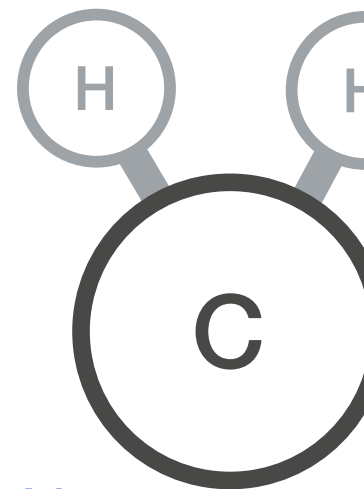


VINNAPAS®



ADHESIVES | POLYMER BINDERS | EMEA

FORMULATING THE FUTURE –
WITH VINNAPAS® DISPERSIONS
FOR ADHESIVES



VINNAPAS® VAE – THE HIGH-PERFORMANCE SOLUTION

Success in the adhesives market often depends on choosing the right binder. VINNAPAS® vinyl acetate-ethylene (VAE) technology offers outstanding benefits in terms of performance, safety and versatility.

VINNAPAS® VAE dispersions are water-based co- and terpolymers mainly based on vinyl acetate and ethylene as comonomers.

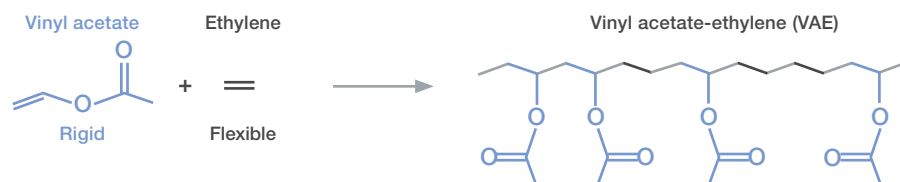
Ethylene contributes permanent flexibility to the VAE polymer. No external plasticizer is thus necessary in VAEs.

Diverse Applications

VINNAPAS® VAE dispersions can be formulated into adhesives for various applications:

- Paper Packaging (e.g. food packaging, envelope manufacturing, film lamination onto paper)
- Wood (e.g. film lamination onto wood, 3D membrane pressing, EPI systems)
- Flooring (e.g. textile flooring, flexible coverings)
- Automotive (e.g. door paneling)
- Tapes & Labels

Two Monomers Creating Best-in-Class Performance



Polymer Properties Provided by Ethylene:

- Softness (T_g approx. $-125\text{ }^\circ\text{C}$)
- Non-polar, hydrophobic
- Permanent flexibility
- High saponification resistance
- Form ideal copolymers with vinyl acetate

Vinyl Acetate:

- Hardness (T_g approx. $32\text{ }^\circ\text{C}$)
- Polar, hydrophilic
- Rigid

VAE Copolymer and Terpolymer Dispersion Properties:

VINNAPAS® VAE dispersions can be formulated into adhesives that provide outstanding benefits:

- Excellent adhesion to a wide variety of substrates
- High heat resistance
- Very fast setting
- Excellent machinability and re-emulsification properties
- Very good cost / performance ratio
- T_g range from approx. $-35\text{ }^\circ\text{C}$ to approx. $30\text{ }^\circ\text{C}$, depending on ethylene content

Optimum Rheology

VINNAPAS® dispersions stabilized with polyvinyl alcohol (PVOH) provide the optimum rheology for a wide range of adhesives applications (e.g. paper packaging) and application technologies (e.g. roller and nozzle application).

Improved Workability

Surfactant-stabilized VINNAPAS® dispersions typically exhibit higher shear thinning than PVOH-stabilized dispersions. Their advantages include better adhesion to plastics, clearer films, higher water resistance and good sprayability, leading to improved workability in manual applications (e.g. flooring adhesives). In addition, they have higher filler acceptance.

Low Migration Potential

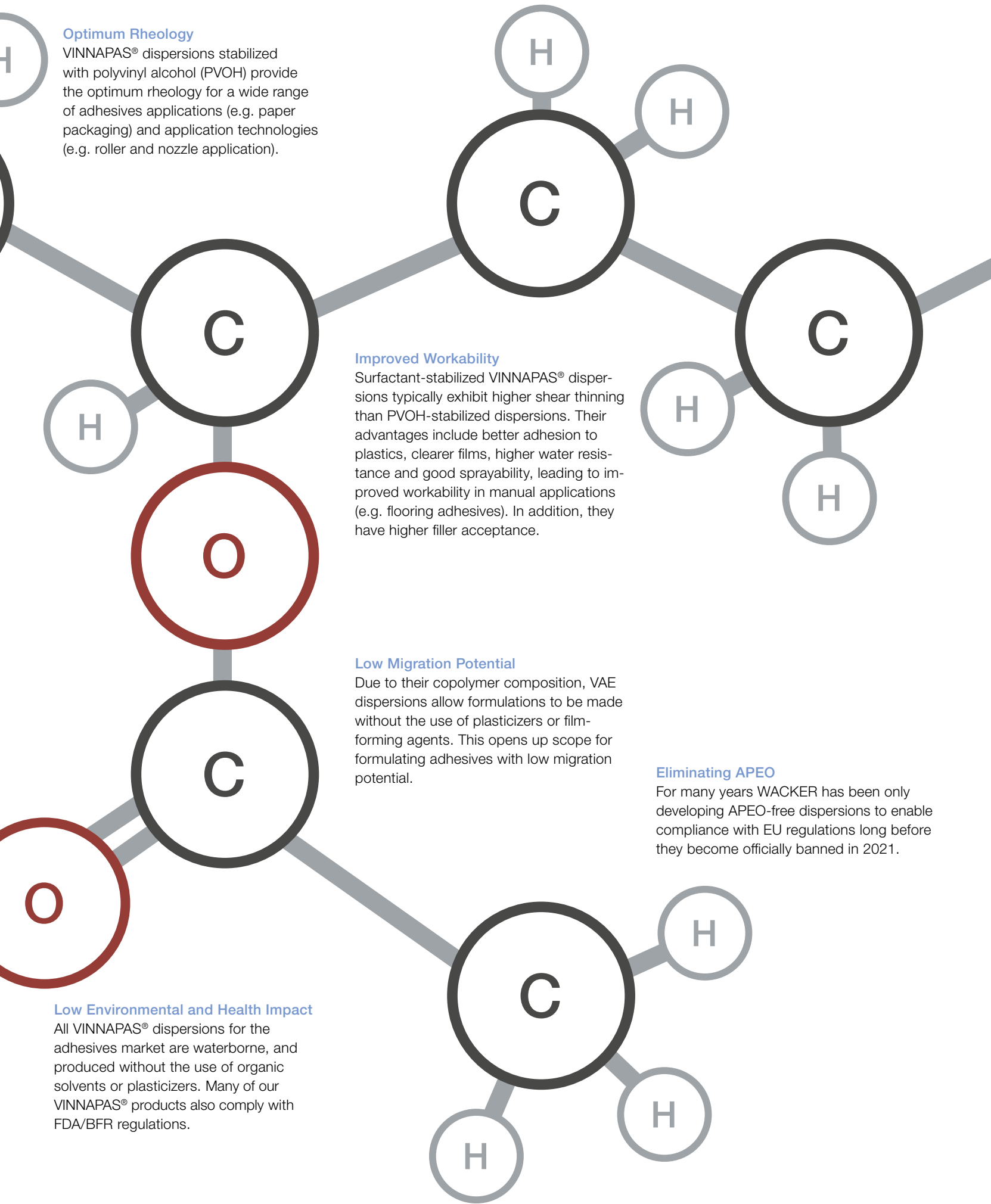
Due to their copolymer composition, VAE dispersions allow formulations to be made without the use of plasticizers or film-forming agents. This opens up scope for formulating adhesives with low migration potential.

Eliminating APEO

For many years WACKER has been only developing APEO-free dispersions to enable compliance with EU regulations long before they become officially banned in 2021.

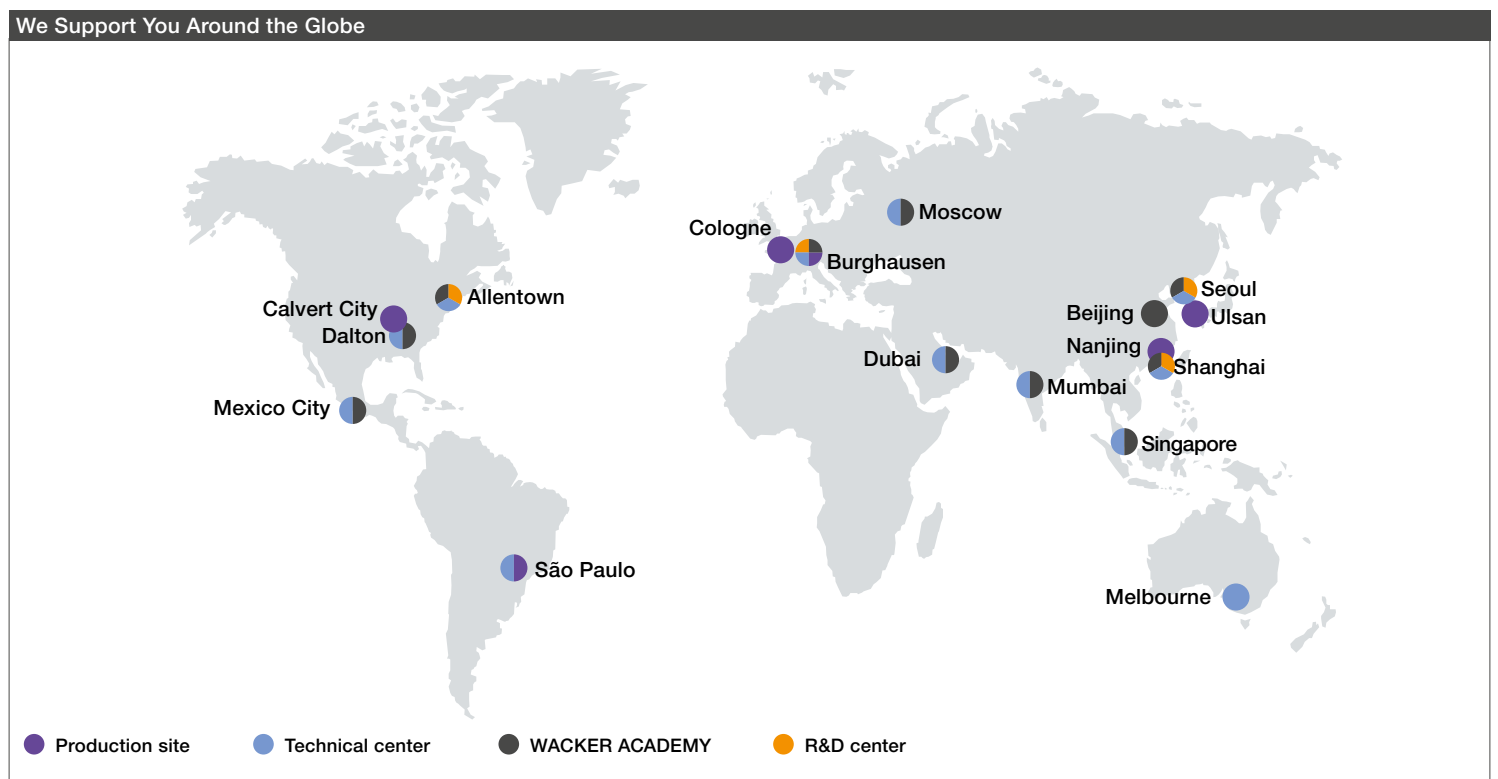
Low Environmental and Health Impact

All VINNAPAS® dispersions for the adhesives market are waterborne, and produced without the use of organic solvents or plasticizers. Many of our VINNAPAS® products also comply with FDA/BFR regulations.



CUSTOMER PROXIMITY – BECAUSE GLOBAL IS LOCAL

WACKER today is a global player in the polymeric binders market. We have come so far because we have always been close to our customers and their markets, establishing subsidiaries and providing experts in our focus regions.



Global Expertise

WACKER is present with some 100 subsidiaries and sales offices in all key regions. Our VINNAPAS® grades for adhesives applications are produced in five manufacturing plants across Europe, the Americas, China and the Asia-Pacific region. We also maintain an extensive, global network of R&D, process and analytical expertise that can provide additional support for our customers.

With Local Focus

Although global in scope, we are local in focus thanks to our in-depth understanding of local market needs and emphasis on close relationships with our customers. We offer you technical support through technical centers in all key regions. Their laboratories are designed to assist you with applications as well as in developing new systems and formulations. The WACKER ACADEMY offers market-specific product training and interdisciplinary seminars.

Leading the Way

WACKER is one of the most research-intensive chemical corporations worldwide. Recent developments in VINNAPAS® extend the range of applications beyond those of traditional adhesives, such as paper packaging, wood working and flooring, to new markets, such as automotive adhesives.

Key facts about WACKER

- R&D rate: 3.1 percent
- New-product rate (NPR): 22.7 percent
- About 3,800 active patents worldwide, with 1,700 patents pending

YOUR QUALITY CHOICE – MADE EASY

Our VINNAPAS® dispersions are specially designed to address the continuously changing needs of the modern adhesives industry, offering up-to-date solutions for the latest end-user requirements and market trends.



Beneficial Portfolio

VINNAPAS® dispersions set the industry benchmark in product quality, performance and reliability. With our product portfolio you benefit from:

- Consistently high quality
- 80 years' experience in vinyl acetate based dispersion technology
- Properties such as adhesion, heat resistance, bonding to a wide range of different substrates, fast setting speed, high wet tack, reliable machinability, and broad formulation possibilities

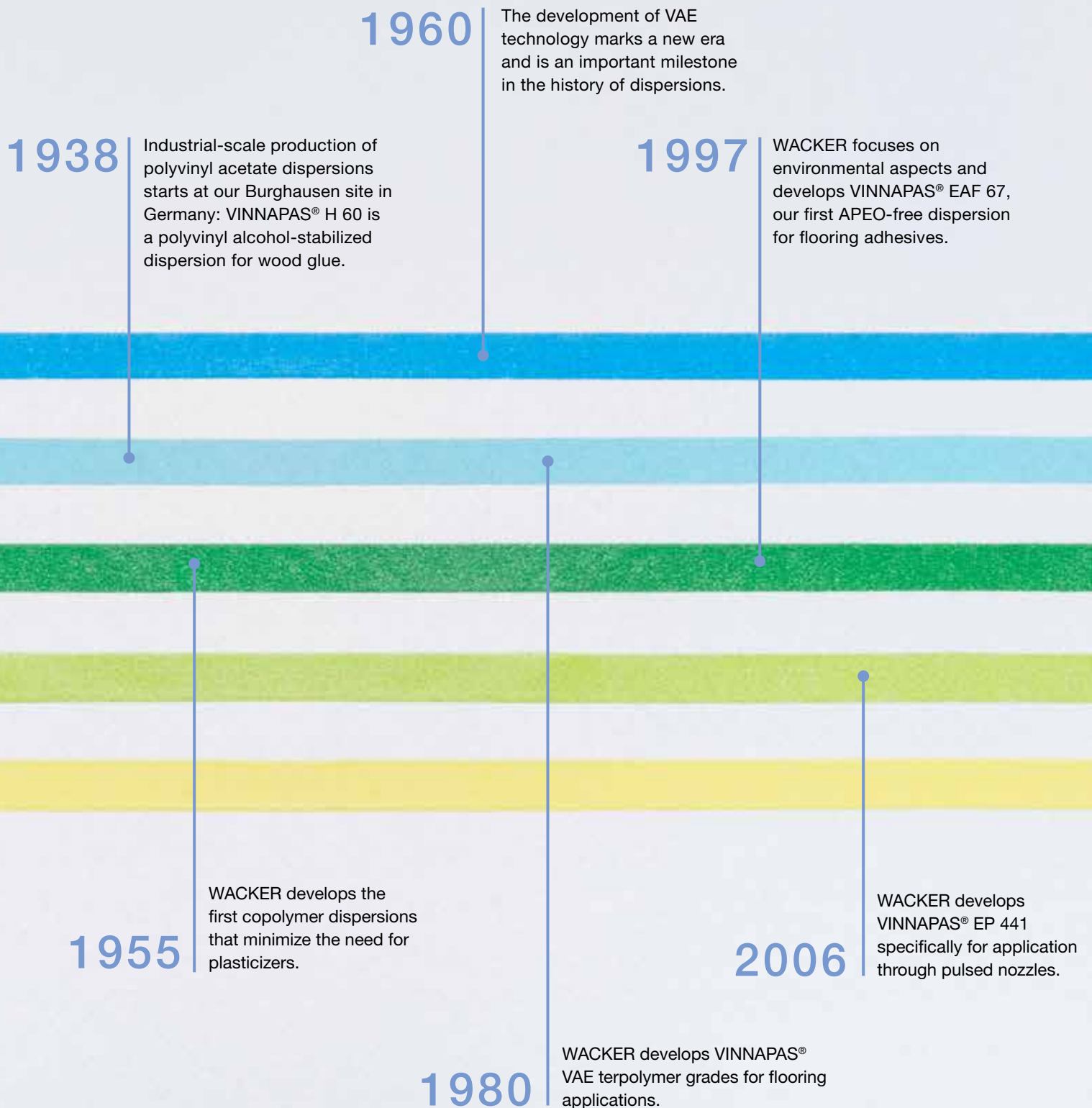
Technical Support

To support adhesives manufacturers, we operate dedicated state-of-the-art adhesives laboratories and technical centers around the globe, where we carry out extensive tests to develop formulations for new products or optimize those of existing products.



WACKER – FUTURE-BOUND SINCE 1938

WACKER is a leading supplier of vinyl acetate-ethylene copolymers and terpolymers (VAE) and polyvinyl acetate homopolymers (PVAc). Our dispersions for waterborne adhesives are trademarked under the brand name VINNAPAS®. WACKER is globally renowned for its expertise in polymer dispersions and its innovative edge in the business.



2010

WACKER launches VINNAPAS® DPX technology for water-resistant wood glues that do not discolor wood or emit formaldehyde.

2019

Let's continue discovering the innovation trail with you.

2017

Introduction low formaldehyde VAE

2013

WACKER introduces VINNAPAS® EP 8010, a VAE copolymer with excellent adhesion to a wide variety of difficult surfaces.



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VERSATILITY MEETS EFFICIENCY

Featured Solutions

Excellent adhesion

The excellent adhesion of VINNAPAS® VAE dispersions makes them an ideal base for adhesives for a variety of difficult surfaces within paper packaging. Examples of these are envelope windows, folded boxes, and film lamination to paper. VINNAPAS®, with its especially broad adhesion profile combined with outstanding heat resistance, is particularly advantageous in this regard.

Food safety

Thanks to their copolymer composition, our VINNAPAS® VAE dispersions can be used to formulate plasticizer-free paper packaging adhesives with low migration potential, which is important e.g. for compliance with regulations for food contact materials.

Reliability and clean machinability

VINNAPAS® VAE dispersions are suited to a broad range of paper packaging adhesives for all types of application technologies. VINNAPAS® is especially versatile due to its compatibility with both roller and nozzle technology.

Featured Applications

Envelopes

Envelopes have changed dramatically in style and uses, and are now made not only with paper but also with specialized substrates. VINNAPAS® dispersions are vital for ensuring that envelopes made with such materials do not fall apart.

Folded boxes

VINNAPAS® dispersions offer the strong adhesion/cohesion balance, low temperature flexibility, good wetting and setting speed necessary to make these packaging applications possible.

Bags

VINNAPAS® VAE dispersions offer adhesives manufacturers the necessary balance of setting speed, adhesion, heat resistance and strength for complex multi-wall bags.

Bookbinding

VINNAPAS® dispersions offer the necessary balance of adhesive and cohesive strength, along with great flexibility and the desired rheological properties.



PAPER PACKAGING

VINNAPAS® dispersions are used to formulate a wide range of paper packaging adhesives. They are notable for their strong adhesion to a large number of substrates, very high heat resistance, excellent machinability and high formulation versatility.

Benefits:

- Broad adhesion and heat resistance spectrum
- Excellent adhesion to a wide range of different substrates, including low-energy substrates, such as PET and PS
- High setting speed
- Reliable, clean machinability
- Formulation versatility
- Formulation of adhesives compliant with food-contact regulations
- Outstanding nozzle compatibility
- Suited to various application technologies

Please note: The benefits stated above are a summary of those possible. Not every individual product can fulfill all the benefits stated.

Applications:

- Paper and cardboard packaging
- Case and carton packaging
- Film-to-board lamination
- Tube winding and honeycomb
- Envelopes
- Bags
- Folded boxes
- Bookbinding

ESTHETICS AND FUNCTIONALITY

Featured Solutions

Strong and durable

We offer a diverse portfolio of binders that generate strong, durable bonds in formulations for wood adhesives and industrial wood-processing adhesives. VINNAPAS® dispersions are water-resistant, low-formaldehyde binders that can bond sensitive woods without producing discoloration.

Featured Applications

Whether used for bonding wood for furniture, veneers, wood flooring, doors and windows or for laminating wood to film or coated paper, VINNAPAS® dispersions possess an extraordinary range of properties that will ultimately improve the functionality and performance of the end-product.

Wood adhesives D2 to D4

High-performance PVAc dispersions provide reliable, water-resistant adhesion. They make ideal solutions for humid and damp areas (e.g. basements and bathrooms) as well as for exterior applications involving direct water contact (e.g. windows). The culmination of 80 years of expertise and development, VINNAPAS® dispersions have water-resistance levels that can be adjusted to match the specific application areas of the respective wood-based materials.

Vinyl, plastic film and paper lamination

Thanks to their good adhesion to impregnated paper, PVC and other plastic film, VINNAPAS® VAE dispersions can be used to laminate decorative plastic film to chipboard, MDF and hardboard. The high cohesion of VINNAPAS® VAE dispersions imparts high green strength to formulations with, e.g., polyurethanes for heat-sealing and vacuum-forming applications.



WOOD PROCESSING

VINNAPAS® dispersions possess an extraordinary range of properties for wood and furniture adhesives that are designed to perform to the highest standards. Their outstanding properties include water, heat and creep resistance.

Benefits:

Wood adhesives D2 to D4

- Excellent water and heat resistance
- Fast setting speed
- DPX Technology
 - No hardener required
 - Ultra-low formaldehyde level of < 5 ppm
 - Discoloration-free

Film-to-wood applications

- Good overall properties especially for impregnated paper or PVC lamination
- Excellent adhesion to PVC film for wet lamination
- Excellent adhesion to difficult substrates
- Very high setting speed

Please note: The benefits stated above are a summary of those possible. Not every individual product can fulfill all the benefits stated.

Applications:

- Wood and wood-processing adhesives D2 to D4, e.g. for furniture, wood flooring, veneers, windows, doors
- Vinyl, plastic film and paper lamination to wooden materials



HIGH PERFORMANCE, LOW EMISSIONS

Featured Solutions

In general, VINNAPAS® VAE copolymer and terpolymer dispersions are the preferred products for formulating flooring adhesives for a wide range of flexible floor coverings. In particular, our VINNAPAS® dispersions provide high initial tack coupled with outstanding cohesion and dimensional stability when used in flooring adhesives.

Featured Applications

Whether in offices, schools, hospitals or residential housing, modern flooring must be rugged, long-lasting, easy to clean and pollutant-free, and at the same time have low emission values. Our VINNAPAS® copolymer and terpolymer dispersions can be used to formulate flooring adhesives for wood, PVC, rubber, linoleum, cork and textiles that comply with European regulations and labeling requirements.



FLOORING INSTALLATION

VINNAPAS® VAE co-polymer and terpolymer dispersions are recommended for flooring adhesives due to their combination of performance advantages and environmental benefits. They are ideal for a wide variety of flexible floor coverings.

Benefits:

- Formulation compatibility
- Long-lasting, highly durable bonding
- Strong adhesion to various substrates
- High cohesive strength
- Outstanding workability
- Excellent dimensional stability

Please note: The benefits stated above are a summary of those possible. Not every individual product can fulfill all the benefits stated.

Applications:

Textile flooring and flexible floor coverings

- PVC
- Rubber
- Linoleum
- Cork
- Textile



TAPES & LABELS

Specific VINNAPAS® dispersions are used in the formulation of pressure-sensitive adhesives (PSAs), either by themselves or in blends with acrylates.

Benefits:

- Excellent balance between tack and cohesion
- Excellent adhesion to a variety of surfaces

Please note: The benefits stated above are a summary of those possible. Not every individual product can fulfill all the benefits stated.

Applications:

- Specialty tapes





CAR INTERIORS

VINNAPAS® VAE copolymer and terpolymer dispersions can serve in a wide variety of high-performance adhesives for car interior applications, including film-to-board lamination, PSA labels and textile lamination.

Benefits:

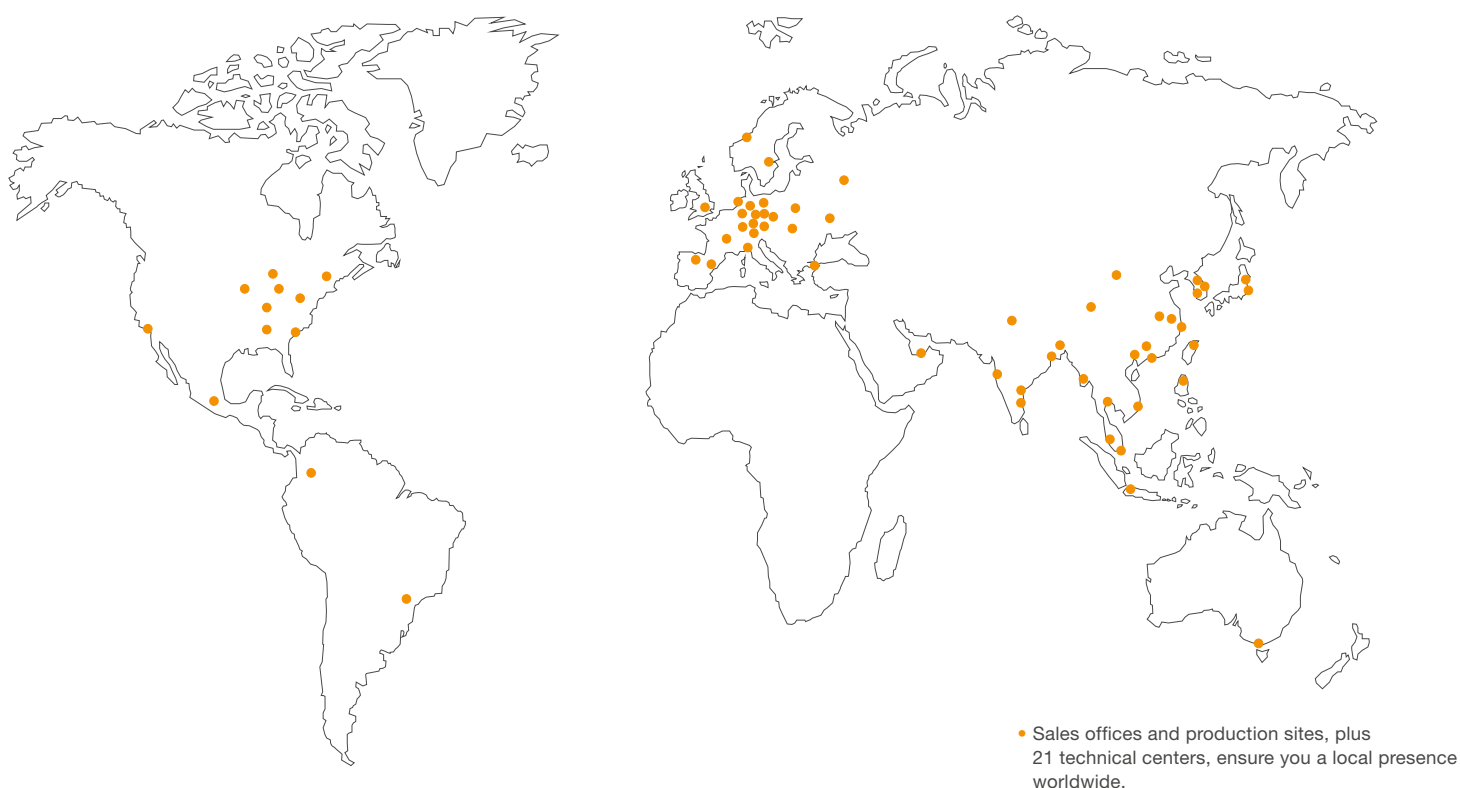
- Excellent balance of tack, adhesion and heat resistance
- Low fogging potential

Please note: The benefits stated above are a summary of those possible. Not every individual product can fulfill all the benefits stated.

Applications:

- Door paneling
- Headliners
- Parcel shelves
- Trunks
- Dashboards

EXPERTISE AND SERVICE NETWORK ON FIVE CONTINENTS



WACKER is one of the world's leading and most research-intensive chemical companies, with total sales of €4.92 billion. Products range from silicones, binders and polymer additives for diverse industrial sectors to bioengineered pharmaceutical actives and hyperpure silicon for semiconductor and solar applications. As a technology leader focusing on sustainability, WACKER promotes products and ideas that offer a high value-added potential to ensure that current and future generations enjoy a better quality of life based on energy efficiency and protection of the climate and environment.

Spanning the globe with 4 business divisions, we offer our customers highly-specialized products and comprehensive service via 23 production sites, 21 technical competence centers, 13 WACKER ACADEMY training centers and 50 sales offices in Europe, North and South America, and Asia – including a presence in China. With a workforce of some 13,800, we see ourselves as a reliable innovation partner that develops trailblazing solutions for, and in collaboration with, our customers. We also help them boost their own success. Our technical centers employ local specialists who assist customers world-

wide in the development of products tailored to regional demands, supporting them during every stage of their complex production processes, if required. WACKER e-solutions are online services provided via our customer portal and as integrated process solutions. Our customers and business partners thus benefit from comprehensive information and reliable service to enable projects and orders to be handled fast, reliably and highly efficiently. Visit us anywhere, anytime around the world at: www.wacker.com



WACKER

Wacker Chemie AG
Hanns-Seidel-Platz 4
81737 München, Germany
Tel. +49 89 6279-1741
info@wacker.com

www.wacker.com

www.wacker.com/socialmedia



7253e/03.19 replaces 7253e/04.15

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