

€ TRAINING

Fire Alarm Systems: Codes & Standards
Requirements for the Installation, Verification
and Testing



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Introduction:

A fire incident is the worst nightmare for any operating company; fire and gas detection systems are deployed to continuously monitor plant activity and in case of hazardous conditions initiate appropriate actions. These systems need to work from the detection of hazardous gases up to a proper plant shutdown. They are critical to plant safety and their efficiency and reliability are of utmost concern not only to plant operators but also to the environmental & business insurance authorities. These systems require a high level of expertise and detailed design and integration to perform effectively.

Fire and gas detection design techniques that are currently in use are often considered to be unsatisfactory due to their nature of being rule-of-thumb and experience-oriented without any real ability to quantify risk. This has resulted in systems that are either over- or under-designed. The development of ISA-TR-84.00.07 resulted in a comprehensive framework for performance-based fire and gas design. This training course describes the techniques recommended in this technical report, along with hands-on use of the techniques and associated software tools. This training course has been designed to cover an introduction to the fire and gas system, including associated hardware and wiring. In addition to covering the hardware, the training course will explore the required software logic that must be programmed into the system to meet the needs of the plant's shutdown philosophy. Upon completion of the training course, participants will have a better understanding of the operations, maintenance, and testing associated with a fire and gas system.

Course Objectives:

At the end of this course the participants will be able to:

- Describe the main types of smoke detectors and their working principle
- Understand the working principle of the different types of heat detectors
- Describe the function of the VESDA system
- Know the typical loop architecture of smoke/ heat detectors
- Describe different types of fire detectors and their principle of operation
- Specify the appropriate type of fire detector for the service
- Describe the purpose of Optical Integrity optional
- Troubleshoot and identify problems with fire & gas monitoring systems
- Describe the principle of operation of Hydrocarbon Gas Detectors

Targeted Audience:

- Managers & Supervisors
- Fire Systems personnel/end users and Fire Responders
- System Design, Fire Protection and Loss Prevention Engineers
- Safety Professionals working in Health, Safety and Environmental Protection
- Instrument and electrical technicians and engineers

Course Outlines:

Unit 1: Introduction/ Selecting the Category of Protection and Coverage/ Detector Zones and Alarm Zones:

- Planning the system
- The role of fire risk assessment and fire engineering BS 5839-1, NFPA 72
- Type of system
- Servicing arrangements - planning flowchart and category
- The meaning of a detection zone and alarm zone
- The purpose of detection zones, configuration guidelines, and detection zone safeguards

Unit 2: Which Type of Fire Detection and Alarm System/ Detector Suitability/ Detector Coverage

- Conventional systems
- Detection zones
- Detectors and call points
- Addressable systems - detectors and call points and digital addressable systems
- Operation of analog addressable detectors
- General fire system engineering principles - detector selection and types

Unit 3: Manual "Break Glass" Call Points/ Limitation of False Alarms/ Means of Giving Warning to Occupants:

- Siting of manual call points
- Categories of false alarm and causes
- Requirements for service technicians
- Protection against electromagnetic interference
- Performance monitoring of newly commissioned systems, system management, servicing, and maintenance
- Audible alarms in noisy areas, alarm zones, and external fire alarm devices

Unit 4: Control and Indicating Equipment/ Power supplies/ Cabling Considerations:

- Siting of control and indicating equipment
- Location of origin of the fire and Security of control equipment
- Networked control panels, mains supply-standby supply; life protection and property protection
- Calculation of standby battery capacity
- Recommended cable types and mechanical protection of cables
- Segregation

Unit 5: Communication with the Fire Service/ System Installation/ Maintenance:

- Automatic transmission of alarm signals and category
- Methods of automatic transmission
- Standards for alarm receiving centers and siting of equipment
- Installation work, inspection, testing, commissioning, and handover
- Routine testing
- Servicing