Dynasylan®

Solution Case Study

Formulate Environmentally Friendly Adhesives and Sealants with Excellent Adhesion and Reduced VOC

Additive

Dynasylan® organofunctional silane–adhesion promoter

Key adhesives and sealants technologies

- Silane modified polyurethane/polyether (SMP)
- MS Polymer
- RTV-1 / RTV-2 oxime- and alkoxy-silicones
- Epoxy adhesives
- Hotmelts
- Polyurethanes

Markets

Construction, transportation, do-it-yourself, industrial assembly

Key benefits

- Reduced VOC in comparison with conventional monomeric silanes: up to 75 % VOC reduction
- Excellent adhesion profile
- High tensile strength in SMP and silicone formulations
- Well-balanced mechanical properties in SMP and silicone formulations
- Enhanced labeling profile of final adhesives and sealants formulations

The challenge

Environmentally friendly adhesives and sealants with reduced VOC as well as enhanced labeling become more and more important in the market.

The main challenge is to reduce the VOC content of the final formulation and to have a positive influence on the labeling while securing good adhesion performance.

The solution

Dynasylan® has a comprehensive range of oligomeric silanes offering excellent adhesion properties and significantly reduced VOC (up to 75 % VOC reduction) compared with traditional monomeric silanes. Moreover, oligomeric silanes often display significant advantages in labeling and can enhance final strength and elasticity as well as other properties of adhesives and sealants.

Reduced VOC with Dynasylan® oligomeric silanes

As shown in the Figure below, oligomeric amino-functional silanes offer significantly reduced formation of methanol compared with the standard amino-functional silane monomer Dynasylan® AMMO.

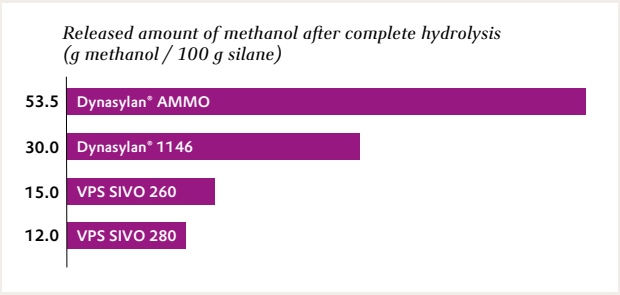


Figure 1 Methanol release of monomeric versus oligomeric aminofunctional silanes values based on theoretical calculations.

In addition, the oligomeric vinyl silane Dynasylan® 6490 offers a significantly reduced VOC in comparison with the monomeric vinyl silane Dynasylan® VTMO.

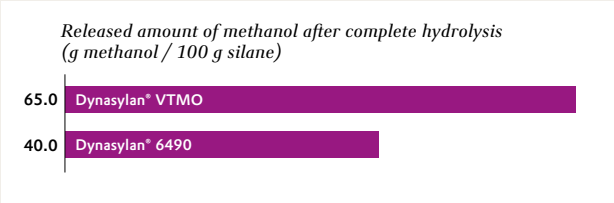


Figure 2 Methanol release of monomeric versus oligomeric vinyl functional silanes

Enhanced adhesion performance with Dynasylan® oligomeric silanes

In addition to the VOC reduction, oligomeric silanes can lead to enhanced adhesion performance.

As shown in **Figure 3**, an alkoxy silicone sealant formulated with Dynasylan® 1146 exhibits outstanding adhesion on aluminum and polystyrene compared with standard amino silane:

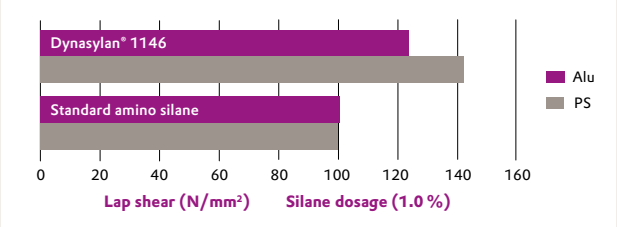


Figure 3 Lap shear on aluminum and polystyrene

As shown in **Figure 4**, a STPU adhesive formulated with VPS SIVO 260 exhibits outstanding adhesion on PC with a plus of 27 % compared with a standard aminofunctional silane:

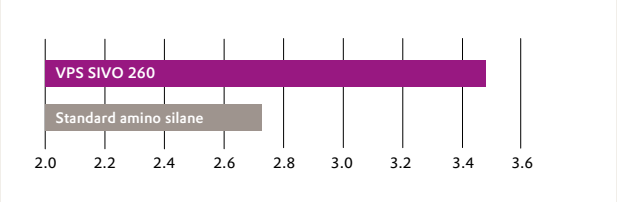


Figure 4 Lap Shear (N/mm²) in a cured STPU-sealant on PC (adhesion promoter = 1.11 %)

Enhanced mechanical performance thanks to Dynasylan®

With oligomeric aminofunctional silanes, formulated in RTV-silicones, you can achieve excellent adhesion and mechanical performance.

In oxime silicones, Dynasylan® 1146 improves the mechanical properties significantly. You can achieve both higher strength of final bonding as well as higher flexibility as shown in **Figure 5** and **6**.

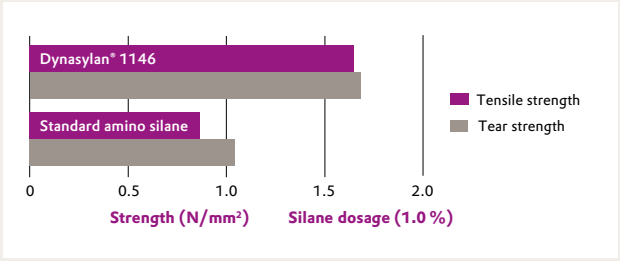


Figure 5 Tear and tensile strength (N/mm²) in a cured oxime silicone dogbone (adhesion promoter = 1 %)

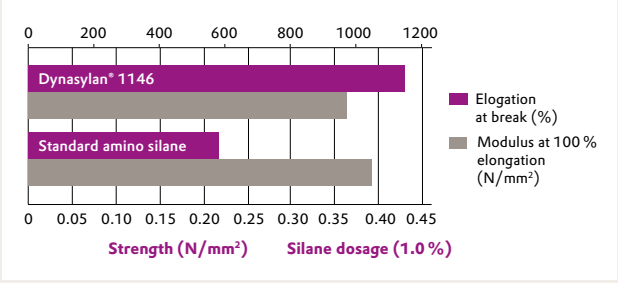


Figure 6 Elongation at break (%) and Modulus 100 % elongation (N/mm²) in a cured oxime silicone dogbone

Additional benefits with oligomeric silanes

- Oligomeric silanes have a higher boiling point offering advantages in formulating as well as in the final application of the adhesives and sealants.

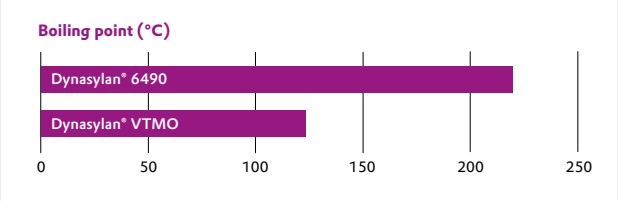


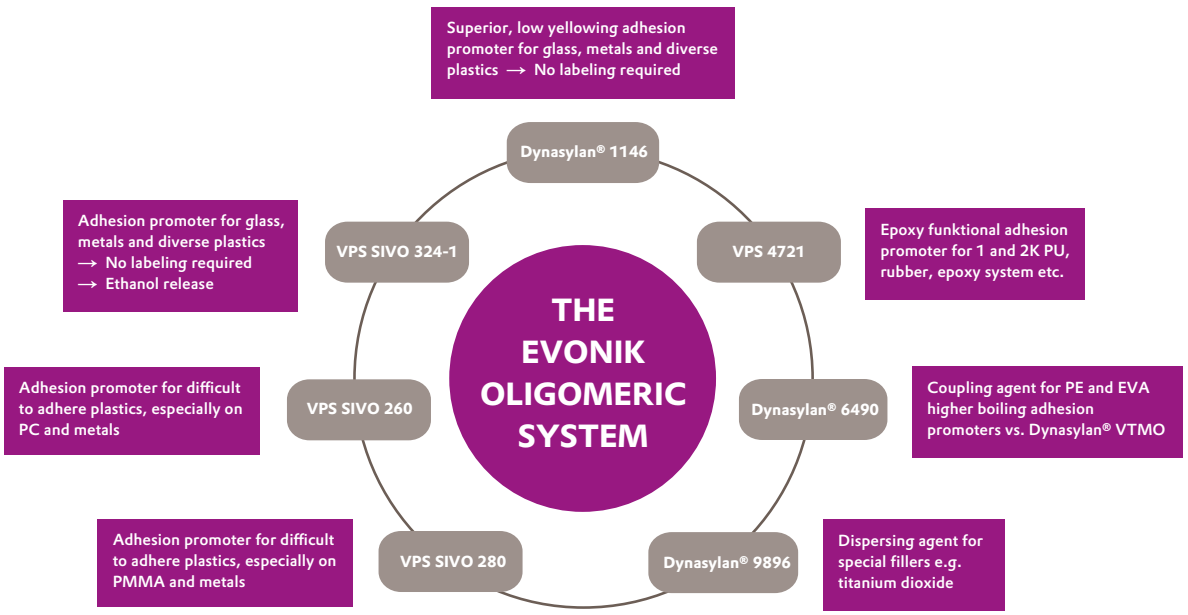
Figure 7 Boiling point of monomeric vs. oligomeric vinyl functional silanes

- Oligomeric silanes are low volatile adhesion promoters for use in hotmelts with reduced odor
- With Dynasylan® oligomeric silanes, in certain cases, you may avoid labeling the pail.
  For example, Dynasylan® 1146 isn't classified as a hazardous substance.

Dynasylan®

Get technical advice on Dynasylan® silane oligomers

Visit our center and the oligomers selection guide



EVONIK RESOURCE EFFICIENCY GMBH
Business Line Silanes
Rodenbacher Chaussee 4
63457 Hanau
Germany
dynasylan@evonik.com
www.dynasylan.com

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