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# PRACTICAL INTRINSIC SAFETY FOR ENGINEERS AND TECHNICIANS



Gain a solid understanding of Intrinsic Safety techniques supported by hands-on practical exercises

## **YOU WILL LEARN HOW TO:**

- Design and install safe working systems using Intrinsic Safety (IS)
- Explain the fundamentals of IS
- Apply the national and international standards
- Identify the vital issues of grounding and bonding IS systems
- Fault find IS problems
- Obtain hands-on practical experience with the IS systems

## **WHO SHOULD ATTEND:**

- Instrumentation and control technicians and engineers
- Design engineers
- Electrical technicians and engineers
- Instrument technicians
- Engineering managers and supervisors



## The Workshop

This practical, intensive, two-day workshop explains the application concepts of explosion protection using Intrinsic Safety (IS or Ex 'I'). This is with reference to British, European and International Standards for the certification and use of electrical 'apparatus'. Where electrical equipment is used in 'Potentially Flammable Atmospheres', the IEC79 Series of International Standards are now emerging and gaining acceptance in order to develop a global approach to hazardous area plant safety. The workshop covers IS as the preferred technique for instrumentation applied to industrial plant Inputs/Outputs in hazardous areas. The principles of IS do not change since these are based on the laws of physics, however, the implementation of IS is open to interpretation and causes some conflict as the subject is still seen as a 'black art'.

The workshop aims to widen the understanding of this technique by explaining the basic rules within the context of their application. Engineers and technicians working in hazardous process control and instrumentation areas must have an understanding of the close integration between the safety and operational aspects of Intrinsic Safety (IS) as a protection technique in order to specify, design and maintain systems. The workshop is designed to explain the theory of IS and its close integration with operational signal transfer. You will gain a greater understanding of IS loop concepts as a basis for working with measurement and control loops using standard and custom IS solutions. Defining and applying the correct terminology will assist you in communicating and documenting important safety details.

**Pre-requisites:** Fundamental grounding in basic electrical concepts.

## Practical Sessions

This is a practical, hands on workshop enabling you to work through practical exercises which reinforce the concepts discussed.

## The Program

### BACKGROUND TO HAZARDOUS AREAS

- Explosion consequences
- Definition of hazardous area

### REVIEW OF PLANT AREA AND APPARATUS CLASSIFICATION SYSTEMS

- Properties of gasses
- Protection requirements
- Zones and definitions
- Apparatus grouping definitions

### PRINCIPLES OF INTRINSIC SAFETY

- Background and history
- Energy limiting concept
- Gas ignition curves
- Hazardous area apparatus
- Simple apparatus
- Safe area associated apparatus and interfaces
- Barriers and isolators
- Systems concepts

### APPLICATIONS

- Introduction to applications
- Status inputs

### Practical session

### OTHER METHODS OF PROTECTION

- Separation: Ex p, o, q, m
- Construction: Ex n, e
- Containment: Ex d
- Special: Ex s
- Design: Ex i (ia and ib)

### APPLICATIONS

- Analogue inputs
- High level
- Systems

### Practical session

### EARTHING AND BONDING

- Basic principles
- Requirement for IS systems
- Noise and interference control
- System earthing approach

### APPLICATIONS

- Low level measurements
- Temperature
- Strain gauge bridge
- Techniques for solving application problems

### Practical session

### STANDARDS AND CERTIFICATION/ APPROVAL

- Authorities
- Marking
- Apparatus and systems certification
- Systems descriptive documentation

### INSTALLATION

- Relevance of codes of practice
- Interpretation of IEC79-14
- Safe area requirements
- Safe area apparatus
- Interconnecting cabling and junction boxes
- Hazardous area apparatus

### Practical session

### INSPECTION AND MAINTENANCE

- Interpretation of IEC79-17
- Grades of inspection
- Requirements for IS
- Use of tools
- Procedures
- Test equipment suitability

### FAULTFINDING AND COMMISSIONING

- Safe methods
- Earthing requirements
- Common problems
- Loop testing
- Repairs

### SUMMARY, OPEN FORUM AND CLOSING

