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Identification and Mechanical Integrity of Safety Controls, Alarms, and Interlocks in the Process Industry

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ISA
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, North Carolina 27709

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Foreword

ANSI/ISA-91.00.01 was initially developed to address a misunderstanding between regulators and owner/operators with respect to implementation of United States OSHA (Occupational Safety and Health Administration) 1910.119 as it related to process sector control systems in the USA. Process sector owner/operators were being cited for having control systems that were not compliant with OSHA 1910.119. At that time, there were no standards that distinguished between basic process control systems and emergency shutdown systems that were covered under OSHA 1910.119 mechanical integrity requirements.

ANSI/ISA-84.01-1996 had been intended to clarify this issue but its complexity required an extended development cycle (3-4 years). Therefore, ANSI/ISA-91.00.01 was approved as a fast-track standard to clarify the difference between the basic process control system and the emergency shutdown system. The standard was developed and issued in less than one year.

Over time, ANSI/ISA-91.00.01 as published became superfluous due to the publication of ISA84 standards and technical reports. However, the scope of mechanical integrity related to instrumentation in the process sector includes process safety safeguards beyond emergency shutdown systems.

Mechanical integrity of process safety safeguards includes inspection, testing, and documentation. This updated version of ANSI/ISA-91.00.01 defines a general class of instrumentation that should be addressed by the mechanical integrity program and provides the associated requirements.

While this standard was originally developed to address concerns of users in the USA, the principles and methodology presented may be applied globally by users in the process sector.

Finally, the ISA91 committee has been merged with the ISA84 committee due to the overlap in the scope and purpose of the two committees. This has resulted in the issuance of this revised standard with the new designation, ANSI/ISA-84.91.01.

Introduction

This standard establishes a procedure to identify the process safety functions that utilize instrumentation to maintain safe operation in the process industry. In this standard, these functions are implemented by safety controls, alarms, and interlocks.

Mechanical integrity and maintenance are important elements in process safety risk management. In this standard, provisions for mechanical integrity and maintenance apply to safety controls, alarms, and interlocks.

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1 Scope

1.1 This standard addresses the instruments that are classified as process safety safeguards by the authority having jurisdiction (typically the owner/operator or local regulatory authority), and establishes requirements for their mechanical integrity, including inspection/testing and documenting the inspection/test results.

1.2 This standard is specific to process safety risk management in the process industry.

1.3 This standard does not address codes, regulations, and other requirements that apply only to the nuclear power industry.

1.4 This standard does not address the mechanical integrity of non-process safety safeguards (e.g., business or asset protection, environmental protection or non-instrumented safeguards).

2 Normative references

ANSI/ISA-84.00.01-2004 Parts 1-3 (IEC 61511 Mod), Functional Safety: Safety Instrumented Systems for the Process Industry Sector.

3 Definitions

3.1
safety controls, alarms, and interlocks
process safety safeguards implemented with instrumentation and controls, used to achieve or maintain a safe state for a process, and required to provide risk reduction with respect to a specific hazardous event

NOTE 1 There are many types of safety controls, alarms, and interlocks, for example: safety alarm, safety interlock, safety permissive, detection or suppression, emergency shutdown, safety critical control, and safety instrumented system. Figure 1 illustrates their relationships to the process hazards analysis. The terms listed in the illustration are not intended to be construed as the only terms applied to safety controls, alarms, and interlocks; neither should it be assumed that each type is necessarily separate and independent.

NOTE 2 Refer to ANSI/ISA-84.00.01-2004 (IEC 61511 Mod) for additional requirements related to safety instrumented systems.

NOTE 3 Examples of non-instrumented safeguards include rupture disks, relief valves, dikes, etc. They do not fall within the scope of this standard.