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STANDARD

**ISA-84.00.01-2004 Part 2  
(IEC 61511-2 Mod)**

**Functional Safety: Safety Instrumented Systems  
For the Process Industry Sector – Part 2: Guidelines  
For the Application of ANSI/ISA-84.00.01-2004  
Part 1 (IEC 61511-1 Mod) – Informative**

**Approved 2 September 2004**

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ISA-84.00.01-2004 Part 2 (IEC 61511-2 Mod)  
Functional Safety: Safety Instrumented Systems for the Process Industry Sector – Part 2: Guidelines for  
the Application of ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod) - Informative

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

#### Part 2: Guidelines for the application of ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod)

#### UNITED STATES NATIONAL FOREWORD

All text of IEC 61511-2 Ed. 1.0 (2003-07) is included. United States National Deviations are shown by ~~strikeout~~ through deleted text and underline under added text.

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International Standard IEC 61511-2 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement and control.

The text of this standard is based on the following documents:

FDIS	Report on voting
65A/387A/FDIS	65A/390/RVD

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

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

~~IEC 61511~~ ANSI/ISA-84.00.01-2004 (IEC 61511 Mod) series has been developed as a process sector implementation of IEC 61508 series.

~~IEC 61511~~ ANSI/ISA-84.00.01-2004 (IEC 61511 Mod) consists of the following parts, under the general title *Functional safety – Safety Instrumented Systems for the process industry sector* (see Figure 1):

Part 1: Framework, definitions, system, hardware and software requirements

Part 2: Guidelines for the application of ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod)

Part 3: Guidance for the determination of the required safety integrity levels

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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- withdrawn;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

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

## INTRODUCTION

Safety instrumented systems have been used for many years to perform safety instrumented functions in the process industries. If instrumentation is to be effectively used for safety instrumented functions, it is essential that this instrumentation achieves certain minimum standards.

This International Standard addresses the application of safety instrumented systems for the Process Industries. It also deals with the interface between safety instrumented systems and other safety systems in requiring that a process hazard and risk assessment be carried out. The safety instrumented system includes sensors, logic solvers and final elements.

This International Standard has two concepts, which are fundamental to its application; safety lifecycle and safety integrity levels. The safety lifecycle forms the central framework which links together most of the concepts in this International Standard.

The safety instrumented system logic solvers addressed include Electrical (E)/Electronic (E)/ Programmable Electronic (PE) technology. Where other technologies are used for logic solvers, the basic principles of this standard may also be applied. This standard also addresses the safety instrumented system sensors and final elements regardless of the technology used. This International Standard is process industry specific within the framework of the IEC 61508 series.

This International Standard sets out an approach for safety lifecycle activities to achieve these minimum standards. This approach has been adopted in order that a rational and consistent technical policy is used. The objective of this standard is to provide guidance on how to comply with ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod).

To facilitate use of this standard, the clause and subclause numbers provided are identical to the corresponding normative text in ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod) (excluding the annexes).

In most situations, safety is best achieved by an inherently safe process design whenever practicable, combined, if necessary, with a number of protective systems which rely on different technologies (for example, chemical, mechanical, hydraulic, pneumatic, electrical, electronic, thermodynamic (for example, flame arrestors), programmable electronic) which manage any residual identified risk. Any safety strategy considers each individual safety instrumented system in the context of the other protective systems. To facilitate this approach, this standard

- requires that a hazard and risk assessment is carried out to identify the overall safety requirements;
- requires that an allocation of the safety requirements to the safety functions and related safety systems, such as the safety instrumented system(s), is carried out;
- works within a framework which is applicable to all instrumented methods of achieving functional safety;
- details the use of certain activities, such as safety management, which may be applicable to all methods of achieving functional safety.

This International Standard on safety instrumented systems for the process industry:

- addresses relevant safety lifecycle stages from initial concept, through design, implementation, operation and maintenance and decommissioning;
- enables existing or new country specific process industry standards to be harmonized with this standard.

This standard is intended to lead to a high level of consistency (for example, of underlying principles, terminology, information) within the process industries. This should have both safety and economic benefits.

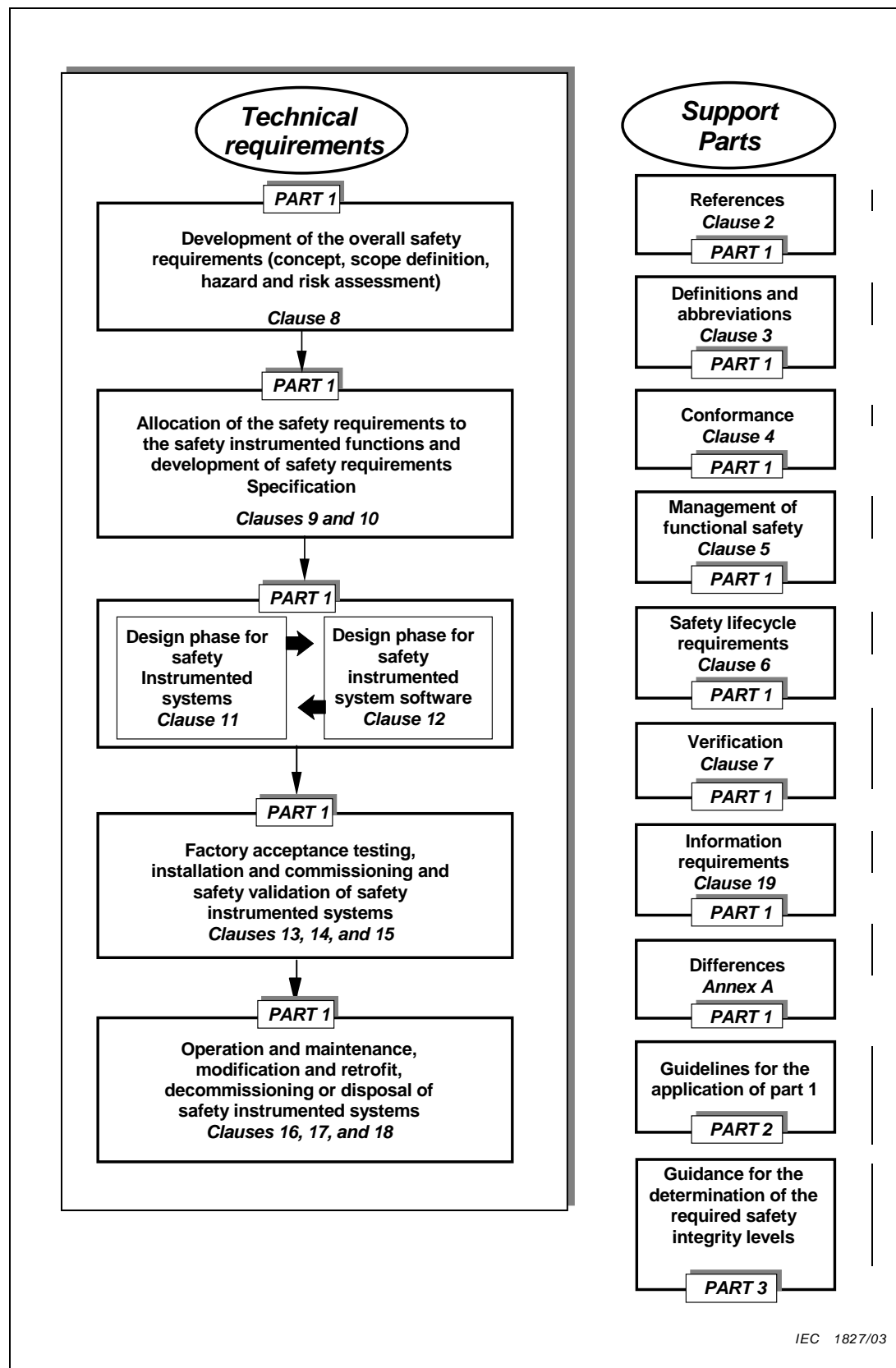


Figure 1 – Overall framework of this standard

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

### Part 2: Guidelines for the application of ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod)

#### 1 Scope

~~IEC 61511-2~~ ANSI/ISA-84.00.01-2004 Part 2 (IEC 61511-2 Mod) provides guidance on the specification, design, installation, operation and maintenance of Safety Instrumented Functions and related safety instrumented system as defined in ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod). This standard has been organized so that each clause and subclause number herein addresses the same clause number in ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod) (with the exception of the annexes).

For existing SIS designed and constructed in accordance with codes, standards, or practices prior to the issue of this standard (e.g., ANSI/ISA-84.01-1996), the owner/operator shall determine that the equipment is designed, maintained, inspected, tested, and operating in a safe manner.

#### 2 Normative references

No further guidance provided.

#### 3 ~~Terms~~, Definitions and abbreviations

No further guidance provided except for 3.2.68 and 3.2.71 of ~~IEC 61511-1~~ ANSI/ISA-84.00.01-2004 Part 1 (IEC 61511-1 Mod).

**3.2.68** A safety function should prevent a specified hazardous event. For example, “prevent the pressure in vessel #ABC456 exceeding 100 bar.” A safety function may be achieved by

- a) a single safety instrumented system (SIS), or
- b) one or more safety instrumented systems and/or other layers of protection.

In case b), each safety instrumented system or other layer of protection has to be capable of achieving the safety function and the overall combination has to achieve the required risk reduction (process safety target).

**3.2.71** Safety instrumented functions are derived from the safety function, have an associated safety integrity level (SIL) and are carried out by a specific safety instrumented system (SIS). For example, “close valve #XY123 within 5 s when pressure in vessel #ABC456 reaches 100 bar”. Note that components of a safety instrumented system may be used by more than one safety instrumented function.