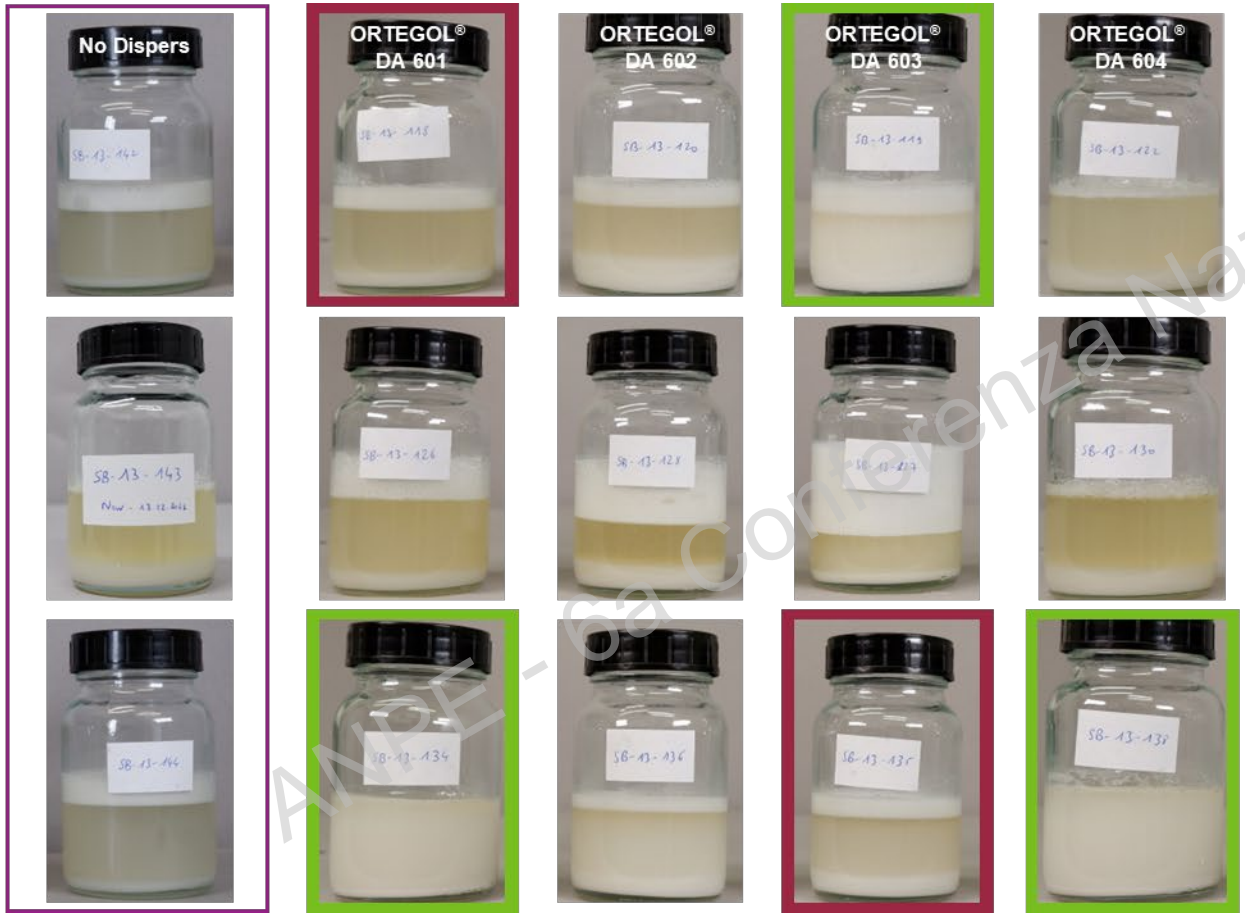
Solutions for dipersing solid flame retardants in rigid PU

Sedimentation various formulations

After 4 days



100 parts Polyol type1
10 parts APP type 1
0.5 parts Dispers

100 parts Polyol type 2
10 parts APP type 1
0.5 parts Dispers

100 parts Polyol type1
10 parts APP type 2
0.5 parts Dispers

NO ONE-FITS-ALL SOLUTION

Properties are depending on interactions with surface and media

Dispersing agents have to be tested for different formulations and FRs

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Our new ORTEGOL® DA dispersing agent series is especially developed to facilitate the application of solid particles in rigid PU foam production

Solid additives might lead to

- Sedimentation & Aggregation during storage
- Clogging of nozzles
- Irregular foam properties

Our ORTEGOL® DA series enables better use of solid particles in rigid PU foam production

- Improved dispersion stability
- No viscosity increase of polyol component due to addition of the dispersing agent
- No negative impact on foam structure and performance