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.

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

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:

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

Figure 2 Methanol release of monomeric versus oligomeric vinyl functional silanes

Figure 3 Lap shear on aluminum and polystyrene

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](image5.png)

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

![Figure 6](image6.png)

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](image7.png)

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.
Get technical advice on Dynasylan® silane oligomers

Visit our center and the oligomers selection guide

Superior, low yellowing adhesion promoter for glass, metals and diverse plastics → No labeling required

Adhesion promoter for glass, metals and diverse plastics → No labeling required → Ethanol release

Epoxy funktional adhesion promoter for 1 and 2K PU, rubber, epoxy system etc.

Coupling agent for PE and EVA higher boiling adhesion promoters vs. Dynasylan® VTMO

Dispersing agent for special fillers e.g. titanium dioxide

Adhesion promoter for difficult to adhere plastics, especially on PC and metals

Adhesion promoter for difficult to adhere plastics, especially on PMMA and metals

This information and any recommendations, technical or otherwise, are presented in good faith and believed to be correct as of the date prepared. Recipients of this information and recommendations must make their own determination as to its suitability for their purposes. In no event shall Evonik assume liability for damages or losses of any kind or nature that result from the use of or reliance upon this information and recommendations. EVONIK EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, AS TO THE ACCURACY, COMPLETENESS, NON-INFRINGEMENT, MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE (EVEN IF EVONIK IS AWARE OF SUCH PURPOSE) WITH RESPECT TO ANY INFORMATION AND RECOMMENDATIONS PROVIDED. Reference to any trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used. Evonik reserves the right to make any changes to the information and/or recommendations at any time, without prior or subsequent notice.

Dynasylan® is a registered trademark of Evonik Industries AG or one of its subsidiaries.

Evonik Operations GmbH
Business Line Silanes
Rodenbacher Chaussee 4
63457 Hanau
Germany
dynasylan@evonik.com
www.dynasylan.com