مركز المستشار الوطني للتدريب
National Consultant Centre For Training
YOUR GATE TO HANDS-ON TRAINING

5-Day Cement Industry Training Course
In

ELECTRICAL SAFETY AND HAZARDOUS AREAS (EX) IN CEMENT PLANTS

Dubai - UAE, 06 – 10 July 2026

COURSE LEVEL: INTERMEDIATE

COURSE OVERVIEW:

Electrical safety and the management of hazardous areas are paramount in the cement industry, where the presence of combustible dust and high-voltage equipment creates a complex risk profile. This course defines the standards for electrical installation and maintenance, specifically focusing on the "Ex" (Explosive Atmosphere) requirements for areas with coal dust and other flammable materials. By understanding the principles of protection, participants will ensure a safe working environment and compliance with international safety codes.

The scope of this training includes the classification of hazardous zones, the selection of certified electrical equipment, and the implementation of safe work practices such as Lockout Tagout (LOTO). It covers the technical requirements for earthing, bonding, and lightning protection to prevent static discharges and equipment failure. Furthermore, the course addresses the specific hazards found in coal mills, fuel storage areas, and electrical substations within the cement plant.

Coverage includes detailed modules on the ATEX and IECEx directives, the inspection of "Ex" rated enclosures, and the management of electrical arcs and flash hazards. Through practical demonstrations, participants will learn how to identify non-compliant installations and perform safe electrical troubleshooting. Attendees will gain the technical knowledge required to maintain electrical integrity and protect personnel and assets from electrical fires and explosions.

COURSE OBJECTIVES:

After completion of this course, the participants will be able to:

- Identify the electrical hazards specific to the cement manufacturing process.
- Classify hazardous areas (Zones 20, 21, and 22) for combustible dust.
- Explain the principles of "Ex" protection (Intrinsic Safety, Flameproof, etc.).
- Select appropriate electrical equipment based on zone classification.
- Conduct safe Lockout Tagout (LOTO) procedures for high-voltage systems.
- Understand the requirements of the ATEX and IECEx directives.
- Perform inspections of "Ex" rated motors, junction boxes, and lighting.
- Implement effective earthing and bonding to prevent static discharge.
- Identify the risks of Arc Flash and use appropriate PPE.
- Manage lightning protection systems for silos and tall structures.
- Describe the safety protocols for working in electrical substations.

- Document electrical inspections and maintain a "Hazardous Area Register."

TARGET AUDIENCE:

This course is intended for Electrical Engineers, Maintenance Supervisors, Safety Officers, Electricians, and Instrumentation Technicians.

TRAINING COURSE METHODOLOGY:

A highly interactive combination of lectures, discussion sessions, and case studies will be employed to maximize the transfer of information, knowledge, and experience. The course will be intensive, practical, and highly interactive. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. The attendants will also be encouraged to raise more of their questions and to share in developing the right answers using their analysis and experience. There will also be some indoor experiential activities to enhance the learning experience. Course material will be provided in PowerPoint, with necessary animations, learning videos, and general discussions.

The course participants shall be evaluated before, during, and at the end of the course.

COURSE CERTIFICATE:

National Consultant Centre for Training LLC (NCC) will issue an Attendance Certificate to all participants completing a minimum of 80% of the total attendance time requirement.

COURSE OUTLINE / COURSE CONTENT:

MODULE 1: FUNDAMENTALS OF ELECTRICAL SAFETY

- Introduction to electricity: Voltage, Current, and Resistance.
- Physiological effects of electric shock on the human body.
- Basic safety rules for electrical maintenance.
- Overview of international standards (IEC, NFPA 70E, OSHA).
- Importance of a "Safety First" culture in electrical teams.

MODULE 2: ARC FLASH AND PERSONAL PROTECTIVE EQUIPMENT

- Definition and causes of Arc Flash and Arc Blast.
- Calculating incident energy and Arc Flash boundaries.
- Selecting Arc-rated clothing and face shields.
- Safety tools: Insulated gloves, mats, and testing equipment.
- Managing "live-work" permits and risk assessments.

MODULE 3: HAZARDOUS AREA CLASSIFICATION (EX)

- Definition of a hazardous atmosphere (Gas vs. Dust).
- Understanding the "Dust Pentagon" and explosion triggers.
- Classifying zones for coal mills, bag filters, and fuel storage.
- Marking and labeling requirements for "Ex" equipment.
- Documenting the Hazardous Area Classification (HAC) report.

MODULE 4: PROTECTION METHODS FOR COMBUSTIBLE DUST

- Intrinsic Safety (Ex i) and its application in sensors.
- Flameproof (Ex d) and Dust-tight (Ex t) enclosures.
- Pressurized (Ex p) and Increased Safety (Ex e) methods.
- Temperature class (T-ratings) and its importance for dust.
- IP (Ingress Protection) ratings for cement environments.

MODULE 5: INSTALLATION AND MAINTENANCE OF EX EQUIPMENT

- Proper cable entry and gland selection for hazardous areas.
- Maintaining the integrity of "Ex" enclosures during repairs.
- Common installation errors and how to avoid them.
- Replacing "Ex" components: Ensuring like-for-like certification.
- Tools and equipment for safe use in hazardous zones.

MODULE 6: LOCKOUT TAGOUT (LOTO) AND ISOLATION

- Principles of the "Six Steps" of LOTO.
- Isolation of high-voltage transformers and switchgear.
- Managing "Multiple-Lock" scenarios for large maintenance teams.
- Verification of "Zero Energy" state before work starts.
- Restoration of power and de-isolation protocols.

MODULE 7: EARTHING, BONDING, AND STATIC ELECTRICITY

- The role of earthing in fault protection.
- Bonding of silos, pipes, and conveyors to prevent static build-up.
- Testing earth resistance and soil resistivity.
- Hazards of static electricity in fuel handling and dust transport.
- Maintenance of earthing pits and conductors.

MODULE 8: LIGHTNING PROTECTION SYSTEMS

- Lightning risks for tall preheater towers and silos.
- Components of a lightning protection system (Air terminals, down-conductors).
- Surge Protection Devices (SPDs) for sensitive electronics.
- Annual inspection and testing of lightning protection.
- Standards for lightning safety in industrial plants.

MODULE 9: ELECTRICAL SUBSTATION SAFETY

- Access control and signage for high-voltage areas.
- Safety protocols for oil-filled vs. dry-type transformers.
- Operation of circuit breakers and disconnect switches.
- Battery room hazards: Hydrogen gas and acid spills.
- Fire suppression systems in electrical rooms (CO2, FM-200).

MODULE 10: INSPECTION AND AUDITING

- Visual, close, and detailed inspection levels for "Ex" gear.

- Using "Ex" inspection checklists and mobile software.
- Frequency of periodic inspections for cement plants.
- Identifying "Non-Conformance" and implementing corrective actions.
- The role of the "Responsible Person" for electrical safety.

MODULE 11: COAL MILL AND FUEL SYSTEM SAFETY

- Specific electrical hazards in the coal grinding department.
- Grounding of coal bags and flexible hoses.
- Interlocking gas detectors with electrical systems.
- Explosion venting and its impact on electrical layout.
- Emergency shutdown logic for fuel systems.

MODULE 12: COURSE CONCLUSION AND FINAL ASSESSMENT

- Final exam on electrical safety and "Ex" standards.
- Group exercise: Identifying hazards from plant photos.
- Feedback and course review.
- Summary of key safety takeaways.