**Training Title**

# SELECTION, INSTALLATION & TESTING OF ELECTRICAL EQUIPMENTS IN HAZARDOUS AREA

**Training Duration**

**5 days**

**Training Venue and Dates**

| | | | | | |
|---|---|---|---|---|---|
| REF EE019 | Selection, Installation & Testing of Electrical Equipments in Hazardous Area | 5 | 14-18 February, 2021 | $4,250 | Abu Dhabi, UAE |

**In any 5 star hotel. The exact venue will be intimated once finalized.**

**Training Fees**

**4,250 US$ per participant for Public Training. Fees Includes Course Materials/Handouts, Tea/Coffee, refreshments, International Buffet Lunch.**

**Training Certificate**

**Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.**

**TRAINING OVERVIEW**

**TRAINING DESCRIPTION**

**The course covers the hazardous area concept, classification and electrical equipment selection in these hazardous areas. In order to properly cover the subject, electric energy theory, gas categorization, temperature classification, methods of explosion protection, routine maintenance of electrical equipment, fault diagnosis and safety practices in these areas are included. This course is a must for anyone who is involved in the selection, operation, applications, or maintenance of electrical equipment in hazardous areas. The course provides the latest directives and technology for the concerning subject.**

**TRAINING OBJECTIVE**



**Upon the successful completion of this course, participants will understand and learn the following :-**

- **The fundamentals of hazardous area classifications and the hazardous result from energy librated from electrical equipment.**
- **The fundamentals of Gas Grouping and temperature classifications to avoid the hazardous.**
- **The different methods for explosion protection.**
- **The selection of electrical equipment in hazardous areas for various applications.**
- **Routine maintenance, modifications and fault diagnostics.**



P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com

- **Safety working practices and new ATEX directives.**

## TRAINING METHODOLOGY:

**This training program is lecture-based and customized to the needs of the audience, providing meaningful experience for personnel that work in petroleum plants.**
**Daily sessions include formal presentation, prepared in the Power Point, interspersed with directed discussions and case study.**
**In addition to formal lectures and discussions, the delegates will learn by active participation through the use of problem solving exercises, group discussions, analysis of real-life case studies etc. All attendees receive a course manual as a reference.**

- **30% Lectures**
- **30% Workshops and work presentation**
- **20% Group Work& Practical Exercises**
- **20% Videos& General Discussions**

## WHO SHOULD ATTEND?

- **Electrical, control and instrument engineers**
- **Plant engineers and instrument technicians**
- **Operations technicians**
- **Electrical maintenance technicians and supervisors**
- **Instrumentation and control system engineers**
- **Process control engineers**

## COURSE OUTLINE

1. **Electrical energy, ignition and flammability**

   **1.1. Electrical energy and ignition**
   **1.2. The basics of electricity**
   **1.3. Electrical heat energy**
   **1.4. Sources of ignition**
   **1.5. Fire Triangle**
   **1.6. Static Electricity.**
   **1.7. Flash point.**
   **1.8. Ignition temperature.**
   **1.9. Flammability**
   **1.10. Flammability principles**
      **1.10.1. Explosive limits.**

2. **Area classification**





P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com

2.1. General
2.2. Principles of safety
2.3. Hazards and hazardous areas
2.4. Basic properties of combustible and ignitable material
2.5. Basis of area classification
2.6. Zonal classification
  2.6.1. Definition
  2.6.2. Classification
    2.6.2.1.Area classification – gas and vapors
    2.6.2.2.Area classification – dust
  2.6.3. Gas groups
  2.6.4. Surface temperature classes
  2.6.5. Apparatus selection & marking
  2.6.6. IP system for enclosures
2.7. Plant operations – normal and abnormal
2.8. Classification procedure
2.9. Responsibility and personnel involved
2.10. Policy and guidelines for implementation
2.11. Area classification examples
2.12. Case Study

3. Design philosophy and selection of equipment/apparatus

3.1. General
3.2. Risks history
3.3. Classification concepts
3.4. Apparatus
3.5. Concepts and techniques of explosion protection grouping
3.6. Methods of explosion protection
  3.6.1. Exclusion of hazardous gases
    3.6.1.1.Pressurization – Ex p
    3.6.1.2.Oil Immersion – Ex o
    3.6.1.3.Encapsulation – Ex m
  3.6.2. Exclusion of heat
    3.6.2.1.Flameproof Ex d = FLP
    3.6.2.2.Increased Safety - Ex e
    3.6.2.3.Intrinsically Safety – Ex I
    3.6.2.4.Non-Sparking Protection –Ex n
    3.6.2.5. Powder / Sand Filling – Ex q
  3.6.3. Exclusion of air
  3.6.4. Temperature classification for all equipment.
  3.6.5. Ingress Protection for all equipment.





P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com

3.7. Typical applications of methods of protection
3.8. Mixed techniques
3.9. Dust explosion-protection methods
3.10. Selection of explosion-protection technique for safeguarding

4. Protection concept 'd'

4.1. General
4.2. Certification in brief
4.3. Construction requirements
4.4. Flameproof theory
4.5. Other general requirements for explosive atmospheres
4.6. Testing
4.7. Grouping and effect of temperature classification
4.8. Conditions of use
4.9. Illustrations of mechanical construction types

5. Protection concept 'e'

5.1. General
5.2. Principles of design for increased safety
5.3. Certification (components)
5.4. Construction requirements
5.5. Principles of testing
5.6. Periodic testing and repair of electrical apparatus
5.7. Conditions of use
5.8. Standards for Ex 'e'

6. Protection concept 'n'

6.1. General
6.2. Principles of design
6.3. Certification
6.4. Construction requirements
6.5. Conditions of use
6.6. Illustrations
6.7. Standards for Ex 'n'



7. Protection concept 'i' principles

7.1. Origins of intrinsic safety
7.2. Principles of IS
7.3. Electrical theory to explain IS



P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com

- 7.4. Implementation of IS
- 7.5. The shunt diode safety barrier
- 7.6. Associated apparatus
- 7.7. Electrical apparatus in the hazardous area
- 7.8. Enclosures
- 7.9. Temperature
- 7.10. The IS systems concept
- 7.11. An IS 'system'
- 7.12. System documentation
- 7.13. Assessment of safety
- 7.14. Simple apparatus
- 7.15. Safety parameters
- 7.16. Temperature classification of systems
- 7.17. Systems concepts in other standards
- 7.18. Standards for Ex 'i'

8. Protection concept 'p'

- 8.1. General
- 8.2. Development of standards for Ex 'p'
- 8.3. Construction requirements
- 8.4. Principles of application
- 8.5. Other design requirements
- 8.6. Testing
- 8.7. Standards of Ex 'p'

9. Other concepts

- 9.1. General
- 9.2. Ex 'o': oil filling
- 9.3. Ex 'q': quartz/sand filling
- 9.4. Ex 'm': encapsulation
- 9.5. Component certification
- 9.6. Special type of protection 's' (IEC Concept Code Symbol Ex 's')
- 9.7. Multiple certification
- 9.8. Selection of certification method
- 9.9. Apparatus for use in dust risks

10. Earthing and bonding

- 10.1. Earthing





P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com

10.2. Personnel safety
10.3. Hazardous area considerations
10.4. Earthing and bonding
10.5. Clean and dirty earthing
10.6. Electrical interference
10.7. Earthing terminology
10.8. Connection of earthing systems
10.9. Power supply systems
10.10. Portable equipment using batteries
10.11. Earthing arrangement standard solutions
10.12. Earth loops
10.13. Computer earthing
10.14. Surge protection systems
10.15. Standards and codes of practice

11. Installations

11.1. Introduction to installation requirements
11.2. Installation requirements
11.3. IEC 60079-14: standard contents
11.4. Other relevant installation standards and codes
11.5. Safety documentation
11.6. General requirements of the standard
11.7. Practical aspects of IS installations
11.8. Other considerations affecting installation
11.9. Other installation issues

12. Inspection and maintenance

12.1. Inspection and maintenance
12.2. Integrity 'preserved'
12.3. Scope of IEC 60079-17
12.4. General requirements
12.5. Inspections
12.6. The insulation test
12.7. Maintenance
12.8. Testing
12.9. Unauthorized modification
12.10. Earthing integrity verification
12.11. BS 5345 inspection requirements





P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com

**13. Safe working practices**

- **13.1. General**
- **13.2. Safety observations**
- **13.3. Danger signals of electrical malfunctioning**
- **13.4. Need for inspection and maintenance**
- **13.5. Maintenance and safe practices**
- **13.6. Fault-finding – safety ensured**
- **13.7. Insulation testing in hazardous area**
- **13.8. Earthing in hazardous area**
- **13.9. Handling 'fall out of fire and electrical shock'**

**14. Fault-finding and testing**

- **14.1. Fault-finding**
- **14.2. Fault-finding routine**
- **14.3. Safety assessment of testing**
- **14.4. Test equipment**
- **14.5. Use of uncertified test apparatus**
- **14.6. Interface testing**
- **14.7. Certified apparatus**
- **14.8. IS apparatus repair procedure**

**15. ATEX Directive**

- **15.1. General**
- **15.2. Definitions**
- **15.3. Scope of the ATEX Directive**
- **15.4. Bird's eye view of ATEX Directive**

**Course summary and Evaluation**



**NOTE:**
**Pre & Post Tests will be conducted**
**Case Studies, Group Exercises, Group Discussions, Last Day Review &Assessments will be carried out.**

……



P.O BOX 45304
ABU DHABI, U.A.E
T +971 2 6264455
F +971 2 6275344
www.definetraining.com