

Nuclear power plants - Control rooms - Requirements
for emergency response facilities

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62954:2021 sisaldab Euroopa standardi EN IEC 62954:2021 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62954:2021 consists of the English text of the European standard EN IEC 62954:2021.
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ICS 27.120.20

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English Version

**Nuclear power plants - Control rooms - Requirements for
emergency response facilities
(IEC 62954:2019)**

Centrales nucléaires de puissance - Salles de commande -
Exigences pour les moyens de réaction d'urgence
(IEC 62954:2019)

Kernkraftwerke - Warten - Anforderungen für Notfall-
Reaktionseinrichtungen
(IEC 62954:2019)

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European foreword

This document (EN IEC 62954:2021) consists of the text of IEC 62954:2019 prepared by IEC/TC 45 "Nuclear instrumentation".

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-07-05
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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60709	NOTE	Harmonized as EN IEC 60709
IEC 60964	NOTE	Harmonized as EN IEC 60964
IEC 60965	NOTE	Harmonized as EN 60965
IEC 61227	NOTE	Harmonized as EN 61227
IEC 61772	NOTE	Harmonized as EN 61772
IEC 61839	NOTE	Harmonized as EN 61839
IEC 62645	NOTE	Harmonized as EN IEC 62645

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61226	2009	Nuclear power plants - Instrumentation and control important to safety - Classification of instrumentation and control functions	EN 61226	2010
IEC 61513	-	Nuclear power plants - Instrumentation and control important to safety - General requirements for systems	EN 61513	-
IEC/IEEE 323	60780--	Nuclear facilities – Electrical equipment important to safety - Qualification	EN 60780-323	-

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Nuclear power plants – Control rooms – Requirements for emergency response facilities

Centrales nucléaires de puissance – Salles de commande – Exigences pour les moyens de réaction d'urgence



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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Nuclear power plants – Control rooms – Requirements for emergency response facilities

Centrales nucléaires de puissance – Salles de commande – Exigences pour les moyens de réaction d'urgence

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 27.120.20

ISBN 978-2-8322-6384-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

NUCLEAR POWER PLANTS – CONTROL ROOMS – REQUIREMENTS FOR EMERGENCY RESPONSE FACILITIES

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62954 has been prepared by subcommittee 45A: Instrumentation, control and electrical power systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
45A/1236/FDIS	45A/1251/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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INTRODUCTION

a) Technical background, main issues and organisation of the Standard

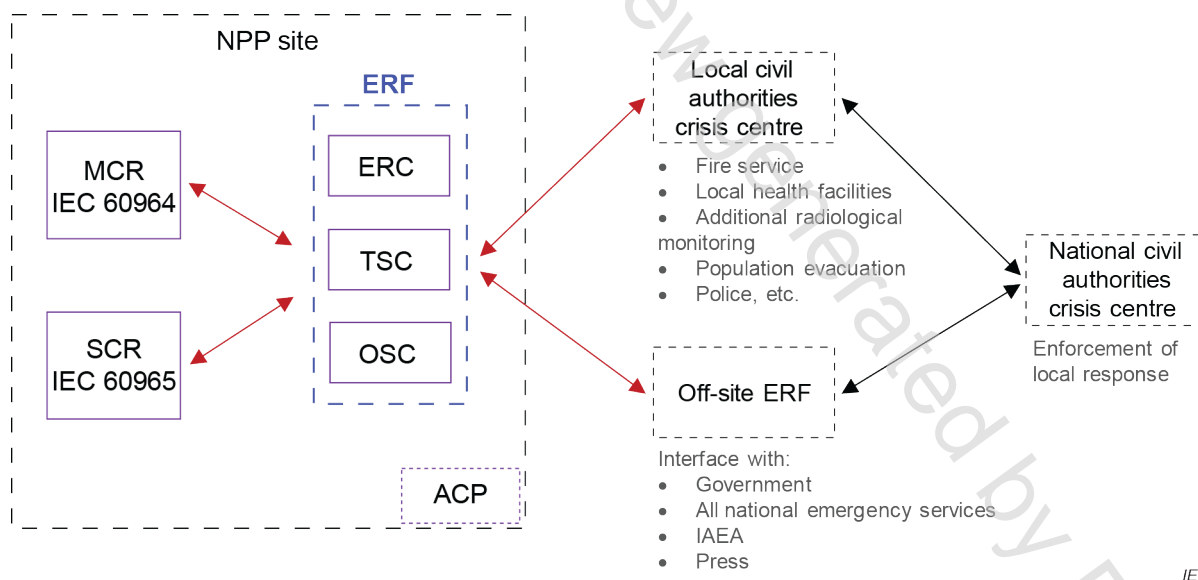
The Fukushima-Daiichi accident has shown that extremely severe hazards can occur for which a nuclear power plant has not been designed to resist. In such situations, the plant has possibly to cope with one or several damaged reactors, and associated radioactive releases, but also has to cope with the loss of a major part of the electrical sources, cooling functions and I&C, possibly including the Main Control Room (MCR), as well as with difficulties in accessing the site. Providing safe on-site facilities for managing such an emergency is hence a major issue.

An international consensus has emerged to promote the design and installation of a specific set of facilities aiming at coordinating the efforts of personnel charged with controlling the emergency activities and those of authorities external to the site charged with protecting the population and the environment. These facilities are called the Emergency Response Facilities (ERF).

Different countries, utilities and nuclear power plants have different geographical and infrastructure characteristics and different requirements under emergency situations. However, the same fundamentals apply in terms of both on-site and off-site requirements.

The IAEA requirements for emergency response are addressed in SSR-2/1 and GSR Part 7. Informative Annex A provides the more relevant extracts from these two IAEA publications.

Figure 1 below illustrates the most important control locations, emergency response facilities and other associated facilities on-site and off-site. Some of the on-site facilities could be combined to support close-communication or their functions could be dispersed across other on-site facilities. The level of hardening and autonomy of the individual on-site facilities could vary considerably.



IEC

Figure 1 – On-site and off-site ERFs and communicating entities

NOTE 1 No internationally standardized terminology has been established for the various on-site and off-site emergency response facilities. The terms used in Figure 1 indicate the ones that have been adopted in this document.

NOTE 2 Depending on local contexts, the “on-site” ERFs could be implemented close to the NPP and not inside it.

NOTE 3 The role and composition of the off-site civil authorities and emergency infrastructure are known to vary widely. These entries in Figure 1 are therefore considered as illustrative only.

As indicated in Figure 1 some functional services are already dealt with in IEC standards.

This standard was proposed after the Fukushima-Daiichi accident to take into account the lessons learned from those dramatic events. Several reports prepared after the accident, at national level (Japanese Government report) as well as at international level (IAEA fact finding mission) highlighted the role played by the Emergency Response Centre (ERC) during those events and identified the need to take into account the experience gained to strengthen the requirements for such a facility.

This led to the development of this standard, with the following principles:

- The scope should align with that of the relevant IAEA guidance, as given in SSR-2/1, Rev. 1 and GSR Part 7;
- The scope should address the three functional facilities related to Emergency Response that are addressed by the IAEA guidance (i.e. the ERC, TSC and OSC);
- The scope should be limited to such facilities that are on or near the NPP site. The scope should exclude activities in the scope of local response authorities;
- The requirements should be defined in terms of the functions that are to be performed;
- The standard should address the way in which the functions are invoked in response to different severities of incident / accident and any responsibilities that would be transferred from the MCR to the Emergency Response Facilities (ERFs);
- The scope should include consideration of the requirements for environment control, lighting, power supplies, access control of the ERFs, etc., as needed to enable the Emergency Response functions to be performed;
- The only “controls” that should be provided are those that relate to the services that provide the above mentioned environment control, lighting, power supplies, access control of the ERFs, etc.;
- The standard should recognize that a wide range of national or regional situations exist regarding the structure and arrangements for the off-site Emergency Response support.

This IEC standard specifically focuses on the issue of requirements relevant for the Emergency Response Facilities (ERFs).

It is intended that the Standard be used by designers and operators of NPPs (utilities), systems evaluators, vendors and subcontractors, and by licensors.

b) Situation of the current Standard in the structure of the IEC SC 45A standard series

IEC 62954 is at the third level of the IEC SC 45A standard series. It is to be considered as affiliated to IEC 60964, the top document on control rooms in the SC 45A standard series.

For a generic description of the structure of the IEC SC 45A standard series, see item d) of this introduction.

c) Recommendations and limitations regarding the application of the Standard

This standard establishes functional requirements for Emergency Response Facilities and clarifies the design and operation of the ERF systems to be used in case of incidents or accidents occurring on nuclear power plants (NPPs) and/or nuclear facilities.

It is recognized that this is an evolving area of regulatory requirements, due to ongoing analysis of the Fukushima lessons learned. Therefore, the goal of this project is to provide a standard, which defines the framework within which the evolving country or plant specific requirements may be developed and applied.

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

The top-level documents of the IEC SC 45A standard series are IEC 61513 and IEC 63046. IEC 61513 provides general requirements for I&C systems and equipment that are used to perform functions important to safety in NPPs. IEC 63046 provides general requirements for electrical power systems of NPPs; it covers power supply systems including the supply systems of the I&C systems. IEC 61513 and IEC 63046 are to be considered in conjunction and at the same level. IEC 61513 and IEC 63046 structure the IEC SC 45A standard series and shape a complete framework establishing general requirements for instrumentation, control and electrical systems for nuclear power plants.

IEC 61513 and IEC 63046 refer directly to other IEC SC 45A standards for general topics related to categorization of functions and classification of systems, qualification, separation, defence against common cause failure, control room design, electromagnetic compatibility, cybersecurity, software and hardware aspects for programmable digital systems, coordination of safety and security requirements and management of ageing. The standards referenced directly at this second level should be considered together with IEC 61513 and IEC 63046 as a consistent document set.

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

A fourth level extending the IEC SC 45 standard 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 and the implementing guide NSS17 for computer security at nuclear facilities. The safety and security terminology and definitions used by SC 45A standards are consistent with those used by the IAEA.

IEC 61513 and IEC 63046 have adopted a presentation format similar to the basic safety publication IEC 61508 with an overall life-cycle framework and a system life-cycle framework. Regarding nuclear safety, IEC 61513 and IEC 63046 provide the interpretation of the general requirements of IEC 61508-1, IEC 61508-2 and IEC 61508-4, for the nuclear application sector. In this framework IEC 60880, IEC 62138 and IEC 62566 correspond to IEC 61508-3 for the nuclear application sector. IEC 61513 and IEC 63046 refer to ISO 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 and IEC 62342 is the entry document for the ageing management standards.

NOTE 1 It is assumed that for the design of I&C systems in NPPs that implement conventional safety functions (e.g. to address worker safety, asset protection, chemical hazards, process energy hazards) international or national standards would be applied.

NOTE 2 IEC/SC 45A domain was extended in 2013 to cover electrical systems. In 2014 and 2015 discussions were held in IEC/SC 45A to decide how and where general requirements for the design of electrical systems were to be considered. IEC/SC 45A experts recommended that an independent standard be developed at the same level as IEC 61513 to establish general requirements for electrical systems. Project IEC 63046 is now launched to cover this objective. When IEC 63046 is published this NOTE 2 of the introduction of IEC/SC 45A standards will be suppressed.