
KENALL® *THE COMPETITIVE* **EDGE**

Issue #3

Hazardous Location LED Lighting

Understanding Hazardous Locations

Personal and property safety in hazardous locations and explosive atmospheres might not sound like a common concern, but the number of hazardous locations in the US numbers in the hundreds of thousands and includes places we visit or drive by every day: retail gas stations, grain elevators, food processors, distilleries, chemical plants, refineries, paint and surface coating application and storage areas, power generation and waste treatment plants are all considered hazardous to some degree.

What Makes a Location Hazardous?

The simple explanation is that it is the presence of a specific concentration of fuel in an environment where electric service is also available.

Flammable gases

Most flammable gases have an ignitable range of concentration: above or below this range, the fuel may not ignite. (Note: a concentration of fuel above the specified range is still considered a hazard, since it is possible to reduce the concentration until it is once again in the ignitable range.) The Texas City, Texas BP Refinery explosion in 2005 was caused by the accidental release of hydrocarbons (gasoline spill), which vaporized and the cloud was accidentally ignited by a running vehicle parked

nearby. Examples of other flammable gases include acetylene, propane, butane, ammonia, methane, hydrogen, and ethylene.

Dust / Fibers and Flyings

Combustible dusts can either form an explosive cloud when mixed with air, or they can accumulate on the surfaces of electrical components, causing them to overheat. According to a 2014 New York Times editorial, combustible dust explosions killed 29 people and injured 161 between 2008 and 2012. Incidents included a series of sugar dust explosions in Georgia in 2008 and three combustible dust accidents in 2011 at the Hoeganaes metal powder plant in Gallatin, Tennessee.

Potentially combustible/explosive dusts are separated into six categories: agricultural products, such

as egg whites, powdered milk, starches, sugars and wood flour; agricultural dusts including many grains (dust and flour), coffee, cotton, grass and spices; carbonaceous dusts such as coal, charcoal, petroleum coke, cork and cellulose; chemical dusts including methyl-cellulose, lactose and sulfur; metal dusts including aluminum, magnesium and zinc; and numerous types of plastics including melamine and several types of vinyl.



In order to maintain safety, lighting in hazardous locations needs to meet a strict set of standards. Kenall's New SimpleSeal™ HSEDO luminaires are Class 1, Division 2 certified.



Preventing Ignition

There are two ways that fuel is ignited: when a fuel is in its explosive range and exposed to air and an ignition source such as (sparks or an open flame), or when it reaches its Auto Ignition Temperature (AIT). The AIT is the temperature at which a fuel will, if heated, ignite and burn without the addition

of sparks or flame. Authorities use factors such as AIT to determine the required maximum operating temperatures of heat-generating devices, such as luminaires and equipment motors. These devices must be designed to contain all sparks or flames generated during normal or abnormal conditions, and must not exceed the maximum operating temperature required for this environment.

Kenall manufactures a number of Hazardous Location fixtures under the SimpleSeal™ family, and now also has a Class 1, Div. 2 luminaire available, the Simple Seal™ HSEDO Series. For a more in-depth look at Hazardous Location lighting, please download our new whitepaper, "A Guide to Hazardous Location Classifications and Device Types", available [here](#).

NEC Classification Systems

Classes

- Class 1: flammable gases
- Class 2: dust
- Class 3: fibers or flyings as found in the textile and woodworking industries (with the exception of wood dust, which is Class 2).

Divisions

- Division I is the most severe environment: the hazardous atmosphere is always or often present, or becomes present, during frequent servicing/ repair.
- Division II: the hazardous atmosphere is only available infrequently, for instance in the case of an accidental spill or the failure of a mechanical positive ventilation system. It includes storage/handling facilities where the fuel is kept in sealed containers or closed systems. This division can also be found adjacent to Division I areas where the fuel might occasionally be communicated.

Groups

Hazardous materials are separated into groups based on physical characteristics, such as explosive energy, particle size and conductivity.

- Class I groups are gases and are designated with the letters A through D. Class I, group A gases generate the highest explosive pressures (acetylene), and group D gases (propane) generate the lowest. Due to the higher explosive energy involved, the equipment destined for group A environments are the most difficult to manufacture.
- Class II groups are dusts: group E contains conductive or metal dusts like magnesium; group F contains carbonaceous dusts, such as coal; group G dusts are non-conductive dusts including grain, wood and plastic.