



Global Risk Experts

Improving Health & Safety - Protecting Assets



HAZARDOUS (CLASSIFIED) LOCATION STUDY - General Industries

Common knowledge associates the Chemical Industries with severe explosion and fire risks due to the inherent hazardous nature of the substances being processed. The same association is often not made for General Industries, although flammable chemicals as liquids and gases, or combustible dusts are handled, processed or otherwise used. In Chemical Industries, these substances are obvious. In General Industries they often seem to be hidden, not implicitly existing throughout a facility, but rather to be used in limited quantities at certain locations only.

Explosions and fires involving flammable liquids, gases and combustible dusts are not frequent but when they occur are usually severe, causing significant property damage and consequential financial losses. Not to forget negative impacts on the environment, as well as on life and health of staff members, visitors, neighbours and other 3rd parties.

Almost all aspects of storing, handling, and processing hazardous substances are defined in international and respective national standards. The relevant safety standards between Europe and North America are today more or less synchronized and represent State-of-the-Art. Respective national standards, especially in developing countries are often not updated and thus not at level with State-of-the-Art

One area of great concern in this respect is Electrical Safety. Electrical installations are often found not to be in compliance with the requirement of Hazardous (Classified) Location.

Why Global Risk Experts?

Global Risk Experts is a Swiss-based risk management consultancy with a branch office in Malaysia, and is led by a group of highly experienced professionals to provide independent, unbiased risk management services.

Our objective is to help companies identify the various risks they face, assess their operational vulnerabilities across the organization and provide practical, cost-effective solutions for minimizing / mitigating those risks.

Enterprise to operating level

We help companies achieve and sustain business resilience by focusing on the most material risks across the overall value chain as well as specific risks in different operating environments, geographies, etc.

Flexible and responsive

Our teams are available whenever and wherever they are needed, and can respond immediately in the event of an emergency or major loss.

Practical, realistic and cost-effective

Our technical expertise is coupled with deep business experience; we understand that risk management necessarily involves trade-offs, and look at risk in the context of the specific business situation - not the theoretical "ideal".

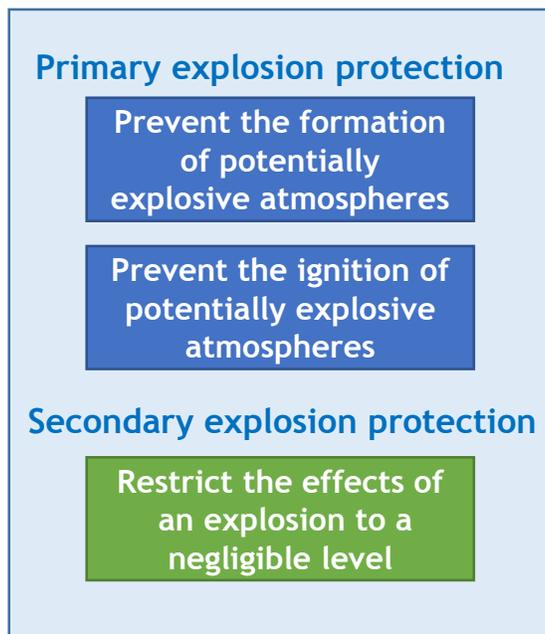
Global reach

We have experience in all regions of the world and are specifically knowledgeable about internationally and local regulatory requirements in numerous countries around the world.

Study Basics:

In most industries, the handling, processing, transport, or storage of flammable materials results in the generation and release of gases, vapours or mist into surrounding areas. Other processes create combustible dust. An explosive atmosphere can form in conjunction with oxygen in the air, resulting in an explosion if ignited.

To prevent explosions in areas with an ignitable atmosphere, the basic prevention and protection means can be summarized into 2 activities:



Preventing ignition sources is one of the main primary explosion protection measures and electrical equipment being prone to sparks and energy discharges is therefore a specific area of concern.

Various international and national standards were defined and are in place. The current main international guidelines and standards are:

- National Electric Code (NEC)
 - NFPA 70 - Chapter 5
 - NFPA 30 / 33 / 496 / 487 / 654 / etc.
- ATEX 94/9/EC
 - EN 60079-x
 - EN 61241-x
- IEC
 - IEC 60079-x
 - IEC 61242-x

Study Schedule:

Identification of hazardous substances

- Flash point / Minimum ignition energy
- Lower / Upper Explosion Limit (LEL/UEL)
- Gas/Dust Group (IIA / IIB / IIC | IIIA / IIIB / IIIC)
- Temperature Class (T1 - T6)
- Group classification (Group A - G) (NEC / NFPA compliance)

Identification of hazardous (classified) locations

- Class I (flammable liquids and gases)
- Class II (combustible dust)
- Class III (combustible fibres)

Development of Zones at classified locations

- Zone 0 / 1 / 2 (Zone 20 / 21 / 22)
- Definition of horizontal and vertical extension of Zones

Identification of existing electrical equipment within the identified zones

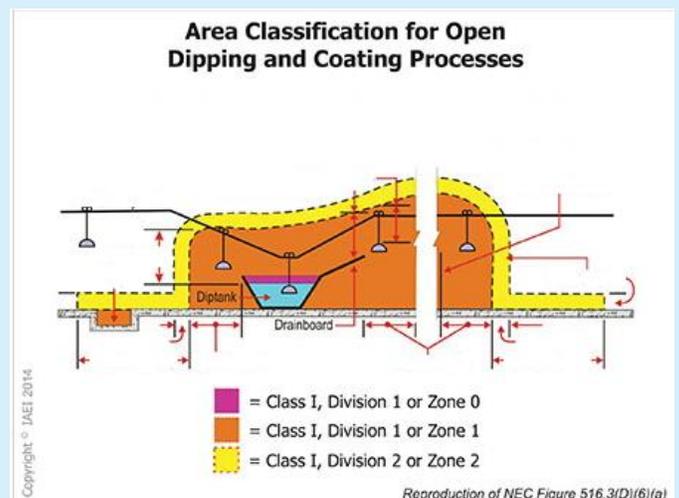
- Equipment classification (e.g. Ex d IIBT3)
- Adequate installation (location / conduit)

Identification of compliance deviations

- Equipment classification
- Proper installations

Development of corrective actions (reporting)

Daily close-out meetings and written summaries



Remark:

It is in the nature of a detailed study covering all hazardous locations of a site, that deviations from best practices regarding electrical and general safety will be observed or identified. Such deviations might not be directly part of the scope of the study; they will nevertheless be brought to the attention of site management, allowing swift action and response.

Direct Benefits:

Compliance

One aim of the study is to ensure the analysed site is in compliance with the most demanding requirement of international standards (NFPA / IEC / ATEX) and respective local standards. Compliance with the latest international standards guarantees state-of-the-art installations, a prerequisite to prevent accidents, property damage, financial losses, negative reputation issues and legal actions. It furthermore reduces discussions and expensive retrofitting actions based on demands of authorities and insurance companies.

Occupational Health & Safety Improvement

The nature of a Hazardous (Classified) Location Studies is to eliminate the ignition of explosive gas/vapour/dust atmospheres by electrical equipment. Eliminating or at least reducing the probability of an explosion is a direct and immediate improvement of the health and safety levels in a plant as personnel, visitors and other 3rd parties won't be exposed to a possible explosion. Besides, protection of staff and other persons against explosion impact is a 'Must Do' requirement. Any violation against it will have severe consequences (legal / financial).

Higher Level of Asset / Business Interruption Protection

Inappropriate electrical equipment is a well-known ignition source for fires and explosions in industrial and commercial environments, especially in areas where ignitable gas, vapours or dust atmospheres exist. Reducing the probability of explosions and fires by eliminating electrical equipment as an ignition source not only decreases the direct physical damage, the impact on consequential financial losses is usually even higher.

Optimizing Capital Expenditure

The Hazardous (Classified) Location Study will clearly indicate what kind of electrical equipment is required at hazardous locations and their respective zones. As the zones define the requirement for the electrical equipment, the often observed practice of installing wide areas with explosion-protected electrical equipment just in case or 'to be on the safe side' can be eliminated. Knowing zones and their size, allows optimizing the purchase and installation of expensive explosion-protected equipment.

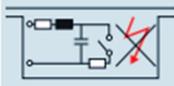
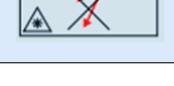
Deliverables:

Comprehensive Report

The final report will consist of a detailed description of each and every hazardous location, definition of the zones, description of the existing electrical equipment and installation in the hazardous location, deviations from requirement or best practices, and - most importantly - what corrective actions are required to gain compliance with international and national standards.

Drawings with Zones (horizontal and vertical)

For every hazardous location a drawing will be provided indicating the type of the zones and the individual extension (horizontal and vertical). If required, the zones can also be integrated into the master CAD drawings as an additional layer.

| Protection types for electrical equipment in explosive gas atmospheres | | | |
|--|-----|---|---|
| Type of protection | M1) | Schematic diagram | Basic principle |
| General requirements | |  | General requirements for the type and testing of electrical equipment intended for the Ex area |
| Increased safety | e |  | Applies only to equipment, or its component parts, that normally does not create sparks or arcs, does not attain hazardous temperatures, and whose mains voltage does not exceed 1 kV |
| Flameproof enclosure | d |  | If an explosion occurs inside the enclosure, the housing will withstand the pressure and the explosion will not be propagated outside the enclosure |
| Pressurized enclosure | p |  | The ignition source is surrounded by a pressurized protective gas (min. 0.5 mbar) – the surrounding atmosphere cannot enter |
| Intrinsic safety | i |  | By limiting the energy in the circuit, the formation of impermissibly high temperatures, sparks, or arcs is prevented |
| Oil immersion | o |  | Equipment or equipment parts are immersed in oil and thus separated from the Ex atmosphere |
| Sand filling | q |  | Ignition source is buried in sand. The Ex atmosphere surrounding the housing cannot be ignited by an arc |
| Encapsulation | m |  | By encapsulation of the ignition source in a molding, it cannot ignite the Ex atmosphere |
| Types of protection | n |  | Slightly simplified application of the other protection types – "n" stands for "non-igniting" |
| Optical radiation | op |  | Suitable measures prevent a hazardous atmosphere from being ignited by optical radiation. |

Follow-up Support

A Hazardous (Classified) Location Study is only the first step in obtaining compliance. Implementation of the prepared risk improvement advice is the equally important next step. Global Risk Experts will support this required work upon request from recommending or qualifying a suitable contractor, to identifying suitable explosion protected electrical equipment, evaluating work proposals, overseeing the remedial work, approving of changed electrical installation in hazardous locations and finally to identify compliance.

The Team

Our team of electrical engineers consists of personnel with more than 15 years' experience in design, installation, commissioning and maintenance of electrical power systems.

All elements of the study are subjected to rigorous engineering review, from the data collection phase on-site, through engineering and reporting, to ensure the highest standards of quality.



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