Electrical Equipment in Hazardous Areas: Ex Selection, Installation and Inspection

18 – 22 January 2027
Barcelona - Eixample district four-star



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Introduction:

Electrical equipment in hazardous areas becomes an ignition source when a zone drawing is out of date, a motor carries the wrong temperature class, a flameproof joint is corroded or an intrinsically safe loop is extended without checking cable capacitance. This Core Concept course trains electrical and instrument staff to read area classification drawings, select Ex equipment from its marking, install cabling and glands correctly, and inspect and maintain protection concepts across their service life. Participants produce an Ex Equipment Register and Inspection Dossier for a plant area of their own.

Course Objectives:

- Interpret hazardous area classification drawings for gas zones 0, 1 and 2 and dust zones 20, 21 and 22, including release sources and zone extents
- Select Ex equipment by matching zone, gas group, temperature class and Equipment Protection Level to the marking on the nameplate and certificate
- Verify an intrinsically safe loop by comparing barrier or isolator output values with field device input values and cable capacitance and inductance
- Install Ex cabling, cable glands, stopping boxes and terminations so that the protection concept stays intact
- Plan and record visual, close and detailed inspections and set inspection intervals from equipment condition and environment
- Control repair, overhaul, modification and replacement of Ex equipment through an equipment register, certificates and change records

Target Audience:

- Electrical technicians who install, terminate and maintain motors, lighting and junction boxes in classified areas
- Instrument technicians who wire, loop check and maintain transmitters, analysers and intrinsically safe circuits
- Electrical and instrument engineers who specify field equipment and review installation drawings for classified areas
- Maintenance supervisors who plan Ex inspections, issue work to crews and sign off defect close-out
- Commissioning and construction staff who hand over Ex installations to operations with complete records

Course Outline:

Day 1: Explosive Atmospheres and Hazardous Area Classification

- Ignition Triangle, Flammable Limits, Flash Point and Autoignition Temperature of Gases and Vapours
- Combustible Dust Clouds and Layers: Particle Size, Layer Ignition and Housekeeping
- Gas Zone 0, 1 and 2 Definitions Using IEC 60079-10-1 Grade of Release and Ventilation
- Dust Zone 20, 21 and 22 Definitions Using IEC 60079-10-2
- Reading Area Classification Drawings, Zone Extents and Substance Data Schedules

Day 2: Protection Concepts, Gas Groups and Ex Marking

- Gas Groups IIA, IIB and IIC and Temperature Classes T1 to T6
- Flameproof Ex d Enclosures to IEC 60079-1: Flame Paths, Gaps and Bolting
- Increased Safety Ex e to IEC 60079-7 and Pressurised Ex p to IEC 60079-2
- Non-Sparking Ex n, Encapsulation Ex m, Oil Immersion Ex o and Powder Filling Ex q
- Decoding Ex Marking, Equipment Protection Levels, ATEX Categories and IECEx Certificates

Day 3: Ex Equipment Selection, Intrinsic Safety and Installation Practice

- Equipment Selection Matrix: Zone, Gas Group, Temperature Class and Ambient Range
- Intrinsic Safety Levels ia, ib and ic to IEC 60079-11 with Zener Barriers and Galvanic Isolators
- Intrinsically Safe Loop Verification Sheet: Source Output, Device Input and Cable Parameters
- Cable Selection, Barrier and Compound Cable Glands, Ingress Protection and Unused Entry Plugs
- Motor and Variable Speed Drive Installation in Classified Areas: Temperature Rise and Certificate Conditions

Day 4: Inspection Grades, Defects, Repair and Records

- Initial, Periodic and Sample Inspection Planning with Visual, Close and Detailed Grades
- Frequent Ex Defects: Damaged Flame Paths, Missing Bolts, Wrong Glands and Painted Nameplates
- Isolation, Gas Testing and Permit Controls Before Opening Ex Enclosures
- Repair, Overhaul and Modification of Ex Equipment and Control of Replacement Parts
- Ex Equipment Register, Verification Dossier and Management of Change Records

Day 5: Plant Area Walkthroughs and the Ex Inspection Dossier

- Compressor Shelter Walkthrough: Zone Drawing Against Installed Equipment Marking
- Instrument Rack Walkthrough: Intrinsically Safe Loop Segregation and Loop Sheet Check
- Grain or Powder Handling Walkthrough: Dust Layer, Enclosure Sealing and Surface Temperature
- Detailed Inspection Checklist Completion and Defect Priority Ranking
- Ex Equipment Register and Inspection Dossier Peer Review

Skills You Will Gain:

- Area Classification Interpretation
- Ex Marking Decoding
- Protection Concept Recognition
- Intrinsic Safety Loop Calculation
- Cable Gland Installation
- Ex Inspection Planning
- Defect Grading
- Ex Records Management

Why Attend This Course:

- Return with an Ex Equipment Register and Inspection Dossier built for a plant area you work in
- Tell at a glance whether a nameplate suits the zone, gas group and temperature class where the item is installed
- Stop gland, flame path and loop extension errors before they reach an inspection finding or an ignition
- Compare Ex practice with electrical and instrument staff from oil and gas, chemicals, pharmaceuticals, grain handling and utilities

Conclusion:

Equipment in explosive atmospheres stays safe only when classification, selection, installation and inspection agree with each other and with the records. The course moves from flammable and dust atmospheres and zone drawings, through gas groups, temperature classes, protection concepts and Ex marking, to equipment selection, intrinsic safety loop verification and cable gland practice, then to inspection grades, frequent defects, repair control and records. The final day applies the material in plant walkthroughs and produces an Ex Equipment Register and Inspection Dossier.