
F&G Detection System Design

A.- General objective

Develop the necessary skills for the design of fire and gas detection systems that guarantee optimal coverage of areas at risk of fire, explosions or toxic cloud in industrial plants and at the same time minimize the possibility of false alarms in the areas to be protected.

B.- Specific objectives:

1. Recognize the functions of a Fire and Gas Detection (F&G) system and its application in industrial plants.
2. Recognize the regulations and criteria required for the design of an F&G detection system (NFPA and ISA TR 84.00.07 standards).
3. Know the methodology and tools available to determine the optimal location of fire and gas detectors.
4. Evaluate the existing technologies of fire and gas detectors to determine the most suitable to be applied in each case.
5. Apply the knowledge acquired in a real case study.

B.- Addressed to:

Aimed at professionals who work in the area of risk analysis and assessment, in the design and operation of safety instrumented systems for the detection of fire and gas in industrial plants with risks of fires, explosions and toxic gas leaks.

C.- Methodology:

- "Online" modality course.
- Theoretical / practical – Analysis of a case study
- Use of software tools to calculate the extent of the consequences of gas leaks and fires.
- Use of tools for optimal location of fire and gas detectors. Deployment of coverage maps and risks of gas dispersion and radiation due to fires.
- Workshop adaptable to the process of each client, increasing the benefits of the course.

D.-Content

Fundamentals of fire and gas detection (F&G) systems

- Role and action of fire and gas detection.
- performance requirements.
- Development philosophy of an F&G system.
- Industry standards, regulations and codes of practice (NFPA, API, IEC).
- Required documentation.

Determination of the extent of the consequences associated with gas leaks and fires

- What is a Consequence Analysis?
- What is a Consequence Analysis used for?
- Consequence Analysis Methodology
- Basic concepts and definitions
- Identification of hazards and definition of scenarios
- Fire Jet (Jet Fire).
- Burning pool (Pool Fire).
- Flash Fire.
- Burst.
- dispersion of toxic gas.
- Calculation and simulators of consequences.

Probability of events and frequency of failures

- Events.
- Event trees.
- Event frequency.
- Weather data.
- Calculation of required coverage of the F&G system.
- Identification of scenarios that generate fire events.
- Identification of scenarios that generate gas events.
- Analysis of the coverage requirement of each scenario based on its level of risk and the accepted tolerable values.

design considerations

- Definition of zones.
- Flame detectors: UV, UV / IR, IR, IR3.
- Gas Detectors: Catalytic, Toxic Gas, Semiconductor, Electrochemical Cell, Open Path Laser, Infrared Gas Detection, Open Point and Path IR, Ultrasonic Gas Detection.
- Installation requirements.
- Voting schemes and false alarms.

fire detection

- Generation of fire puddle and fire jet flame graphs based on simulation results.
- Definition of obstacles and shadows in the fields of vision of flame detectors.
- Projection of vision traces of flame detectors.
- Generation of risk density maps for fire events.
- Generation of fire detection coverage maps.
- Risk-based fire detection coverage calculation.

gas detection

- Generation of scatter plots of flammable and/or toxic gases based on simulation results.

- Generation of risk density maps for gas events.
- Generation of gas detection coverage maps.
- Risk Based Gas Detection Coverage Calculation.

Case study in location of flame detectors

Gas detector location case study

E.-Required tools

- A personal computer with internet connectivity, headphones and microphone is required.
- The Power Point presentations used during the course will be delivered as well as the supporting material in electronic format.
- All online sessions will be recorded and participants will be given access so that they can be downloaded.
- Distribution of the demo version of the help software for the location of F&G sensors.

F.-Duration

20 hours (16h theory and 4h practical workshop).