1 Purpose

This technical report provides discussion on various topics associated with ANSI/ISA-61511-1-2018 Parts 1-3 and includes examples of practical ways to implement the standard. This technical report is informative and provides nonmandatory methods or techniques.

There is nothing in this technical report that precludes, replaces, or makes obsolete any requirement of ANSI/ISA-61511-2018 Part 1.

2 Introduction

In the United States of America, the Occupational Safety and Health Administration (US-OSHA) regulation, 29 CFR 1910.119 (OSHA 1910.119), requires the identification and management of the instrumented systems responsible for safe operation. ISA Standards Panel 84 (ISA84) developed ANSI/ISA-84.01-1996 to define how to manage safety instrumented systems (SIS) using a life-cycle approach. The standard provided a formal, documented process for addressing the design, operation, maintenance, testing, and management of change for SIS. The efforts of the ISA84 committee resulted in US-OSHA recognizing ANSI/ISA-84.01-1996 as representing good engineering practice for SIS.

During its initial development, the ISA84 committee relied on existing US functional safety practices, such as those documented in OSHA 1910.119 and by the Center for Chemical Process Safety (CCPS) "*Guidelines for the Safe Automation of Chemical Processes.*" Working in parallel to the ISA84 committee effort, the International Electrotechnical Commission (IEC) was developing IEC 61508. Concepts introduced in the draft international standard were incorporated into ANSI/ISA-84.01-1996, resulting in ANSI/ISA-84.01-1996 being accepted as the US functional safety standard for the process industry sector. Through ANSI/ISA-84.01-1996, owner/operators have become familiar with terms such as safety integrity levels, safety instrumented systems, and safety instrumented functions.

Since 1996, some countries have utilized ANSI/ISA-84.01-1996, while others have used their own national standard or adopted IEC 61508 when it was released in 1999. In an era where design, engineering, and operation can occur in multiple countries, this diversity of standards resulted in an immediate need for an international, consensus process industry sector standard.

The IEC 61511 committee was formed to specifically address SIS in the process industry sector. IEC 61511 is the process industry sector implementation of the basic safety standard, IEC 61508. The first edition of IEC 61511 was published in 2003. IEC 61511 was adopted by the ISA84 committee with one modification and published as ANSI/ISA-84.00.01-2004 (IEC 61511 Mod). Over time, the terminology and the technical clauses used within IEC 61511 have evolved to better support effective application in the process industry sector. The second edition of IEC 61511 was issued by IEC in 2016. After an amendment was integrated into IEC 61511-1, the ISA84 committee accepted IEC 61511-1 as ISA-61511-1 in 2017. ANSI approved the new standard as ANSI/ISA-61511-1:2018.

This guideline is divided into two parts:

- Part 1 provides guidance on a wide range of topics related to the standard.
- Part 2 provides a single user example to illustrate some of the life-cycle steps in ANSI/ISA-61511:2004.

ISA-TR84.00.04 Part 1 (ISA-TR84.00.04-1) contains four main clauses.

- Clause 1 is the purpose.
- Clause 2 explains the history of the standard and discusses its relationship to other regulations, standards, and practices.

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- Clause 3 and Annex A specifically address the determination of whether an existing SIS is designed, maintained, inspected, tested, and operating in a safe manner.
- Clause 4 provides an overview of the SIS lifecycle and references to subject-specific annexes for additional guidance on key issues.

3 Existing SIS

The concept of “grandfathering” originated with OSHA 1910.119. The intent of “grandfathering” is to recognize that installed equipment implemented in accordance with previously published practices may provide sufficient safety integrity without upgrading to the latest requirements of the ANSI/ISA-61511-1:2018. The equipment may remain “as is” until the user determines that the equipment is no longer meeting the functional and safety integrity requirements.

NOTE 1 For more detail, see OSHA 29 CFR 1910.119 (d) (iii)

NOTE 2 There are many chemical industrial processes that are not covered under OSHA 1910.119. Some owner/operators choose to manage these processes under the same program as their covered processes. The discussion in this section is considered applicable to noncovered process SISs.

NOTE 3 US-OSHA has published guidance on the interpretation of the OSHA 1910.119 grandfather clause with regard to the Process Safety Management program (Refer to Appendix C to 1910.119 – Compliance Guidelines and Recommendations for Process Safety Management (Nonmandatory) and in various compliance letters published on www.OSHA.gov). The guidance provided in this clause and Annex A in this technical report is intended to supplement the US-OSHA guidance and to provide examples of methodologies that various owner/operators are using to determine whether their existing SIS is acceptable as is.

NOTE 4 Where ANSI/ISA-61511-1:2018 is applied outside of the US, the user should look into the country-specific or company-specific requirements around existing SISs.

ANSI/ISA-61511-1:2018 provides the requirements for the continued use of existing SISs as part of the functional safety management system. As part of the rationale, the user is required to have a process for gathering data on SISs and their equipment. The user then makes a judgement on whether the equipment remains fit for purpose based on this data. This documented assessment of the suitability of the equipment in SISs based on previous operating experience in similar operating environments is defined as “prior use.”

ANSI/ISA-61511-1:2018 Clause 5.2.5.4 states: *“For existing SIS designed and constructed in accordance with codes, standards, or practices prior to the issuance of this standard, the user shall determine that the equipment is designed, maintained, inspected, tested, and operating in a safe manner.”*

The existing systems clause provides the basis for justifying the continued use of the installed equipment—the owner/operator of the SIS should determine that the “equipment is designed, maintained, inspected, tested, and operating in a safe manner.” The elements of this determination are incorporated in functional safety management system requirements contained in ANSI/ISA-61511-1:2018 Clauses 5 through 7. The determination relies on information that is gathered during the operation and maintenance of the process and the equipment that controls its safe operation and on a comprehensive review of the existing SIS installation.

The determination of the acceptability of an existing SIS should confirm the following:

1) Management practices fulfill the functional safety management requirements for the SIS lifecycle and are sufficient to ensure that the SIS achieves the required functional and safety integrity requirements for all relevant operating modes of the process.

   NOTE The functional safety management system applies to existing and new SISs. Prior practices should consider all aspects of ANSI/ISA-61511-1:2018 Clause 5. The functional safety management system, including documentation, assessment, verification, validation, response to detected failure, and management of change, is necessary to identify and prevent random and systematic failures, which impact the safety integrity of the SIS.

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