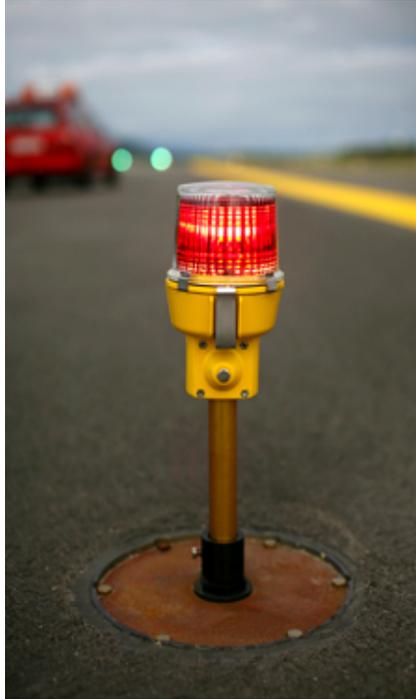


Long-term success of electrical equipment installed at airports depends on corrosion prevention knowledge and defense of the original product specifications.



Contributions from general aviation to the U.S. economy supports 1.1 million total jobs and \$219 billion in total economic output in the United States. These numbers include direct, indirect, induced, and enabled impacts.¹ According to SourceAV Jobs, the United States possesses the largest and most extensive aviation system in the world, with more than 18,000 airports serving more than 30 million passengers annually.

As such, it is critical to protect the overall airport system to keep the structure operating at full capacity day in and day out. Unfortunately, this is not an easy task, especially when many airports struggle to overcome the corrosive environment that exists due to harsh weather conditions—such as the rain, sleet, and snow plaguing airports during the year.



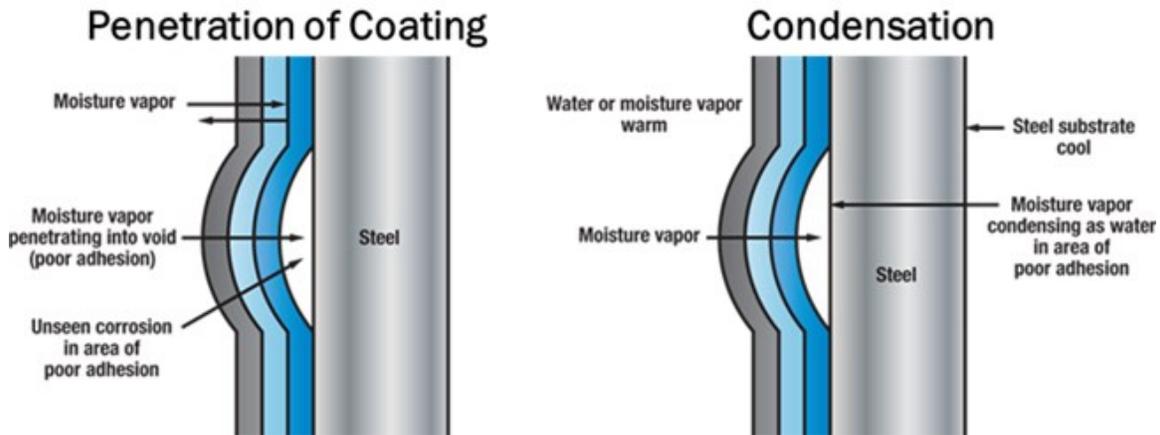
There are many electrical components within the airport system that are often impacted by corrosion. A few of these electrical components can be found throughout the airport on places such as runway lighting, vehicle fueling stations, fuel storage systems, deicing areas and parking garages.²

All chosen materials for the conduit should be able to withstand exposure to corrosive elements as well as exposure to chemical properties. Protective coatings prevent the chemical action of corrosion by blocking electrolytes from the anode, cathode, and metallic path, which are often on the same piece of material. In severely corrosive environments, galvanized steel is often coated with an additional paint or polymer coating, such as PVC, for even stronger corrosion protection. However, it is important to choose a superior coated product as many coatings fail in the field due to poor adhesion to the metal.



Photo Caption: The PVC coating has blistered due to poor adhesion of the coating to the substrate.

For PVC coatings to properly adhere to a galvanized zinc surface, proper preparation of the surface is a must. Sherwin Williams states that approximately 80 to 90 percent of premature coating failures are caused by improper or inadequate surface cleaning and preparation.⁵ As seen in the figure below, without proper coating adhesion, often times, the corrosive elements become trapped underneath the coating and are held up against the substrate, accelerating the rate of corrosion.



Corrosion engineers have recognized the significance of coating adhesion for years, but it was not documented in conduit performance standards until 2006. In 2006, an independent third party, Intertek ETL SEMKO, was engaged to develop a specification for a regulated and quantitative test protocol to confirm adhesion performance. Choosing products that meet performance standards of a third party independent testing organization, such as Intertek and have a documented listing such as ETL PVC-001, is the best line of defense for ensuring product performance.

Tested and proven products have undergone proper manufacturing processes that make them a reliable choice for corrosion protection and long-term performance in highly corrosive environments like those in airport operations.

Having a corrosion preventative strategy plan in place is critical to facility longevity and safety

San Francisco International Airport (SFO) maintenance team regularly faces the impact of corrosion on electrical products throughout the airport, especially conduit. To assist maintenance, the SFO engineering design team decided to look into additional testing factors performed on conduits such as ETL-Verified PVC-001 PVC coated conduit.

Although corrosion to conduit has many factors, a specific environment at SFO that tends to accelerate the effects of corrosion is the airport's proximity to San Francisco Bay. The San Francisco Bay contains the combination of saltwater, salt air and high moisture.

Due to the close proximity of the San Francisco Bay many underground structures such as vaults and conduits are exposed to those factors. The saltwater seepage along with the salt air and high moisture can be difficult to mitigate and exposure to it can potentially reduced the performance of those infrastructure in the long term.

Due to this corrosive environment at the SFO Airport, engineering made the decision to try the PVC coated galvanized rigid conduit. In the process an engineer from SFO attended Corrosion College to become more familiar with the ETL testing procedure and get further information on corrosion in conduits.

Corrosion College is a two-day intensive course that provides well-rounded, hands-on experience in understanding and combating the process of corrosion. The comprehensive curriculum includes case studies, laboratory workshops and interactive presentations demonstrating the details of proper installation and use of anti-corrosion products. The hands-on, intensive structure of the course, taught by experienced industry professionals, is highly effective at providing a thorough knowledge of corrosion protection.

During the course, attendees learn about ETL testing, ETL Verification and how ETL is based on actual product performance as a predictor of reliable service life. Hence, all manufacturers that carry the ETL Verified PVC-001 mark have documented proof the product will perform in a corrosive environment over an extended period of time.

Incorporating a corrosion prevention strategy and implementing a specification based on performance ensures that products will perform as intended in a harsh environment thus contributing to facility longevity and safety.

Why is adhering to the original written specification necessary?

While proper material selection is one important component of a solid corrosion protection program, we have discovered another critical area that can also contribute to airport components failing from the

effects of corrosion---a substitution in the product specified during the installation.

Most of the time, those who are involved in electrical projects, including owners, end users, specifiers, distributors, and contractors; always begin with the best intentions for the long-term success of the project. Yet, most encounter obstacles. Changes, increased costs, logistical variables, or other obstacles contribute to delays—often causing the actual specification to become a secondary consideration to be addressed later in the life cycle.

This is unfortunate, because too often it becomes easy to stray from the original plan, resulting in an increased risk of product failures, liabilities, and unnecessary future costs. Adhering to the original written specification is in the owner's best interest for the long-term success of the installed solution.

Substitutions are often made without the privilege of knowing the important reasons a product was specified in the first place. Thus, it is imperative to allow those that were involved in the specification process to choose products based on their benefit as well as those of the owner. Otherwise, what seems like a simple adjustment leads to greater future challenges.

At the time specifications are written, the owner and specifier should collectively understand the most important reasons behind each decision because the cost-efficiency of the project and long-term intentions hinges on these initial decisions. This is the first step to ensure that original specifications are followed.

Specifiers spend significant time researching the best options for each component of an entire electrical system and make decisions based on their extensive knowledge of what works for certain applications and what tends to fail over time. The specifiers are best suited to inform others of the reasons why chosen products are essential to the success of a project.

We encourage anyone that specifies electrical products for airports to become as knowledgeable, as possible, about corrosion. Contact

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To learn more about Corrosion College: www.corrosioncollege.com

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