SIS Functional Safety Maintenance and Proof Testing

- Verify SIS performance
- Help identify SIS failures
- Comply with regulatory requirements
- Manage risk

Functional Safety Maintenance and Proof Testing for continued safety integrity and operation in accordance with the IEC 61511 Safety Life Cycle.

Introduction

Plant personnel use Safety Instrumented Systems (SIS) to perform specified functions to achieve or maintain a safe state of the process when unacceptable or dangerous process conditions are detected. These systems also enable the process to move from one safe state to the next, or to mitigate consequential events. Safety instrumented systems consist of sensors, logic solvers, and final elements all chosen with these three goals in mind.

Safety instrumented functions (SIF) are implemented to reduce the likelihood of each identified hazardous event. For the SIF to operate correctly, it requires sensors capable of detecting abnormal operating conditions. It also requires a *logic solver* to receive the sensor input signal(s), process the input signal and give outputs according to user-defined logic. Finally, these outputs result in *final element(s)* taking action on the process to bring it to a safe state.

As per the safety lifecycle concept introduced in IEC61511, the fully validated SIS is in a condition to accept hazardous substances and enter the operational phase, the longest phase of the lifecycle. To maintain the desired level of safety integrity, many SIS-specific monitoring and test activities are required. All design assumptions need to be verified at regular intervals and the SIS must be subjected to regular inspection and proof testing.

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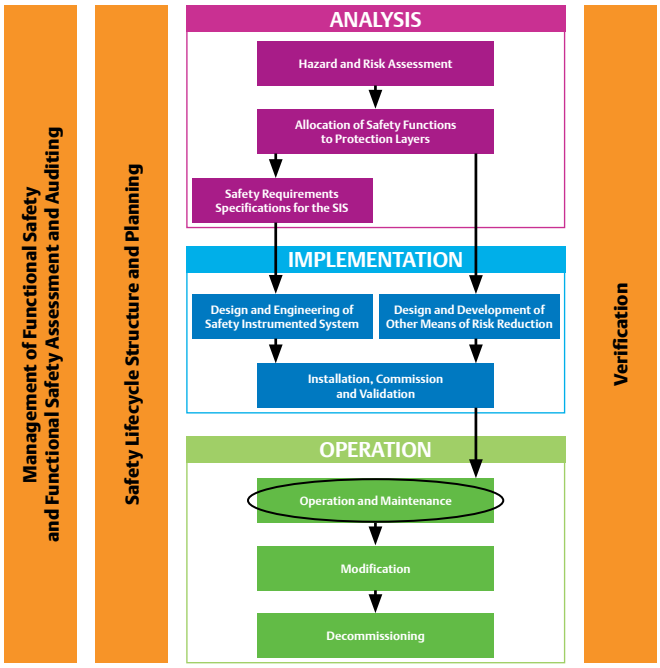
Achieving a theoretical Safety Integrity Level (SIL) during the design phase requires that many design assumptions are made to predict the SIF performance. Operating conditions will affect these assumptions and therefore the SIF safety integrity.

Periodic proof testing is required to ensure the continued and demonstrable integrity of each SIF. Proof tests must be conducted per managed procedures that ensure the tests are done correctly, consistently and safely. Failed devices must be properly bypassed, repaired and then returned to a fully operational state.

IEC 61511 Safety Life Cycle

Meeting regulatory requirements such as the IEC61511 Safety Life Cycle requires a partner with experience, and with the best available technology and services.



Functional Safety Maintenance and Proof Testing Services address IEC61511 during the Operations and Maintenance phase of the Safety Lifecycle.

Benefits

The SIS is a critical system, and competent people, departments or organizations are necessary to ensure the system complies with industry best practices and applicable local or international regulations/codes/standards. You expect that the safety integrity of the SIS is consistently managed in compliance with regulatory requirements.

Emerson provides service specialists trained in the application of IEC61511 and specifically the maintenance of the SIS. Specially trained teams follow the Emerson policy to comply with IEC 61511 using our TÜV certified Safety Management System (SMS).

Using the Emerson Functional and Proof Testing service will help you to:

- **Verify SIS performance:** All operational and system performance variables are monitored over time. SIF performance (PFD, MTTFS/STR, response time) is recalculated to verify that the required performance is maintained.
- **Help identify SIS failures:** Proof testing is a key component of functional safety and will reveal undetected faults in a safety instrumented function.
- **Comply with regulatory requirements:** Local authorities expect process operators to provide evidence that test and inspections are adequate and that industry best practice has been followed.
- **Manage risks:** The price of failure is high. Subcontracting safety specialist services allows our customers to focus their attention on running their process plants.

Service Description

Emerson's SIS specialists can work with your designated plant personnel to gather operational and maintenance data, then plan and execute SIS proof testing procedures. During a typical SIS proof test, our specialists test each SIF, including the sensors, logic solvers, and final elements. They document any faults or deficiencies, call them to the attention of your staff, and in many cases, our specialists will be able to correct them at your request.

With Emerson's SIS functional safety maintenance and proof testing services you get:

- **Independent service using Emerson certified/qualified personnel:** Functional safety maintenance and proof testing services ensures both competency and that appropriate independence is maintained from the customers operational and maintenance teams.
- **Competent specialists:** Emerson has significant experience in the instrument, control and safety system fields and is a recognized service provider throughout the industry. Due to the safety critical nature of the systems involved, it is required that all our staff have a detailed knowledge of the processes and standards used in the SIS and must be fully trained and qualified in accordance with the TÜV certified safety management system in place on all Emerson SIS projects.
- **Verification and proof test reports:** For traceability, the verification and proof testing activities are recorded using an agreed report format and updated after each activity. The report builds a long term profile of SIS performance.

Ordering Information

Description	Model Number
SIS Functional Safety Maintenance and Proof Testing Services	Please consult your local Emerson office for availability.

To learn how comprehensive Lifecycle Services solutions address your process management needs, contact your local Emerson sales office or representative, or visit **www.emerson.com**.

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