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**Identification of Emergency  
Shutdown Systems and Controls  
That Are Critical to Maintaining  
Safety in Process Industries**



ANSI/ISA-S91.01, Identification of Emergency Shutdown Systems and Controls That Are Critical to Maintaining Safety in Process Industries

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## 1 Purpose

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**1.1** Establish a procedure to identify the emergency shutdown systems and safety critical controls that are key to maintaining safety in the process industries as defined in the Mechanical Integrity and Maintenance sections of Process Safety Management (PSM) regulations such as Occupational Safety and Health Administration (OSHA) Federal Regulation 29 CFR 1910.119 ([reference 5.1](#)), and Risk Management Program (RMP) regulations such as the (proposed) U.S. Environmental Protection Agency Regulation 40 CFR Part 68 ([reference 5.2](#)).

**1.2** Mechanical integrity and maintenance are major elements in PSM and RMP programs. In this standard, provisions for mechanical integrity and maintenance apply to the following equipment:

- a) Emergency shutdown systems; and
- b) Safety critical controls (including monitoring devices and sensors, alarms, and interlocks).

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## 2 Scope

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**2.1** This standard addresses the instruments that are classified as emergency shutdown systems and safety critical controls and establishes requirements for testing and documenting the test results of these systems.

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

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## 3 Definitions

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**3.1 basic process control system:** The control equipment installed to perform the normal regulatory functions for the process--e.g., PID control and sequential control.

**3.2 emergency shutdown system:** Instrumentation and controls installed for the purpose of taking the process, or specific equipment in the process, to a safe state. This does not include instrumentation and controls installed for non-emergency shutdowns or routine operations. Emergency shutdown systems may include electrical, electronic, pneumatic, mechanical, and hydraulic systems (including those systems that are programmable).

Other common terms used for emergency shutdown systems include safety instrumented systems, safety shutdown systems, protective instrument systems, and safety interlock systems.

**3.3 safety critical control:** A control whose failure to operate properly will directly result in a catastrophic release of toxic, reactive, flammable, or explosive chemical.

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## 4 Procedure

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### 4.1 Identification

**4.1.1** Emergency shutdown systems and safety critical controls should be identified during a process hazard analysis for those events judged likely to occur at an unacceptable frequency.

**4.1.2** Emergency shutdown systems and safety critical controls shall be identified and documented in a manner that clearly distinguishes them from other control systems, such as the basic process control system.

### 4.2 Maintenance and testing

**4.2.1** All emergency shutdown systems and safety critical controls shall be periodically tested and maintained in accordance with user system test procedures taking into account system manufacturer recommendations.

**4.2.2** The periodic tests of the emergency shutdown systems and safety critical controls shall contain the following minimum documentation:

- a) Date of inspection;
- b) Name of person who performed the test;
- c) Serial number or other unique identifier of the equipment;
- d) Results of the test as compared to user-defined acceptance criteria; and
- e) A description of the test(s) performed.

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## 5 References

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**5.1** U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Federal Regulation 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals, Explosives, and Blasting Agents*; Final Rule, February 24, 1992.

**5.2** U.S. Environmental Protection Agency (EPA), Federal Regulation 40 CFR Part 68, *Risk Management Programs for Chemical Accidental Release Prevention*; October 20, 1993 / Proposed Rules.



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