



**International Society of Automation**  
*Setting the Standard for Automation™*



## **Comprehensive safety education from the automation experts**

Covering key topics from safety instrumented systems (SIS), process and safety control, management, and regulations to safety life cycles and integrity levels, protection layers, hazard identification, and risk assessment.

**2023/24 SAFETY TRAINING COURSE CATALOG**

# Essential training for industrial process safety professionals

The functional safety of your facility is essential—not only does a safe operation protect your employees, but it's more efficient, productive, and profitable. As a mission-driven non-profit, the International Society of Automation (ISA) is the perfect partner to help your company achieve your safety goals.

Today's plants and facilities face a lot of challenges. With aging infrastructure, an aging workforce, and increasing financial pressures, a comprehensive safety program is essential. ISA's courses, certificate programs, and resources can provide the building blocks for developing a well-trained, confident staff.

In this catalog, you'll find ISA's scheduled safety training courses. These courses are taught by automation experts who have been vetted by ISA and the courses all conform to ISA's global standards.

You can also tout your skills by earning and displaying ISA safety certificate badges. Certificates are awarded to those who successfully complete the requirements of ISA's related safety courses.

ISA has been serving automation and control professionals for more than 75 years and offers standards development, certification, education and training, webinars, technical publications, and six conferences a year.

Our consensus-based standards are globally recognized, and provide an essential starting point for organizations looking to develop a consistent, standards-based approach to functional safety at every level.

Do you need a more customized approach? Get in touch with one of our learning consultants today for a needs assessment and training plan. Learn more on page 13.



# ISA Safety Certificate Series

ISA and the Automation Standards Compliance Institute (ASCI) offer three certificate programs to indicate an individual's understanding of the ISA/IEC 61511 standard.

Each certificate program includes specialized training on ISA/IEC 61511 and an exam that is offered through testing centers worldwide. If you take the training course and pass the exam, you will be issued an ISA certificate specifying that you have successfully completed the program.



## CERTIFICATE 1

### ISA/IEC 61511 SIS Fundamentals Specialist

This certificate requires the completion of EC50 or EC50E and successful completion of the associated exam. This certificate is required to take the exams for Certificate 2 and 3.



## CERTIFICATE 2

### ISA/IEC 61511 SIL Selection Specialist

This certificate requires completion of EC52 and successful completion of the associated exam. Certificate 1 is a prerequisite.



## CERTIFICATE 3

### ISA/IEC 61511 SIL Verification Specialist

This certificate requires the completion of EC54 and successful completion of the associated exam. Certificate 1 is a prerequisite.



### ISA/IEC 61511 SIS Expert

Individuals who achieve Certificates 1, 2, and 3 are designated as ISA/IEC 61511 Safety Instrumented Systems (SIS) Experts.

**LEARN MORE**  
[isa.org/safetycertified](http://isa.org/safetycertified)

# Safety Instrumented Systems: A Life-Cycle Approach (EC50, EC50E, EC50V)



## Course Formats:

Classroom  
(EC50)  
Courses

Virtual  
Classroom  
(EC50V) Courses

Online, Instructor-  
Guided (EC50E)  
Courses

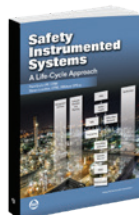
LEARN MORE  
[www.isa.org/EC50](http://www.isa.org/EC50)

Learn how to determine safety integrity levels and evaluate whether proposed or existing systems meet the performance and documentation requirements defined in the ISA 84 (IEC 61511) standard.

This course will help students calculate device failure rates, model system performance for relay and software-based logic systems, and model the impact of different configurations.

## You will be able to:

- Differentiate between process control and safety control
- Implement the ISA84 (IEC 61511) standard
- Evaluate process risk levels
- Select safety integrity levels (SILs) for safety instrumented functions (SIFs) using a variety of techniques
- Analyze the performance of different logic system technologies
- Analyze the performance of various sensor, logic, and final element configurations, as well as the impact of diagnostics, test intervals, common cause, system size, imperfect manual testing, and bypassing
- Determine optimum system test intervals
- Specify and select safety instrumented systems
- Apply the documentation requirements for process safety management, regulations, and industry standards



## Includes textbook:

*Safety Instrumented Systems:  
A Life-Cycle Approach*

by Paul Gruhn, PE, CFSE and  
Simon Lucchini, CFSE, MIEAust CPEng

# Advanced Safety Integrity Level (SIL) Selection (EC52, EC52V)



Safety Instrumented Systems: A Life-Cycle Approach (EC50, EC50E, EC50V)

Advanced Safety Integrity Level (SIL) Selection (EC52, EC52V)

Advanced Design and SIL Verification (EC54, EC54V)

Fire and Gas Mapping: Practical Application (EC56, EC56V)

Boiler Control Systems Engineering (ES15)

Burner Management Systems Engineering (ES16)

Applying Instrumentation in Hazardous (Classified) Locations (ES10E)

ISA's portfolio of standards-based, safety-related resources

## Course Formats:

**Classroom (EC52) Courses**

**Virtual Classroom (EC52V) Courses**

After learning the basics of Safety Integrity Level (SIL) selection in EC50, take Advanced Safety Integrity Level (SIL) Selection to gain additional hands-on examples using a variety of different techniques. This course provides more insight into the factors that determine risk reduction requirements. By building on the foundation set in EC50, these lessons will help students save their companies time and money by optimizing system performance.

### You will be able to:

- Develop and implement different SIL selection techniques within your organization, including risk matrix, risk graph, and layer of protection analysis (LOPA)
- Determine the appropriate level of performance needed of your safety systems
- Help prevent over- or under-designing the system requirements to save your organization time and money



### Includes textbook:

*Safety Integrity Level Selection—Systematic Methods Including Layer of Protection Analysis*

by Edward M. Marszal, PE and Dr. Eric W. Scharpf, MIPENZ

**LEARN MORE**  
[www.isa.org/EC52](http://www.isa.org/EC52)

# Advanced Design and SIL Verification (EC54, EC54V)



## Course Formats:

**Classroom (EC54) Courses**

**Virtual Classroom (EC54V) Courses**

Are your systems secure enough? This course, the third in the ISA safety certificate series, will help students analyze any system technology and configuration to see if it meets international standards. The course also includes additional hands-on examples to help illustrate how to determine if systems are safe enough or if they need to be upgraded.

### You will be able to:

- Analyze any system technology and configuration to see if it will meet the required SIL (Safety Integrity Level)
- Determine if existing systems are safe enough (or whether they need to be upgraded) and whether proposed systems will meet the performance requirements
- Determine the optimum manual test interval for any system, saving your company time and money by not over or under-testing systems

**LEARN MORE**  
[www.isa.org/EC54](http://www.isa.org/EC54)



### Includes textbook:

*Safety Instrumented System Design: Techniques and Design Verification*

By Iwan van Beurden, CFSE, and William M. Goble, CFSE

# Fire and Gas Mapping: Practical Application (EC56, EC56V)

## Course Formats:

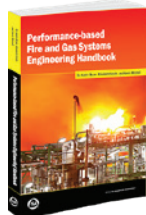
**Classroom  
(EC56)  
Courses**

**Virtual  
Classroom  
(EC56V) Courses**

This course explains how to determine the correct quantity and location of fire and gas detectors to appropriately reduce risk to a tolerable level. This course is part of the Fire and Gas Mapping Specialist Certificate Program.

### You will be able to:

- Identify the hazards that are being mitigated by fire and gas systems (FGS)
- Identify the steps in the FGS safety lifecycle
- Define the elements of a fire and gas detection philosophy
- Explain how to develop a preliminary detector layout
- Discuss how risk is used in performance-based FGS engineering
- Explain how to specify FGS performance requirements
- Apply the principles of detector coverage assessment and fire and gas mapping



### Includes textbook:

*Performance-based Fire and Gas Systems Engineering Handbook*

by Austin Bryan, Elizabeth Smith, and Kevin Mitchell

**LEARN MORE**  
[www.isa.org/EC56](http://www.isa.org/EC56)

Advanced Design  
and SIL Verification  
(EC54, EC54V)

Fire and Gas Mapping:  
Practical Application  
(EC56, EC56V)

Boiler Control  
Systems Engineering  
(ES15)

Burner Management  
Systems Engineering  
(ES16)

Applying  
Instrumentation in  
Hazardous (Classified)  
Locations (ES10E)

ISA's portfolio of  
standards-based,  
safety-related resources

# Boiler Control Systems Engineering (ES15)

## Course Formats:

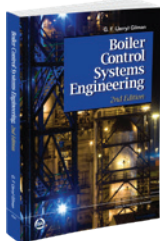
### Classroom (ES15) Courses

Students who take Boiler Control Systems Engineering will learn the symbols used in boiler control, control and ratio control fundamentals, feed forward control, cascade control, and more.

### You will be able to:

- Identify the benefits of improved boiler process control and savings from improved efficiency
- Develop proper control systems documentation
- Apply principles and methods for flow and level measurements to improve boiler operations
- Specify appropriate strategies for flow, level, and pressure control
- Explain how to tune boiler control systems
- Implement analyzer measurements for improved boiler efficiency
- Analyze basic control loops required for boiler operation
- Apply control concepts such as cascade, ratio, and feedforward control for boiler control
- Specify appropriate safety system interlocks
- Evaluate process requirements for writing instrumentation specifications

**LEARN MORE**  
[www.isa.org/ES15](http://www.isa.org/ES15)



### Includes textbook:

*Boiler Control Systems Engineering, Second Edition*

By G. F. (Jerry) Gilman



# Burner Management Systems Engineering Using NFPA Code 85 and ANSI/ISA77 Standards (ES16)

## Course Formats:

**Classroom  
(ES16)  
Courses**

Students in Burner Management Systems Engineering will learn safe start-up, monitoring, and shutdown of multiple burner boiler furnaces. This course covers the causes of furnace explosions and the relationship between burner management systems and boiler control systems.

### You will be able to:

- Identify the primary cause of furnace explosions
- Apply NFPA 85 Code
- Use design basis documentation and flow sheets
- Identify equipment needs for gas, oil, and pulverized coal systems
- Explain prefiring purge requirements for both single and multiple burner boilers
- Follow the ignition-permissive establishment procedures for single and multiple burner systems
- Implement flame failure protection for specific systems
- Design alarms, interlocks, and emergency shutdown systems
- Describe the function and use of the burner front, operator interfaces, and logic systems

**LEARN MORE**  
[www.isa.org/ES16](http://www.isa.org/ES16)



### Includes standard:

NFPA Standard 85 Code 2019,  
*Boiler and Combustion Systems  
Hazards Codes*

Boiler Control  
Systems Engineering  
(ES15)

Burner Management  
Systems Engineering  
(ES16)

Applying  
Instrumentation in  
Hazardous (Classified)  
Locations (ES10E)

ISA's portfolio of  
standards-based,  
safety-related resources

# Applying Instrumentation in Hazardous (Classified) Locations (ES10E)

## Course Formats:

**Online, Instructor-Guided (ES10E) Courses**

In this course, students will learn a detailed, systematic approach to specifying and implementing instrumentation in hazardous locations. Includes relevant standards from the National Fire Protection Association (NFPA), National Electrical Manufacturers Association (NEMA), International Electrotechnical Commission (IEC), American Petroleum Institute (API), and ISA.

## You will be able to:

- Identify process and environmental factors that determine classification
- Describe and use procedures for electrical classification
- Use applicable standards to develop classification drawings for gases, dusts, and fibers
- Describe the basic principles of protection
- Select explosion proof apparatus for specific applications
- Determine when and why explosion seals should be used
- Specify the use of intrinsically safe and nonincendive systems
- Select the appropriate protective techniques for different hazards
- Select alternative protective techniques for reduced cost

## Includes ISA Standards:

- ANSI/ISARP12.06.01-2003, *Intrinsic Safety*
- ANSI/ISATR12.24.01-1998 (IEC 60079-10 Mod), *Class I, Zones 0, 1, and 2*
- ANSI/ISA12.01.01-2009, *Definitions*
- ANSI/ISA12.12.01-2013, *Nonincendive*

**LEARN MORE**  
[www.isa.org/ES10](http://www.isa.org/ES10)



# Understanding Changes in IEC 61511 (EC51VID)

## Course Formats:

### Online (EC51VID)

This online, on demand course is available in a pre-recorded video format taught by a subject matter expert that explains the changes in globally accepted safety systems standard IEC 61511.

The course discusses what the changes in the standard are and how they will impact SIS design and implementation work practices moving forward. It will bring an SIS practitioner that is familiar with the 2003 version of the standard up-to-date with the current standard in the most efficient way possible.

### You will be able to:

- Define the revalidation process for standard
- Describe important changes to definitions in the 2016 version of the standard
- Identify which clauses have been changed, deleted, or updated in the 2016 version of the standard
- Describe how to incorporate the changes into policies and procedures for SIS design at their plant to make them consistent with the new version of the standard
- Develop strategies for implementation new requirements of the standard in their facilities

LEARN MORE  
[www.isa.org/EC51VID](http://www.isa.org/EC51VID)

# ISA's portfolio of standards-based, safety-related resources

From process safety fundamentals and SIS design to advanced Safety Integrity Level selection and verification, ISA covers plant safety from every angle and across all systems, disciplines, and topics.

## Industrial Standards

- **ANSI/ISA-61511-1-2018 / IEC 61511-1:2016+AMD1:2017 CSV**, *Functional Safety: Safety Instrumented Systems for the Process Industry Sector-Part 1: Framework, definitions, system, hardware and application programming requirements (IEC 61511-1:2016+AMD1:2017 CSV, IDT)*
- **ANSI/ISA-61511-2-2018 / IEC 61511-2:2016**, *Functional Safety: Safety Instrumented Systems for the Process Industry Sector-Part 2: Guidelines for the application of IEC 61511-1:2016 (IEC 61511-2:2016, IDT)*
- **ANSI/ISA-61511-3-2018 / IEC 61511-3:2016**, *Functional Safety: Safety Instrumented Systems for the Process Industry Sector-Part 3: Guidance for the determination of the required safety integrity levels (IEC 61511-3:2016, IDT)*
- **ISA-TR84.00.04-2020, Part 1**, *Guidelines for the Implementation of ANSI/ISA-61511-1-2018*
- **ISA-TR84.00.04-2005, Part 2**, *Example Implementation of ANSI/ISA-84.00.01-2004 (IEC 61511 Mod)*
- **ANSI/ISA-84.91.01-2021**, *Identification and Mechanical Integrity of Process Safety Controls, Alarms, and Interlocks in the Process Industry Sector*
- **ANSI/ISA-18.2-2016**, *Management of Alarm Systems for the Process Industries*
- **ISA-TR18.2.4-2012**, *Enhanced and Advanced Alarm Methods*
- **ISA-TR18.2.5-2022**, *Alarm System Monitoring, Assessment, and Auditing*

- **ISA-TR18.2.6-2012**, *Alarm Systems for Batch and Discrete Processes*
- **ANSI/ISA-67.04.01-2018**, *Setpoints for Nuclear Safety-Related Instrumentation*
- **ISA-RP67.04.02-2010**, *Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation*
- **ANSI/ISA-77.41.01-2015**, *Fossil Fuel Power Plant Boiler Combustion Controls*
- **ISA-RP77.60.02-2014**, *Fossil Fuel Power Plant Human-Machine Interface: Hard Panel Alarms*

## Reference Publications

- **Control Systems Safety Evaluation and Reliability, Third Edition**, by William M. Goble
- **Performance-based Fire and Gas Systems Engineering Handbook**, by Austin Bryan, Elizabeth Smith, and Kevin Mitchell
- **Safety Instrumented Systems: Design, Analysis, and Justification, Second Edition**, by Paul Gruhn, P.E., CFSE and Harry L. Cheddie, P.Eng., CFSE
- **Safety Instrumented Systems Verification-Practical Probabilistic Calculations**, by William M. Goble and Harry Cheddie
- **Safety Integrity Level Selection—Systematic Methods Including Layer of Protection Analysis**, by Edward M. Marszal, P.E. and Dr. Eric W. Scharpf, MIPENZ
- **Safety Profiles for Real-Time Ethernet-Based Industrial Automation Networks**, by Alberto Elia, Luca Ferrarini, and Carlo Veber

# Training That Meets You Where You Are

Bring ISA's world-class training to your facility. We offer customizable in-person and online training options that are tailored to your training challenges and goals. Through ISA's needs assessment, our learning consultants will conduct interviews and preliminary tests of your employees' skills and recommend a training course of action.

When every second counts, onsite training reduces interruption and makes the most out of the time your employees spend in the classroom, with more one-on-one access to the instructors and a focused learning environment. ISA on site training offers:

- Needs assessment
- Individualized learning plans
- Custom course development
- Onsite employee credentialing

## Consult with our learning experts today.



**Jon Phillips**  
Learning Consultant  
jphillips@isa.org  
919-990-9258



**Matthew Rothkopf**  
Manager of Learning  
Consultation  
mrothkopf@isa.org  
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## Join ISA and the ISA Safety and Security Division

As an ISA member, you'll have the opportunity to connect with other automation professionals and receive a 20% discount on ISA products.

**JOIN NOW**  
[www.isa.org/join](http://www.isa.org/join)

# Open Enrollment Classroom Training

- ▶ Lab exercises
- ▶ Developed and taught by industry experts
- ▶ Real-world examples
- ▶ Training locations around the US

ISA's open enrollment classroom courses are hands-on lessons taught by industry leaders, giving attendees an opportunity to work through real-world examples on equipment used in facilities worldwide. ISA's in-person classroom courses are the best opportunity to interact with our expert instructors and to network with industry professionals.

ISA's open enrollment classroom training courses are held several locations throughout the United States, including Texas, North Carolina, Colorado, California, Pennsylvania, and Wisconsin. The training schedule is subject to change, so please be sure to check ISA's website for the most up-to-date training offerings.

## Virtual Classroom

ISA's virtual classroom courses feature an immersive virtual environment that mimics the classroom experience. Registrants can engage in two-way, real-time discussions with subject matter experts and connect with fellow peers.

## Instructor-Guided, Online Courses

ISA's instructor-guided, online courses have a start and end date and are guided by an expert instructor. Each course includes live Q&A sessions with the instructor so that students can ask questions and clarify material.

## Self-Paced, Modular Courses

ISA's self-paced, modular courses are a series of modules that can be completed on the student's schedule. These courses are truly self-paced and can be completed at any time within one year of registering for the course.

## Customizable In-Plant Training

ISA offers customizable, private training solutions that can be scheduled at your facility or online. These trainings can be customized to fit your needs. Speak with an ISA learning consultant today by contacting us at [trainingsales@isa.org](mailto:trainingsales@isa.org) or +1 919-549-8411.

ISA is accredited by the International Association for Continuing Education and Training (IACET). ISA complies with the ANSI/IACET Standard, which is recognized internationally as a standard of excellence in instructional practices. As a result of this accreditation, ISA is authorized to issue the IACET CEU.



Provider #1001262



## **International Society of Automation**

*Setting the Standard for Automation™*

The International Society of Automation (ISA) is a non-profit professional association founded in 1945 to create a better world through automation. ISA empowers the global automation community through standards and knowledge sharing, driving the advancement of individual careers and the overall profession. ISA develops widely used global standards; certifies professionals; provides education and training; publishes books and technical articles; hosts conferences and exhibits; and provides networking and career development programs for its members and customers around the world.

ISA created the ISA Global Cybersecurity Alliance ([isa.org/ISAGCA](http://isa.org/ISAGCA)) to advance cybersecurity readiness and awareness in manufacturing and critical infrastructure facilities and processes. The Alliance brings end-user companies, automation and control systems providers, IT infrastructure providers, services providers, system integrators, and other cybersecurity stakeholder organizations together to proactively address growing threats.

ISA owns Automation.com, a leading online publisher of automation-related content. Through a wholly-owned subsidiary, ISA bridges the gap between standards and their implementation with the ISA Security Compliance Institute ([isasecure.org](http://isasecure.org)) and the ISA Wireless Compliance Institute ([isa100wci.org](http://isa100wci.org)).

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