

# INTERNATIONAL STANDARD

**IEC**  
**61511-1**

First edition  
2003-01

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**Functional safety –  
Safety instrumented systems  
for the process industry sector –**

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

*Sécurité fonctionnelle –  
Systèmes instrumentés de sécurité pour le secteur  
des industries de transformation –*

*Partie 1:  
Cadre, définitions et prescriptions concernant  
le système,  
le matériel et le logiciel*



Reference number  
IEC 61511-1:2003(E)

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

**XC**

*For price, see current catalogue*

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Withdrawing

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61511-1 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/368/FDIS	65A/372/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 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 in the application of IEC 61511-1
- 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.

Withdrawn

## 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 and performance levels.

This international standard addresses the application of safety instrumented systems for the Process Industries. It also requires a process hazard and risk assessment to be carried out to enable the specification for safety instrumented systems to be derived. Other safety systems are only considered so that their contribution can be taken into account when considering the performance requirements for the safety instrumented systems. The safety instrumented system includes all components and subsystems necessary to carry out the safety instrumented function from sensor(s) to final element(s).

This international standard has two concepts which are fundamental to its application, safety lifecycle and safety integrity levels.

This standard addresses safety instrumented systems which are based on the use of electrical/electronic/programmable electronic technology. Where other technologies are used for logic solvers, the basic principles of this standard should 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 IEC 61508 (see Annex A).

This International Standard sets out an approach for safety life-cycle activities to achieve these minimum standards. This approach has been adopted in order that a rational and consistent technical policy is used.

In most situations, safety is best achieved by an inherently safe process design. If necessary, this may be combined with a protective system or systems to address any residual identified risk. Protective systems can rely on different technologies (chemical, mechanical, hydraulic, pneumatic, electrical, electronic, programmable electronic). 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 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 all safety life-cycle phases from initial concept, design, implementation, operation and maintenance through to decommissioning;
- enables existing or new country specific process industry standards to be harmonized with this standard.

This International 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.

In jurisdictions where the governing authorities (for example, national, federal, state, province, county, city) have established process safety design, process safety management, or other requirements, these take precedence over the requirements defined in this standard.