Effective Protection against Graffiti and More

Sometimes it’s just scribbles, sometimes it’s full-size murals in all the colors of the rainbow: graffiti. Some of the sprayers engaging in this mischief are tempted because it’s forbidden, others do it to gain kudos from their peers. Not everyone is impressed, however. Graffiti causes immense damage to cities, communities and homeowners. Removing the aggressive spray paints is extremely costly, damages the building fabric and can cause the entire property to drop in value. Homeowners can now relax: 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.

Graffiti paints penetrate deeply into building fabric

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 an immaculate natural stone wall.

“In porous masonry, the paint can penetrate down to a depth of about one millimeter,” says Prof. 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
Removal can damage the buildings fabric. 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 euros every year. In the United States, the Department of Justice puts the annual cost at some twelve billion dollars. The cost of removing graffiti and posters in Germany alone is believed to amount to more than 500 million euros.¹

"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

¹ Sources: Haus & Grund, US Department of Justice, markets&markets
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Silicone-based paint barrier

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 Dr. 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.

Successful tests in Burghausen

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 favorite target for graffiti,” says Albert Günthner, 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-square-meter test area was cleaned, Günthner 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”, emphasizes Günthner.
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 exactly 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 consistency of honey and should be diluted with a solvent before use. “Manufacturers of building protection agents can also add pigments to make colored coatings”, says Kreuzpointner. The active-agent content, viscosity and color are infinitely adjustable. Applying the anti-graffiti coating is also a cinch: brush, roller or spray will do. The protective film makes the colors 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.
“The protective film is about 0.2 millimeters thick and can be stretched by up to 160 percent before it tears. This allows cracks and irregularities to be bridged effectively, while the substrate is protected from damage by the paint”, explains building protection expert Ackermann. The extensibility 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 under a scorching sun and 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.
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 to 250 grams of our silicone product per square meter”, explains Kreuzpointner. “The coating is permeable to water vapor and therefore much more breathable than its polyurethane-based counterparts, which are used as permanent anti-graffiti protection as well”, says the WACKER expert.

For building expert Weber, that is the salient point: “Moisture transport must not be hindered, especially in the case of coarse-pored building materials such as sandstone, because otherwise the growth of microorganisms would be promoted or parts of the surface could spall.” A chemist and former WACKER employee, the independent technical assessor has been developing building maintenance concepts for many years. “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”, says Weber. “Proper protective measures can ensure that the value of buildings is enhanced over the long term. That’s why we are increasingly incorporating anti-graffiti protection into our concepts.”

The extent to which cities and communities are afflicted by graffiti varies greatly from region to region, but one thing is for sure: graffiti attacks are on the rise all around the world. “The
Market for anti-graffiti protection growing annually at over six percent

need for effective anti-graffiti protection is increasing," explains Kreuzpointner. According to a US study2 from 2015, the global market for dirt-resistant coatings is worth 2.3 billion US dollars. Experts forecast annual growth of around 6.6 percent through to 2026, when the market will be worth 4.6 billion US dollars. “All major paint makers are currently trying to get to grips with the graffiti problem,” says Kreuzpointner. “That’s why our customers are so interested in our technology.”

With or without anti-graffiti protection, one thing is paramount: unwanted graffiti, posters and other defacements should be removed as quickly as possible. After all, once a building has been defaced, it doesn’t take long for copycats to appear on the scene.

For further information on anti-graffiti technology from WACKER, visit our website at www.wacker.com, call 0800-6279800 (WACKER Infoline) or send an email to info@wacker.com.

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2 Sources: Haus & Grund, US Department of Justice, markets&markets
From Temporary to Permanent – an 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 have to 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 has to 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 vapor. 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. Moisture damage to the building fabric is also possible. This is not the case with WACKER’s new anti-graffiti system. It contains water-vapor-permeable silicones. These virtually eradicate such undesirable side effects.

Walls as Canvas: 5,000 Years of Graffiti

The first known graffiti was inscribed on rocks, statues and tombs in ancient Egypt and can be dated back to 2707 BC. Ever since, graffiti has popped up in different cultures, providing insights into the lives of people during different epochs. Particularly impressive are the greetings, sayings and drawings in the town of Pompeii, which was buried under volcanic ash in 79 AD. Archaeologists discovered more than 5,000 inscriptions during the course of their excavations. The Mayan civilization was not averse to graffiti either, as findings dating to around 100 BC testify. Even the Vikings found time to leave drawings and writings on walls and buildings as they plundered their way around Europe.
In 1915, the future Chinese leader Mao Zedong scribbled 4,000 characters in the toilets of his university in Changsha, criticizing his teachers and Chinese society. This makes him the world-record holder for graffiti with the most number of characters. Graffiti in its modern form emerged in the USA in the 1960s and 1970s, where youths would write their initials, or tags, on the walls. The most prominent of this graffiti generation are Darryl McCray from Philadelphia, who calls himself “Cornbread,” and the Greek messenger boy Dimitaki from New York, known as “TAKI 183.” In the early 1980s, the trend came to Europe. Among the first graffiti artists was Harald Naegeli, who achieved world renown as the “Sprayer of Zurich” in the late 1970s.

The growth in popularity was accompanied by a desire to be more artistic. Whereas initially graffiti was only about marking one’s territory with nicknames, nowadays it comes in all possible forms – from a small smiley to detailed portraits to masterpieces in a riot of color. Probably the best known graffiti image is the Peace symbol, which was created in 1958. Since the turn of the millennium, companies and municipalities have also officially commissioned graffiti. The brightest star on the graffiti artists’ scene is Banksy from the UK. He is active all around the world and famous particularly for his artwork in London and at the separation wall in Jerusalem. The longest piece of graffiti in the world is in Dubai in the United Arab Emirates. It depicts the history of the country over a length of 2,245.4 meters.
With WACKER’s new protective silicone coating a sponge and cold water are enough to remove graffiti. (Photo: Wacker Chemie AG)

Easy-peel: the anti-graffiti coating from chemical company WACKER is so smooth that neither spray paints nor unwelcome stickers can catch a grip. (Photo: Wacker Chemie AG)
Compared to other anti-graffiti coatings, silicones have the great advantage of being breathable. Moisture and, consequently, mold won’t develop in the masonry. (Photo: Wacker Chemie AG)

The anti-graffiti agent has the consistency of honey and is diluted with a solvent before application. The active-ingredient content, viscosity and color can be adjusted. The anti-graffiti coating can be applied by brush, roller or spray. (Photo: Wacker Chemie AG)
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The company in brief:
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and annual sales of around €4.9 billion (2017).
WACKER has a global network of 23 production sites, 21 technical competence
centers and 50 sales offices.

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