

BUREAU OF INDIAN STANDARDS

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मसौदा भारतीय मानक
परमाणु और विकिरण सुविधाओं की सुरक्षा प्रणाली में
कंप्यूटर के लिए हार्डवेयर
(पहला पुनरीक्षण)

Draft Indian Standard
Nuclear Power Plants –
Instrumentation and Control Important to Safety -
Hardware Requirements

(First Revision)

ICS 27.120.20

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LITD 08 Electronic Measuring Instruments, Systems And Accessories Sectional Committee

NATIONAL FOREWORD

(Formal clauses will be added later)

This Draft Indian Standard (First Revision) which is identical with IEC 60987:2021 'Nuclear power plants - Instrumentation and control important to safety - Hardware requirements' issued by the International Electrotechnical Commission (IEC) *will be* adopted by the Bureau of Indian Standards on the recommendation of Electronic Measuring Instruments, Systems And Accessories Sectional Committee, LITD 08 and approval of the Electronics and Information Technology Division Council.

This standard was originally published in 2003 and was identical with IEC 60987:1989. The first revision of this standard under taken to align it with the latest version of International Standard IEC 60987:2021.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Title modified;
- b) Take account of the fact that hardware requirements apply to all I&C technologies, including conventional hardwired equipment, programmable digital equipment or by using a combination of both types of equipment;
- c) Align the standard with the new revisions of IAEA documents SSR-2/1, which include as far as possible an adaptation of the definitions;
- d) Replace, as far as possible, the requirements associated with standards published since the edition 2.1, especially IEC 61513, IEC 60880, IEC 62138, IEC 62566 and IEC 62566-2;
- e) Review the existing requirements and update the terminology and definitions;
- f) Extend the scope of the standard to all hardware (computerized and non-computerized) and to all safety classes 1, 2 and 3;
- g) Complete, update the IEC and IAEA references and vocabulary;
- h) Check possible impact of other IAEA requirements and recommendations considering extension of the scope of SC 45A;
- i) Highlight the use of IEC 62566 and IEC 62566-2 for HPD development;
- j) Introduce specific activities for pre-existing items (selection, acceptability and/or mitigation);
- k) Introduce clearer requirements for electronic module-level design, manufacturing and control;
- l) Complete reliability assessment methods;
- m) Introduce requirements when using automated tests or control activities;

- n) Complete description of manufacturing control activities (control process, assessment of manufactured equipment, preservation of products);
- o) Define and ensure the inclusion of a graded approach for dealing with the 3 different classes of equipment and related requirements.

The text of 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 respective places, are listed below along with their degree of equivalence for the 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 standards	Corresponding Indian standards	Degree of Equivalence
IEC 60812, Failure modes and effects analysis (FMEA and FMECA)	IS/IEC 60812 : 2018 Failure Modes and Effects Analysis (FMEA and FMECA)	Identical with IEC 60812 :2018
IEC 61000 (all parts), Electromagnetic compatibility (EMC)	IS 14700 (all parts), Electromagnetic compatibility (EMC)	Identical with IEC 61000
IEC 61025, Fault tree analysis (FTA)	IS/IEC 61025 : 2006 Fault Tree Analysis (FTA)	Identical with IEC 61025 : 2006

The technical committee has reviewed the provisions of the following international standards referred in this adopted draft standard and has decided that it is acceptable for use in conjunction with this standard. For dated references, only the edition cited applies. For updated references, the latest edition of the referenced document (including any amendments) applies:

International Standards	Titles
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IEC/IEEE 60780-323	Nuclear facilities – Electrical equipment important to safety – Qualification
IEC 60880	Nuclear power plants – Instrumentation and control systems important to safety – Software aspects for computer-based systems performing category A functions
IEC/IEEE 60980-344	Nuclear facilities – Equipment important to safety – Seismic qualification
IEC 61513:2011	Nuclear power plants – Instrumentation and control important to safety – General requirements for systems
IEC 61709	Electrical components – Reliability – Reference conditions for failure rates and stress models for conversion
IEC 62003	Nuclear power plants – Instrumentation, control and electrical power systems – Requirements for electromagnetic compatibility testing
IEC 62138:2018	Nuclear power plants – Instrumentation and control systems important to safety – Software aspects for computer-based systems performing category B or C functions
IEC 62566:2012	Nuclear power plants – Instrumentation and control important to safety – Development of HDL-programmed integrated circuits for systems performing category A functions
IEC 62566-2	Nuclear power plants – Instrumentation and control systems important to safety – Development of HDL-programmed integrated circuits – Part 2: HDL-programmed integrated circuits for systems performing category B or C functions
ISO 28590	Sampling procedures for inspection by attributes — Introduction to the ISO 2859 series of standards for sampling for inspection by attributes
IPC-A-610	Acceptability of Electronic Assemblies

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 same as that of the specified value in this standard

SCOPE OF IEC 60987:2021

“I&C systems important to safety may be implemented using conventional hardwired equipment, programmable digital equipment or by using a combination of both types of equipment.

This document provides requirements and recommendations for the hardware aspects of I&C systems whatever the technology and applies for all safety classes in a graded manner (as defined by IEC 61513).

The requirements defined within this document guide, in particular, the selection of preexisting components, hardware aspects of system detailed design and implementation and equipment manufacturing.

This document does not explicitly address how to protect systems against those threats arising from malicious attacks, i.e. cybersecurity, for programmable digital item. IEC 62645 provides requirements for security programmes for programmable digital item for all their development phases and on-site operation.

Pre-existing items may include microcontrollers or HPDs and, where firmware or programming files are deeply-embedded, be effectively "transparent" to the user. In such cases, this document can be used to guide the assessment process for such components. An example of where this approach is considered appropriate is in the assessment of modern processors which contain a microcode. Such code is generally an integral part of the "hardware", and it is therefore appropriate for the processor (including the microcode) to be assessed as an integrated hardware component using this document.

Software which is not deeply-embedded, as described above, is developed or assessed according to the requirements of the relevant software standard (for example, IEC 60880 for class 1 systems and IEC 62138 for class 2 and 3 systems).

In the same manner, HPDs which are not deeply-embedded, as described above, are developed or assessed according to the requirements of the relevant HPD standard (for example, IEC 62566 for class 1 systems and IEC 62566-2 for class 2 and 3 systems).”

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 IEC 60987:2021 or kindly contact.

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