

BUREAU OF INDIAN STANDARDS

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मसौदा भारतीय मानक

**परमाणु ऊर्जा संयंत्र - सुरक्षा के लिए महत्वपूर्ण मापयंत्रण, नियंत्रण और
विद्युत ऊर्जा पद्धतियाँ- कार्यों का संवर्गीकरण और पद्धतियाँ का
वर्गीकरण**

Draft Indian Standard

**Nuclear power plants - Instrumentation, control and
electrical power systems important to safety - Categorization
of functions and classification of systems**

ICS: 27.120.20

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LITD 08-Electronic Measuring Instruments,
Systems And Accessories Sectional
Committee

Last date for comments: 16 July 2024

NATIONAL FOREWORD

(Formal clauses will be added later)

This Draft Indian Standard which is identical with IEC 61226:2020 ‘Nuclear power plants - Instrumentation, control and electrical power systems important to safety - Categorization of functions and classification of systems’ issued by International Electrotechnical Commission (IEC) will be adopted by the Bureau of Indian Standards on the recommendation of the Electronic Measuring Instruments, Systems And Accessories Sectional Committee, LITD 08 and approval of the Electronics and Information Technology Division Council

The text of ISO/IEC Standard *may be* approved as suitable for publication as an Indian Standard without deviations. Certain conventions are however not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words ‘International Standard’ appears referring to this standard, they should be read as ‘Indian Standard’.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current Practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their places, are listed below along with their degree of equivalence for editions indicated. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

International Standard	Corresponding Indian Standard	Degree of Equivalence
IEC 60812 ‘Failure Modes and Effects Analysis (FMEA and FMECA)	IS/IEC 60812 : 2018 Failure Failure Modes and Effects Analysis (FMEA and FMECA)	Identical with IEC 60812 : 2018

IEC 60880, Nuclear power plants – Instrumentation and control systems important to safety – Software aspects for computer-based systems performing category A functions.	IS 15398 : 2003 Software for computers in the safety systems of nuclear and radiation facilities	Modified/Technically Equivalent
IEC 60980, Recommended practices for seismic qualification of electrical equipment of the safety system for nuclear generating stations	IS 14989 : 2001 IEC 60980 Recommended practices for seismic qualification of electrical equipment of the safety system for nuclear generating stations	Identical with IEC 60980
IEC 60987, Nuclear power plants – Instrumentation and control important to safety – Hardware design requirements for computer-based systems.	IS 15399 : 2003 Hardware for computers in the safety system of nuclear and radiation facilities	Modified/Technically Equivalent
IEC 61000-4 (all parts), Electromagnetic Compatibility (EMC) – Part 4: Testing and measurement techniques	IS 14700-4 (all parts) Electromagnetic compatibility (EMC): Part 4 testing and measurement techniques	Identical with IEC 61000-4

The technical committee has reviewed the provisions of following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

International Standards	Title
IEC 60709	Nuclear power plants – Instrumentation, control and electrical power systems important to safety – Separation
IEC/IEEE 60780-323	Nuclear facilities – Electrical equipment important to safety – Qualification
IEC 60964	Nuclear power plants – Control rooms – Design.

IEC 60965	Nuclear power plants – Control rooms – Supplementary control room for reactor shutdown without access to the main control room.
IEC 61500	Nuclear power plants – Instrumentation and control systems important to safety – Data communication in systems performing category A functions.
IEC 61513:2011	Nuclear power plants – Instrumentation and control important to safety – General requirements for systems.
IEC 61771	Nuclear power plants – Main control-room – Verification and validation of design
IEC 61772	Nuclear power plants – Control rooms – Application of visual display units (VDUs)
IEC 61839	Nuclear power plants – Design of control rooms – Functional analysis and assignment
IEC 62003	Nuclear power plants – Instrumentation and control important to safety – Requirements for electromagnetic compatibility testing
IEC 62138:2018	Nuclear power plants – Instrumentation and control important for safety – Software aspects for computer-based systems performing category B or C functions
IEC 62566	Nuclear power plants – Instrumentation and control important to safety – Development of HDL-programmed integrated circuits for systems performing category A functions.
IEC 62645	Nuclear power plants – Instrumentation and control systems – Requirements for security programmes for computer-based systems.
IEC 62671	Nuclear power plants – Instrumentation and control important to safety – Selection and use of industrial digital devices of limited functionality
IEC 62859	Nuclear power plants – Instrumentation and control systems – Requirements for coordinating safety and cybersecurity
IEC 63046:—3	Nuclear power plants – Electrical power systems – General requirements
IAEA GSR Part 2:2016	Leadership and Management for Safety
IAEA SSR-2/1 (Rev.1):2016	Safety of nuclear power plants: Design
IAEA SSG-30:2014,	Safety Classification of Structures, Systems and Components in Nuclear Power Plants

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:2022 ‘Rules for rounding off numerical values (Second Revision)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Scope of IS/IEC 61226:2020 is as follows:

This document establishes, for nuclear power plants², a method of assignment of the functions specified for the plant into categories according to their importance to safety. Subsequent classification of the I&C and electrical power systems performing or supporting these functions, based on the assigned category, then determines relevant design criteria.

The design criteria, when applied, ensure the achievement of each function in accordance to its importance to safety. In this document, the criteria are those of functionality, reliability, performance, environmental qualification (e.g. seismic) and quality assurance (QA).

This document is applicable to:

- the functions important to safety that are performed by I&C systems and supported by electrical power systems (categorization of I&C functions),
- the I&C systems that enable those functions to be implemented (classification of I&C systems),
- the electrical power systems that support those functions (classification of electrical power systems).

The systems under consideration provide automated protection, closed or open loop control, information to the operating staff, and electrical power supply to systems. These systems keep the NPP conditions inside the safe operating envelope and provide automatic actions, or enable manual actions, that prevent or mitigate accidents, or that prevent or minimize radioactive releases to the site or wider environment. The I&C and electrical power systems that fulfil these roles safeguard the health and safety of the NPP operators and the public.

This document follows the general principles given in IAEA Safety Requirement SSR-2/1 and Safety Guides SSG-30, SSG-34 and SSG-39, and it defines a structured method of applying the guidance contained in those codes and standards to the I&C and electrical power systems that perform functions important to safety in a NPP. This document is read in association with the IAEA guides together with IEC 61513 and IEC 63046 in implementing the requirements of the IEC 61508 series. The overall classification scheme of structures, systems and components for NPPs can be summarized as follows by Figure 1.

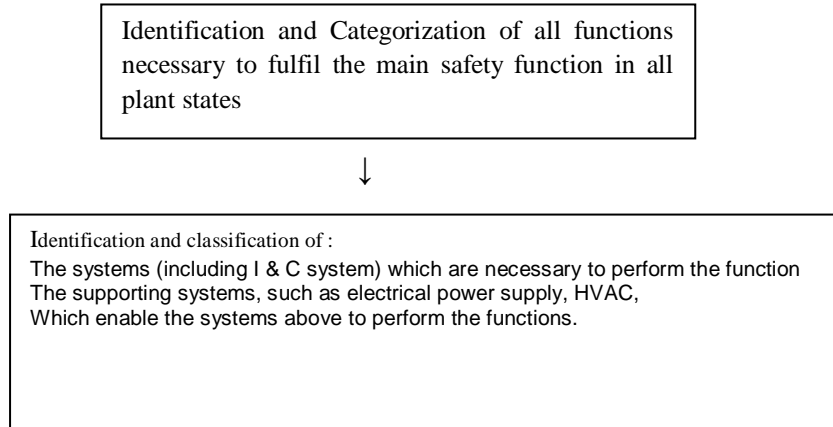


Figure 1 – Overall classification scheme

This 2-phase process is defined for purpose of comprehensiveness; it enables the capture of all the functions and all the systems important to safety, including I&C systems, as well as electrical power systems.

In this scheme, functions are defined and categorized regardless of the physical means that are implemented to fulfill them. In the framework of this document, the functions to be categorized are performed by I&C systems. --Accordingly, they are called I&C functions.

This document applies to I&C and electrical power systems for new nuclear power plants as well as for modification and modernization of existing plants.

For existing plants, only a subset of requirements can be applicable, and this subset is identified at the beginning of any project.

Note: - The Technical content of this document has not been enclosed as these are identical with the corresponding IEC Standard. For details please refer to **IS/IEC 61226:2020** or kindly contact.

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