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TECHNICAL REPORT

Functional safety – Safety instrumented systems for the process industry sector –
Part 0: Functional safety for the process industry and IEC 61511

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUNCTIONAL SAFETY – SAFETY INSTRUMENTED SYSTEMS FOR THE PROCESS INDUSTRY SECTOR –

Part 0: Functional safety for the process industry and IEC 61511

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IEC TR 61511-0, which is a technical report, has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
65A/847/DTR	65A/852/RVDTR

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61511 series, published under the general title *Functional safety – safety instrumented systems for the process industry sector*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

FUNCTIONAL SAFETY – SAFETY INSTRUMENTED SYSTEMS FOR THE PROCESS INDUSTRY SECTOR –

Part 0: Functional safety for the process industry and IEC 61511

1 Scope

This part of IEC 61511 provides an overview of the other three parts of IEC 61511.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61511-1:2016, *Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and application programming requirements*

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 61511-3:2016, *Functional safety – Safety instrumented systems for the process industry sector – Part 3: Guidance for the determination of the required safety integrity levels*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Process industry environment and the Safety Instrumented System (SIS)

4.1 General

There are many hazards in process industries that can lead to loss of containment, resulting in an impact on health, safety, environment and plant assets. Process safety is best achieved by using inherently safe processes. However, when this is not practical or possible, protective systems are required to mitigate the risk of hazards to an acceptable level. Functional requirements for these protective systems are determined from a Hazard and Risk Assessment (H&RA) and good engineering practices. Protective systems may be implemented using different technologies such as mechanical, chemical, pneumatic, hydraulic, electric, electronic or programmable electronic.

4.2 Safety Instrumented Functions (SIF)

Safety Instrumented Functions (SIF) are protective functions implemented in a Safety Instrumented System (SIS). A typical SIS is comprised of multiple SIFs; typically, each SIF has process sensors that measure a process deviation, a logic solver that executes the functional logic, and final control elements (e.g. valves, pumps) that bring the process to a safe state. The IEC 61511 series of standards addresses SIS based on the use of electrical, electronic, or programmable electronic technology in the process industry sector.

4.3 Safety Instrumented System (SIS) components

All components of a SIS are selected, designed, installed, operated, maintained and tested to achieve the specified risk reduction for each SIF. The SIS can fail to provide risk reduction due to failure of components or systematic failures resulting from human errors of omission or commission.

To minimize SIS failures:

a) selected SIS components are reliable and suitable for the service and environment in which they are operated, and

b) a management system is implemented to verify and assure that systematic failures are minimized across the SIS lifecycle.

5 IEC 61511 – Part 1

Part 1 is the normative part of the series.

It includes terminology, and requirements for specification, hardware design and application programming, commissioning, validation, operation, maintenance and testing of SIS components. To address systematic failures, it also includes requirements for management of the SIS lifecycle (Figure 1) which include:

a) developing a plan identifying responsibilities and activities for each lifecycle phase,

b) competency of persons, departments and organizations,

c) supplier quality management,

d) change and bypass management,

e) verification, testing, assessments and audits,

f) tracking and timely closure of action items.

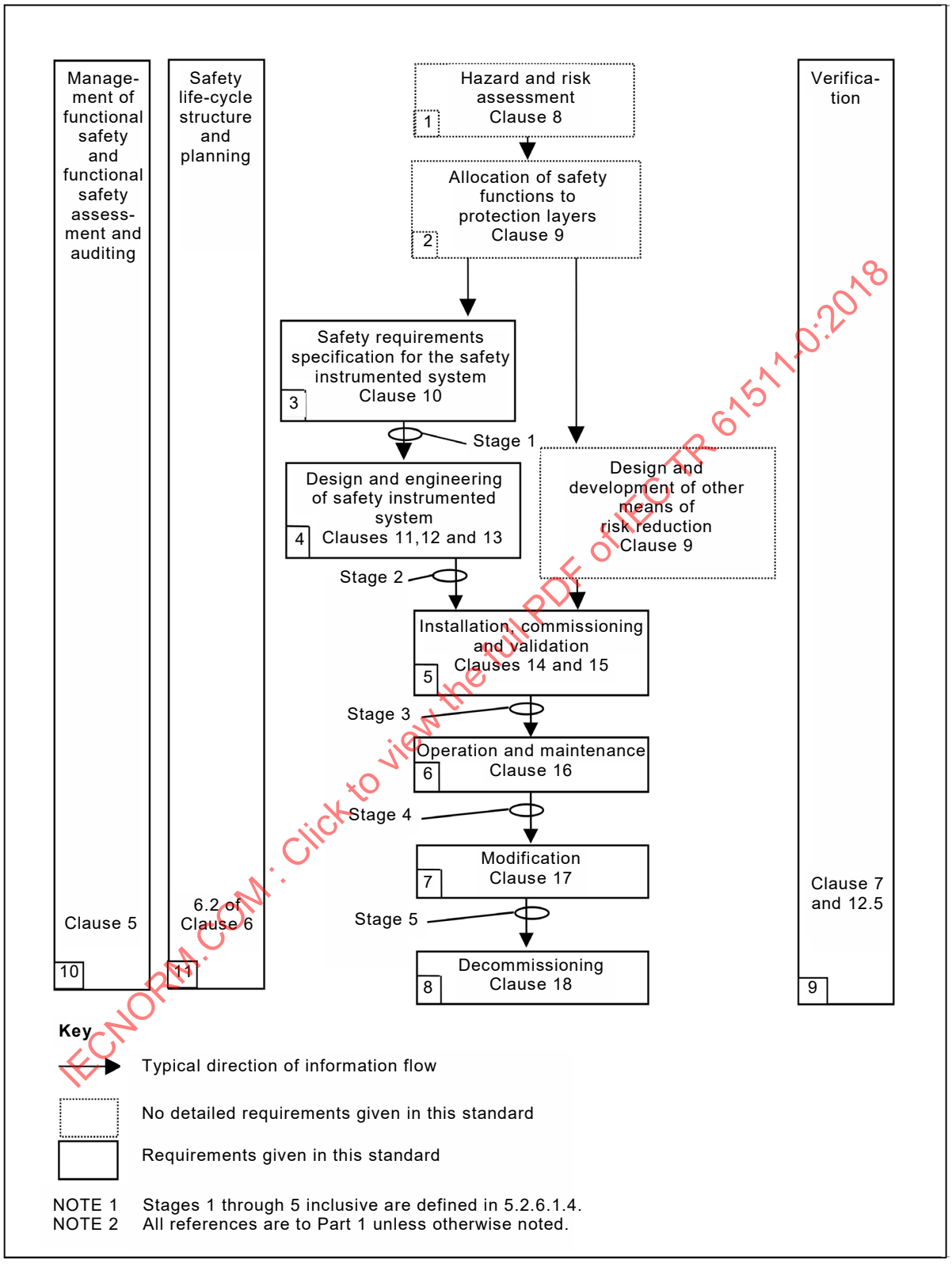

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Figure 1 – SIS safety life-cycle phases and functional safety assessment (FSA) stages

NOTE See IEC 61511-1 for further information.