IEC TR 63400

Edition 2.0 2025-12

TECHNICAL REPORT

Nuclear facilities - Instrumentation, control and electrical power systems important to safety - Structure of the IEC SC 45A standards series

ICS 27.120.20

ISBN 978-2-8327-0760-9

IEC TR 63400:2025-12(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Nuclear facilities – Instrumentation, control and electrical power systems important to safety - Structure of the IEC SC 45A standards series

FOREWORD

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IEC TR 63400 has been prepared by subcommittee 45A: Instrumentation, control and electrical power systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
45A/1597/DTR	45A/1622/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

This second edition cancels and replaces the first edition published in 2021. This edition constitutes a technical revision.

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

a) This edition reflects changes made to the IEC SC45A portfolio of publications between 2021 and 2025, including the publication of revised standards in addition to new publications including in the field of artificial intelligence applications for nuclear facilities.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

a) Technical background, main issues and organisation of this document

The IEC SC 45A series of standards include the same common description in their Introduction, item d), outlining the overall structure of the series and its relationship with other standards bodies and standards (e.g. specific IAEA safety guides and IEC 61508).

The structure of the IEC SC 45A series at the time of drafting this document can be described as a "pyramid" extending down from two top-level documents (at level 1) to other documents (at levels 2, 3 and 4).

With the gradual extension of the IEC SC 45A scope to address electrical power systems, cybersecurity and human factors engineering, and ongoing development of new standards, it had become apparent that the common description could no longer, on its own, adequately fulfil this objective without becoming overly extensive.

This document is therefore intended to augment the common description that is included in the Introduction, item d), of all IEC SC 45A documents.

A revision of this document can be considered after each IEC SC 45A meeting and, if judged necessary, a revision then undertaken subject to the availability of the appropriate resources.

In this Edition 2, the list of IEC SC 45A published documents and approved projects and the list of IAEA documents of particular relevance to the IEC SC 45A technical scope have been updated. However, no significant changes have been made to either the basic objective or structure of the edition 1.

This document is organized as follows:

– Clause 5 outlines the scope of the IEC SC 45A standards series;
– Clause 6 describes the basic structure of the IEC SC 45A standards series, with particular reference to a hierarchy of levels and subdivision into a set of broad topic areas;
– Clause 7 presents the structure of the IEC SC 45A standards series in diagrammatic form;
– Clause 8 introduces and points to three annexes that include:
– the full set of IEC SC 45A standards in tabular form and numerical order,
– other (i.e. non-IEC SC 45A) documents of particular relevance to IEC SC 45A, and
– the IEC SC 45A standards in tabular form for each broad topic area.

NOTE 1 In this edition, the documents under the responsibility of IEC SC 45A, as listed in the annexes, and their status correspond to the situation that applied on 1 May 2025. For documents developed by other committees cited for their relevance to IEC SC 45A, this document in most cases reflects the status of the situation that applied on 1 May 2024.

b) Situation of this document in the structure of the IEC SC 45A standards series

This document is a fourth level IEC SC 45A document.

Item d) of this Introduction describes the structure of the IEC SC 45A standards series in general terms.

This document augments that description to enable users of individual IEC SC 45A standards to obtain a more comprehensive understanding of the overall structure of the series and its relationship with other standards bodies and standards. The publication of this document and its subsequent editions should also enable minor changes in the structure to be described without the need for amending the common description that is included in the Introduction, item d), of all IEC SC 45A documents.

c) Recommendations and limitations regarding the application of this document

It is important to note that a Technical Report is entirely informative in nature. It gathers data collected from different origins and it establishes no requirements.

d) Description of the structure of the IEC SC 45A standards series and relationships with other IEC documents and other bodies documents (IAEA, ISO)

The IEC SC 45A standards series comprises a consistent set of documents organised in a hierarchy of four levels. The top-level documents of the IEC SC 45A standards series are IEC 61513 and IEC 63046, covering general requirements for instrumentation and control (I&C) systems, and general requirements for electrical power systems of NPPs, respectively. IEC 61513 and IEC 63046 adopt an overall system life-cycle framework and constitute, along with the relevant second-level standards, the nuclear implementation of the basic safety series IEC 61508.

IEC 61513 and IEC 63046 refer directly to other IEC SC 45A standards for general requirements for specific topics, such as categorization of functions and classification of systems, qualification, separation, defence against common cause failure, control room design, electromagnetic compatibility, human factors engineering, cybersecurity, programmable digital item and hardware aspects for programmable digital systems, coordination of safety and cybersecurity requirements and management of ageing.

At a third level, IEC SC 45A standards not directly referenced by IEC 61513 or by IEC 63046 are standards related to specific requirements for specific equipment, technical methods, or activities. Usually, these documents refer to second-level documents for general requirements and can be used on their own.

A fourth level extending the IEC SC 45A standards series, corresponds to the Technical Reports which are not normative.

The IEC SC 45A standards series consistently implements and details the safety and security principles and basic aspects provided in the relevant IAEA safety standards and in the relevant documents of the IAEA nuclear security series (NSS). In particular this includes the IAEA requirements SSR-2/1, establishing safety requirements related to the design of nuclear power plants (NPPs), the IAEA safety guide SSG-30 dealing with the safety classification of structures, systems and components in NPPs, the IAEA safety guide SSG-39 dealing with the design of instrumentation and control systems for NPPs, the IAEA safety guide SSG-34 dealing with the design of electrical power systems for NPPs, the IAEA safety guide SSG-51 dealing with human factors engineering in the design of NPPs, and the implementing guide NSS42-G for computer security at nuclear facilities. The safety and security terminology and definitions used by the SC 45A standards are consistent with those used by the IAEA.

IEC 61513 and IEC 63046 refer to ISO 9001 as well as to IAEA GSR part 2 and IAEA GS-G-3.1 and IAEA GS-G-3.5 for topics related to quality assurance (QA).

At level 2, regarding nuclear security, IEC 62645 is the entry document for the IEC/SC 45A security standards. It builds upon the valid high-level principles and main concepts of the generic security standards, in particular ISO/IEC 27001 and ISO/IEC 27002; it adapts them and completes them to fit the nuclear context and coordinates with the IEC 62443 series. At level 2, IEC 60964 is the entry document for the IEC/SC 45A control rooms standards, IEC 63351 is the entry document for the human factors engineering standards and IEC 62342 is the entry document for the ageing management standards.

NOTE 2 This document provides a more comprehensive description of the overall structure of the IEC SC 45A standards series and of its relationship with other standards bodies and standards.

1 Scope

The IEC SC 45A series of standards includes a general description in the Introduction, item d) of each part, outlining the overall structure of the series and its relationship with other standards bodies and standards (e.g. specific IAEA safety guides and IEC 61508).

This document is intended to augment that description to enable users of individual IEC SC 45A International Standards to obtain a more comprehensive understanding of the overall structure of the series and its relationship with other standards bodies and standards.

2 Normative references

There are no normative references in this document.