

Sealant Replacement: Get Your Money's Worth

By Scott E. Siegfried

On most buildings, exterior sealants are a critical part of the wall system. Sealant, commonly referred to as caulk, is typically installed between precast concrete or stone panels, at concrete and masonry expansion joints, around window systems, and in a number of other joints on the building façade. The exterior sealants provide a watertight seal between the main façade components and allow the components the space to expand and contract. The sealant is installed in a liquid form and chemically cures into rubber. There are several types of sealant, with silicone and polyurethane being the most commonly used types in building construction. Depending on the size of the building, there can be several thousand to several hundred thousand feet of sealant.

Sealant failure is often a source of water infiltration and can cause widespread problems within the building. Sealant failure occurs when the sealant joint is no longer watertight, which occurs when the sealant material debonds from the substrate (adhesive failure) or the sealant itself starts to break apart (cohesive failure). Rubber breaks down over time, so each type of sealant has an average useful service life and can be expected to fail sometime around the end of that service life. The typical service life of a polyurethane sealant is approximately 7 to 10 years and the typical service life of a silicone sealant is approximately 15 to 20 years.

In many cases the damage caused by water infiltration through deteriorated sealant joints can be avoided. Periodic evaluation of a building façade can help detect sealant deterioration before joints have failed and let water into the building. Building owners should keep accurate records of when their exterior sealants were installed and what the average useful service life of the sealant is. Once the sealant has reached 75 percent of its useful service life, periodic review of the sealants should be conducted. In most cases, the initial evaluation could be done from the ground and the roof. Once the sealants have reached the average useful service life, a more extensive evaluation should be performed, including the use of a swing stage to adequately observe the building sealant joints.

In most cases, façade evaluations are triggered by leaks in the building. When water has entered a

façade that is not designed to weep it out, it does not always show up in the building interior as a leak. Many times the water has to travel through interior components such as insulation, cavities, pipe chases, window jambs, wall board, and finishes before it will be detected on the interior of the building. In the time it takes the water to first enter the building to being detected on the interior, the water can cause damage to many hidden elements. Structural steel and concrete can be deteriorated, insulation can become wet, wall board can be destroyed, and, in many cases, hidden water can create areas that are ideal for mold growth. The cost of repairing these elements can be many times the cost of a sealant replacement project. Additionally, trying to determine the source of the leak once it has been detected in the building is not easy, as the water may have traveled down several floors and over many feet. This means that the source of the leak does not always line up with where the water is detected on the interior.

Sealant replacement is a typical expense for which most building owners must budget, yet in many cases sealant replacement is not treated as an important project. Quality control during the installation process is the best way to ensure that the installed sealants reach or surpass their useful service life. Many owners, in an effort to save money, do not protect themselves by having quality control procedures in place during the sealant replacement project. This often leads to improper sealant installation, which can be a cause of sealant failure and may greatly shorten the life of the sealant. The money saved at the beginning of the project may result in higher repair costs later in the building's life.

The Importance of Quality Assurance

There are several key steps that must be completed during the sealant installation process to allow the sealants to function the way they are designed to. Complete removal of the existing sealant is essential for the installation of a proper sealant joint. Often the new sealant is installed directly over the existing sealant, which can cause a number of problems. A properly functioning sealant joint

is designed to be twice as wide as it is deep with adhesion on two sides. Sealants should be installed in an hourglass shape, which can be accomplished by using a backer rod. By installing the new sealant over the existing sealant, typically it is not possible to achieve the proper sealant depth or shape. There is also a good chance the new sealant will bond to the existing sealant, thereby preventing the sealant from compressing and expanding as designed. This can lead to adhesive and cohesive failures of the sealant.

Another critical factor for sealant installation that is often overlooked is proper preparation and cleaning of the substrates to which the sealant is adhering. All existing sealant, dust, dirt, oil, grease, and other matter that might adversely affect adhesion of the sealant must be removed. A mechanical grinder or wire brush is typically used to clean the substrates. A solvent may be required to clean metal or other non-porous surfaces. Improper cleaning of the substrates will not allow the sealant to bond properly, which can cause adhesive failure of the installed sealant. Test areas of the sealant should be installed prior to beginning the sealant replacement project. The manufacturer of the sealant should perform adhesion tests to ensure an adequate bond can be achieved. Once the tests are complete, the manufacturer should provide preparation methods for the different substrates on the building.

Many manufacturers provide warranties for the sealants. Warranties for polyurethane sealants can range up to 10 years and warranties for silicones can range up to 20 years. Warranties can be written to cover either the material or the material and labor needed to replace them. The owner should be familiar with the available sealants and associated warranties prior to selecting a sealant for the building.

Typically, manufacturers require that a pre-qualified contractor install the sealants to receive a labor and materials warranty. Contractor selection is a very important part of the sealant replacement project. Often owners will not adequately check the credentials of the contractor they have selected for their project. The contractor should have completed several projects similar to the owner's project and should be able to provide references for those projects. The contractor should also be pre-qualified by the major sealant manufacturers. Having a contractor with the necessary knowledge of sealants and skills to properly install joints can save the owner from having problems during the project and should help avoid premature sealant failure.

Another common problem is that many times the contractor is selected without the use of technical specifications. Detailed specifications allow the owner and contractor to agree on the process and scope of work for removing the existing sealant and installing the new sealants prior to agreeing on the cost of the project. The specifications provide the



Control joint improperly installed with new sealant applied over old sealant. Note how new sealant can be pulled off old sealant



Adhesion failure of sealant on masonry joint. Improper preparation and lack of primer can cause debonding



Improper adhesion of sealant on window due to poorly formed joint. Bonding area on metal is insufficient to provide adequate sealant bond

baseline or standard to which the work will be compared and should help reduce the need for changed orders throughout the work. The owners can also use the specifications to get competitive bids from several qualified contractors, which gives owners the best available price for the work. Many times owners will hire a contractor based on a simple description of the work provided by the contractor. This can cause confusion when issues arise that were not discussed before the project began and often times lead to changed orders or work that does not meet the owner's expectations.

There are many issues that an owner should consider when dealing with the sealants on the façade of their building. Early detection of a deteriorated sealant joint can save the owner money and avoid unnecessary repairs to interior elements. Checking a contractor's credentials and using specifications to bid the project are proven practices which can provide quality assurance during the replacement project. The time and money spent prior to beginning the sealant replacement project can help the owner get the most out of their sealant replacement project and avoid having to replace prematurely failed sealant joints in the future. The

sealants on the façade of the building are critical to the waterproof capabilities of the façade, and should be treated as such.

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Scott E. Siegfried is a Project Engineer with Facility Engineering Associates, PC. A graduate of the Pennsylvania State University's five-year program in Architectural Engineering, Siegfried has over 3 years of experience in repair and restoration consulting and has been a Project Engineer on over 20 projects with Facility Engineering Associates, PC. He has been involved in the field investigation, testing, evaluation, preparation of construction documents, bidding, and construction administration of renovation projects. Siegfried's specialty is building exterior systems. He has worked on a wide variety of projects in Maryland, Virginia, and Washington, D.C.