



INDUSTRIAL HAZARDS & LED LIGHTING:

7 Environmental Factors that can Destroy Your Lights

There's a reason the phrase "industrial-grade" has become synonymous with resiliency, toughness and ability to withstand relentless use and abuse.

Industrial work sites are some of the most unforgiving environments on the planet. The harsh conditions require heavy duty solutions—from the equipment and tools used to maintain production machinery to the clothing and protective gear that keeps employees safe. You need heavy-duty products that will last and help you save time, hassle and money replacing those that just aren't up to snuff. This is a safety issue as well—industrial-grade products are much more resistant to the unexpected failures, which can put workers and production at risk.

Specifying industrial-grade products is a no-brainer when it comes to production equipment and maintenance needs. But many facilities overlook one of the most commonly used and perhaps most important safety products in the whole facility: THE LIGHTING SYSTEM.

Recently, a growing number of companies have transitioned to LED lighting for its outstanding quality of light and long-life, maintenance-free performance compared to conventional luminaires like High-Pressure Sodium and Metal Halide. But, settling for cheap, lighter duty LED fixtures can essentially eliminate all those purported benefits.

Not only can subpar lighting create a costly, time-consuming maintenance headache as companies are forced to continuously change out failed LED fixtures, but these failures can also be a serious safety risk for employees. For example, OSHA has identified poor lighting as a leading cause of injuries caused by slips, trips, falls and contact with objects and equipment.

Over the past decade alone, these types of accidents have cost industrial workplaces billions of dollars in medical and worker compensation expenses. Worse yet, thousands of these accidents have resulted in loss of life, which could have been prevented through better lighting.

Strategies banking on saving money by installing inexpensive, off-the-shelf fixtures end up costing significantly more in the long run. Of course, companies don't intentionally put their employees at risk with cheap lighting. Many simply don't realize just how much damage their environment can do to the electronic components of low cost LED lighting fixtures—or that there are industrial-grade solutions built for better reliability.

Here, we'll take a look at some of the biggest environmental culprits that could destroy your LED fixtures, and we'll offer suggestions for safer, more dependable options.



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The Culprit: **DUST**

Dust is a pervasive problem in nearly every facility. Open doors and the continuous movement of everything from people to forklifts throughout the facility—creates fine particulates that waft into the air and come to land on every flat surface. This is made much worse in facilities where raw materials add to the problem, such as paint pigments, carbon, grains, fibers, etc.

As this material accumulates on LED lighting fixtures, it creates an insulating blanket that blocks heat from escaping. Sustained high heat even as little as 10 degrees above a fixture's published operating temperature range can cut the service life of the fixture in half in many cases.

Cheap LED fixtures are designed to minimize purchase price by reducing LED counts. Part of this common design practice of reducing LED counts is to drive these lower quality LEDs with a high current in order to meet lumen output requirements. This leaves little head room for the excess ambient temperatures expected within industrial spaces. Standard Industry performance testing such as LM-79 and TM-21 life prediction does not require accounting for environmental factors, meaning end users are left blind and cannot predict how site conditions will affect published performance values. In the end, low cost lighting may not meet published performance metrics, and will fail faster, requiring frequent replacement in industrial spaces. The facility can be left with the same problem it started out with: poor lighting putting employees at serious risk.

The Solution:

Source industrial-grade LED fixtures designed to shed dust and debris to prevent buildup of foreign material. Those that are IP66 or IP67 rated for water resistance can even be washed down periodically to mitigate dust accumulation. Prioritize safety by choosing LED fixtures that feature robust heat sink technology, heat-resistant components, and ambient temperature ratings higher than 60°C, which can keep their cool even under a blanket of dust.



The Culprit: **CHEMICAL VAPORS & VOLATILE ORGANIC COMPOUNDS**

The presence of chemical vapors and volatile organic compounds certainly isn't limited to chemical or petroleum facilities. A wide variety of solvents, process oils and other materials that produce mist or vapors are common across nearly every manufacturing sector.

These materials can have a devastating effect on lighting and facility safety in two ways:

1. They can be highly volatile and prone to explosion or ignition in the presence of high heat or electric spark. LED fixtures which are not certified for use in the applicable hazardous locations associated with high amounts of certain VOCs can contribute to an unsafe situation.
2. VOCs can cause chemical degradation of the LEDs and other electronic components, resulting in color shifting or lumen depreciation. That means the crisp, white light that once clearly illuminated the work area will soon dim or turn to a dull yellow, which eliminates one of the key value propositions of LED lighting: the near daylight color quality and visual acuity of the system.

The Solution:

Invest in industrial-grade LED fixtures which are hazardous certified as necessary, and IP sealed to prevent moisture and dust from entering the fixture. This offers the best defense to protect critical internal fixture components from corrosion or LED discoloration. Also, be sure that the fixtures you choose feature high-quality chemical-resistant polycarbonate or glass lenses to resist discoloration. This will ensure your investment in LED lighting will provide the safest, longest-lasting quality light source for the facility.



The Culprit: **HIGH HEAT**

Aside from high temperatures as a result of seasonal or geographic climate, there are many types of heat sources inside any industrial facility. From process equipment and heavy-duty motors to molten raw materials, it's a pressure cooker inside many facilities.

Off-the-shelf or commercial LED fixtures are simply not designed or manufactured to withstand these kinds of conditions. Lacking proper thermal management and heat-resistant components, high heat will quite literally fry the electrical components, resulting in premature failure or the risk of a potentially unsafe drop in lighting output that plunges the work area into darkness.

The Solution:

Look for industrial LED fixtures rated for ambient temperatures above 60°C which indicates their ability to perform in high temperature conditions. These heat-resistant fixtures typically include power supplies that are purpose-built to perform under extreme conditions, along with advanced mechanical designs with optimal thermal dissipation. The most durable industrial LED fixtures will have also undergone an Accelerated Life Test prior to hitting the market, and will be backed by a warranty which demonstrates their ability to withstand the harsh conditions of real-world industrial use.



The Culprit: **MOISTURE & CORROSION**

Moisture is a constant problem in virtually every facility causing corrosion and degradation of metal structures. Add to that any kind of caustic or corrosive contaminants and you have a recipe for disaster when it comes to lighting fixtures.

Salt spray is one of the biggest culprits. Many industrial facilities are located along coastal areas for easy access to shipping facilities for raw and finished material transportation. These coastal and marine applications are subject to highly corrosive conditions that can literally eat away at fixture components and hardware, compromising the integrity of the fixture itself as well as its secure mounting. That means not only is the fixture at risk of frequent failure, but also falling and hurting someone or damaging equipment.

The Solution:

Choose fixtures with proven resistance to moisture and corrosion that feature a sealed chassis to protect critical components from failure. Those with a dual (double-layer) powder-coat finish and corrosion-resistant stainless-steel hardware will offer the most durability to ensure long-life function and safety of the fixture even in the harshest coastal or offshore applications. As added protection, always utilize secondary retention cables where possible.



The Culprit: **VIBRATION**

Constant vibration of non-stop heavy machinery can literally shake lighting fixtures apart. Not to mention, even the slightest direct impact from moving equipment can also easily destroy a fixture, requiring immediate replacement. Conventional HID sources are especially vulnerable due to the inherent design of the lamps which can be easily and adversely affected by vibration and impact, causing premature failure.

But even some LED fixtures, with their solid-state design can suffer the same fate if they aren't designed to withstand these conditions. The drivers, power connections and even the fixture housing itself can quickly fall apart under constant vibration. Dampeners at the mounting can help to some degree, but there's still only so much a thin piece of rubber can do under extreme conditions.

The Solution:

Insist on heavy-duty, industrial-grade LED fixtures that are tested to withstand high-vibration environments and include built-in shock resistance. Long-life potted drivers and rugged, proven mechanical designs can protect against damage from vibration and shock-related failures.



The Culprit: **FLAMMABLE OR EXPLOSIVE ENVIRONMENTS**

When it comes to facility safety, this is the biggest lighting-related risk of all. The volatile combination of explosive gases, dust or fibers in the air, combined with the potential for ignition from an arc or spark from a malfunctioning light—or even just the high heat output from most fixtures—can have dire consequences.

Environments where flammable or volatile airborne matter may be present are classified as hazardous locations using a system that varies slightly by region or country: UL in the US, CSA in Canada, IECEx/ATEX in Europe and other parts of the world. The hazardous classifications address the presence of these materials, including the type and likelihood that the flammable conditions will exist.

Quite simply, failing to install the proper hazardous location-certified products for your facility is extremely dangerous and puts your employees at serious risk. Lighting in hazardous locations must adhere to the UL/CSA/IECEx/ATEX standards by law, as dictated by local jurisdictions.

The Solution:

Anywhere that flammable or explosive materials are present, install only hazardous location classified industrial-grade lighting fixtures. Not every LED lighting manufacturer offers products for these conditions, and only certified products are compliant. These standards require luminaires to contain penetration-resistant seals and other components to prevent and/or contain explosions depending on the nature and severity of the classified location. You'll want to choose an experienced provider that's well-versed in hazloc compliance in order to avoid this serious safety risk.





The Culprit: **UNPREDICTABLE POWER CONDITIONS**

If you're not familiar with the term "dirty power," you should be! It's likely taking a major toll on your lighting system. Despite the best efforts of seasoned electrical professionals, industrial environments are notorious for unstable power conditions—surges and sags caused by heavy equipment startup and shutdown, along with other conditions that cause power to fluctuate.

This unpredictability can wreak havoc, overstressing LED power supplies that are simply not built for these "dirty power" conditions. The constant voltage fluctuation will cause excess heat, eventually frying the internal circuitry and causing unexpected and premature fixture failure.

The Solution:

Look for industrial-grade LED fixtures with high-quality power supplies and built-in surge protection components to mitigate the impact of unstable power. While it's impossible to eliminate power fluctuations, installing LED fixtures that can withstand the conditions will safeguard against premature failure, ensuring you get the longest possible maintenance-free performance from your investment.

DIALIGHT: *Your Harsh & Hazardous Environment Lighting Partner*

You depend on your lighting every day to illuminate your facility and keep your employees safe. Choosing inexpensive, subpar LED lighting fixtures may seem like a money saving opportunity today, but it will only lead to more maintenance and safety risks that cost more down the road—exactly the opposite of the benefits that likely prompted you to switch to LED lighting technology in the first place.

Dialight is the world leader in industrial LED lighting with millions of fixtures installed worldwide in some of the most unforgiving environments on the planet. Our fixtures undergo extensive and rigorous testing that far exceeds the industry standard, including:

- *Optical testing through our NVLAP certified in-house optics lab featuring the latest cutting edge equipment*
- *In-house Salt spray testing at 10X the industry standard*
- *Shock and vibration testing to Lloyd's standard or IEC 60068*
- *Accelerated life testing that simulates lifetime exposure to excessive heat and fluctuating power conditions in environmental chambers located in our facilities*
- *In-house expertise on hazardous-location certifications covering every class, division and zone in the industry.*

Our vast expertise and long legacy in providing the highest quality, most reliable and durable industrial LED fixtures on the market ensures maximum protection for both the safety of your employees and your lighting investment. Dialight fixtures are designed and built to withstand the rigors of heavy industrial use, and we back that promise with our industry leading 10 year warranty on most models.

When you need safe, reliable lighting you can count on, you need Dialight.

Ask us how to choose the right fixtures to meet your needs and specific applications.

HAZARDOUS LOCATIONS RATINGS

Fixed and portable fixtures for installation and use in hazardous (classified) locations Class I, Divisions 1 and 2, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class II, Division 2, Groups F and G; and Class III, Divisions 1 and 2, in accordance with the National Electrical Code, NFPA 70

Classes

The classes define the general nature of hazardous material in the surrounding atmosphere.

Class	Hazardous Material in Surrounding Atmosphere
Class I	Hazardous due to the presence of flammable gases or vapors in the air in quantities to produce explosive or ignitable mixtures
Class II	Hazardous due to the presence of combustible and/or conductive dusts
Class III	Hazardous due to the presence of easily ignitable fibers and flyings, such as wood chips, cotton, flax and nylon. Group classifications are not applied to this class

Divisions

The division defines the likelihood of hazardous substances being present in ignitable concentrations in the surrounding atmosphere.

Division	Presence of Hazardous Material
Division 1	The hazard exists during normal operating conditions
Division 2	The hazard is present only due to accidental system breakdowns or abnormal operations

Groups

The group(s) are determined by the specific hazardous materials which may be present.

Group	Hazardous Material in Surrounding Atmosphere
Class I Groups	
Group A	Acetylene
Group B	Hydrogen, fuel and combustible process gases containing more than 30% hydrogen by volume or gases of equivalent hazard such as butadiene, ethylene oxide, propylene oxide and acrolein
Group C	Carbon monoxide, methyl ether, hydrogen sulfide, methylacetylene, cyclopropane, ethyl and ethylene or gases of equivalent hazard
Group D	Gasoline, acetone, ammonia, benzene, butane, cyclopropane, ethanol, hexane, methanol, methane, vinyl chloride, natural gas, naphtha, propane or gases of equivalent hazard
Class II Groups	
Group E	Combustible metal dusts, including aluminum, magnesium and their commercial alloys or other combustible dusts whose particle size, abrasiveness and conductivity present similar hazards in connection with electrical equipment
Group F	Carbonaceous dusts that have more than 8 percent total entrapped volatiles or that have been sensitized by other materials so that they present an explosion hazard. Coal, carbon black, charcoal, and coke dusts are examples of carbonaceous dusts
Group G	Flour dust, grain dust, flour, starch, sugar, wood, plastic and chemicals

Reference
2020 NEC Code