EPOX-Z™

High Performance Coatings

EPOX-Z ZEROVOCs™

EPOX-Z IC™
High Performance Industrial Coatings

WhitePaper

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High Performance Coatings

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Industrial coatings are designed to provide protective and aesthetic properties to diverse materials with the most common use being for corrosion control of steel and concrete. Coatings must meet critical, protective and aesthetic needs in some of the most severe environments, including the power generation, gas transmission, marine and wastewater treatment industries. The polymer most relied upon for this use is epoxies.

The term "epoxy" refers to a chemical group consisting of an oxygen atom bonded with at least two carbon atoms already united in some other way. It may also be known as epoxide or oxirane or you may see them referred to by their chemical names such as Ethylene oxide (epoxy ethane), Trimethylene oxide (oxetane), Tetrahydrofuran, Cyclohexene oxide, Epichlorohydrin, Glycidic acid, and Glycidol.

Corrosion Costs

The World Corrosion Organization, a United Nations NGO, stated in 2010 that over 3.1% of the World's Gross Domestic Product or 2.2 Trillion USD is the cost of corrosion to the World's economy. It further revealed that, although corrosion management has improved over the past several decades, the industrialized nations of the world must find more and better ways to encourage, support, and implement optimal corrosion control practices.

This study found the most commonly used method for corrosion protection was organic protective coatings.

The U.S. continues to face critical challenges in the field of corrosion prevention and control, where aging equipment, new product formulations, environmental requirements, and strict budgets require corrosion control programs that are designed for specific situations

Why Coatings Fail

Protective coating systems "are most commonly applied without incident, and perform as expected over their anticipated service life. However, occasionally, a coating system will fail prematurely, for unexpected reasons, and with expensive consequences."

In a paper titled "Causes of Coating Failures," **Kenneth B. Tator, P.E.** of **KTA-Tator, Inc.,** categorizes the technical reasons for such coating failures, and discusses ways to prevent those failures.

"After the coating work has been properly completed, the coated surface is subjected to environmental exposure. If all other factors have been done correctly, including the selection of the proper coating material and its surface preparation, application, curing, shipping and handling, and erection, premature failure still may occur.

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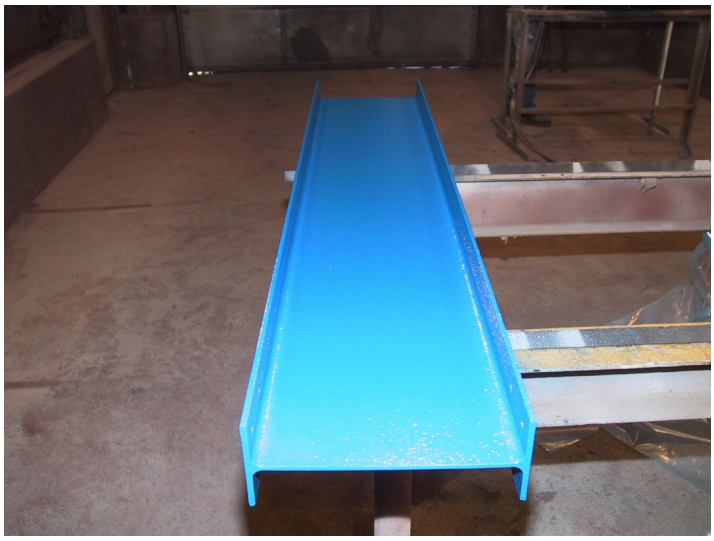

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Some of the reasons for such failures are listed below:

- Exposure to excessive moisture (such as ponding water), or temperatures (hot and cold) than anticipated.
- Exposure to different or more concentrated chemicals than anticipated.
- Exposure to abrasion, impact or mechanical damage.
- Combinations of the above.

Such unanticipated exposure conditions may stress the coating system beyond its ability to perform in a given environment. If these exposure excursions are transient, and occur unknowingly, it may be very difficult to trace the cause of the coating failure. Even if exposure excursions are known by the owner, records may be hard to find, or alternately, may not be available to the coating failure investigator. Unless there is physical evidence of coating degradation that may be traced to an exposure excursion (such as high heat, chemical attack or physical damage), the cause of failure may be difficult to discern…."

*"**Internal Stress-coating drying and curing:*** Internal coating stresses build up during drying, curing and upon aging. Curing stresses are caused by solvent (or water, if a water-based coating) evaporation causing a volume loss, and cross-linking resin polymerization, which shrinks the coating film. Drying of a coating (unless it is 100% solids with no volatile solvents or materials) results in a volume decrease as the water or solvent evaporates into the atmosphere. As the coating initially gels, but remains soft after initial drying, stress is minimal because the resin is still deformable. However, as the coating dries further, and commences to cross-link, stress increases as the resin becomes harder and less deformable. Low molecular weight plasticizers added to keep the resin soft and relatively flexible may in time volatilize causing embrittlement, and stress. Thick, highly cross-linked resins (such as polyester and vinyl ester resins) have greater stresses than less cross-linked resins, or thinner coating systems. Over time, cross-linking and solvent evaporation and plasticizer migration and volatilization continues, further embrittling and stressing the coating film.

In extreme cases, disbonding and/or cracking and splitting of the coating may occur, usually initiated at stress points such as edges or damage to the coating. Internal stresses can be relieved by proper pigmentation, and pigment distribution throughout the coating film. Good cleaning and surface profiles can also help to mitigate that effect of the stresses on the adhesion of the system. When applying additional coats to an existing system, if the old coating has insufficient adhesion, stresses from the new coating will disbond the existing material."

EPOX-Z Features and Benefits

EPOX-Z Corporation is a manufacturer of epoxy-based coatings that are used for surface protection in a range of markets including roof restoration, marine, power generation, gas transmission, and wastewater treatment facilities. Since its commencement, EPOX-Z has created a niche in the protective coatings market by developing unique and technologically superior products. Driven by the need to protect industrial structures as well as the environment, the company has developed a unique, solventless coating solution that offers superior performance without any environmental hazards. EPOX-Z's 100 percent solids, solvent-free epoxy coating has exceptional surface tolerance and provides a high level of resistance to chemicals and moisture.

Differentiation

EPOX-Z coatings are based upon a completely unique polymer chemistry. The proprietary polymer utilized in our coating systems improves the environmental impact of the coating and thus eliminates the inclusion of toxic solvents. Furthermore, the revolutionary and proprietary curing agents used in the coating enable it to outperform other coatings available in the market.

Most of the coatings available in the market are part of a multi-coat system that consists of a primer coat, an intermediate coat, and a topcoat. EPOX-Z's coatings are applied in a single coat, which significantly reduces the total quantity of coating material needed to accomplish a particular project. The efficiency of the coatings results in significant cost savings for end users.

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What does "*100% Solid*" Mean?

100% Solids does not mean that the material is a single solid piece. In the coatings industry, it refers to a liquid material that will change to a solid state without losing its mass.

What does "*Solvent Free*" mean?

The majority of traditional epoxy coatings use water or VOC-(Volatile Organic Compounds) laden solvents as the vehicle to keep the coating in a liquid state so it can be transferred from the container to the surface. VOCs are harmful to the environment and are also detrimental to the coating system performance.

The drying process of these traditional coatings relies on solvent or water evaporation. A coating inadvertently applied too thickly may not be able to allow the solvents to fully evaporate out of the coating leading to solvent entrapment. This can result in blisters, voids, pinholes, or soft spots in the coating. EPOX-Z High Performance Coatings eliminate the solvent risks.

In additional, EPOX-Z High Performance Coatings deliver better edge retention than solvent based coatings. As EPOX-Z High Performance Coating's cure, they do not shrink like solvent-based coatings or pull away from surface edges, thus significantly increasing surface protection.

EPOX-Z products containNO solvents and **ZEROVOCs**

Is there an odor during application?

All coatings give off an odor during application. For the most part this odor comes from the evaporating solvents. This is eliminated with EPOX-Z High Performance Coatings. Only a very low level of "epoxy" smell might be detected during the application. This odor disappears very quickly, unlike conventional materials that may "smell bad" for hours or even days.

What surfaces can I apply EPOX-Z High Performance Coatings to?

EPOX-Z High Performance Coatings have excellent adhesion to a variety of surfaces. When applied over blasted steel, typical values exceed 2,000 psi. Even on rusted steel with a hand tool cleaning, pull off values exceeded 1,000 psi. Adhesion to concrete is excellent, with all pull off failures being in the concrete and generally exceeding 600 to 700 psi.

EPOX-Z coatings have been applied to metal, pressure treated lumber, fiberglass, drywall, wood and CMU with excellent results and no known adhesion failures.

Once applied, how long will it take to dry?

One of the past difficulties with solvent free epoxies was managing the cure times. Research with a new epoxy resin has made it possible for EPOX-Z to provide a one hour pot life, is dry to the touch in 4 hours and cures overnight without forced heat.

How thick are EPOX-Z High Performance Coatings?

The EPOX-Z High Performance Coatings can be applied as thin as 4 mils in a single coat, or built up to 65 mils.

Will EPOX-Z High Performance Coatings "curl"?

An outstanding feature of EPOX-Z High Performance Coating is its low surface tension. It is well-known that the damaged edge of an existing coating will curl after being top-coated. When applied to a surface where the existing coating film was not completely removed, EPOX-Z will creep under the exposed edges of the previous film because of its "flow" properties. EPOX-Z High Performance Coatings—unlike the more commonly used solid resins cut in solvent—have excellent penetrating properties & flow until they are truly "chemically" cured, as opposed to partially cured through solvent evaporation alone. Combined with the lack of shrinkage, this "gluing down" will circumvent the curling effect.