



Tufting machine at carpet producer Edel Group. Tufting is the technical term for the most widely-used process to manufacture carpets and functions similar to a sewing machine. The picture shows the tufting process, i.e. how the fibers are put through the primary backing. Edel Group uses a precoat formulated with VAE dispersions to bond the fibers to the primary backing. The tufted broadloom carpets are used in both commercial and residential buildings.

THE SWEET SMELL OF SUCCESS

Edel Group is a Dutch company that has become the world's first tufted-carpet manufacturer to coat the backings of their carpets with compounds based completely on WACKER's VINNAPAS® VAE dispersions. VAE binders offer a variety of advantages over traditionally used latex: their price is more stable, they emit hardly any volatile organic compounds, provide greater flame-retardance, are easy to process – and are almost odorless.

This carpet does not smell. At least, not in the characteristic way of new carpets, even though it has come directly from the factory. This chocolate brown, super-cozy “Pamina” carpet made of polyamide fibers is so soft you have to feel it. This is being demonstrated by the Edel Group sales representatives to customers attending the Domotex Trade Fair for Floor Coverings in Hanover, Germany and is only one example of Edel Group’s conversion to the new all-VAE carpet backing, marketed under the “Ceneva” brand. It’s the VAE binder in the backing that makes all the difference – including the absence of odor.

“At first glance, our customers don’t notice anything different,” says Dr. Mike de Lange, Manager Operations at Edel Backing, a member of Edel Group. The carpet backing looks the same as always. It holds the carpet together, stopping the fibers from coming out even after many years’ wear and tear. VAE dispersions from WACKER now enable Edel Group to produce a backing that can be processed with perfect results. The resulting backing is one which has excellent performance in everyday use and offers several additional benefits, of which the lack of odor is only one.

The typical smell that pervades a room for several days after carpeting has been fitted is due to conventional styrene-butadiene latex (SBL) binders, explains Dr. Holger Künstle. He is in charge of WACKER POLYMERS’ carpet applications lab in Burghausen, Germany. Over the last few months, many square meters of carpet have passed through the hands of the chemist and his staff.

TRIED AND TESTED

Since every carpet manufacturer has their own recipe adapted to existing equipment, Dr. Künstle and his team collaborated with Edel

Group’s technical experts to create the optimal VAE carpet binder formulation for each carpet type. Dr. Künstle’s team also tested the coated carpet specimens under practical conditions. He used machines that simulate shoes walking over the carpet thousands of times or the repeated rolling of office chair casters.

INCREASED FLAME RETARDANCE

Dr. Künstle was particularly impressed by the tests carried out in his lab’s combustion chamber. During this test, he set fire to films of carpet backing compounds, some made with VAE, some with SBL. He observed that VAE films are less flammable than SBL films. In the case of certain flame-retardant VAE grades, the fire was even self-extinguishing, whereas compounds formulated with SB latex burnt completely, releasing black smoke in the process. If the backings are bonded with VAE binders, much less flame retardant additive, such as aluminum trihydrate, has to be added. On account of their lower flammability, carpets with a VAE backing are therefore ideal for commercial installations, such as in hotels and offices, or in aircraft construction and ship-building, where fire safety is a high priority.

The benefits of VAE dispersions reveal themselves in emissions testing, too. Since their surface area is large, floor coverings have the potential to emit volatile organic compounds (VOCs) to the environment. The Association of Environmentally Friendly Carpets (GUT e.V.), an initiative launched by European carpet manufacturers, has established the “GUT” label. To receive this label, carpets must undergo extensive analysis for possible pollutants and must meet the rigorous standards. These carpets are tested, among other things, for plasticizers, biocides, pesticides, aromatics, hydrocarbons, aldehydes, and ketones.

Additionally, a sensory odor test is performed. “Our tests showed that in the case of a VAE carpet backing, the total emissions of vola-

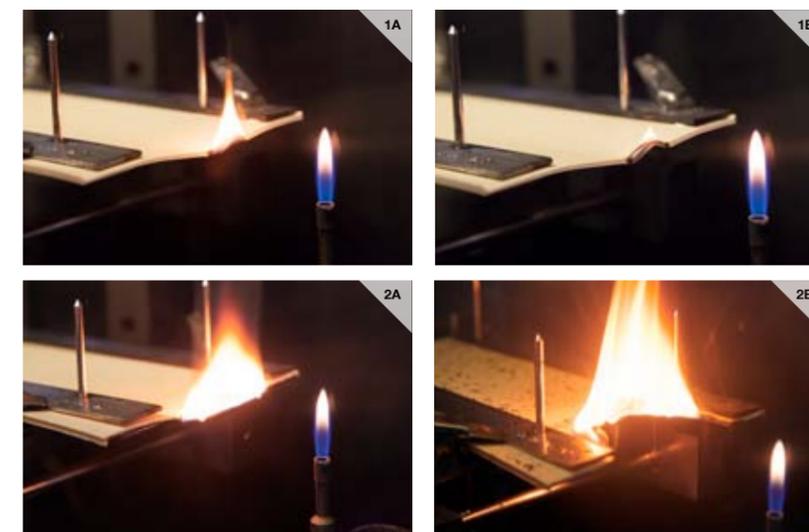
tile organic compounds, are much lower than when SB latex is used,” says Dr. Mike de Lange.

A STRONG CORNERSTONE

In Europe, there has been a long tradition of formulating carpet backing compounds to produce carpets which last through many years of wear. Tradition is also a cornerstone of Edel Group’s corporate philosophy. The family-run business, with its 120-strong workforce, has been making carpets at its base in Genemuiden, The Netherlands, for almost 100 years. Not satisfied with

standing still, Edel Group is always looking to improve. An example is the development of carpets made with recyclable raw materials.

Polymeric binders are a traditional mainstay of the WACKER portfolio. Burghausen chemists began producing vinyl acetate from acetic acid in 1928. By 1966, the researchers had succeeded in combining vinyl acetate with ethylene to produce a copolymer. They created a binder that has now become an integral part of a wide range of applications. VAE dispersions are used in adhesives, low-odor interior



FURNACE CHAMBER TEST

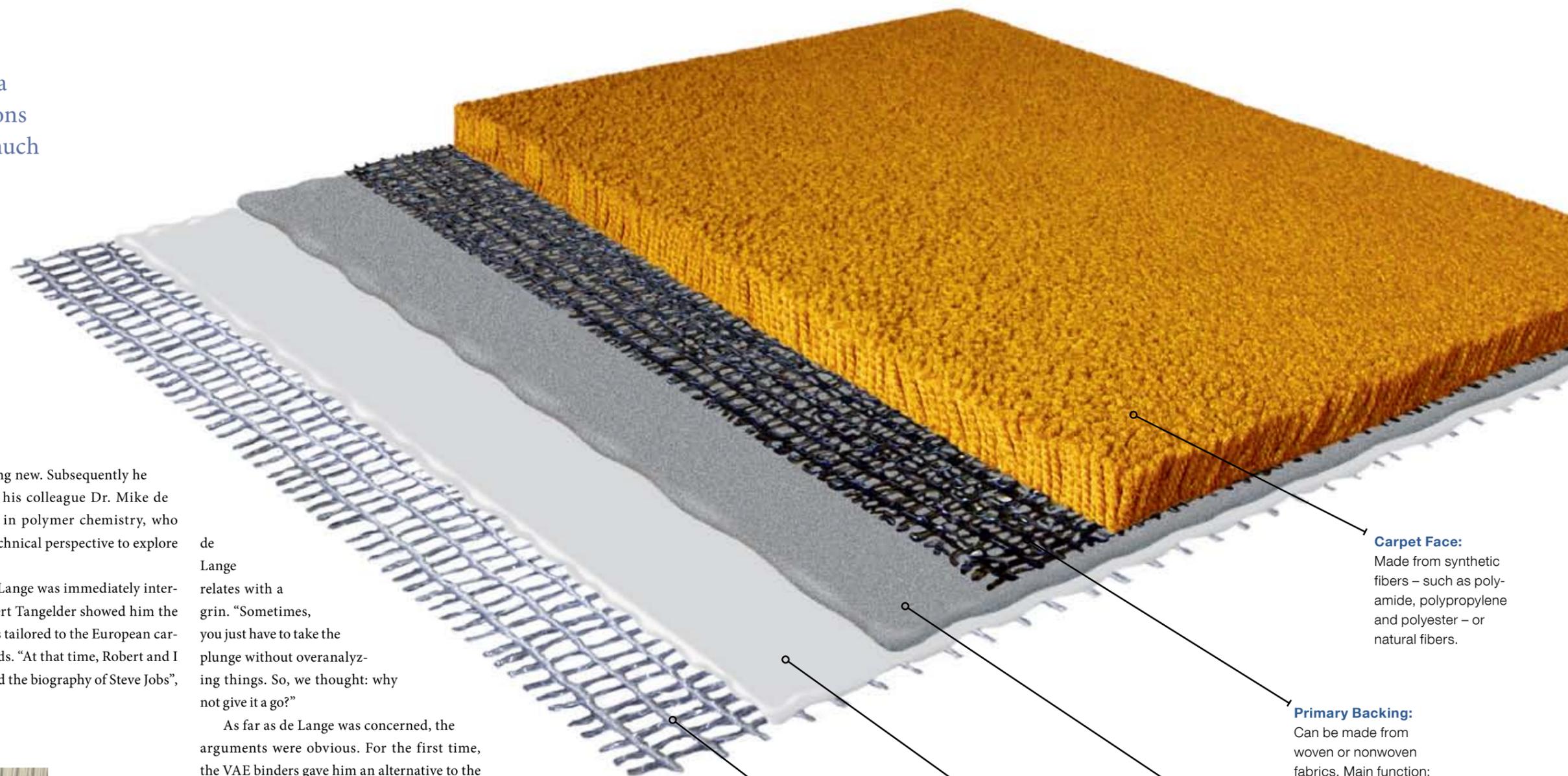
Images from a furnace chamber test – in accordance with the DIN 4102-1 standard – at WACKER’s carpet laboratory in Burghausen. Films made with both VAE and SBL were tested, each time including 150% calcium carbonate as a filler. The pictures above show that VAE-based films are self-extinguishing (1A, 1B), while films made with SBL burn readily, issuing black smoke (2A, 2B). VAE-based binders therefore allow formulations that need fewer flame retardant additives.



Edel Group purchasing manager Willem van der Meer (left) and Robert Tangelder, business development manager at WACKER, view the finished carpet’s quality in person.

“Our tests showed that in the case of a VAE carpet backing, the total emissions of volatile organic compounds, are much lower than when SB latex is used.”

Dr. Mike de Lange, Manager Operations, Edel Backing



Carpet Face:
Made from synthetic fibers – such as polyamide, polypropylene and polyester – or natural fibers.

Primary Backing:
Can be made from woven or nonwoven fabrics. Main function: carrier for fibers.

Secondary Backing:
Commonly made of woven polypropylene. Also used are felts or heavy weight backings. Main function: contributes to the dimensional stability of carpets.

Secondary Coating:
Formulated with VINNAPAS® VAE dispersions; filled with calcium carbonate and adjusted with additives, e.g. dispersing agents or thickeners. Main function: delamination properties; fixation of secondary backing; contributes to the dimensional stability of carpets.

Precoat:
Formulated with VINNAPAS® VAE dispersions; filled with calcium carbonate and adjusted with additives, e.g. dispersing agents or thickeners. Main function: tuft bind. The precoat fixes the fibers to the primary backing.

paints and nonwovens. VAE is the core technology at WACKER POLYMERS.

A STEP AHEAD

When Robert Tangelder, Business Development Manager for WACKER POLYMERS dispersion team in Europe, introduced these VAE dispersions for carpet backing applications to Willem van der Meer, Edel Group’s Purchasing Manager, Willem realized this unique opportunity

to start something new. Subsequently he teamed up with his colleague Dr. Mike de Lange, a doctor in polymer chemistry, who brought in his technical perspective to explore the innovation.

Dr. Mike de Lange was immediately interested when Robert Tangelder showed him the new VAE binders tailored to the European carpet-industry needs. “At that time, Robert and I had both just read the biography of Steve Jobs”,

de Lange relates with a grin. “Sometimes, you just have to take the plunge without overanalyzing things. So, we thought: why not give it a go?”

As far as de Lange was concerned, the arguments were obvious. For the first time, the VAE binders gave him an alternative to the previously unrivaled styrene-butadiene (SB) – an alternative that could be processed using existing equipment, too. “Customers from Scandinavia, a very environmentally conscious market, had often asked me why we couldn’t manage without SB,” explains de Lange. Now he finally saw an opportunity to do so and introduce a totally satisfactory substitute.

Both Mike de Lange and Willem van der Meer feel that the choice of a suitable carpet-backing binder includes two additional factors: supply security and stable prices. Edel Group does not only manufacture backings for their own carpets, they also toll-produce backings for other carpet manufacturers. The



A successful collaboration: Dr. Mike de Lange (Manager Operations Edel Backing), Feike van der Heide (Business Director for WACKER POLYMER’s dispersion business in EMEA), Robert Tangelder (Business Development Manager for WACKER POLYMER’s dispersion business in EMEA) and Willem van der Meer (Purchasing Manager Edel Group).

Laboratory employee Kerstin Zeiler during the tuft bind test at WACKER's carpet laboratory. This process tests how well the precoat bonds the fibers to the primary backing.



Edel Backing facility conducts precoat and secondary coatings on residential and commercial carpets that use a broad variety of fibers including polyamide, polyester, polypropylene and wool.

To be able to forecast long-term in the tolling business, Edel Group needs large quantities of binder at stable prices. This is one of the main advantages of VAE dispersions since they are less at the mercy of crude oil than SB. Ever since they switched their tufted carpet backing production completely over to VAE, Edel Group has been able to guarantee its customers stable terms and conditions for the next quarter. "That would have been unimaginable for SB, as its price constantly peaks and troughs," says Willem van der Meer.

VAE dispersions have already enjoyed tremendous success in the USA. Even though VAE has been used at a low level for over 30 years, WACKER has experienced a 10-fold increase with all the key carpet manufacturers for the past three years. In North America, this shift has been enabled by the high and volatile price of butadiene, helped by the steady climb in the price of styrene. Both of these raw materials are traded globally so the wave of volatility has been felt in all regions. Of course, the price of VAE would mean little



The delamination test, Lisson test and Vettermann drum test are three additional tests conducted at WACKER's carpet laboratory. The delamination test (left) evaluates the adhesion of the backing to the carpet. The Lisson test (center) and the Vettermann drum test (right) are used to simulate the daily stress a carpet is submitted to, such as through footsteps and rolling office chairs.

if it did not perform – and it does. Over several months, WACKER's American carpet experts in Dalton, GA successfully switched over the precoat of one production line after the other and have been providing solid technical support to the mills ever since. When WACKER's Robert Tangelder was first approaching the European carpet market with the VAE success story, he had no prior contact with producers in the European carpet industry and did not know what to expect. Yet Tangelder found Edel Group extremely receptive right from the start. "Edel Group is a company that understands a great deal about chemistry and their work is very much based around finding solutions," he says. "That is why they understood the special characteristics of VAE so quickly and adapted them to their own processes."

Initially, Mike de Lange certainly had his doubts. When he used SBL and VAE in parallel, the inherent differences in the flow properties of the two binders became apparent. The VAE formulation had to be optimized. "Wow, we're really charting unknown territory," de Lange thought at times. Once the formulation was optimized and following six months of intensive carpet testing, Edel Group was ready to change its production. "From the moment we switched production entirely over to VAE, everything

was fine," he recalls, adding that, today, the in-factory processes are more stable and uniform with VAE than with SBL in the past, and don't have to be modified as often. "The production staff thus also see the positive effects of VAE during processing," says de Lange.

JOINT EFFORTS FROM BOTH SIDES

That's something Feike van der Heide likes to hear. The Dutchman is responsible for VAE dispersions in WACKER's EMEA region (Europe, Middle East and Africa). "The European carpet industry is quite a large, strategically important market for us," he explains. "We have focused our efforts to penetrating this market by means of VINNAPAS® CA 55, our dispersion specifically designed for carpets. We're now glad that we made the breakthrough." What's more, van der Heide is very proud of the close cooperation with a first mover such as Edel Group, which has been the first manufacturer to switch over its production entirely to VAE – both for the precoat and the secondary coat.

"That was a huge step for us, too," adds Willem van der Meer. "But we took it, because we trust WACKER as a reliable and major partner with a wealth of experience – and because we were given a great deal of support."

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