

# TÜV Rheinland Functional Safety Program

## Training: Functional Safety Technician

The TÜV Rheinland Functional Safety Program is a unique opportunity to provide evidence of competency in functional safety from an internationally recognised organisation

The certified FS Technician (TÜV Rheinland) certificate demonstrates competency in the fundamentals of Functional safety and provides a skill set that is transferable from one work situation to another and enables staff to fulfill responsibilities and to perform activities to recognised standards of competence on a regular basis, in order to

- *reduce risks*
- *satisfy legal and regulatory requirements*
- *meet the organisation's business objectives*

### By understanding:

- The principles and concepts of the internationally agreed standards IEC 61508 and IEC 61511 for safety instrumented systems (SIS) including competency requirements.
- Hazard identification and the hazard and operability (HAZOP) process including understanding the sequence of events leading to the hazard.
- Risk, using tolerable risk targets to demonstrate how reducing risks to as low as reasonably possible (ALARP) is achieved by applying semi quantitative methods using examples based on risk matrices and layers of protection analysis (LOPA)
- Correctly developing the Safety Requirements Specification (SRS) to ensure the requirements are traceable, auditable, testable and written for ease of understanding

- How safety-instrumented systems are designed for protecting against process related hazards using the techniques and measures in IEC 61508 and IEC 61511 including developing lifecycle procedures (e.g. maintenance, inspection and testing)
- The technical information required on all system components including extracting reliability data for the application from manufacturers certificates, reports and identifying key FS requirements.
- SIL demonstration calculations such as probability of failure on demand (PFD), safe failure fractions, hardware fault tolerance, common cause failures and proof test interval determination
- Requirements for prior use evidence for existing installed equipment
- Requirements for Installation and commissioning and the validation documentation to demonstrate that systems have been fully tested checked and approved against the safety requirements specification.
- Requirements for maintaining and operating the SIS including proof testing, inspection, management of change, impact analysis, management of overrides, recording of plant maintenance data for proven in use evidence.

### **Course Objectives**

Colin Easton, a globally recognised expert in functional safety, leads the course. The course will provide participants with the knowledge for understanding and mastering the application, principles and requirements of IEC 61508 – Functional safety of electrical/electronic/programmable electronic safety systems and IEC 61511 – Functional Safety: Safety Instrumented Systems for the Process Sector at a Technician level.

Successful participants, who also have sufficient functional safety experience, will achieve the prestigious FS Technician (TÜV Rheinland) certification.

The course will provide two days of classroom tuition and practical guidance, mixed with practical exercises. Day three consists of a three-hour two-part proficiency examination with:

Part 1 = 30 multiple-choice questions

Part 2 = 10 open questions

## Day 1 Agenda

Will provide an introduction to the functional safety standards, the underpinning legislation and the concept of the functional safety lifecycle. Phases 1, 2, 3, 9, 10 and 11 - process hazard analysis, risk assessment, allocation of safety functions and functional safety and competency management will be discussed in depth and participants will be introduced to the concepts of the international standards that cover this area of Hazard Identification, risk assessment and risk reduction.

The topics covered are:

- IEC 61508 and IEC 61511 background
- Functional Safety Management and the application of the FS lifecycle
- Competency Management and Assessment
- Hazard Identification and Hazard and Operability Studies
- The ALARP principle and Risk Tolerance Targets
- Risk Reduction Methods using Risk Matrix and Layers Of Protection Analysis (LOPA)
- Practical Exercises

## Day 2 Agenda

Covers phases 4 and 8 in depth from developing the Safety Requirements Specification (SRS), undertaking designs for Safety Instrumented Functions (SIF). Participants will be introduced to the concepts of Probability of Failure on Demand (PFD), safe failure fraction, hardware fault tolerance, proven in use, failure modes, reliability, diversity, separation and the influence of common cause. Requirements for Installation and commissioning, validation against the SRS, maintaining and operating the SIS including proof testing, inspection, management of change, impact analysis, management of overrides and recording of plant maintenance data for proven in use evidence

The topics covered are:

- SIS Safety Requirements Specification
- Selection of Components and Subsystems
- Proven in use
- Failures and failure modes

- Demand Modes
- Probability of Failure on Demand (PFD)
- SIF Implementation (Low demand mode)
- Importance of Testing and Maintenance
- Common cause failures and influence on reliability
- Safe Failure Fraction and Hardware Fault Tolerance
- Operations & Maintenance - Installation & Commissioning
- Proof testing strategies and the impact of testing
- Validation Planning and reporting
- Operation and Override procedures
- Inspection and maintenance management
- Modification, Change management and Impact Analysis
- Practical Exercises
- Exam Preparation exercise

### **Day 3 Agenda**

A three (3) hour two part competency examination comprising:

Part 1 = 30 multiple-choice questions (2 marks each question);

Part 2 = 10 multiple part questions (4 marks each question).

The pass score criterion is 75%

### **Who Should Attend?**

Instrument, Electrical, Mechanical, Operator, Process and Safety Technicians, as well as Operating and Maintenance personnel who are involved in any of the lifecycle phases for safety instrumented systems from hazard and risk assessment, design, installation, commissioning, validation, operations and maintenance.

### **Participant eligibility requirements**

In accordance with the TÜV Rheinland Functional Safety Program:

- A minimum of 2 years experience working with Safety Instrumented Systems.
- Vocational Certificate in a relevant engineering discipline or equivalent experience and responsibilities as certified by employer.

### **Course Provider**

Colin Easton MInstMC MIET, FS Senior Expert (TÜV Rheinland) PHRA & SIS ID 145/09.

**Prices:** From £1,300 GBP per participant

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