

Effective protection against graffiti and more

WACKER has developed a new, highly effective anti-graffiti product, which permanently protects surfaces with a thin film of silicone. Graffiti and stickers can be readily washed off with just cold water.

It's a scenario replicated in cities all around the world: under cover of darkness, a graffiti artist whips out a spray can and gets to work. The pitch-black paint etches its way mercilessly into the masonry. The fine pores of the sandstone soak up the acrylic paint like a sponge. After a few minutes, the culprit has disappeared – leaving a personal memorial on what was once a natural stonewall.

"In porous masonry, the paint can penetrate down to a depth of about one millimetre," says Professor Helmut Weber, founder of the Competence Center for Building Protection and Renovation in Ebersberg near Munich, Germany. "It literally clings to rough sandstone surfaces and is highly tenacious," notes the construction expert. A great deal of water, special chemicals and a high-pressure cleaner are needed to remove the graffiti. Even so, the outlines of the inscriptions can often still be seen afterwards. The only remedy in such cases is to resort to sandblasting. "But that, of course, strips away the building fabric," says Weber. "If you do that after every graffiti attack, the building itself will eventually suffer."

Year after year, graffiti and wild posters inflict huge damage on public buildings, bridges, underpasses and house walls. They are not only time-consuming and expensive to eliminate. They lower the value of these structures, too. The Deutscher Städtetag (Association of German Cities) estimates the damage done in Germany at €200-million every year. In the United States, the Department of Justice puts the annual cost at some US\$12-billion.

"Spray paints are becoming cheaper and thus affordable for everyone. Consequently, the spotlight is increasingly being turned on technologies that can provide buildings with long-lasting protection against graffiti and other defacements," explains Marianne Kreuzpointner, a marketing expert in construction chemicals at WACKER's production site in Burghausen, Germany. "We're receiving more and more requests from customers about whether we supply products that offer permanent surface protection and enable graffiti to be removed for a low cost."

One such WACKER product is already available in the USA. Applications engineer Hartmut Ackermann and his research colleagues have taken this pioneering technology and enhanced it further. "Like most anti-graffiti systems, our new product forms a continuous film on the substrate, where it acts as a barrier between the substrate and the spray paint," says Ackermann.

"The graffiti is unable to develop permanent adhesion to the silicone and so can be removed with cold water and a cloth or a high-pressure cleaner," explains the chemist. Tests in the Upper Bavarian town of Burghausen prove just how well the product works. An underpass there for cyclists was treated with the new anti-graffiti coating. "We deliberately chose a concrete wall that is a favourite target for graffiti artists," says Albert Gunthner, head of the department responsible for the town's upkeep. "The sprayers usually slip in here unnoticed and have plenty of time to create memorials."



When the 20 m² test area was cleaned, Gunthner witnessed for himself how effective the anti-graffiti protection is. "Before this, we had to use sandblasters to clean the defaced concrete walls, because the paint penetrates so deeply into them. What's more, the frequent cleaning was exacting a heavy toll on the structural fabric. Thanks to this new anti-graffiti product from WACKER, all we need now is a high-pressure cleaner and cold water. It is very impressive," he says.

"The protective film is about 0.2 mm thick and can be stretched by up to 160% before it tears. This allows cracks and irregularities to be bridged effectively, while the substrate is protected from damage by the paint," explains Ackermann. The extendibility of the silicone is also important for another reason: building materials are always under tension. They expand during the day as the wall warms up and contract at night when it gets cold. This is a constant challenge for the protective coating. Another is posed by heat and UV light. The silicone must remain transparent even



1. With WACKER's new protective silicone coating, a sponge and cold water are enough to remove graffiti.
2. Easy-peel: the anti-graffiti coating from chemical company WACKER is so smooth that neither spray paints nor unwelcome stickers can catch a grip.
3. Compared to other anti-graffiti coatings, silicones have the great advantage of being breathable. Moisture and, consequently, mould, won't develop in the masonry.
4. The anti-graffiti agent has the consistency of honey and is diluted with a solvent before application by brush, roller or spray.

under a scorching sun and it must not turn yellow or embrittle.

Under normal conditions, the protective coating cures to a tack-free surface in two to four hours. After six hours, it is already firm enough to be cleaned. "A commercially available high-pressure cleaner can then be used to remove graffiti without any problems," says Ackermann. "You don't generally need to resort to any special chemicals. In fact, the protective coating is so dirt-resistant that you basically only need a sponge and cold water to remove all traces from the surface." Even stickers and posters cannot find a hold on the anti-graffiti coating. In most cases, they can easily be pulled off by hand.

Laborious, expensive cleaning and remediation are now history. Tests at WACKER in Burghausen show that the anti-graffiti film is still as good as new even after having been cleaned 20 times. Experts therefore believe that the protection will endure for years – and probably decades, if the mischief-makers do not strike too frequently.

The secret? Graffiti adheres so poorly to the silicone film because of the particularly low surface tension of the silicone. Surface tension is the force that enables some insects to walk on water and is also why water forms droplets. Spray paints have a much higher surface tension than the silicone coating and so have difficulty holding on. "A reliable anti-graffiti effect can be obtained with 200-250 g/m² of our silicone product," explains Kreuzpointner. "The coating is permeable

to water vapour and, therefore, much more breathable than its polyurethane-based counterparts, which are also used as permanent anti-graffiti protection," he explains.

Weber adds: "Moisture transport must not be hindered, especially in the case of coarse-pored building materials such as sandstone, because the growth of microorganisms would be promoted or parts of the surface could spall."

"Graffiti prevention is becoming more and more important, especially for natural stone. These surfaces are very delicate when left untreated, and suffer massively when subjected to frequent cleaning," he says. "Proper protective measures can ensure that the value of a building is enhanced over the long term. That's why we are increasingly incorporating anti-graffiti protection into our concepts."

For users of anti-graffiti agents, it is particularly important that the products are not harmful to health and that they contain no hazardous substances if possible. That is also what makes WACKER's new product so special. "We worked for a long time to find the right composition. The formulation that we have now developed provides optimum adhesion to the mineral substrate and is also designed to allow graffiti to be removed easily and cleanly without residues," explains Ackermann. The researchers addressed the safety aspect by basing the product's adhesion promoter and crosslinker on harmless silanes – not on an oxime and tin crosslinker.

The active-agent concentrate has the con-



sistency of honey and should be diluted with a solvent before use. "Manufacturers of building protection agents can also add pigments to make coloured coatings," Kreuzpointner adds. The active-agent content, viscosity and colour are infinitely adjustable. Applying the anti-graffiti coating is also a cinch: brush, roller or spray will do. The protective film makes the colours of the substrate appear more intense and adds a hint of gloss to the surface.

The anti-graffiti coating bonds especially well to concrete, brick, plaster, marble and limestone. If a special primer is used, it can even protect glass and metal. In the presence of atmospheric moisture, the thin film cures from the outside in. The silicone molecules anchor themselves in the masonry by forming covalent bonds with some of the mineral components. They furthermore crosslink with each other to form a stable, but elastic, protective layer. □

Overview of key anti-graffiti technologies

In anti-graffiti protection, a distinction is drawn between temporary, permanent and semi-permanent coatings. Temporary systems are made of waxes or biopolymers. The protective film is invisible and can be used on listed buildings. A further advantage is that the systems are breathable. This means that moisture can evaporate from the building fabric. However, by their nature, such films do not provide lasting protection, as they must be removed and completely replaced every time they are cleaned. Even in the

absence of graffiti attacks, these coatings will only last a few years.

In semi-permanent systems, only one component of the film is lost during cleaning. The substrate must be treated again every time graffiti is removed and at intervals of three to five years. The advantage of semi-permanent coatings is that they are barely visible and permeable to water vapour. These products often consist of blends of organic waxes and fluoroalkyl silanes.

The major advantage of permanent

anti-graffiti systems is that they remain intact when the graffiti is removed and can last many years without losing their ability to protect the surface. The downside, however, is that they alter the appearance of the substrate. In addition, many products seal the surface and thus prevent the natural passage of moisture. The protective film detaches in some places as a result, potentially causing blisters to form or the paint to flake off. This is not the case with WACKER's new anti-graffiti system. It contains water-vapour-permeable silicones. These virtually eradicate such undesirable side effects. □