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

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

Juan Serra, Universitat Politècnica de València

Lab assistant Stefanie Werkstätter compasses 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) exhibit considerable weathering.
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, resulting in an uneven, heterogeneous film. This inhomogeneity, in turn, destabilizes the bond and increases the risk of cracking. “

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.
WACKER technician Manuela Mühlthaler measures at regular intervals how well the various shades of color withstand rain and sun. As a 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. “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.

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.
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