Practical

INTRINSIC SAFETY

for Engineers & Technicians

YOU WILL LEARN:

- **How to design and install safe working systems using Intrinsic Safety (IS)**
- **A solid grounding in Intrinsic Safety**
- **How to apply the National and International Standards**
- **The vital issues of grounding and bonding**
- **How to fault find intrinsic safety problems**
- **How to guarantee a safe installation**

WHO SHOULD ATTEND:

- **Instrumentation and Control Engineers**
- **Design Engineers**
- **Electrical Engineers**
- **Instrument Technicians**
- **Engineering Managers**

IDC TECHNOLOGIES

Technology Training that Works

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 I/O 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. The workshop also includes discussion on the new European ATEX Directives that come into force in July 2003. 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.

WORKSHOP OBJECTIVES

Practical Intrinsic Safety for Engineers and Technicians is designed for personnel who require a detailed knowledge of the application of IS and explains the principles of this method of electrical protection. The application of IS is used to illustrate the principles and to provide worked examples of the design, installation and maintenance of individual instrument I/O loops.

At the end of the workshop, delegates will have an understanding of the system approach to IS and be able to work with IS instrument loops from equipment selection through to maintenance.

PRACTICAL SESSIONS

Practical sessions include:

- PLC switch input compatibility
- Fault-find (safely) a simple IS switch system with wiring faults
- Safely fault-find a 4-20mA transmitter loop with five faults
- Review a hazardous area loop as to whether it has been correctly certified
- Review and redesign three alternative IS circuit arrangements

THE PROGRAM

DAY ONE

HAZARDOUS AREA OVERVIEW
- Explosion consequences
- Definition of Hazardous Areas
- Properties of gases
- Protection requirements
- Apparatus classification definitions

PRINCIPLES OF IS (OR Ex 'i')
- Background and history
- Energy limiting concept
- Gas ignition curves
- Infallible components
- Circuit design
- Hazardous area apparatus
- Simple apparatus
- Safe area associated apparatus
- Interfaces
- Shunt-diode safety barriers
- Galvanic isolators
- Systems concepts

GROUNDING AND BONDING
- Basic principles
- Requirements for IS systems
- Noise and interference control
- IS grounding requirements
- System grounding approach
- Static protection
- Lightning protection

'Ex' METHODS OF PROTECTION
- Usefulness in considering instrumentation
- Basic Principles of:
  - Containment: Ex d
  - Separation: Ex p, o, q, m
  - Construction: Ex, n, e
  - Special: Ex, s
  - Design: Ex ia & ib

APPLICATIONS: THE APPROACH TO IS LOOPS
- Basic of I/O systems
- Switch/Status Inputs/Outputs
- Analogue Inputs/Outputs
- Digital/Data I/O

DAY TWO

ADVANCED APPLICATIONS
- Low level measurements
- Temperature
- Strain Gauge Bridge
- Analogue and digital data signal transfer

STANDARDS AND CERTIFICATION
- Authorities
- Documentation
- Marking and identification
- Apparatus certification
- Interconnected apparatus
- Systems certification
- Systems descriptive documentation

INSTALLATIONS
- Codes of practice
- Safe area requirements
- Safe area apparatus
- Interconnecting cabling
- Hazardous area junction boxes
- Hazardous area apparatus
- User requirements

APPARATUS SELECTION
- Suitability
- Choice of protection technique
- Weatherproofing

MAINTENANCE
- Commissioning
- Inspection requirements
- Loop testing
- Fault finding
- Common problems
- Planned maintenance
- Safe methods
- Test equipment suitability

Ex 'i' SYSTEMS
- Old and new approaches
- Future developments
- I/O systems
- FieldBus systems

ATEX
- Structure of ATEX
- Practical implications

> *Excellent Instructor*
>
> A. van den Berg

ON-SITE TRAINING

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