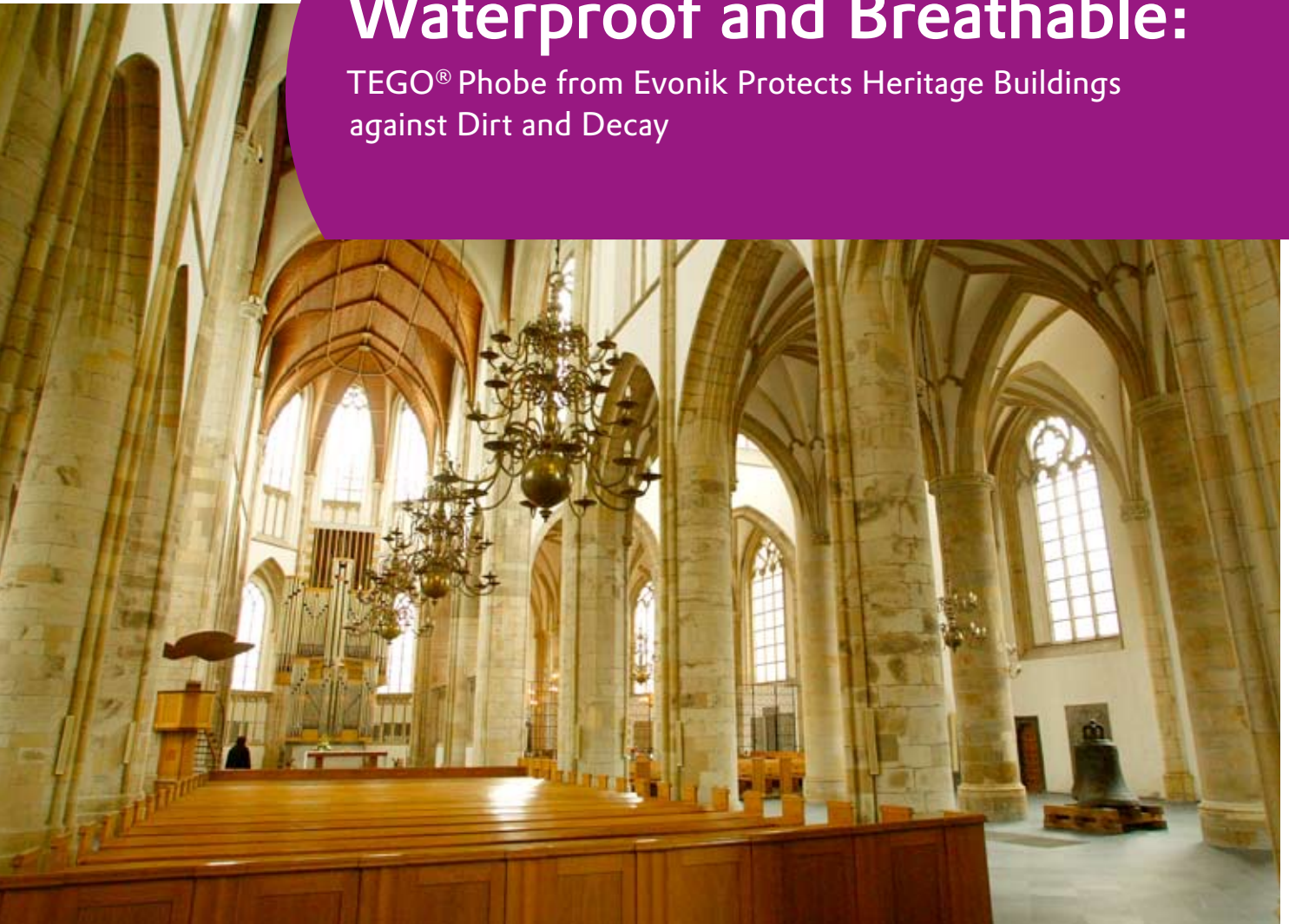


Waterproof and Breathable:

TEGO® Phobe from Evonik Protects Heritage Buildings against Dirt and Decay



The interior of the late Gothic Willibrordi Cathedral in Wesel, Germany, is a picture of perfection. Sunlight streams from dozens of antique glass windows into the basilica, illuminating the altar table and the organ. Mighty columns and arcade arches support the edifice; wooden decks and slate flooring lend a splendid, solemn air. But on leaving the building, it is immediately obvious how time has slowly but inexorably ravaged this Wesel landmark, with algae and lichens covering parts of the basalt base. Dust and dirt from the air have over the centuries discolored some windowsills and cornices to gray or black. But now a product from Evonik's chemistry labs will eradicate the marks of time and also protect the Cathedral over the next few decades.

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In an industrial dishwasher the samples are treated with a water-dirt mixture and then examined for discoloration.

TEGO® Phobe is the name of this product, a special active ingredient for formulations to protect large buildings or small single-family houses against water. Its special feature is that in silicone resin paints and waterproofing formulations the product repels rainwater; it does not, however, seal the stone but allows water vapor to escape from the interior to the exterior. "The principle's the same as for a Gore-tex® jacket," says Jürgen Kirchner, an Evonik engineer. "Drops of rainwater bead off, but the far smaller molecules of water vapor penetrate through the pores of the stone from the interior to the exterior of the basalt." This allows moist masonry to dry without fresh moisture penetrating from the outside. The method sounds simple enough but underlying it is a fund of chemical expertise acquired through years of research, as quickly becomes evident during a tour of Evonik's Essen site where special additives for paints and coatings are developed. TEGO® Phobe is industrially available as a milky emulsion or solution, which is then formulated to the end product, silicone resin paint or impregnation. This is then very simply applied, for example with a roller.

Ten cycles in the soiling machine

A quick round of the laboratory gives an excellent insight into the expertise behind a product like TEGO® Phobe. On this particular day, chemical lab technician Elke Rohlf is daubing formulations based on TEGO® Phobe on a number of stone samples of various materials, each the size of the palm of a hand. New formulations for silicone resin paints and impregnations are developed in serial trials and are compared with competitive products to market standards. Each stone is investigated in detail to determine, for example, how much water it takes up, and how much soiling occurs in the course of time. Using special cameras and computers, Elke Rohlf and her colleagues measure the water repellency of a coated surface.

Individual samples are then treated in an adapted industrial dishwasher, where they are flushed in ten cycles with a mixture of water, tar, and soot. "That's what we call our soiling machine," explains Jürgen Kirchner with a smile. "It allows a quick simulation of how silicone resin paints will stain over a period of several years." This test procedure in the industrial washing machine is an in-house development.



In the measurement of contact angle, special cameras are used to investigate the degree of water repellency of a coated surface.



Preventive protection against algae and lichens

TEGO® Phobe will be used on Willibrordi Cathedral before the year is out, and Prof. Wolfgang Deurer, the cathedral's master builder, is eagerly looking forward to this. He is very well aware of the perils and difficulties of restoring and renovating listed monuments. The Wesel cathedral was severely damaged in the Second World War and then restored over several decades. This work naturally used the old plans and the traditional building materials of the Middle Ages, including the Oberkirchen sandstone used in all the churches of the Lower Rhine. "This stone is indeed very strong," says the master builder, "but unfortunately it rapidly takes up dirt from the air and becomes discolored." The pale sandstone turns gray and black, particularly at ledges and corners. Additionally, algae and lichens can attack the mortar in the interstices and crack it; sooner or later, moisture penetrates into all masonry.

"Construction is a lifelong battle against water," says Prof. Dr. Deurer from experience. Water moves upward from the foundations; piping becomes leaky; the masonry "sweats" in summer; and in winter the water freezes and expands, developing tremendous explosive force. For this reason, he was very interested to hear about TEGO® Phobe. The product not only permanently protects the facade and arrests the discoloration process; formulated with the right auxiliaries, it also prevents the growth of algae and lichens. "This would be an ideal solution for our church," says the master builder, "because frequent cleaning of the facade is simply too expensive."

By the end of this year, the first slabs will already have been treated with a waterproofing agent based on TEGO® Phobe. Using stone samples from Wesel, Kirchner and his colleagues have developed the appropriate formulation in Evonik's labs. After the first slabs have been treated, and if the expected results are obtained, large parts of the facade will be treated in the same way. The master builder is confident of the outcome: "With good waterproofing, we'll have no cleaning expenses for the next ten years at least."