Training Course on Electrical Installations in Hazardous Areas

Professional Development Training Course Outline

Category	Engineering	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

This comprehensive training course is meticulously designed to equip participants with the **essential knowledge** and **practical skills** required to safely design, install, inspect, and maintain **electrical installations** in **hazardous areas**. Understanding the principles of **explosion protection**, **area classification**, and adherence to stringent **safety regulations** are paramount in industries dealing with flammable gases, vapors, dusts, and fibers. This course delves into the intricacies of selecting appropriate **electrical equipment**, implementing **wiring methods**, and ensuring **system integrity** to mitigate the risk of ignition in potentially explosive atmospheres. By focusing on globally recognized standards and best practices, participants will gain the confidence and competence to contribute to a safer working environment and comply with legal requirements.

The curriculum emphasizes a thorough understanding of **hazardous area classification**, including zones and divisions, and the selection criteria for various types of **explosion-proof equipment**, such as **Ex d**, **Ex e**, **Ex i**, and **Ex p** protection methods. Participants will learn about **intrinsically safe circuits**, **increased safety measures**, and **pressurized enclosures**, alongside practical considerations for **grounding and bonding**, **cable gland selection**, and **lighting in hazardous locations**. Furthermore, the course covers essential aspects of **inspection and maintenance procedures**, ensuring the long-term reliability and safety of **electrical systems** in these critical environments. Upon completion, individuals will be well-versed in the latest technologies and regulatory frameworks governing **electrical safety in hazardous environments**.

Programme Curriculum

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Course Duration

10 days

Course Objectives

Upon successful completion of this training course, participants will be able to:

1. Detail the different **zones and divisions** according to relevant international and local standards, including ATEX and IECEx.
2. Recognize potential sources of ignition in **hazardous atmospheres**, such as electrical sparks, arcs, and hot surfaces.
3. Comprehend the principles and applications of various **Ex protection techniques**, including **flameproof enclosures (Ex d)**, **increased safety (Ex e)**, and **intrinsic safety (Ex i)**.
4. Choose the correct **electrical apparatus** for specific **hazardous area classifications** and environmental conditions.
5. Apply appropriate **wiring methods** and installation techniques in accordance with **hazardous area regulations**.
6. Explain the concept of **intrinsically safe circuits** and their application in instrumentation and control systems.
7. Implement effective **grounding and bonding** strategies to prevent static discharge and ensure electrical safety.
8. Choose suitable **cable glands and entry devices** that maintain the integrity of **explosion-proof enclosures**.
9. Plan and install appropriate **lighting fixtures** for use in **hazardous locations**, considering light levels and temperature ratings.
10. Perform routine **inspections** and implement effective **maintenance procedures** for **electrical installations** in **hazardous areas**.
11. Understand and apply key aspects of **electrical safety standards** and legal requirements for **hazardous environments**.
12. Implement measures to control and prevent **electrostatic discharge** in areas with flammable materials.

13. Utilize **risk assessment methodologies** to identify and evaluate hazards associated with **electrical installations** in potentially explosive atmospheres.

Organizational Benefits

Implementing this training course within your organization will yield significant benefits:

- Foster a greater awareness and understanding of **electrical safety in hazardous areas**, leading to a reduction in accidents and incidents.
- Ensure adherence to local and international **hazardous area regulations**, minimizing the risk of legal penalties and operational disruptions.
- Equip personnel with the knowledge and skills to perform tasks safely and effectively, reducing downtime and improving productivity.
- A demonstrable commitment to safety through comprehensive training can potentially lead to lower insurance premiums.
- Empower employees with the competence to work safely in **hazardous environments**, boosting morale and reducing anxiety.

Target Participants

This training course is designed for professionals working in industries where hazardous atmospheres may be present, including but not limited to:

1. Electrical Engineers.
2. Instrumentation Technicians.
3. Maintenance Personnel
4. Safety Officers
5. Plant Managers and Supervisors.
6. Installation Electricians.
7. Project Engineers
8. Control and Automation Specialists

Course Outline

Module 1: Fundamentals of Hazardous Areas

- Introduction to flammable materials: gases, vapors, dusts, and fibers.
- Understanding the fire triangle and explosion pentagon.
- Sources of ignition in industrial environments.
- Overview of international and local hazardous area regulations (e.g., ATEX, IECEx, NEC).
- Consequences of explosions in industrial facilities.

Module 2: Hazardous Area Classification - Gases and Vapors

- Principles of gas and vapor classification.
- Defining zones based on the frequency and duration of explosive atmospheres (Zone 0, 1, 2).
- Understanding gas groups and temperature classes.
- Practical examples of gas and vapor classification in various industries.
- Documentation and marking requirements for classified areas.

Module 3: Hazardous Area Classification - Dusts

- Characteristics of combustible dusts and their behavior.

- Defining zones based on the frequency and duration of explosive dust atmospheres (Zone 20, 21, 22).
- Understanding dust groups and minimum ignition energy (MIE).
- Factors influencing dust explosion hazards.
- Specific considerations for handling and processing dusty materials.

Module 4: Ignition Sources and Prevention

- Detailed analysis of electrical ignition sources (sparks, arcs, hot surfaces).
- Non-electrical ignition sources (mechanical sparks, static electricity, chemical reactions).
- Strategies for preventing the formation of explosive atmospheres.
- Methods for eliminating or controlling ignition sources.
- Importance of risk assessment in identifying and mitigating ignition hazards.

Module 5: Overview of Explosion Protection Methods

- Principles of containment, segregation, and prevention.
- Introduction to various Ex protection techniques according to IEC 60079 series.
- Understanding the concept of Equipment Protection Levels (EPLs).
- Selection criteria for different Ex protection methods based on zone and material.
- Marking and certification of Ex equipment.

Module 6: Explosion Protection Method - Flameproof Enclosures (Ex d)

- Design principles and construction requirements for Ex d enclosures.
- Understanding flame paths and their importance.
- Installation and maintenance requirements for Ex d equipment.
- Selection criteria and application examples of Ex d equipment.
- Repair and modification procedures for Ex d enclosures.

Module 7: Explosion Protection Method - Increased Safety (Ex e)

- Design principles and construction requirements for Ex e equipment.
- Focus on preventing excessive temperatures and arcs.
- Installation and maintenance requirements for Ex e equipment.
- Selection criteria and application examples of Ex e motors, terminals, and lighting.
- Specific requirements for Ex e cable glands and entries.

Module 8: Explosion Protection Method - Intrinsic Safety (Ex i)

- Principles of limiting energy in electrical circuits.
- Understanding intrinsically safe and associated apparatus.
- Installation requirements for Ex i circuits and wiring.
- Selection criteria and application examples of Ex i sensors and control systems.
- Safety barriers and isolators: types and applications.

Module 9: Other Explosion Protection Methods

- Pressurized enclosures (Ex p): principles and applications.
- Powder filling (Ex q) and oil immersion (Ex o) techniques.
- Type of protection 'n' (Ex nA, Ex nC, Ex nR): application in Zone 2.
- Comparison of different Ex protection methods and their suitability.
- Hybrid protection methods and their applications.

Module 10: Selection and Installation of Electrical Equipment in Hazardous Areas

- Factors to consider when selecting electrical equipment for hazardous areas.
- Compatibility of equipment with the classified zone and environment.
- Correct installation practices to maintain the integrity of Ex protection.
- Requirements for cable selection and installation in hazardous areas.
- Earthing and bonding requirements in explosive atmospheres.

Module 11: Wiring and Cable Glanding in Hazardous Areas

- Specific requirements for wiring systems in different hazardous zones.
- Selection and installation of appropriate cable glands and entries.
- Maintaining the degree of protection of Ex enclosures.
- Requirements for conduit and trunking systems in hazardous areas.
- Practical considerations for cable routing and termination.

Module 12: Lighting and Small Power in Hazardous Areas

- Selection criteria for lighting fixtures in different hazardous zones.
- Installation requirements for lighting systems to prevent ignition.
- Requirements for small power outlets and portable equipment.
- Emergency lighting considerations in hazardous locations.
- Maintenance and inspection of lighting installations.

Module 13: Inspection and Maintenance of Electrical Installations in Hazardous Areas

- Importance of regular inspection and maintenance for safety.
- Types of inspections: initial, periodic, and visual.
- Competency requirements for inspection and maintenance personnel.
- Record keeping and documentation of inspections and maintenance activities.
- Repair and modification procedures for Ex equipment.

Module 14: Standards, Regulations, and Certification

- Detailed review of relevant international standards (IEC 60079 series).
- Overview of regional and local regulations (e.g., ATEX Directives).
- Understanding the role of certification bodies and conformity assessment.
- Equipment marking and documentation requirements.
- Changes and updates in hazardous area regulations.

Module 15: Risk Assessment and Safety Management Systems

- Principles of risk assessment in hazardous areas.
- Methodologies for identifying, evaluating, and controlling risks.
- Developing and implementing safety management systems for hazardous environments.
- Permit-to-work systems and safe operating procedures.
- Emergency preparedness and response in case of incidents.

Training Methodology

This training course will employ a blended learning approach incorporating:

- **Interactive Lectures:** Engaging presentations with real-world examples and case studies.

- **Group Discussions:** Facilitated discussions to encourage knowledge sharing and problem-solving.
- **Practical Exercises:** Hands-on activities and simulations to reinforce theoretical concepts.
- **Case Study Analysis:** Examination of real-life incidents and best practices.
- **Visual Aids:** Use of diagrams, videos, and animations to enhance understanding.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org **or call** *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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