



Process Safety Academy

Courses 2026

JOIN NOW

The global learning centre for sustainably improving process safety expertise

Excellence in process safety requires that the right people, with the appropriate skills, implement properly designed process safety programs, motivated by the right organizational culture.

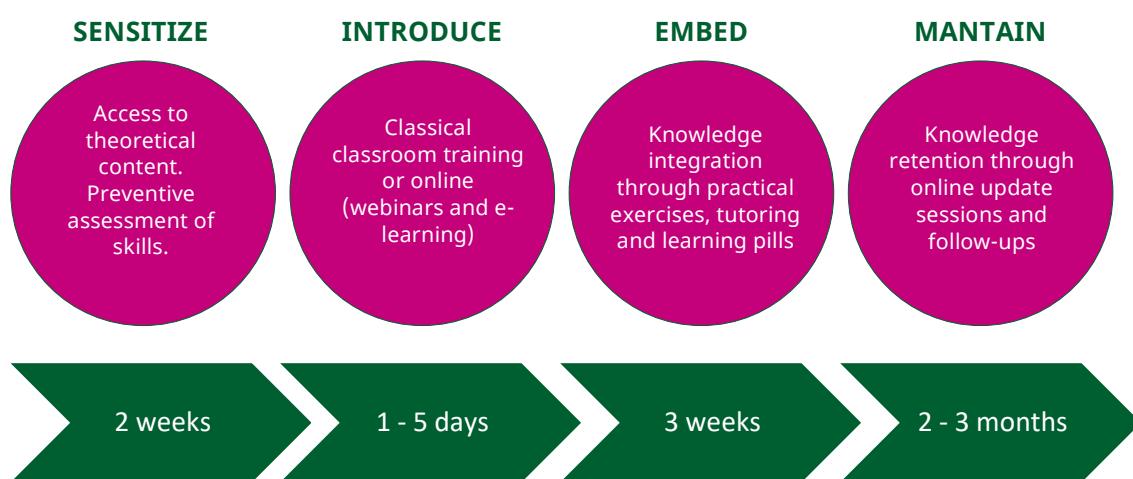
DEKRA Process Safety Academy **introduces, embeds and maintains** process safety related skills in your organization. With more than 30 years of experience, our team of highly qualified experts, senior professionals and scientists, makes us the global process safety experts who care about your learning.

Different types of target	Operators, technicians, supervisors, engineers, managers,
Different levels of learning	Introduction, basic, intermediate, expert applications
Different languages	English, German, Spanish, French, Italian, Chinese, Portuguese
Training Programs	Effective, impactful, globally consistent, sustainable
Different learning methods	Corporate programs, open courses, webinars, mentoring,
Teachers	Highly Qualified Process Safety Consultants

Our skills development programs

We know how to turn training into competency

Training alone does not mean competence. People tend to forget very quickly and, after a few weeks, can only memorize a small percentage of the acquired knowledge. True learning requires experience, support and mentoring, verification and monitoring over time. Our competency development programs are based on the following important learning principles:



DEKRA Process Safety Academy

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For more information on our business solutions and skills development programmes, please call us on +39 02 89929 628 or write to segreteriaPS.italy@dekra.com

OVERPRESSURE VENTING DEVICES (DIERS)

Course Objectives

Explain methods for sizing overpressure venting systems using DIERS methodology. The DIERS methodology is applied in cases where the overpressure is generated by ongoing runaway reactions.

Provide indications on how to collect and use the data necessary for vent sizing, but also on the characterization of the reactor system during the overpressure scenario, analysing cases of single-phase and two-phase discharges.

Define the appropriate timing in order to have a correct sizing within a new project or a critical review of safety valves on an existing plant.

.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

DATES:

to be scheduled on request

Program

Safety devices

- Terminology
- Normative references
- Safety valves and rupture discs
- Measurement, regulation and control systems
- Collection and treatment of emergency discharges
- Identification of pressure systems
- Identification of accident scenarios

Sizing of single-phase outflows

Sizing of Two-Phase Venting Devices for Non-reactive Systems

Sizing of Two-phase venting devices for reactive systems (DIERS)

- Reactive systems
- Two-phase sizing

DIERS Methodology

Target Audience

The course is intended for HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed at Public Administration officials and technicians who need to evaluate process safety aspects.

Minimum requirements for effective participation

- Familiarity with basic chemistry and physics concepts.
- Participation in the course "Thermal Stability and Characterization of Fugitive Reactions" is recommended

PED DIRECTIVE 2014/68/EU

Course Objectives

Understand the regulatory approach to pressure equipment and the changes introduced by the PED Directive (2014/68/EU).

Provide the minimum knowledge set to be able to properly manage all activities related to the acquisition, implementation and modification of pressure equipment, according to legal obligations.

DURATION:
8 h (divided into 2 modules of 4 h)

COST:
600 € + VAT

TIMETABLE:
9:00-13:00

DATES:
to be scheduled on request

Program

Legislation

- Legislative outlines and conceptual differences between the old and the new regulatory approach
- The PED Directive (2014/68/EU): innovations and differences compared to 97/23/EC
- Essential Safety Requirements
- Conformity assessment procedures

Commissioning and verification

- Provisions for commissioning and related declarations
- Verifications of the first installation and related exemptions
- Periodic verifications
- Reporting and management of plants built before 29/05/2002
- Reporting of piping and containers for liquids
- Repair and modifications of pressure equipment

Target Audience

The course is intended for HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed at Public Administration officials and technicians who need to evaluate process safety aspects.

Minimum requirements for effective participation

- Familiarity with basic chemistry and physics concepts.

HAZARDOUS AREA CLASSIFICATION METHODS FOR GASES / VAPOURS / DUSTS: GOOD PRACTICES AND PRACTICAL EXAMPLES

Course Objectives

Provide basic knowledge related to explosions of flammable liquids, gases and vapours, and combustible dusts.

Define the essential tools for Hazardous Area Classification (HAC), according to harmonized European standards.

Illustrate the main contents of the Explosion Protection Document

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

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Program

Flammable atmospheres

- Explosions of flammable liquids, gases and vapours
- Explosions of combustible dusts
- Ignition sources
- Explosion prevention and protection

Classification of hazardous areas

- Regulatory references
- Hazardous Area Classification for liquids, gases and vapours

- Hazardous Area Classification for combustible dusts
- The Explosion Protection Document
- **Common ATEX issues exemplified by case histories from DEKRA's experience**
- The reduction of classified areas
- Technical solutions for zone downgrading

Target Audience

The course is intended for HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed at Public Administration officials and technicians who need to evaluate process safety aspects.

Minimum requirements for effective participation

- Familiarity with basic chemistry and physics concepts.

IGNITION SOURCES FOR FLAMMABLE ATMOSPHERES: UNI EN 1127-1

Course Objectives

Identify, evaluate and quantify possible ignition sources for a flammable atmosphere, according to the general principles outlined in EN 1127-1.

Evaluate the effectiveness of heat-related ignition sources, in relation to the properties of the flammable substances involved and the process equipment under analysis.

Understand the nature, causes and consequences of phenomena related to static electricity, so as to properly assess the risk of ignition due to the possible presence of electrostatic charges in process equipment and take appropriate safety measures.

DURATION:

8 h (divided into 2 modules of 4 h)

COST: 600 € + VAT

TIMETABLE: 9:00-13:00

DATES:

to be scheduled on request

Program

Regulatory requirements

- Legislation regarding fire and explosion hazards
- The role of ignition sources
- EN 1127-1 standard: General criteria for the explosion prevention

- Ionizing radiation
- Ultrasonics
- Adiabatic compression and shock waves
- Exothermic reactions

Ignition sources

- Hot surfaces
- Flames and hot gases (including embers)
- Mechanical Sparks
- Electrical equipment
- Stray electric currents
- Static electricity
- Lightning
- Electromagnetic waves

Static Electricity

- Generation and accumulation of electrostatic charges
- Discharge mechanisms
- Prevention charge build-up

Electrostatic discharge control

- Control when handling liquids and solids
- Hazardous operations
- Grounding and bonding

Accident analysis

Target Audience

The course is intended for HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed at Public Administration officials and technicians who need to evaluate process safety aspects.

Minimum requirements for effective participation

- Familiarity with basic chemistry and physics concepts.

ATEX DIRECTIVES 34/2014/UE AND 1999/92/EC: COMPLIANCE OF EQUIPMENT

Course Objectives

Provide basic knowledge related to explosions of flammable liquids, gases and vapours, and combustible dusts.

Illustrate the legal requirements for plants with an explosion risk and equipment installed in classified areas.

Outline the documentation required for ATEX compliance from both the manufacturer's and user's perspective.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

*to be scheduled
on request*

Program

Flammable atmospheres

- Explosions of flammable liquids, gases and vapours
- Explosions of combustible dusts
- Ignition sources
- Explosion prevention and protection

- Compliance of equipment in hazardous areas
- ATEX marking
- Conformity of pre-ATEX and post-ATEX equipment
- Electrical apparatus in explosive atmospheres: protection modes
- Non-electrical equipment for explosive atmospheres: protection principles

The ATEX Directives

- The ATEX Manufacturers Directive 95 (34/2014/EU)
- The ATEX Users Directive 137 (1999/92/EC)

Case Studies

- The “reconditioning” of pre-ATEX equipment

ATEX compliance

- Compliance of electrical and non-electrical equipment

Target Audience

The course is intended for HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed at Public Administration officials and technicians who need to evaluate process safety aspects.

Minimum requirements for effective participation

- Familiarity with basic chemistry and physics concepts.
- Participation in the course " IGNITION SOURCES FOR FLAMMABLE ATMOSPHERES: EN 1127-1" is recommended.

CRITERIA AND METHODOLOGIES FOR QUANTIFIED RISK ANALYSIS IN THE WORKPLACE

Course Objectives

Provide the tools and criteria for conducting a Risk Analysis of workplaces with a quantitative approach, allowing you to evaluate the raw risk (without barriers) the mitigated risk (with barriers in place) and the possible need for additional barriers. A quantified approach allows for the most objective assessment possible, highlighting the most significant risks, the importance of barriers, and the priority of improvement efforts.

DURATION:
8 h (divided into 2 modules of 4 h)

COST:
600 € + VAT

TIMETABLE:
9:00-13:00

DATES:
to be scheduled on request

Program

Introduction to Workplace Risk Analysis Requirements

Why conduct a quantified risk analysis

Concept of hazard, probability and risk

Risk measurement and references

The concept of 'tolerable' risk

Risk tolerance criteria

Risk matrices

Workshop

Target Audience

The course is aimed at HSE managers, company RSA/SPM, prevention and protection service officers.

Minimum requirements for effective participation

Basic concepts of safety in the workplace

GET THE BEST OUT OF YOUR HAZOP ANALYSIS: TOOLS AND TRICKS

Course Objectives

Acquire the techniques to be able to efficiently participate in a HAZOP study; identify and quantify potential accidental events related to a production process; assess the criticality of the risk associated with them through the definition and use of a risk matrix and a tolerability criterion; verify the adequacy of the control and safety systems.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

calendar p. 32

Program

HAZOP Pillars

Risk analysis

- What is a HAZOP
- Why and when to do a HAZOP
- Other risk analysis techniques
- References and standards

The HAZOP methodology

- Organization of a HAZOP Study
- Identification of nodes, deviations and guidewords
- The HAZOP Approach

HAZOP Study of Batch Systems

Risk assessment

- Risk Tolerability Criteria and Risk Matrices
- Barriers: prevention and protection
- FTA
- LOPA
- Consequence Analysis

HAZOP Study Software

Hazop Study Preparation

- Working Group
- Organizational
- Documentation
- Logistics

Practical exercise - Qualitative HAZOP

Practical exercise - Semi-quantitative HAZOP

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers

Minimum requirements for effective participation

- "CRITERIA AND METHODOLOGIES FOR QUANTIFIED RISK ANALYSIS IN THE WORKPLACE " course or Familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk)
- Ability to read and analyse a P&ID

HAZOP LEADERSHIP

Course Objectives

Refine the techniques needed to be able to conduct a HAZOP Study as HAZOP Leader; quantify risk by determining severity of effects and probability of events, using databases; coordinate a HAZOP team; prepare a HAZOP Study, conduct sessions and prepare a HAZOP report; identify the reliability of existing barriers and define the minimum reliability of any recommended barriers.

N.B. The "HAZOP Leadership" module is complementary to the basic 2-day "HAZOP semi-quantitative" module.

The course provides the necessary topics to take the HAZOP Leader certification examination at DEKRA Testing and Certification.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

*to be scheduled
on request*

Program

HAZOP Pillars

Introduction to the required soft skills

Running, recording and managing a HAZOP Study

- The HAZOP Leader
- The HAZOP Team
- Roles and responsibilities
- Conduct the HAZOP study
- The HAZOP Report

Common Mistakes

- HAZOP
- Barriers
- Recommendations

HAZOP procedures

Practical exercise/Role play

Target Audience

The course is designed for HSE managers, corporate ASPPs and RSA/SPM, manager, maintenance workers, process and safety engineers.

Minimum requirements for effective participation

- "CRITERIA AND METHODOLOGIES FOR QUANTIFIED RISK ANALYSIS IN THE WORKPLACE" course or familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk)
- "SEMI-QUANTITATIVE HAZOP: IEC 61882" course
- Ability to read and analyse a P&ID, Cause & Effect Matrix, Heat & Material Balance

Module 2 – Risk Analysis – QRA 3

FAULT TREE ANALYSIS (FTA), EVENT TREE ANALYSIS (ETA), BOW-TIE

Course Objectives

Evaluate the frequencies of occurrence of events or accident scenarios, considering possible barriers with their properties (independence, effectiveness and reliability).

Define the main parameters involved in estimating frequencies.

Correctly interpret the results of frequency analysis..

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

DATES:

*to be scheduled
on request*

Program

Overview of risk and tolerability concepts

MTTR, MTBF, PTI

Definition and analysis of barriers

Graphical representation of logical relationships: FTA and ETA

Independence, effectiveness, reliability

Bow-tie

Notes on set theory and logical relations

Calculation methods

Reliability of basic events and how to determine it

Interpretation of results: minimal cut-set and sensitivity

Target Audience

The course is aimed at HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed for Public Administration officials and technicians who need to evaluate process safety aspects

Minimum requirements for effective participation

- "CRITERIA AND METHODOLOGIES FOR QUANTIFIED RISK ANALYSIS IN THE WORKPLACE " course or familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk)

CONSEQUENCE MODELLING OF ACCIDENTAL EVENTS

Course Objectives

Understand the main physical phenomena resulting from incident events involving hazardous substances and related mathematical modelling.

Provide an overview of some widely used software models.

Define criteria, limits of applicability and plausibility.

DURATION:

16 h (divided into 4 modules of 4 h)

COST:

1,100 € + VAT

DATES:

*to be scheduled
on request*

Program

Physical consequences of accidental events

- Mathematical modelling of effects
- Determination and modelling of the source term

Main models models of physical consequences

- Physical consequences simulation models:
 - Dispersion
 - Fires

- Explosions
- BLEVE

Simulation models of environmental effects:

- Release of substances on soil
- Groundwater diffusion and dispersion
- Contamination of closed basins and effects on aquatic life
- Release in sea and drift of hydrocarbons

Practical exercise

Target Audience

The course is aimed at HSE managers, company RSA/SPM, manager, maintenance engineers, process and safety engineers.

Minimum requirements for effective participation

"CRITERIA AND METHODOLOGIES FOR QUANTIFIED RISK ANALYSIS IN THE WORKPLACE" course or familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk).

RISK RECOMPOSITION

Course Objectives

Provide the tools and criteria to perform a Quantitative Risk Analysis (QRA), which aims to evaluate the risk associated with a facility in terms of frequency of events, magnitude of consequences, and individual and societal risk to the public.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

DATE:

to be scheduled on request

Program

Quantitative Risk Assessment (QRA)

- Why perform a QRA
- Basic Concepts
- Hazard identification
- Frequency estimation

Risk determination

- Individual Risk
- Social Risk

Risk acceptability criteria

Use and interpretation of results

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers

Minimum requirements for effective participation

- "Criteria and Methodologies for Quantified Risk Analysis in the workplace" course of familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk)
- "Fault Tree Analysis (FTA), Event Tree Analysis (ETA), Bow-Tie" course or familiarity with methodologies for calculating accidental event occurrence frequencies
- The "Consequence Modelling of Accidental Event" course or familiarity with the methodologies used for incident modelling.

CRITERIA AND METHODOLOGIES FOR QUANTIFIED RISK ANALYSIS IN THE WORKPLACE

Course Objectives

To provide the tools and criteria for conducting a Risk Analysis of workplaces with a quantitative approach, allowing you to evaluate the raw risk (without barriers) the mitigated risk (with barriers in place) and the possible need for additional barriers. A quantified approach allows for the most objective assessment possible, highlighting the most significant risks, the importance of barriers, and the priority of improvement efforts.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Program

Introduction to Workplace Risk Analysis**Requirements****Why conduct a quantified risk analysis****Concept of hazard, probability and risk****Risk measurement and references****The concept of 'tolerable' risk****Risk tolerability criteria****Risk matrices****Workshop**

Target Audience

The course is aimed at HSE managers, company RSA/SPM, prevention and protection service officers.

Minimum requirements for effective participation

- Basic concepts of safety in the workplace

SEVESO III AND THE IMPACT OF NATURAL EVENTS (NATECH)

Course Objectives

To illustrate the technical and administrative requirements for establishments falling within the scope of the regulations, also in the case of new installations or modifications.

Give evidence of the contents required for Safety Reports/Technical Safety Reports, which include in particular the identification of risks and their management.

To provide context for the assessment of impacts from natural events (NaTech) within the Seveso Directive.

To evaluate the actions to be taken by Managers and Employers regarding their obligations in managing NaTech risk.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

DATE:

to be scheduled on request

Program

Directive 2021/18/EU

- Technical requirements for upper and lower threshold establishments

The Safety Report

- Identification of major accident risks
- Main techniques of risk analysis and identification of accident scenarios

- Assessment Methodologies:
 - RAPID N: Rapid Natech Risk Assessment Tool
 - UNI/TS 11816-1:2021: Guidelines for the management of NaTech events within establishments with major-accident hazards - Part 1: General requirements and earthquakes

Contents of the Notification Form (Annex 5)

NaTech events

- State of the art (EUR21292EN "State of the art in NaTech Risk Management")
- Typologies:
 - Earthquake
 - Tsunami
 - Floods
 - Tornadoes/Hurricanes

The Seismic Risk

- The seismic phenomenon in Italy
- Seismic risk assessment and management: regulatory obligations for managers and employers
- Seismic vulnerability assessment of buildings and structures

NaTech risk management - Prevention and Protection

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers.

Minimum requirements for effective participation

- Preliminary view of Directive 2021/18/UE

INTRODUCTION TO SAFETY INSTRUMENTED SYSTEMS (SIS): IEC 61508 AND IEC 61511

Course Objectives

To acquire the basic elements of understanding safety instrumented systems, techniques for identifying their needs and requirements, and how to apply them.

Program

Introduction

- Learning from past incidents

Regulatory references: IEC 61508 and IEC 61511

- Definitions
- The security lifecycle

Determination of SIL levels

- Overview of methods for determining SIL levels

Implementation, Operation, and Maintenance

Designing an SIS

Application of control systems to instrumentation

- The concept of integrity
- Safety System Integrity: the requirements for implementation
- Human invoices and reliability

Practical exercise 1

SIL Verification

- Methodology for SIL verification
- Reliability databases

Management systems

Practical exercise 2

Target Audience

The course is aimed at HSE managers, company RSA/SPM, manager, maintenance engineers, and process and safety engineers

Minimum requirements for effective participation

- "Risk Assessment and Tolerability Criteria" course or Familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk)
- HAZOP courses (Semi-quantitative HAZOP: IEC 61882 and Leadership)
- Ability to read and analyse a P&ID

DURATION:

16 h (divided into 4 modules of 4 h)

COST:

1200 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

PROCESS SAFETY MANAGEMENT SYSTEMS (PSM)

Course Objectives

To understand the elements that comprise the process safety management system (PSM), to develop and implement an effective process safety management program that is an integral part of the company's safety culture and daily operations.

To analyze the role and importance of developing and maintaining an effective process safety culture, and the role of indicators in maintaining a PSM program

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Program

What is Process Safety

- Risks in the Process Industry
- Process Safety vs. Occupational Safety
- The culture of process safety

Why MSP

- Incidents that define process safety
- Benefits of MSP
- Integration of MSP into existing management systems

Introduction to the PSM system

- Key Elements: Plan - Do - Check - Act
- The pillars of MSP
 - 1. Involvement in process safety
 - 2. Understand hazards and risks
 - 3. Managing risk
 - 4. Analysis of past incidents
- The regulatory environment

PSM System Implementation

- Promoting a process safety culture
- Management involvement and leadership
- Recommended Actions

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers.

Minimum requirements for effective participation

- "Risk Assessment and Tolerability Criteria" course or familiarity with basic concepts of risk analysis (definition of hazard, frequency of an event, concept of risk)

OPERATIONAL MANAGEMENT AND EMERGENCY MANAGEMENT

Course Objectives

- To structure the organization of daily plant work in order to implement and maintain high Process Safety performance over time.
- To understand the basic principles of emergency management and the development of an emergency plan.

DURATION:
8 h (divided into 2 modules of 4 h)

COST:
600 € + VAT

TIMETABLE:
9:00-13:00

DATES:
to be scheduled on request

Program

Operational management in process companies

Operational control:

- Procedures and work permits
- Availability and qualification of resources
- Formalization of communications

The management of equipment and systems

The human factor in operational management:

- The Culture of Safety

- Education and training of resources

Definition of emergency

Types of emergency

- Internal and External Emergencies
- Emergency Levels

Assessment of minimum resources required

- Personnel
- Fixed and mobile means

Modalities of Communication and alerting

Management mode

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers.

Minimum requirements for effective participation

- Course " Process safety management systems ".
- Basic concepts of risk analysis

SAFETY MANAGEMENT SYSTEMS: INSPECTIONS AND CONTROLS

Course Objectives

To understand and properly manage inspections and checks on critical elements of process plants.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Program

The importance of inspections for plant integrity and maintenance costs

Relationship between inspections, maintenance and failures

The function of inspections and their indicators

Relationship between reliability of systems and barriers and inspections

Definition of Critical Elements

Optimization of inspection time (hints at Risk Based Inspection and Maintenance)

Seveso critical elements

Impact of incomplete or inadequate inspections

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers.

Minimum requirements for effective participation

- Course "Process safety management systems".
- Basic concepts of risk analysis

PROCESS INCIDENT INVESTIGATION TECHNIQUES

Course Objectives

To provide participants with the tools necessary to conduct a comprehensive investigation following accidental events, in order to identify the causes and dynamics of occurrence, in order to prevent a recurrence.

DURATION:
8 h (divided into 2 modules of 4 h)

COST:
600 € + VAT

TIMETABLE:
9:00-13:00

DATES:
to be scheduled on request

Program

Introduction

- Definitions
- A culture of safety
- Why investigate the cause of an accident

Methods of investigation

- Data analysis
- Analysis techniques

Stages of an investigation

- The first measures to be taken
- The evaluation of the event
- The investigator
- Data collection
- Interviews

Root Cause Analysis

- Physical factors
- Human factors
- Organizational factors

Recommendations

- Characteristics
- Short-, medium- and long-term actions

The final report

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers.

Minimum requirements for effective participation

- Course "Process safety management systems".
- Basic concepts of risk analysis

ASSET INTEGRITY AND AGEING MANAGEMENT

Course objectives

To understand the main challenges in equipment aging management to define risk-based operation and maintenance programs to maintain high plant reliability, safety and efficiency.

To illustrate the method for the safe management of equipment aging in Seveso establishments in the context of inspections under Directive 2012/18/UE.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Program

The importance of inspections for plant integrity and maintenance costs

- The function of inspections and related indicators
- Common strategies and their limitations

Basic concepts and tools for making risk-based choices

- Failure probability, consequences, mitigation
- Risk management, qualitative, semi-quantitative and quantitative risk analysis

Introduction to the use of the Methodology for Summary Evaluation of the Adequacy of the Equipment Aging Management Program in Seveso Facilities

Guide to completing the Index Method forms.

Basic concepts of Risk Based Inspection and Maintenance (RBI & RBM): limitations and benefits

- API RP 580 and API RP 581 normative references

Target Audience

The course is designed for HSE managers, corporate RSA/SPM, manager, maintenance, process and safety engineers

Minimum requirements for effective participation

- Course "Process safety management systems"
- Basic concepts of risk and reliability analysis

HAZARDOUS PROPERTIES OF SUBSTANCES: FLAMMABILITY AND INSTABILITY

Course objectives

A sound risk analysis of industrial processes cannot ignore a good knowledge of the behaviour of substances (raw materials, intermediates and finished products) with respect to the hazards of flammability and thermal instability (decomposition).

From this point of view, the course illustrates the main properties useful to characterise substances and the laboratory test methods to obtain them, and provides the participant with the practical tools to apply the data obtained, highlighting their meaning and limits of applicability.

The training session will illustrate the experimental tests to analyse both flammable gases and vapours (Flash Point, Self-Ignition Temperature, etc.) and combustible powders (Minimum Ignition Energy; Basket Test, etc.). There will also be an in-depth examination of the characterisation tests of chemical reactions (Thermal Screening and Calorimetry).

Program

Introduction

- The role of Process Safety Information (PSI)
- Regulatory and legislative aspects

Flammable gases and vapours

- Flammability limits
- Flash Point
- Auto-ignition temperature
- Limiting Concentration of Oxygen

Combustible dusts

- Burning Behaviour BZ
- Minimum Ignition Energy
- Self-ignition temperatures in cloud and layer

Target Audience

The course is aimed at HSE managers, company RSA/SPM, manager, maintenance engineers, process and safety engineers. It is also recommended for civil employees and technicians in the public administration who need to evaluate process safety aspects

Minimum requirements for effective participation

- Familiarity with basic concepts of chemistry and physics.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

FUGITIVE REACTIONS AND THERMAL STABILITY

Course Objectives

To present the main theoretical and experimental techniques to thermally characterize the stability of products and reactions present in industrial processes.

To acquire the basics of a methodology for approaching process scale-up in order to identify hazards present at various stages of process development.

To analyze key techniques for limiting the risk of fugitive reaction occurrence and their mitigation.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Program

Context

- Past incidents
- Regulatory aspects

Characteristics of fugitive reactions

- Fugitive reactions
- Mechanisms of heat generation and dissipation
- Heat losses and adiabatic conditions
- Main experimental techniques for the characterization of fugitive reactions
- Reaction calorimetry and adiabatic calorimetry

Characterization and experimental techniques

- Predictive methods of thermal behaviour and chemical incompatibility

- Obtaining thermodynamic and kinetic data from laboratory tests: definition and optimization of the testing strategy

Security measures

- Measures of prevention and protection from fugitive reactions
- Available techniques (quenching, dumping, drown-out)
- Safety devices (rupture discs, PSV)
- Sizing of rupture discs and PSV (brief outline)

Case studies

Target Audience

The course is aimed at HSE managers, company RSA/SPM, manager, maintenance workers, process and safety engineers. The course is also aimed for Public Administration officials and technicians who need to evaluate process safety aspects

Minimum requirements for effective participation

- Familiarity with basic concepts of chemistry, physics, and thermodynamics.

EMOTIONAL INTELLIGENCE AND SAFETY

Course Objectives

To acquire the basic principles of emotional intelligence to become promoters and role models of a safety-based culture. Start from their own awareness and management of their emotions to understand the fears and feelings in the organization in order to be able to transfer and actively engage people towards a culture of safety. Facilitate participants to become agents of change by leveraging personal awareness, and a humanistic, emotional and learning approach to change.

Program

The principles of emotional intelligence

- Self-awareness
- Awareness of the other
- Management of oneself
- Other Management

Neuroscience and safety

- Empathy to create engagement
- Negative and positive emotions (impacts on safety)
- Feedback
- Teamwork

Becoming a Role Model

- Lead by example
- Positive influence
- Spreading change

Target audience

The course is aimed at safety supervisors and managers (figures defined by 81/08). In addition, to HSE managers, company RSA/SPM, manager, maintenance engineers, process and safety engineers and in general to any employee of any kind and grade from videoterminalists to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

ERROR PREVENTION

Course Objectives

Safe behaviors affect everyone's safety now more than ever.

To define and share behaviors and attitudes, individual and group, functional to the creation and dissemination of a real culture of safety.

To reflect on the obstacles to the spread of a culture of safety and experiment and share solutions and concrete tools to overcome them.

To raise awareness of the value of prevention to develop a proactive culture of safety in which each person becomes a key player for its dissemination.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Program

Culture of safety

Individual and organizational attitude

Link between behaviour and injuries

Human factors and behaviour under stress

Chain of errors, latent and active errors

Spreading the value of prevention

Target Audience

The course is aimed at safety supervisors and managers (figures defined by 81/08). In addition, to HSE managers, company RSA/SPM, manager, maintenance engineers, process and safety engineers and in general to any employee of any kind and grade from videoterminalists to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

ERROR MANAGEMENT AND THE CONCEPT OF PSYCHOLOGICAL SAFETY

Introduction

High motivation and accountability are not enough to create a 360 ° safety culture. Often it happens that despite these people do not communicate the mistakes made for fear of appearing incompetent or "losing face" or work due to a punitive organizational culture, which does not accept mistakes. People tend to blame each other and hide mistakes. This is why, in addition to preventing errors, it is essential to integrate culture with error management through psychological safety. A culture based on psychological safety creates the conviction that you will not be punished or humiliated for giving voice to your ideas, questions, concerns and mistakes, and leads to innovating by learning from mistakes.

DURATION:

16 h (divided into 4 modules of 4 h)

COST:

1,100 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Course Objectives

Have participants learn the characteristics and benefits of a culture based on psychological safety. Acquisition of tools that can build the foundation for a psychological safety culture, within which people perform safely, feel confident to communicate transparently and errors are drastically reduced.

Program

Neuroscience and Culture of Safety

- Risk perception and propensity
- The three dimensions of culture, how to improve them safely
- Empathy and risk communication.
- Teamwork and interdependent attitude

Creating psychological safety to communicate transparently

- Recognize fallibility (versus knowing everything and being right all the time)
 - All team members are involved

Create the motivation to communicate transparently

- Create the logic to speak
- Framing work as a learning problem (not as an execution problem)
- Recognize and make uncertainty explicit.

Create the need to communicate transparently

- Why do this? Advantages and Benefits!
- The power of questions
 - Innovation through learning from mistakes

Target Audience

The course is aimed at safety supervisors and managers (figures defined by 81/08). In addition to HSE managers, RSA/SPM, manager, maintenance, process and safety engineers and in general to any employee of any kind and grade from video operators to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

PERSONAL MENTAL HEALTH AND MENTAL HEALTH IN THE MANAGERIAL ROLE

Foreword

Poor mental health contributes to a loss of productivity in the workplace and research shows that there is a negative and significant correlation between job burnout and job performance. Moreover, employees with mental health problems are twice as likely to be distracted at work and to have serious accidents.

Personal well-being within the organisation is a central driver in the people strategy of organisations that want to be safe, healthy and productive.

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Course Objectives

This training programme for managers has the central aim of raising awareness of the issue, providing participants with the tools to promote mental wellbeing in their own organisations, encouraging the flow down of best practice, with a positive impact on safety, climate, employee engagement and therefore business performance.

Program

Mental wellbeing: conveying the concept correctly, overcoming prejudices and biases, and representing its centrality to process safety and organisational sustainability.

JD-R Model as a tool and roadmap for the promotion of well-being in the company.

Managing role ambiguity.

Sharing key behavioural and management models to promote awareness and strengthen accountability.

Promote the 'lead by example' approach.

Create and support a culture of mental wellbeing by providing tools and practical examples (e.g. CARE Leadership, a catalyst for positivity);

Support managers in developing a roadmap to strengthen, monitor and continuously improve safety-related mental wellbeing within their organisation (Job Demand Resource Model).

Target Audience

The course is aimed at safety officers and managers (figures defined by 81/08). It is also aimed at HSE managers, company RSA/SPM, manager, maintenance engineers, process and safety engineers and in general at all employees of any gender and grade, from video screeners to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

DURATION:

16 h (divided into 4 modules of 4 h)

COST:

1,100 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

RESOURCES AND STRATEGIES TO CATALYZE RESILIENCE AND MENTAL WELLBEING DURING AND AFTER THE PANDEMIC

Introduction

How people **will manage to work in 2024** will determine **the results that will be achieved within our organizations**.

It is more and more important to be able to **help people** (employees and managers) to **work on their physical and psychological energy** to **combat "covid fatigue"** and to **be able to work effectively, with the same level of energy both remotely and in presence**.

To achieve these goals, it is critical that managers develop a leadership capacity for change and support, **the change capable leadership, to catalyze resilience, promote and foster mental health, to effectively guide their people into the *new normal***

DURATION:

16 h (divided into 4 modules of 4 h)

COST:

1,100 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Training Objectives

To teach participants the characteristics and benefits of a change capable leadership, capable of managing changes quickly and effectively, facilitating and developing psychological and mental well-being for oneself and for others. Acquisition of tools capable of building the foundations for the development of one's resilience starting from one's own awareness and self-management to that of others.

Program

- **Psychophysical well-being and resilience: enhancing emotional intelligence, resilience, and agility as core competencies for the future.** **improve psychophysical well-being and performance mindset.**
- **Coping techniques and strategies: mental, physical, relational, and contextual, in action to cope with the dangers of stress and burnout.** **Build resilience to change and provide tools to manage post-pandemic and employee Covid Fatigue.**
- **Gain autonomy in inserting a virtuous home routine in order to** **Sharing models and tools to support development and help employees: from smart working to working smart**

Target Audience

The course is aimed at safety supervisors and managers (figures defined by 81/08). In addition to HSE managers, RSA/SPM, manager, maintenance, process and safety engineers and in general to any employee of any kind and grade from video operators to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

BBS - CULTURAL CHANGE IN SECURITY

Introduction

The pandemic has dramatically accelerated the need to link productivity, **safety and well-being to values, individual behaviours** and, essentially, to the **organizational culture**. Management systems, structures, and business processes make up the perimeter and rules of security, but the key enablers of the actions (or inactions!) that operationally determine security in organizations are ultimately tied to the **behaviours of individuals**. It is therefore essential to **start from the people** in order to **develop mindset and a cultural change based on the BBS**. The latter is a process that creates a safety partnership between management and employees that continually focuses people's attentions and actions on their own and others' daily safety behaviours, thereby **creating a strong behavioural and cultural cohesion toward common organizational safety goals**.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

Training Objectives

Behind every type of effective change there is a cultural and mindset change. However, we are convinced that there is no cultural change without a change in people's behaviour. In order to make an effective change, you need to create a culture in which the strategies, values and behaviors you implement every day are consistent and compatible with each other. The purpose of this course is to provide you with the tools you need to implement and manage cultural change based on BBS principles.

Program

- **Manage the behavioural and decision-making change of the individual and the team from a safety perspective (BBS);**
- **Promote awareness of the new culture focused on behavioral safety, to foster knowledge and behavioral change toward the new H&S culture.**
- **Identify and overcome resistance to change.**
- **Set up a new method to successfully drive change processes towards total safety management in the company.**
- **Avoid major mistakes and the pitfalls of change**

Target Audience

The course is aimed at safety officers and managers (figures defined by 81/08). It is also aimed at HSE managers, company RSPPs, department heads, maintenance technicians, process and safety engineers and in general at all employees of any gender and grade, from video screeners to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

KNOWING HOW TO COMMUNICATE SECURITY: THE VALUE PROPOSITION

Introduction

While it is absolutely necessary for companies to comply with the technical and organizational obligations outlined in the current legislation, it is equally important to ensure the application of adequate and safety behaviours by workers, through specific programs, which envisage the broad and constant involvement of personnel to contribute to the reduction of the accident phenomenon, considering that many studies have identified the human-behavioural factor as the main cause.

In parallel to these specific programs, however, effective communication and storytelling about safety is essential to get people to embrace this value and the behaviours that come with it.

Training Objectives

This training program aimed above all at managers, has the main purpose of **strengthening awareness** of the importance of **communication and knowing how to influence others**, providing participants with the **tools** to be able to **effectively communicate safety as a value**, with a **positive impact on people's behavioural change and therefore on the culture of safety**.

Program

- **Communicate the value of safety more effectively;**
- **Choose from a wider range of techniques and skills to improve communication;**
- **Use Advocacy and Inquiry in a balanced way (when to say and when to ask);**
- **Knowing how to build a Value Proposition tailored to each specific need;**
- **Building and maintaining rapport for better working relationships;**
- **Understanding preferences and the effect they have on communication;**
- **Be more aware of one's preferences and strengths in relation to communication;**
- **Understand the communication process for better results.**

Target Audience

The course is aimed at safety supervisors and managers (figures defined by 81/08). In addition to HSE managers, RSA/SPM, department manager, maintenance, process and safety engineers and in general to any employee of any kind and grade from video operators to workers.

Minimum requirements for effective participation

There are no minimum requirements for participation.

DURATION:

8 h (divided into 2 modules of 4 h)

COST:

600 € + VAT

TIMETABLE:

9:00-13:00

DATES:

to be scheduled on request

TRAINING COURSE CALENDAR

Training sessions will be delivered remotely through Teams platform. Each training will be divided into modules of 4 hours each, according to the dates defined below.

The following dates and contents do not include each training topic described in the previous pages. Special dates or themes not included in the following table can be organised and scheduled on request.

Cod.	CORSO	DURATA	DATA	DATA
ATEX 1	Techniques for classifying areas at risk of explosion due to gas/vapour/dust: best practices and examples of application	8 h	12-13 march	24-25 september
ATEX 2	Identifying, quantifying and preventing ignition sources in areas classified as at risk of explosion	8 h	19-20 march	1-2 october
ATEX 3	How to assess the compliance of equipment in ATEX areas: learning about ATEX Directives 34/2014/EU and 1999/92/EC	8 h	26-27 march	8-9 october
PED 1	Pressure equipment: navigating the PED Directive 2014/68/EU	8 h	8 april	14 october
QRA 0	Giving risk its due weight: understanding and managing the probability and tolerability of events Process Safety	8 h	9-10 april	15-16 october
QRA 1	Getting the most out of HAZOP analysis: tools and tips	16 h	16-17 april 23-24 april	22-23 october 29-30 october
QRA 2	HAZOP Leadership: responsibilities and skills of the facilitator	8 h	7-8 may	5-6 november
QRA 3	Quantified risk analysis: a tool for prioritising investments in company assets	8 h	14-15 april	12-13 october
SIL 1	Introduction to safety instrumented systems (SIS) - IEC 61508 and IEC 61511	16 h	21-22 may	19-20 november
HUM 1	Emotional intelligence and safety	8 h	28-29 may	-
HUM 2	Error prevention	8 h	4-5 june	-
HUM 3	Error management: the concept of Psychological Safety	16 h	11-12 june 18-19 june	-

REGISTRATION FORM

To enrol in the courses, it is necessary to send the form below, duly completed and signed, to **segreteriaPS.italy@dekra.com** at least 15 days in advance of the course date.

COURSE TITLE:

COURSE DATE:

FIRST AND LAST NAME:

ROLE:

SOCIETY:

TELEPHONE:

ADDRESS:

EMAIL:

POSTCODE:

CITY:

Administrative contact person

NAME:

SURNAME:

EMAIL:

SDI CODE

I authorise the processing of my personal data in accordance with art. 13 of Legislative Decree 196/2003 and art. 13 GDPR 679/16. *

I authorise the processing of my personal data for the purpose of sending promotional material concerning DEKRA Italia activities.

I accept the general terms and conditions of sale as specified on page 37. *

* Mandatory field

Signature

GENERAL TERMS AND CONDITIONS OF SALE

1. Scope of application

These General Terms and Conditions shall apply to all training activities between DEKRA Italia S.r.l. (hereinafter referred to as DEKRA Italia) and its customers (hereinafter referred to as the companies that have already participated or will participate in the training activities organized by DEKRA Italia), unless otherwise agreed in writing or otherwise provided by law.

2. Object

DEKRA Italia is committed to providing the training activities proposed in this brochure.

3. Enrolment procedure

Enrolment in one or more courses organized by DEKRA Italia is considered effective with the signing of the Enrolment Form or the transmission of a formal order by the Customer. By returning the signed Enrolment Form, the Customer accepts without reservation these general conditions of sale.

4. Cancellation and cancellation

DEKRA Italia reserves the right to cancel the course if the minimum number of participants is not reached up to 3 days before the scheduled date. In case of cancellation, DEKRA will return to the participants the amount already paid. DEKRA Italia cannot in any case be held responsible for costs and/or damages resulting from the cancellation of the training session. Any written cancellation communicated by the customer within 4 days (will be accepted and fully refunded in case of advance payment. Cancellations will not be accepted and no refunds will be made after these deadlines.

5. Prices, promotional rates and discounts

The training sessions listed in the brochure are provided for a fee, as indicated in the brochure itself.

Prices shown are exclusive of VAT and include educational materials and certificate of participation.

- 8 hours training session € 600 + VAT
- 16 hours training session € 1.100 + VAT

Discounts are provided in the following cases:

- 10% discount for 2 or more employees of the same company who subscribe for the same course; the discount will be applied starting from the second participant; 10% discount for a person subscribing at the same time for 2 or more training sessions during the same year; the discount will be applied from the second training session for which the trainee will register
- 10% discount for public administration employees

Promotions cannot be combined with each other.

Special fees for students that are currently attending the University.

Any other discounts for special cases may be determined from time to time by contacting our sales department.

6. Invoicing

DEKRA Italia will issue an invoice after the course has taken place. Please communicate during registration the unique code for electronic invoicing (SDI) – Italian Company only – or VAT/tax number, and any order number / code to which to refer.

7. Payment

Payment at sight by bank transfer made out to DEKRA Italia S.r.l.

Bank details: Deutsche Bank SpA - Agenzia di Monza (MB), c/c 000000770004 - IBAN IT39C031042040000770004.

Any changes to the terms of payment may be agreed in advance during registration.

8. Training contents

The content of the training is detailed in the programs of the individual courses in the brochure. DEKRA Italia reserves the right to modify these programs in order to adapt them to the level of the participants, the regulatory environment or in order to improve the course content.

9. Intellectual Property

DEKRA Italia holds all copyrights on the training services provided to the Customer; any media used during the training activities remain its exclusive property. In particular, the Customer because of this, is forbidden to directly or because of this, to reproduce, directly or indirectly, in whole or in part, to modify, to disseminate, to market to third parties unrelated to the training provided by DEKRA Italia, the supports used and provided by DEKRA Italia.

10. Responsibility

DEKRA Italia is committed to carrying out the training activities using only qualified personnel. DEKRA Italia is in no way responsible for any failure by third parties to recognize the validity of the certificates issued, nor is it liable for any claims for damages / compensation due to failure to meet the expectations of the customer in respect of the course itself.

11. Warranty

DEKRA Italia guarantees the organization of the means but does not guarantee the result expected by the Customer. The parties agree that DEKRA Italia is not liable for a specific outcome but only for the training service and that it is exclusively within the decision-making and risk sphere of the Customer to make the necessary decisions on the basis of the service provided.

12. Place of jurisdiction

In the event of disputes arising between DEKRA Italia and the Customer in relation to the interpretation and execution of these conditions, the exclusive competent court shall be the Court of Milan.

VIRTUAL PROCESS SAFETY ACADEMY

The DEKRA Virtual Process Safety Academy provides training in all areas of process safety delivered in a digital format for greater access, flexibility and affordability. Our goal is to facilitate and embed learning to ensure that internal competence is developed, demonstrable and sustainable. To expand access to process safety competence training, instruction is provided on 8 core topics and in 9 languages. Backed by expertise in each content area, our courses ensure that participants remain engaged and fully integrate their new skills and knowledge into their daily work



→ <https://it.training.dekra.com/learn>

Your benefits

- Availability in 9 world languages, with standardized, consistent content globally
- Customization and flexibility to accommodate participants' needs
- Savings both in costs and time through e-learning
- An environmentally sound alternative to travel-heavy, in-person training

We have developed 8 process safety training packages:

- HAZOP for participants.
- HAZOP for facilitators.
- Process Safety Management / Organizational Process Safety (OPS).
- Gas/liquid explosions.
- Combustible dust explosions.
- Chemical reaction hazards.
- Incident investigation.
- Layer of protection analysis (LOPA).

Our virtual competence development courses are suitable for production teams, maintenance, engineering, HSE, Research & Development, laboratory members as well as contractors.

We deliver consistent, standardized instruction in nine languages:

- Arabic
- Chinese
- English
- French
- German
- Dutch
- Italian
- Spanish
- Portuguese

OUR PROCESS SAFETY AND SECURITY DATA ACQUISITION SERVICES

Consulting

Process Safety Management

- Process Safety Performance Improvement Program
- Audit of process safety management systems
- Assistance in the elaboration of Safety Reports
- Risk analysis (HAZOP, HAZID, LOPA)
- Functional safety (SIL)
- Industrial accident experts (fires, explosions)

Explosion risk/ATEX conformity

- Compliance Assessment
- Classification of hazardous areas for dusts, gases, vapours, and liquids
- ATEX risk analysis
- Design and sizing of prevention and protection systems

Seveso Directive

- Safety reports, risk analysis, evaluation and modelling of consequences and effects of potential hazards (fire, explosion, toxic release)
- Emergency plans
- Inspection and implementation of Safety Management Systems

Electrostatics

- Electrostatic Risk Assessment
- Measurement of electrostatic properties

Chemical reactions and thermal stability

- Thermal runaway assessment
- Prevention and Protection

Pressure equipment (PED)

- Preparation of Technical Reports and assistance with regulatory bodies
- Sizing of safety devices

Process safety data

Accredited and compliant laboratories for GLP (Good Laboratory Practice) testing

Flammability

- Explosiveness of dusts
- Flammability of gases and vapours

Thermal stability

- Thermal stability of reactions
- Self-heating and stability of dust

Regulatory tests

- Physical-chemical properties (REACH, CLP)
- Classification tests for the transport of dangerous goods (UN)

Electrostatic properties

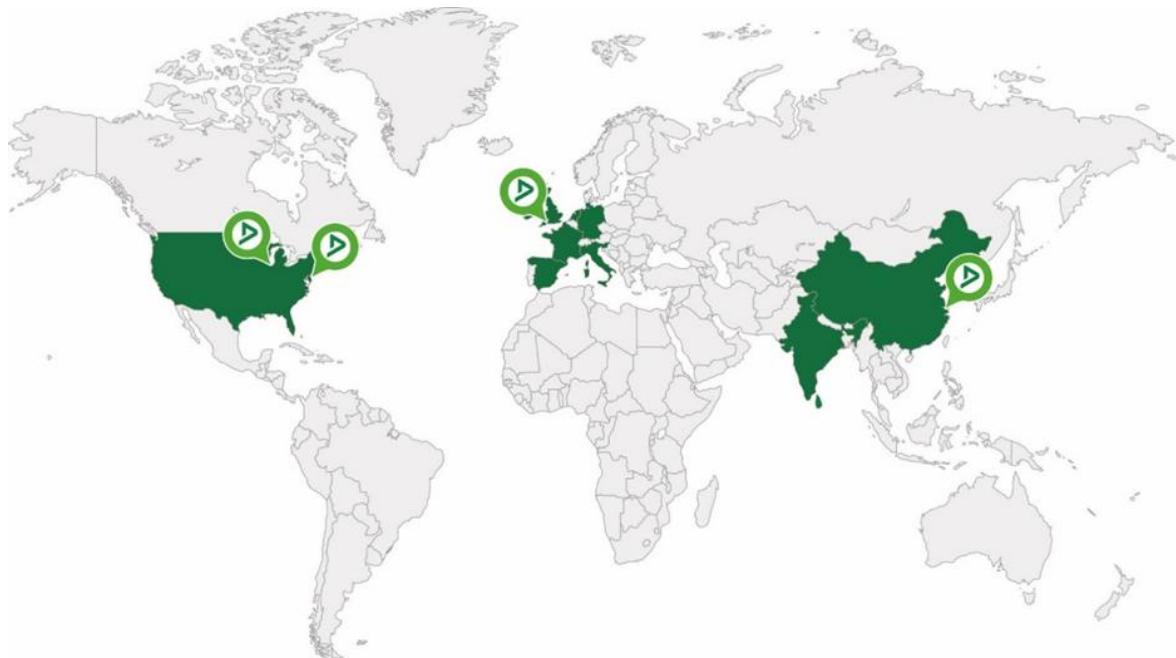
- Chargeability, resistivity and charge decay time
- Conductivity of liquids, films and packages
- Field measurements

We assist clients in choosing the best strategy for defining process safety data to optimize results.

Laboratory equipment

Wide range of laboratory equipment to determine flammability, reactivity, and electrostatic properties of materials.

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