



NSAI
Standards

Irish Standard
I.S. EN 61227:2016

Nuclear power plants - Control rooms - Operator controls

I.S. EN 61227:2016

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN 61227:2016 is the adopted Irish version of the European Document EN 61227:2016, Nuclear power plants - Control rooms - Operator controls

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EUROPEAN STANDARD

EN 61227

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2016

ICS 27.120.20

English Version

Nuclear power plants - Control rooms - Operator controls (IEC 61227:2008)

Centrales nucléaires de puissance - Salles de commande -
Commandes opérateurs
(IEC 61227:2008)

Kernkraftwerke - Warten - Handbedienungen
(IEC 61227:2008)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

EN 61227:2016

European foreword

This document (EN 61227:2016) consists of the text of IEC 61227:2008 prepared by SC 45A "Instrumentation, control and electrical systems of nuclear facilities" of IEC/TC 45 "Nuclear instrumentation".

The following dates are fixed:

- latest date by which the document has to be implemented at (dop) 2017-03-01
national level by publication of an identical national
standard or by endorsement
- latest date by which the national standards conflicting with (dow) 2019-03-01
the document have to be withdrawn

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The text of the International Standard IEC 61227:2008 was approved by CENELEC as a European Standard without any modification.

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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 60073	-	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators	EN 60073	-
IEC 60964	-	Nuclear power plants - Control rooms - Design	EN 60964	-
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)	EN 61772	-
IAEA Safety Guide NS-G-1.3	2002	Instrumentation and control systems important to safety in nuclear power plants	-	-

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IEC 61227

Edition 2.0 2008-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Nuclear power plants – Control rooms – Operator controls

**Centrales nucléaires de puissance – Salles de commande – Commandes
opérateurs**



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IEC 61227

Edition 2.0 2008-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Nuclear power plants – Control rooms – Operator controls

Centrales nucléaires de puissance – Salles de commande – Commandes opérateurs

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONALE

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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
4 Design principles	8
4.1 Basic concepts	8
4.2 Types of HMI.....	9
4.2.1 Discrete controls	9
4.2.2 Soft controls	9
4.3 Selection of control system.....	10
5 Design requirements	11
5.1 Individual controls and indicators	11
5.1.1 Control board layout	11
5.1.2 Positioning of groups	12
5.1.3 Device layout.....	12
5.1.4 Uniformity of orientation	13
5.1.5 Mimic diagrams	13
5.1.6 Coding.....	14
5.1.7 Protection against mal-operation of control devices	15
5.1.8 Compatibility with VDU formats.....	15
5.2 Soft controls	16
5.2.1 Display devices	16
5.2.2 Selection displays.....	17
5.2.3 Input Fields	17
5.2.4 Input formats	17
5.2.5 User-System Interaction	17
5.3 Special requirements for touch panels.....	18
Annex A (informative) Examples for the arrangement of discrete controls	20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**NUCLEAR POWER PLANTS –
CONTROL ROOMS –
OPERATOR CONTROLS****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 61227 has been prepared by subcommittee 45A: Instrumentation and control of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation.

This second edition cancels and replaces the first edition published in 1993 and constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) account has been taken of the fact that computer design engineering techniques have advanced significantly in the intervening years;
- b) alignment of the standard with the new revisions of IAEA documents NS-R-1 and NS-G-1.3, which includes as far as possible an adaptation of the definitions;
- c) replacement, as far as possible, of the requirements associated with standards published since the first edition, especially, IEC 60964 (edition 2) and IEC 61772 (edition 2);
- d) review of the existing requirements and updating of the terminology and definitions.

The text of this standard is based on the following documents:

FDIS	Report on voting
45A/694/FDIS	45A/702/RVD

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

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

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

This IEC standard specifically focuses on operator controls.

It is intended that this standard be used by operators of NPPs (utilities), systems evaluators and by licensors.

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

IEC 61227 is the third level IEC SC 45A document tackling the generic issue of operator controls.

IEC 61227 is to be read in association with IEC 60964 and IEC 61772. IEC 60964 is the appropriate IEC SC 45A chapeau document for control rooms which provides guidance on control room design and which references IEC 61227. IEC 61772 establishes requirements for the application of VDU (Visual Display Units).

For more details on the structure of IEC SC 45A standard series, see item d) of this introduction.

c) Recommendations and limitations regarding the application of this standard

It is important to note that this standard establishes no additional functional requirements for safety systems.

To ensure that this standard will continue to be relevant in future years, the emphasis has been placed on issues of principle, rather than specific technologies.

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 document of the IEC SC 45A standard series is IEC 61513. It provides general requirements for I&C systems and equipment that are used to perform functions important to safety in NPPs. IEC 61513 structures the IEC SC 45A standard series.

IEC 61513 refers directly to other IEC SC 45A standards for general topics related to categorization of functions and classification of systems, qualification, separation of systems, defence against common cause failure, software aspects of computer-based systems, hardware aspects of computer-based systems, and control room design. The standards referenced directly at this second level should be considered together with IEC 61513 as a consistent document set.

At a third level, IEC SC 45A standards not directly referenced by IEC 61513 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 45A standard series, corresponds to the Technical Reports which are not normative.

IEC 61513 has adopted a presentation format similar to the basic safety publication IEC 61508 with an overall safety life-cycle framework and a system life-cycle framework and provides an interpretation of the general requirements of IEC 61508-1, IEC 61508-2 and IEC 61508-4, for the nuclear application sector. Compliance with IEC 61513 will facilitate consistency with the requirements of IEC 61508 as they have been interpreted for the nuclear

industry. In this framework IEC 60880 and IEC 62138 correspond to IEC 61508-3 for the nuclear application sector.

IEC 61513 refers to ISO as well as to IAEA 50-C-QA (now replaced by IAEA 50-C/SG-Q) for topics related to quality assurance (QA).

The IEC SC 45A standards series consistently implements and details the principles and basic safety aspects provided in the IAEA code on the safety of NPPs and in the IAEA safety series, in particular the Requirements NS-R-1, establishing safety requirements related to the design of Nuclear Power Plants, and the Safety Guide NS-G-1.3 dealing with instrumentation and control systems important to safety in Nuclear Power Plants. The terminology and definitions used by SC 45A standards are consistent with those used by the IAEA.

NUCLEAR POWER PLANTS – CONTROL ROOMS – OPERATOR CONTROLS

1 Scope

This International Standard supplements IEC 60964 which applies to the design for control rooms of nuclear power plants. It identifies the Human-Machine Interface (HMI) requirements for discrete controls, multiplexed conventional systems, and soft control systems. For the main control room of a nuclear power plant, IEC 60964 includes general requirements for layout, user needs and verification and validation methods, and these aspects are not repeated in this standard. However, IEC 61772 on Visual Displays Unit (VDU) also provides some guidance on displays and indications where necessary for the correct application of the control requirements.

This standard is intended for application to the design of new main control rooms in nuclear power plants designed to IEC 60964 where this is initiated after the publication of this standard. If it is desired to apply it to supplementary control points or local control positions, or to existing control rooms or designs, special caution shall be exercised as it makes assumptions such as the automation level that may not apply.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60073, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators*

IEC 60964, *Nuclear power plants – Control rooms – Design of main control room*

IEC 61771, *Nuclear power plants – Control rooms – Verification and validation of design*

IEC 61772, *Nuclear power plants – Control rooms – Application of visual display units (VDU)*

IAEA Safety guide NS-G-1.3:2002, *Instrumentation and Control Systems Important to Safety in Nuclear Power Plants*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60964 and the following definitions apply:

3.1

discrepancy control and indication

binary control with state and discrepancy indication using a single control switch

3.2

discrete (individual) controls

devices to support operator control of plant components, such as pumps, valves, controllers, with one control being assigned to a single plant component or function

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