

WWW

WWW.WACKER-MAGAZINE.COM

WACKER



BRIGHT PROSPECTS FOR DURABLE PAINTWORK

A novel WACKER dispersion for exterior paints combines the unique properties of organic and mineral components: the high pigment stability of PRIMIS® AF 1000 makes for richly colored facades that retain their brilliance for an unusually long time, are slow to fade and absorb little dirt.

444

square kilometers – that is the size of the Caribbean island of Curaçao, where these brightly painted historic houses are located.

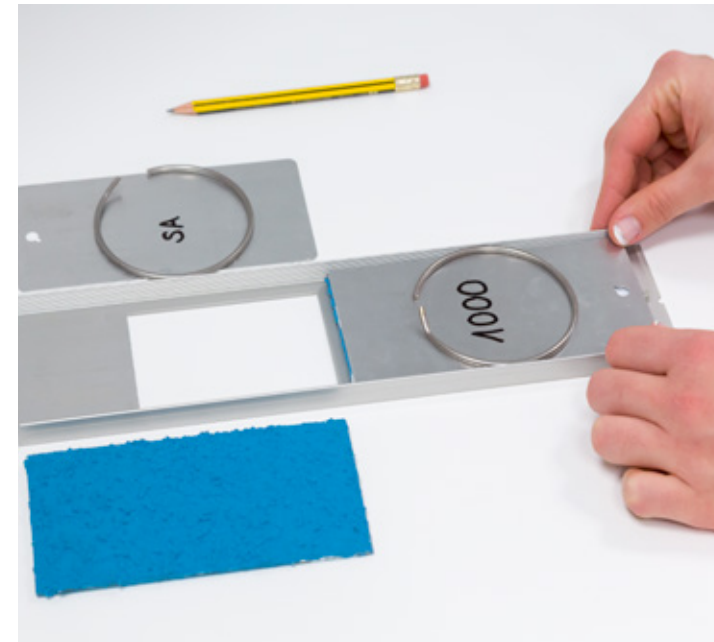




The first step in testing the color fastness of PRIMIS® AF 1000 is to prime test panels in the applications lab in Burghausen.



One test panel is then given a coat of paint based on PRIMIS® AF 1000. A second test panel is coated with a commercially available alternative product.



A lab assistant then inserts the coated test panels into metallic test specimens. The number 1000 indicates that a test panel has been coated with PRIMIS® AF 1000.



Lab staff use what is known as a QUV tester to simulate accelerated weathering; for this purpose, the test materials are exposed to alternating cycles of UV light and moisture at high and low temperatures.

With the tremendous success of the Bauhaus style in the 20th century, there was a retreat from the use of color in architecture initially. Modernism came to be synonymous with purism – and that meant white. The roughly 4,000 “International Style” buildings that have gone up in Tel Aviv since the 1930s, for example, have been tellingly dubbed the “White City” and have been registered as such on the UNESCO World Heritage List.

But white has not always been this dominant: even the temples, palaces, gods and human images of the ancient Greeks were multicolored – adorned with bright pigments such as vermilion red, cobalt blue and malachite green. Yet only traces of these vivid colors have

survived the ravages of time, which is why the buildings and sculptures of Greece appear to have only ever had bare, unpainted surfaces of natural limestone and marble.

With the rise of postmodern architecture in the 1980s, however, more and more architects have found the courage to explore bright colors. “Color has made a comeback in architectural design over the past few decades,” explains Juan Serra of the Universitat Politècnica de València, who has conducted and published a great deal of research on the use of color in architecture.

Their colors and surface properties are what turn exterior coatings into a design element, defining the look both of individual buildings and of entire regions. When we think of Swe-

den, for example, most of us picture red wooden buildings, while the baroque structures of Central Europe stand out in bright pastels, and the old quarters of Paris are distinguished by sandy, champagne-colored plasters.

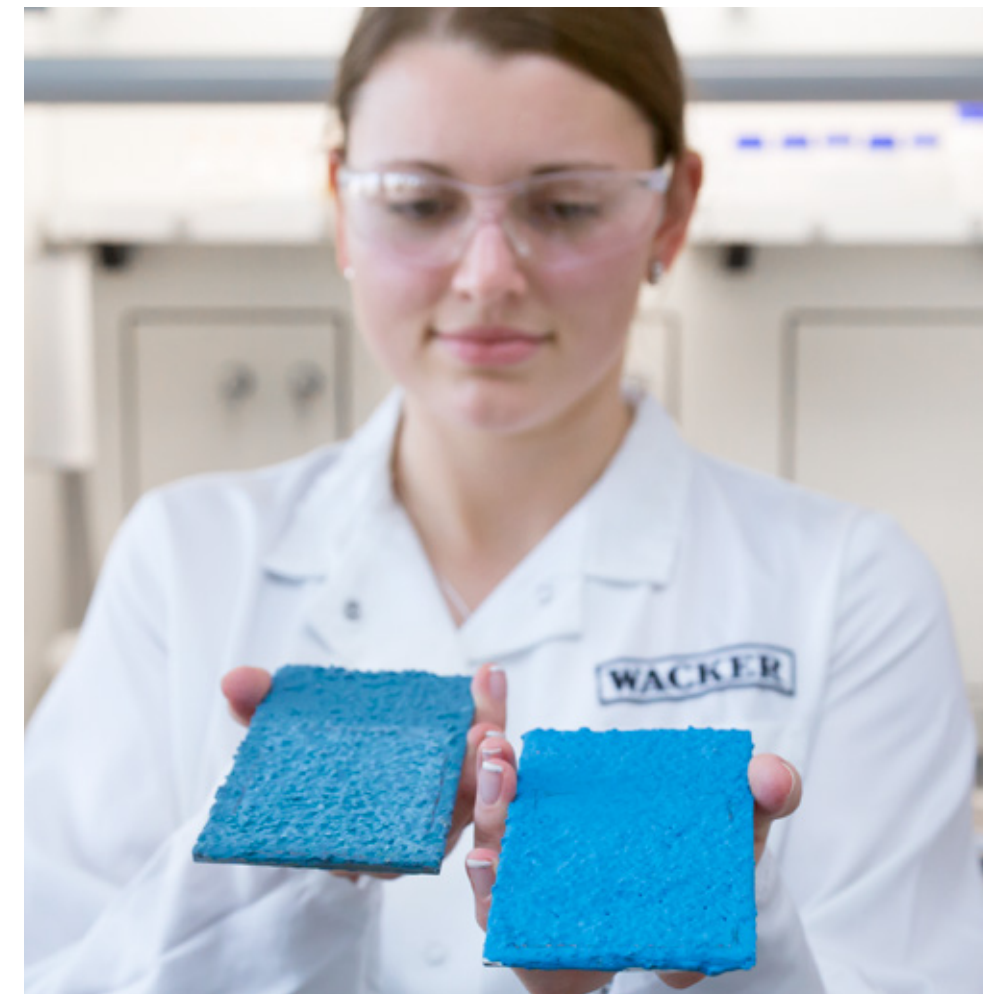
Exterior coatings offer both enhanced appearance and functionality. They protect buildings from environmental influences such as cold, heat, rain, ice and UV radiation. WACKER has developed a new binder designed to make brilliant colors last: “Our new PRIMIS® AF 1000 dispersion is effective in stabilizing coating pigments to produce a facade that will remain intact and attractive for a long time to come,” says Dr. Markus Busold, global market manager for Coatings at WACKER POLYMERS.

NO MORE AGGLOMERATION

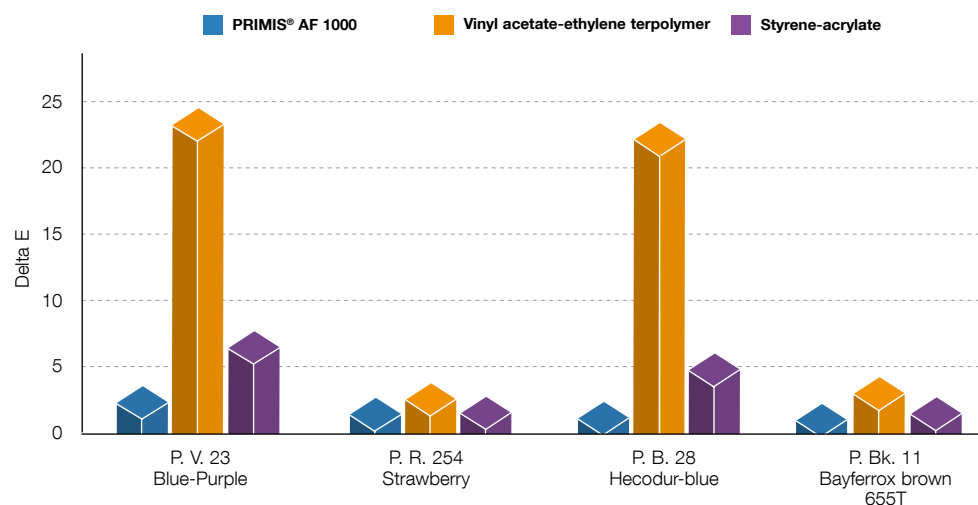
Its composition is what makes this novel product special – at the heart of the dispersion are fine mineral and organic particles. The mineral components lend paints and renders considerable mechanical stability, low combustibility and long-lasting, vivid colors. The organic polymer component is based on acrylic esters and produces excellent adhesion to the substrate and a high degree of cohesion and flexibility.

“Color has made a comeback in architectural design over the past few decades.”

Juan Serra, Universitat Politècnica de València



Lab assistant Stefanie Werkstetter compares the two panels: even after 1,000 hours, the brilliant colors of the sample formulated with the new PRIMIS® AF 1000 dispersion (right) remain unchanged, whereas the commercial alternative (left) exhibits considerable weathering.



Color consistency test (2 mm render, after 1,000 h of QUV testing): the new PRIMIS® AF 1000 binder does a particularly good job of stabilizing pigments for long periods of time (the shorter the bar, the greater the color consistency). While the human eye cannot identify deviations at values below 5, those differences are readily detectable in the lab.

The construction industry has been combining organic and inorganic components in binders for some time, often by simply mixing the mineral particles into an organic dispersion. There is a drawback, however: the particles can agglomerate, which compromises storage stability. Phase separation can also be a problem during film formation, resulting in an uneven, heterogeneous film. This inhomogeneity, in turn, destabilizes the bond and increases the risk of cracking.

“In PRIMIS® AF 1000, WACKER’s new mineralized binder, mineral and organic components are chemically bound together, which prevents them from agglomerating during storage and film formation,” explains Dr. Udo Kotschi, who helped develop the new dispersion at WACKER’s Application Technology department. PRIMIS® AF 1000, he points out, is also characterized by excellent film formation – even at low outdoor temperatures – and by the elasticity of the polymer surface at maximum blocking resistance. The results are stable, homogeneous films.

THE BEST OF BOTH WORLDS

“The launch of PRIMIS® AF 1000 introduces a new binder for sophisticated external applications that combines the advantages of its organic and inorganic components,” says John Fotheringham, who heads the Dispersions & Resins business unit at WACKER POLYMERS. The dispersion, he observes, allows manufacturers to produce coatings in which the color remains consistent – an unattainable goal using the purely acrylate-based binders available to date. “The recent introduction of the PRIMIS® brand name also signals our intent to expand WACKER’s comprehensive portfolio of high-quality renders and exterior paints,” Fotheringham adds by way of explanation.

The high thermal conductivity of the mineralized dispersion means that paint and facade surfaces dry rapidly. In addition to producing ideal barrier properties, however, PRIMIS® AF 1000 also reduces the amount of dirt that the coating picks up. Thermoplasticity is one of the

hallmarks of traditional acrylate dispersions, but it causes the facade to soil more quickly. The new binder technology, on the other hand, provides good elasticity at an optimum level of surface hardness, preventing soiling by making it very difficult for dirt particles to adhere to the surface.

Formulations containing the new WACKER binder are also less combustible thanks to its mineral components. Paints and renders exhibit remarkable dimensional stability under extreme heat, which provides better fire protection and greatly reduces the need for flame-retardant additives in the coatings. PRIMIS® AF 1000 also offers improved scratch and abrasion resistance and optimized thermal conductivity, and makes paints and renders easier to process.

Pigments are blended into exterior paints and renders in order to add rich, vivid color to the exterior walls of homes and buildings. While organic pigments are known for their wide variety of shades, they are not particularly stable, especially when exposed to UV radiation. As a



With the rise of postmodern architecture in the 1980s, vivid colors made a comeback on building sites. A well-maintained appearance requires exterior paints that ensure color consistency.



Coated test panels are exposed to the elements for months or even years at the Burghausen plant's open-air weathering facility. WACKER technician Manuela Mühthaler measures at regular intervals how well the various shades of color withstand rain and sun.

result, they fade and become increasingly pale over time due to the sun and weather. Inorganic pigments, by contrast, are better able to resist the elements, but do not offer the same variety of shades and hues.

The new PRIMIS® AF 1000 binder significantly increases the stability of organic pigments in paint formulations. "Mineralization is a more efficient way of protecting organic pigments from UV radiation," Kotschi notes. As the WACKER chemist then goes on to explain, "They lose their brilliance and intensity much more slowly as a consequence, allowing exterior paints to retain their original shade longer." This enhanced color consistency and paint longev-

ity has also been verified in the lab using what is known as a QUV tester to simulate accelerated weathering. In these experiments, lab employees exposed the test materials to alternating cycles of UV light and moisture at high and low temperatures, thereby mimicking the effects of sunlight, dew, rain and spray. Scientists can simulate within a few days or weeks the damage caused by months of exposure to climate and weather.

FOCUSING ON FOUR PIGMENTS

The laboratory experts tested exterior paints containing the new PRIMIS® AF 1000 dispersion over a period of 1,000 hours and compared the results to those obtained using standard commer-

cial alternatives based on vinyl acetate-ethylene and styrene-acrylate. The tests focused on four particularly critical organic pigments that produce attractive colors in the final formulation, but that, unfortunately, readily fade or grow pale.

Lab test results showed that the new PRIMIS® AF 1000 binder does a particularly good job of stabilizing the pigments for long periods of time (see graph on page 66). "Paints and renders formulated with new PRIMIS® AF 1000 provide optimum protection from wind and weather, and maintain brilliant colors – both for new buildings and renovated structures," explains Dr. Markus Busold, global market manager for Coatings at WACKER POLYMERS. ■

EXPERTISE AND SERVICE NETWORK ON FIVE CONTINENTS



• Sales offices and production sites, plus 22 technical centers, ensure you a local presence worldwide.

WACKER is one of the world's leading and most research-intensive chemical companies, with total sales of €5.3 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 5 business divisions, we offer our customers highly-specialized products and comprehensive service via 25 production sites, 22 technical competence centers, 12 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 17,000, 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 Chemie AG Hanns-Seidel-Platz 4, 81737 Munich, Germany
Tel. +49 89 6279-0, www.wacker.com

The data presented in this medium are in accordance with the present state of our knowledge but do not absolve the user from carefully checking all supplies immediately on receipt. We reserve the right to alter product constants within the scope of technical progress or new developments. The recommendations made in this medium should be checked by preliminary trials because of conditions during processing over which we have no control, especially where other companies' raw materials are also being used. The information provided by us does not absolve the user from the obligation of investigating the possibility of infringement of third parties' rights and, if necessary, clarifying the position. Recommendations for use do not constitute a warranty, either express or implied, of the fitness or suitability of the product for a particular purpose.