

Preventing dust explosions

IECEx certification provides high level of protection

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When addressing the topic of explosive atmospheres, what immediately comes to mind is the oil and gas or petrochemical industries. Unfortunately the list doesn't stop there. The risk of fire or explosion exists in a variety of other sectors, such as transportation – including aerospace – furniture manufacturing, automotive manufacturing and repair, pharmaceuticals, food processing, grain handling and storage, sugar refineries and coal mining.

A common denominator

What is the common denominator between all these sectors? They all utilize flammable or combustible substances in quantities capable of resulting in concentrations that are potentially explosive, whether on a constant basis, as a by-product of normal operation or due to the occurrence of an abnormal situation.

Let's have a look at one of the substances found in huge quantities in many Ex industry sectors: dust.

While dust is often the byproduct of a production process and treated as waste, it can also be an important element in the manufacturing of products such as food products, pharmaceuticals or pigments. Coal, wood, grain, sugar starch, certain metals, dyes and plastics all generate dust.

A risk factor

The large majority of industrial dusts are combustible, and dust explosions can occur in any enclosed area. Dust explosions are a frequent occurrence in underground coal mines, but they can happen in any location where powdered combustible material is present.



The risk of dust explosion exists in the pharmaceutical industry...



...in sawmills...

A publication by German-based company Stahl explains the mechanisms of a dust explosion:

“If a draft of air swirls up a layer of dust in a small area, the dust, along with oxygen, forms a combustible dust/air mix. If this mix is ignited by an ignition source, an explosion is triggered.

The force of the resulting explosion swirls up more dust, which is in turn

ignited. This process continues, and under some conditions chain reactions such as these sweep through entire buildings or facilities, destroying them.”

Even an extremely thin dust layer in a closed room is sufficient to trigger an explosion when the dust is swirled up and ignited.

Ignition sources for dusts include sparks from electrical or mechanical processes, arcs, open flames, ESD (electrostatic discharge), and electromagnetic waves among others.

Safe manufacturing processes

Because of the hazards associated with the presence of dusts, all equipment – electric cables and motors, enclosures, isolators and vents, lamps and switches, control systems and many, many more – used in manufacturing processes should have the relevant level of dust explosion protection. Failure to do so can result in major industrial accidents and have fatal consequences.

Through its standardization and conformity assessment work, the IEC has a solution for all sectors of industry that are operating in those hazardous environments. The Commission has been at the forefront of Ex standardization for many years, preparing International Standards and establishing a CA (Conformity Assessment) System that provides testing and certification for all types of Ex equipment and related services as well as personnel competence.

International Standards

IEC TC (Technical Committee) 31: Equipment for explosive atmospheres, has a complete series of International Standards, IEC 60079, that cover all specific requirements for Ex equipment and systems, from general requirements to protection levels for apparatus used by all sectors that operate in hazardous environments, such as food processing, pharmaceuticals, sugar refineries, flour mills, grain silos as well as the paper and textile sectors.

TC 31 has also developed the IEC 61241 series of International Standards that focuses on electrical equipment in the presence of combustible dust.

Testing and certifying to IEC Standard

To make sure that the equipment they purchase meets the very strict



...and in silos for grain storage

requirements specified in the IEC 60079 series of International Standards, as well as those put in place by national or regional regulations and legislation, the Ex industry can rely on IECEx, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres for testing and certification.

An IECEx certificate provides clear proof of compliance with International Standards, an important assurance for anyone responsible for the safety of those working in such areas.

Repair and maintenance of Ex equipment

Because Ex equipment has a much higher capital cost than the same equipment used elsewhere, repairing it is often more cost-effective than replacing it. The IECEx Certified Service Facilities Scheme assesses and certifies that organizations and workshops that provide repair and overhaul services to the Ex industry do so according to the strict requirements of IEC International Standard 60079-19, Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation. This ensures that unique Ex safety features are not compromised during the repair or overhaul process. The system includes

on-site audits prior to issuing the IECEx Certificate and periodic audit reports.

The IECEx Certified Service Facilities Scheme also covers other Ex related services including, installation and inspection of Ex equipment and installations.

High level of safety for Ex workforce

To cover all safety aspects in Ex environments and to complement the Certified Equipment Scheme, IECEx has developed the IECEx Certification of Personnel Competence Scheme for assessing and certifying individuals working in potentially hazardous areas.

The IECEx CoPC (Certificate of Personnel Competence) provides independent proof that the certificate holder has the required qualifications and experience for working on electrical equipment located in hazardous areas and can implement IEC International Standards covering explosive atmospheres.

For the CoPC, competence is defined as «the ability to apply knowledge» rather than simply assessing knowledge. In this sense, the assessment of persons includes assessing their ability to perform certain Ex-related tasks.