FLAME GUARD USA'S X-TINGUISH®XT-3000 AEROSOL GENERATOR PUT TO THE CORROSION TEST

Wind Turbine Generators (turbines) experience failures that may lead to small contained fires and, at times, devastating large fires that render the turbine a total loss. Causes such as loose glowing electrical connections, short circuits, arcing and component failures can cause direct and secondary damage throughout the equipment. Secondary damage, also known corrosion, is caused by residual chemicals after a combustion event. When measured in remediation cost, secondary damage can be 10-15 times more severe than direct damage.

Flame Guard USA, an industry leader in aerosol fire suppression systems, released the X-Tinguish® XT-3000, a fixed condensed aerosol generator that is used in early stage and fully developed fires. Once the X-Tinguish®XT-3000 generator is triggered, an aerosol mist is generated. The mist expands volumetrically, engulfing the space and suppressing the flames within seconds. This tool successfully reduces the temperature by as much as 1,000°F in as little as 30 seconds, reducing the need for water by as much as 80 percent in applicable environments.

Flame Guard USA X-Tinguish® XT-3000 installed in a turbine

In an effort to quantify what, if any, adverse effects the aerosol mist may have on various metals and electronic circuitry, Flame Guard USA partnered with AREPA, a professional equipment reconditioning firm, to conduct an experiment.

THE EXPERIMENT

Turbines contain metals such as copper, aluminum, stainless steel, galvanized steel, as well as both non-conformal coated and coated circuit boards.

In an effort to simulate extreme field conditions, AREPA secured the noted metals and electronic circuitry, exposed them to the X-Tinguish® XT-3000 aerosol mist and placed them in a chamber with elevated moisture and heat.

AREPA harvested analytical samples on the exposed components after seven days, 14 days and 30 days in order to properly understand the chemical reaction that was taking place on the sampled surfaces.

THE RESULTS

AREPA determined that nitrates (NO3-), magnesium (Mg++) and potassium (K+) were the ions present following the aerosol mist exposure. As noted in the tables below, prolonged exposure did affect a portion of the tested surfaces, although not in a uniform way. Following seven days of exposure, all the contaminated surfaces were restored back to their newly manufactured cleanliness levels. Following 14 days, stainless steel and galvanized steel exhibited surface haziness while copper developed black patina (corrosion). Technical reconditioning successfully removed the hazing and the black patina. The circuit boards were not impacted. Following 30 days of exposure, the metals did not exhibit a significant difference from the 14-day mark. AREPA's technical reconditioning processes were successful once again at restoring the metals back to their new cleanliness levels.

Day 7 Following Exposure	Observations
Aluminum	No corrosion observed. Technical reconditioning successful.
Stainless Steel	No corrosion observed. Technical reconditioning successful.
Galvanized Steel	No corrosion observed. Technical reconditioning successful.
Copper	No corrosion observed. Technical reconditioning successful.
Conformal Coated Circuit Board	No corrosion observed. Technical reconditioning successful.
Non-Conformal Coated Circuit Board	No corrosion observed. Technical reconditioning successful.

Day 14 Following Exposure	Observations
Aluminum	Hazing on surface pre and post decontamination.
Stainless Steel	Pre decontamination haziness. Technical reconditioning successful.
Galvanized Steel	Pre decontamination haziness and discoloration. Technical reconditioning successful.
Copper	Pre decontamination black patina noted. Technical reconditioning successful.
Conformal Coated Circuit Board	No corrosion observed. Technical reconditioning successful.
Non-Conformal Coated Circuit Board	No corrosion observed. Technical reconditioning successful.

Day 30 Following Exposure	Observations
Aluminum	Hazing on surface pre and post decontamination.
Stainless Steel	Pre decontamination haziness. Technical reconditioning successful.
Galvanized Steel	Pre decontamination haziness. Technical reconditioning successful.
Copper	Pre decontamination black patina noted. Technical reconditioning removed the patina.
Conformal Coated Circuit Board	No corrosion observed. Technical reconditioning successful.
Non-Conformal Coated Circuit Board	No corrosion observed. Technical reconditioning successful.

AREPA's technical reconditioning process guarantees that post decontamination, the equipment exposed to Flame Guard USA's X-Tinguish® Aerosol will meet the original equipment manufacturers (OEM) design cleanliness specification. If the OEM does not have their own design cleanliness specification, AREPA will adhere to the most stringent industry standard for semiconductor cleanliness – the IPC standard.

About AREPA

AREPA is an innovative leader in the equipment restoration industry, providing comprehensive recovery solutions for their global clients. AREPA specializes in highly technical equipment decontamination solutions, as well as preventive reconditioning in industries such as energy, marine, IT/telecom, healthcare and manufacturing. AREPA has offices in Denmark, The Netherlands, Sweden, Canada and the United States.

About Flame Guard USA

Flame Guard USA manufactures and distributes X-Tinguish® brand Condensed Aerosol Fire Suppression Technology Worldwide as well as our own brand of fire suppression control panels, I-FIRE™.

X-Tinguish® Aerosol is currently installed in every major industrial and commercial market. X-Tinguish® Condensed aerosol suppression systems are an innovative and green way to suppress fires. Their aerosol was developed as a Halon replacement, providing a greater margin of safety and sustainability in today's market. They are US EPA SNAP listed. Their systems are simple to install and require no piping. They have Zero Ozone Depletion Potential (ODP) and Zero Global Warming Potential (GWP) and are not pressurized and are non-toxic, non-conductive and non-corrosive.

Flame Guard USA, LLC is an ISO 9001-2015

Quality is an integral part of Flame Guard USA's Corporate Business Principles. These principles guide their actions to deliver products and services that are safe, compliant and preferred. They are essential for the achievement of their ambition to be recognized and trusted to offer products and services that enhance the quality of life and contribute to a healthier future. At Flame Guard USA, their commitment is to never compromise on the safety, compliance and quality of their products and services. This requires everybody to be engaged, to understand their responsibility and to be empowered to act in order to protect individuals and families, their customers and their brands.