

# Dynasylan<sup>®</sup> for Plastics



  
Dynasylan<sup>®</sup>



# Dynasylan®. Experience. Knowledge. Future

## Our research has a clear focus

For more than half a century the brand Dynasylan® has been synonymous with the investigation, production and application of silanes. Not just in recent years, but for decades the research department for Dynasylan® has been very focused on its goals.

In the interest of our customers, the top priority for our researchers is to make sure that the functional performance and cost-effectiveness of our Dynasylan® products are increased simultaneously.

Dynasylan® Multifunctional Silane Systems™ are created by combining various chemical and technological functions. The use of Dynasylan® vinyl-oligomers optimizes, for example, both the manufacturing process and the finished product. A particularly high flashpoint facilitates the transport, storage and use of the coupling agent. The electrical properties of the cable are also significantly improved. This means the customer can cut production costs at the same time as increasing their competitive advantage.



Silanes must be designed to be safe, non-polluting and non-harmful not just in the end product, but also for the environment and for those involved in their production and application. This is just one of the aims we have achieved with Dynasylan® vinyl-oligomers.



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# Our Visions of Yesterday - Our Innovations of Today

## Decades of experience with silicon chemistry

For many decades we have been producing silicon compounds. Continuous improvements in the manufacture of silicic acid esters and organofunctional silanes have resulted in the constant expansion of this group of products at Evonik. For example, an important milestone was the development of the Dynasylan® HYDROSIL series in the 1990s. These products, protected by patents, are water-based and neither contain solvents nor generate solvents when in use.

Thus Dynasylan® Multifunctional Silane Systems™ conform to an extraordinary degree to the principles of environmental protection.

## New molecules, applications and processes

Today, with such innovative energy and long-term thinking we are way ahead of the competition. Revolutionary products and processes such as organosilane condensates, special Multifunctional Silane Systems™ or VOC-free (VOC= Volatile Organic Compound) and water-based systems are just some of the highlights of the world's most extensive range of commercially available organosilanes. By continually finding new ways to synthesize and by minimizing the production of waste material, manufacturing processes can be constantly optimized.

## A strong and comprehensive patent portfolio

Today, Evonik is the market leader in the field of organofunctional silanes and has more than 400 patents worldwide, in all of the important industrialized countries. Evonik has an even larger number of trade marks registered for silanes. We are proud of the fact that our research has contributed to making many of our customers' projects safer, more efficient, more environmentally friendly and thus more successful.



When developing customized products for especially innovative applications which promise success, the close cooperation with our customers is crucial.

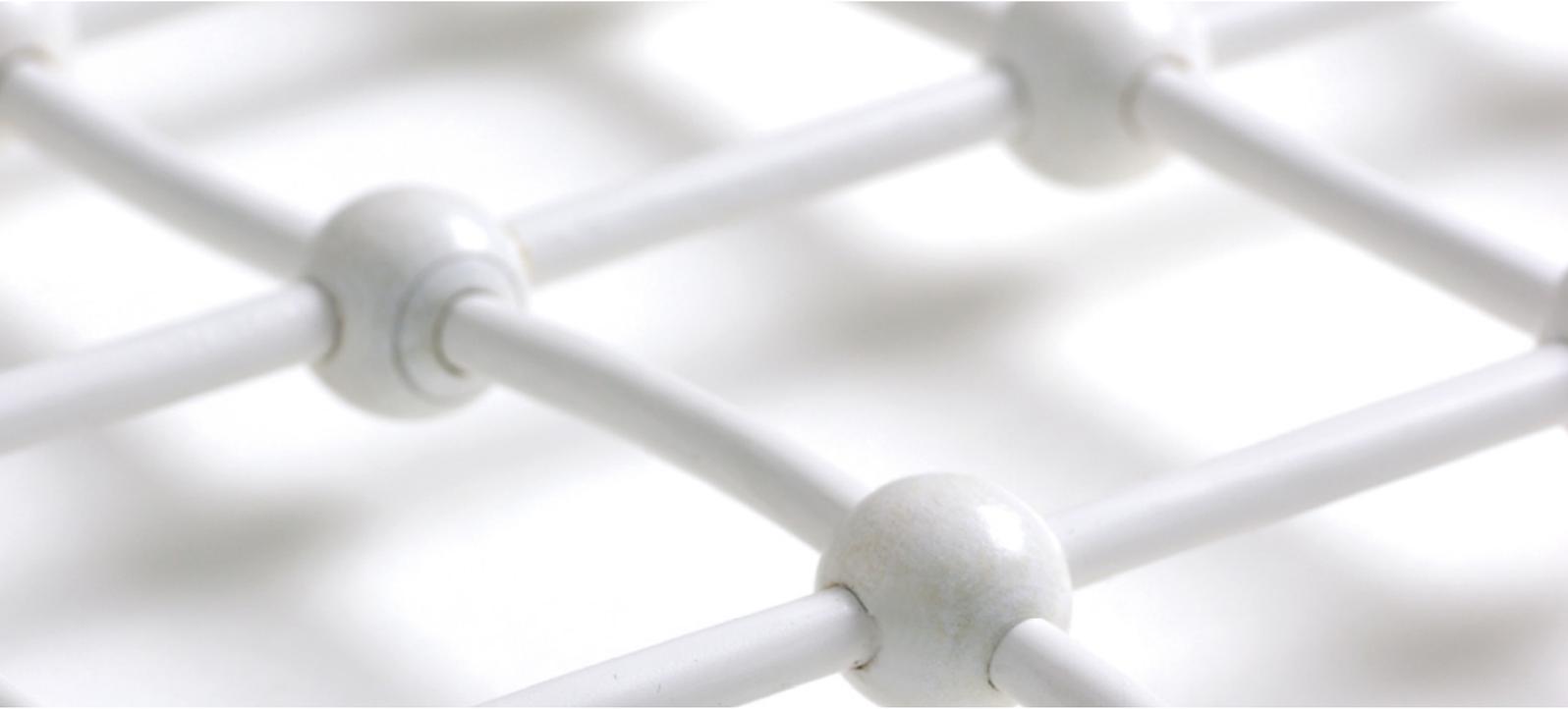
## Multifunctionality. Customized products and new molecules

Multifunctional Silane Systems™ list amongst the great innovations of recent years. They are created by combining different properties from one product or by developing completely new Multifunctional Silane Systems™, which produce a silane with new properties. Dynasylan® leads in both fields. We develop tailored solutions for innovative customer projects, thereby playing a significant role in contributing to the success of new products.

Or we develop original Multifunctional Silane Systems™ such as the one used in Dynasylan® 6598. These make it possible to develop new ways to manufacture cables, pipes and other plastics. With Dynasylan® 6598 it is possible avoid methylglycol as a by-product entirely, at the same time as achieving unparalleled levels of hydrophobization in the end product, which results in significantly improved electrical properties for cable compounds.



In many research and high-tech projects, for example the MAGLEV drive technology in the Transrapid, cables manufactured with Dynasylan® are used in order to meet very specific requirements.



## The Smallest Ingredient Can Make Something Great

The crosslinking of polyethylenes for cable and pipe compounds, using peroxide, silanes or irradiation, has been a standard process for decades.

When crosslinking polyethylenes with silanes - the PEX-b procedure - these almost literally represent the salt in the soup – except, though just as important, they are considerably more versatile. There is no doubt that the use of even small amounts of silane guarantees the quick and cost-effective crosslinking of polyethylenes.



The PEX-b crosslinking of polyethylenes enables a three-dimensional, flexible crosslinking of molecules. The wide range of Dynasylan® SILFIN products is designed to work in all kinds of polyethylenes.



Only then is the mechanical and thermal stability of pipes and cables certain. It is important to emphasize again that the silane and polyethylene need to be perfectly matched.

Evonik, the market leader in specialty chemical solutions, is the only silane manufacturer in the world to develop, test and produce silane products of the Dynasylan® brand in close cooperation with its customers, specifically designed to fit their needs. These customers currently have access to almost one hundred different products of the brand family Dynasylan® SILFIN. Furthermore, in many countries Dynasylan® products have also been officially approved for use in drinking water pipes.



## There Are Many Polymers. We Have the Matching Dynasytan<sup>®</sup>

Strength, flexibility and the ability to resist external influences depend on the mechanical properties of a structure, which are the result of the cohesion of all components. For cables and other plastics, the coupling between organic and inorganic components represents a particular challenge because their different molecular structures are not compatible.



The coupling between the organic polyethylene and the inorganic filler is guaranteed with Dynasylan® silanes.

Dynasylan® silanes demonstrate a molecular structure which contains an organic and an inorganic group. They link with all sorts of different polymers and filler materials on a molecular basis. This feature has made silanes the unchallenged number one for the coupling of organic with inorganic materials.

With the brand Dynasylan®, Evonik has the widest range of products offered by any silane manufacturer. This means that Dynasylan® customers can find the best possible match of filler for whichever duroplast, thermoplast or elastomer is being used.



## There's Only One Thing More Important than Safety: More Safety

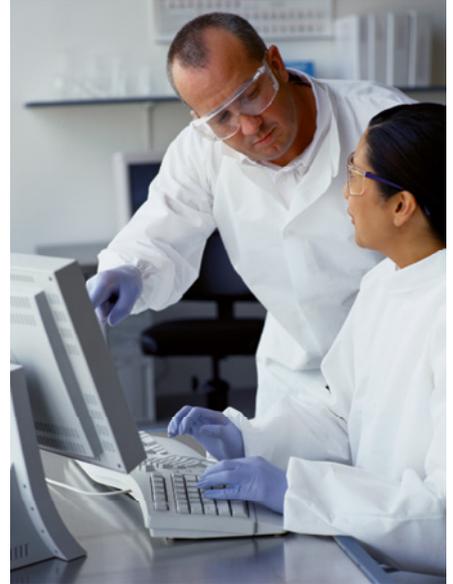
Like many of our customers, we are an international player, with more than 50 years' experience in the world's major economic regions.

It takes more than a good product - customized service is essential too. That's why we have continuously adapted our logistics to meet our customers' needs. Over decades our experience and our know-how have repeatedly been proven throughout the world.

Absolute reliability and fast, efficient communication are key - we keep our promises.

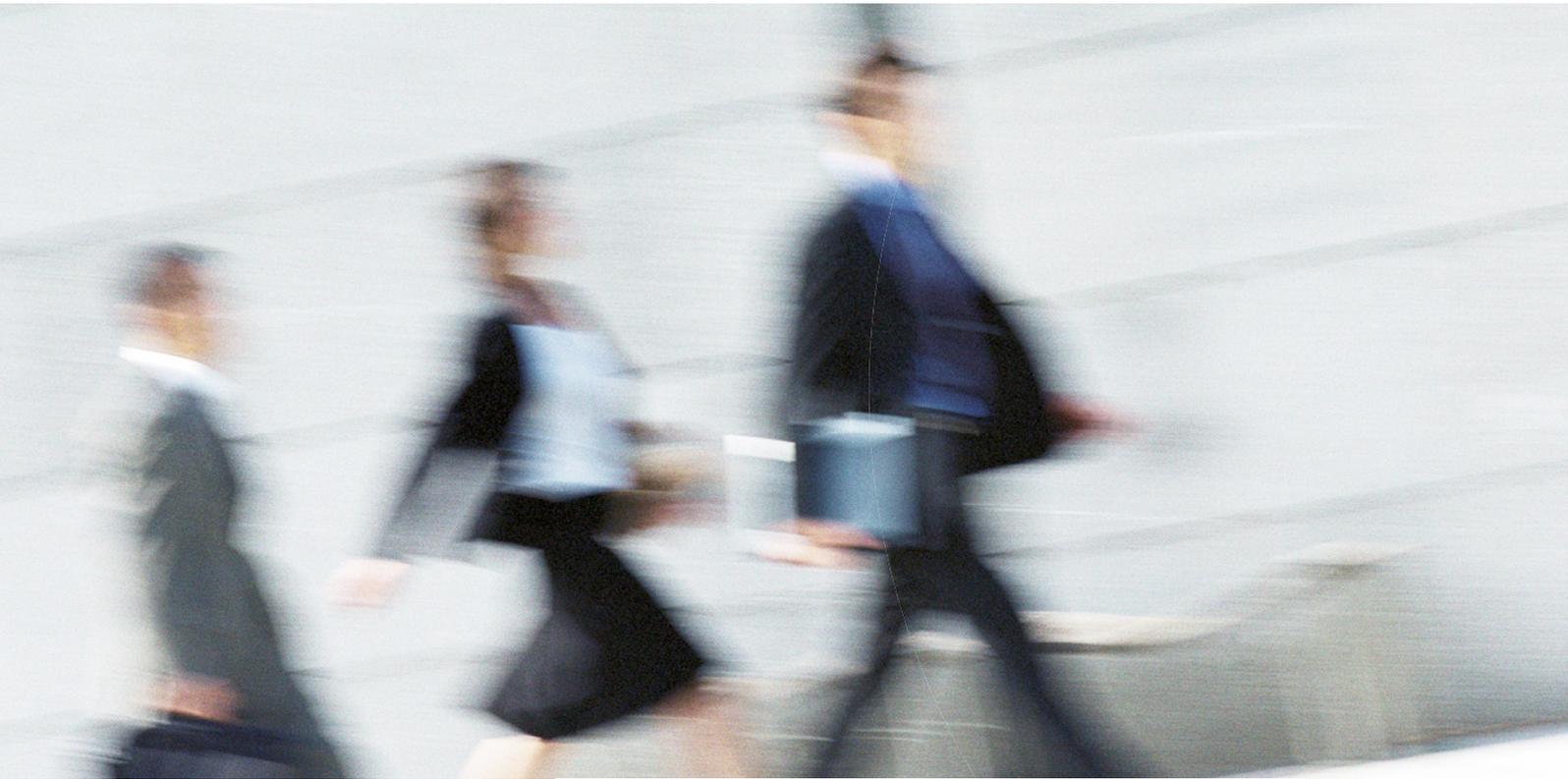
Above and beyond punctual delivery, we are working on logistic solutions for the future.

In order to adapt our logistics concept to the exact needs of our customers, we use modern approaches such as the SCOR concept (Supply Chain Operations Reference). With this, we can reliably handle almost any challenge our customers set us.



As the only major manufacturer of organofunctional silanes, Evonik offers trading unit sizes ranging from 25 kg drums to 20 ton bulk containers, available also with customized filling volumes on request. Because of our global presence, we are familiar with local environmental protection and toxicological regulations in numerous countries. This knowledge eases the way for many companies who are starting up local production operations.





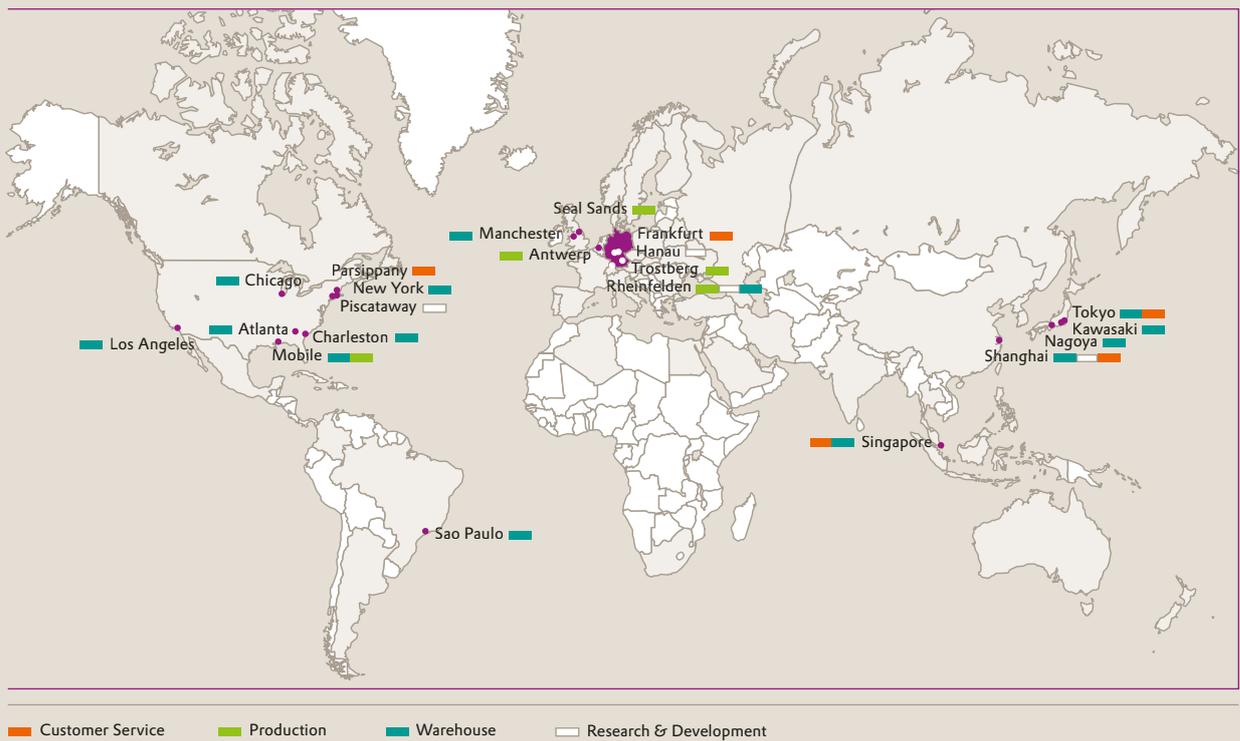
## Quality Product + Global Service = Brand Product

Many of our ideas for new products or applications originated in projects which we planned out and put into practice with our customers. To support this dialogue, there are Evonik silane specialists available at the many different units for development and business in Europe, Asia and North America. Some of the most innovative manufacturers of cables and pipes benefit from this close cooperation, which helps them to stay steps ahead of the market.

Challenging projects bring with them chemical and technological questions which have to be solved. Our scientists and application engineers develop customized products which meet exactly both the economic requirements of the global brand Dynasylan® and the needs of the customer, as well as the demands of their respective technologies.

This customer-focused cooperation not only applies to the development of new Dynasylan® Multifunctional Silane Systems™. We also grow with the needs of our customers: We are the only large manufacturer of organofunctional silanes to offer every packaging option, from 25 kg containers to a bulk system available worldwide, or even special filling quantities according to customer specifications.

Our global presence means that we have specific knowledge of product registration and environmental protection in many countries. We support our customers in security questions and use our know-how to help them realize cost-saving potentials.



# Your Customers are at Home Throughout the World. Just like You. Just like Dynasylan®

For Evonik, a global company with customers operating worldwide, a vital criterion for quality is precise and on-time delivery. Building on our SCOR (Service Chain Operations Reference) know-how, we have implemented a service assessment procedure which enables the control, recognition and execution of a transparent optimization potential.

Regardless of whether our customers need materials in Germany, the USA or China, our range of services are the same throughout the world and meet any challenge.





# Dynasylan®.

## Products as Diverse as the World of Cables and Pipes

Cost-effective standard products and innovative specialties

The diversity of the Dynasylan® product group is unmatched. It ranges from Dynasylan® products, synonymous with functionality and reliability for decades, to state of the art Multifunctional Silane Systems™, which are important components in the manufacture of modern cable and pipe systems.

Besides aminosilanes and vinyl silanes, the Evonik brand Dynasylan® includes a wide range of Dynasylan® SILFIN prod-

ucts whose chemical structures are specially designed to match the various polymers used in cable and pipe manufacturing. In products of our brand family Dynasylan® HYDROSIL, any VOCs (Volatile Organic Compounds) have been removed during production in a controlled procedure specially developed by Evonik. This means that neither Dynasylan® HYDROSIL nor the end products release environmentally unfriendly VOCs.

# Dynasylan® on the Internet

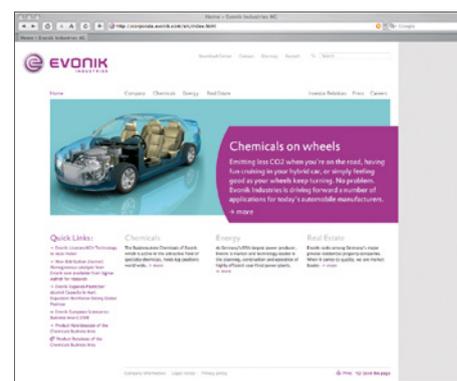
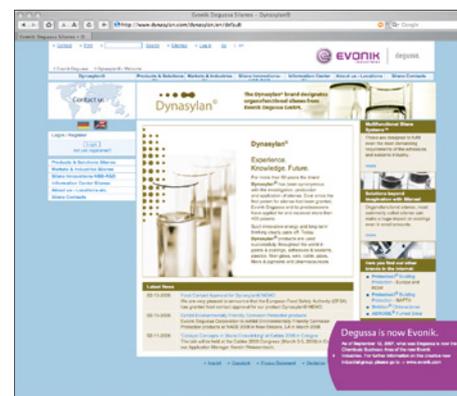
## Information, addresses, and contacts

The website **www.dynasylan.com** offers a well-structured platform where you can find information on products, methods, and chemical processes. A solution-finder provides informative brochures and presentations for downloading, in addition to product information and safety data sheets.

The database containing details of Evonik contacts and dealers worldwide gives you convenient access at any time to important contact data.

**www.dynasylan.com**

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