



# FS Engineer SIS training

## Based on IEC61511 edition 2.0

## Improve your Functional Safety Competency

As a partner for **GM International** in cooperation with **TVC Functional Safety Services**, **Tormatic** is pleased to recommend the Functional Safety Engineer (TÜV Rheinland) classroom instructor-led **Training for Safety Instrumented System Professionals**, presented by world wide renowned Functional Safety Expert, **Tino Vande Capelle**.



### COURSE OBJECTIVES

The main objective is to provide all engineers involved in safety instrumented systems with elementary and necessary knowledge about functional safety, based on the leading international functional safety standards IEC 61508 and IEC 61511. A second objective is to give anybody attending the course the opportunity to have his or her functional safety competency confirmed by the TÜV Rheinland upon successfully passing the exam.



### WHY SHOULD YOU ATTEND?



**IEC61511 ed2.0 released in February 2016**, clearly indicates as a 'Normative' requirement:

- That anybody involved in safety lifecycle activities **shall** be competent to carry out the activities for which they are accountable.
- That a procedure **shall** be in place to manage competence of all those involved in the SIS life cycle.
- That a periodic assessments **shall** be carried out to document the competence of individuals against the activities they are performing and on change of an individual within a role.

Take advantage of this course, examination and certification to prove your clients, peers and management, your competency in the field of Functional Safety.

Success in the final examination certifies your functional safety knowledge on your personal name, adding a great value to your professional career and image.

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### COURSE PROVIDER

**Tino Vande Capelle** ([www.tinovc.com](http://www.tinovc.com)):

Tino is providing 'INDEPENDENT' Functional Safety (FS) Consultancy as freelance & self-employed. Capitalizing on his 30+ years of process safety sector experience, offers a unique and practical approach of the IEC 61508:2010 & IEC61511:2016 FS standards in the industry.

Tino has trained Functional Safety for more than 2500+ engineers in 150 different classes worldwide and still counting.

Tino is a Senior FS Expert (TÜV Rheinland, ID#109/05) & Trainer for Safety Instrumented Systems (SIS) of the TÜV Rheinland Functional Safety Program as an accepted course provider. He is currently the only remaining active trainer from the original 4 trainers who joined the program from the beginning in 2005.



### COURSE INFORMATION

- **Course dates:** 29 November - 2 December 2022
- **Course type:** Classroom
- **Course location:** Stavanger, Norway
- **Course language:** English
- **Duration:** 3 days + 4 hours exam
- **Course exam date:** One day after the course
- **Where:** Quality Hotel Pond, Stavanger  
For accommodation please contact the hotel at tel. +47 51 63 68 00

### PREREQUISITES

In accordance with the FS Engineer (TÜV Rheinland) Program:

- Minimum 3 years experience in the field of functional safety.
- University degree (Master's or Bachelor's degree in Engineering) or equivalent engineer level responsibilities status certified by employer.

### FEES AND CONTACTS

Registration is valid only upon receipt of registration form and payment. The price - 25.000,- NOK per person - includes:

- Course material, GM International SIL manual and SIL informative poster.
- Registration fees and certificate of attendance
- Refreshments and lunch for 4 days
- Upon successful completion of the exam a FS Engineer (TÜV Rheinland) certificate and a listing on the TÜV Rheinland website

The training course contains both theoretical instructions and practical exercises.

Contact us for registration: [info@tormatic.no](mailto:info@tormatic.no)



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### EXAM - RULES AND REGULATIONS

The applicant has to attend three consecutive days training course given by TVC Functional Safety Services FZ-LLC. Additionally, the applicant needs to comply to the Eligibility Requirements prerequisites before writing the exam.

Exam are a closed book, that will be written under surveillance. No mobile phone or recording devices are allowed, calculator is not needed to complete the exam.

**The Classroom exam** contains 85 questions (60 multiple choice – 60 points and 25 open questions – 25 points) with a maximum duration of 4 hours under surveillance.

#### EXAM Summary

There are in total 85 points to score, the passing criteria is set at 75% (63.75/85) by TÜV Rheinland in able to achieve your personal FS ENG SIS certificate and #ID number listed on [www.certipedia.com](http://www.certipedia.com).

#### Re-Exam:

In case of failing the minimum 75% passing criteria, you are allowed within maximum 1 calendar year from the first exam, to retry once (1) the exam against an additional fee without following the 3 days course again.

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### FS TRAINING PROGRAM

#### Introduction to Functional Safety

- Modern history of disasters
- What is safety?
- Legal status IEC61511
- Overview of legal requirements
- Layers of protection
- Safety Instrumented System
- Safety Integrity Level
- Problems with safety systems
- Safety system failures
- What is Functional Safety?
- Functional Safety Standards

#### Management of Functional Safety

- Lifecycle concept 61508/61511
- Functional Safety Management
- Competency
- Risk evaluation and management
- Safety Planning
- Implementation and monitoring
- Functional Safety Assessment
- Functional Safety Audit
- SIS configuration management

#### Planning the Safety System

- Safety lifecycle structure/planning
- FS management system
- Verification & Validation plan
- Safety Requirement Specification

#### Verification & Application Program

- Verification planning
- Verification testing
- Application program verification

#### Process Hazard & Risk Assessment

- Hazard & Risk definition
- Tolerable risk and ALARP
- Risk management
- Hazard Identification Techniques, FMEA, FTA, HAZOP
- Hazard Analysis Techniques, ETA, dispersion modeling, bowtie

- Hazard Analysis Techniques ETA
- Risk Reduction Techniques, risk matrix, risk graph,
- Security Risk Assessment, digital mapping, Security Levels, Security Assurance Levels, Foundational Requirements

#### Allocation Safety Function to layers

- Layer Of Protection Analysis LOPA
- Typical IPL characteristics
- LOPA working example
- LOPA pros and cons
- LOPA CCPS books references
- SIF operating modes and Safety Integrity Requirements

#### Safety Requirement Specifications

- SRS general requirements
- SIF description requirements
- MTTR-MRT, etc
- Application Program SRS

#### SIS Design and Engineering, AP development

- General requirements H/W
- Safety Manual as per IEC61508
- Hardware concepts
- IEC61511 SIF - mode of operation
- Safety - vs Process - HFT
- Diagnostics - vs Proof - test
- IEC61508 Safe Failure Fraction
- Architectural constraints Route 2H - Route 1H
- Selection of devices/field devices
- Maintenance and testing requirements
- Quantification of Random Failures
- Three barriers to clear to claim SIL
- General requirements AP
- Application Program (AP) design
- V-model lifecycle documentation
- AP implementation
- AP verification and testing
- AP methodology and tools

#### Installation, Commissioning and Validation

- Installation plan and documentation
- Activities, procedures and techniques
- Validation FAT - SAT

#### Operation and Maintenance

- Planning operation/maintenance
- Procedures operation/maintenance
- Bypass - MOS
- Proof test procedure for every SIF
- Training for operators/maintenance personnel

#### Modification

- Modification objectives
- Input needed
- Change vs Modification
- Before you start modification
- During modification
- After modification
- FSA before you begin

#### Decommissioning

- Procedures, analysis and authorisation
- SIF requirements

#### Wrap up

- Summary
- Exam preparation

#### Student exercises

- With the student exercises, the participants will have the opportunity to put the learned theory into practice
- Failure classification
- Hazard and risk analysis (FMEA, FTA & HAZOP)
- Selecting the appropriate SIL
- Safety versus HFT
- Design a Safety Integrity Function
- Define device level safety functions
- Selection and comparing devices
- Accident documentary (video)
- Questions & Answers