SLOVENSKI STANDARD
SIST EN 60780-323:2017

01-december-2017

Jedrski objekti - Električna oprema, pomembna za varnost - Kvalifikacija (IEC/IEEE 60780-323:2016)

Nuclear facilities - Electrical equipment important to safety - Qualification (IEC/IEEE 60780-323:2016)

Kerntechnische Anlagen - Elektrisches Gerät mit sicherheitstechnischer Bedeutung - Qualifizierung (IEC/IEEE 60780-323:2016)

Installations nucléaires - Equipements électriques importants pour la sûreté - Qualification (IEC/IEEE 60780-323:2016)

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27.120.20	Jedrske elektrarne. Varnost	Nuclear power plants. Safety

SIST EN 60780-323:2017 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
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October 2017

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English Version

Nuclear facilities - Electrical equipment important to safety - Qualification (IEC/IEEE 60780-323:2016)

Installations nucléaires - Equipements électriques importants pour la sûreté - Qualification (IEC/IEEE 60780-323:2016)

Kerntechnische Anlagen - Elektrisches Gerät mit sicherheitstechnischer Bedeutung - Qualifizierung (IEC/IEEE 60780-323:2016)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

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European foreword

This document (EN 60780-323:2017) consists of the text of IEC/IEEE 60780-323:2016 prepared by SC 45A "Instrumentation, control and electrical systems of nuclear facilities" of IEC/TC 45 "Nuclear instrumentation", in cooperation with the Nuclear Power Engineering Committee of the Power and Energy Society of the IEEE, under the IEC/IEEE Dual Logo Agreement between IEC and IEEE.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-09-11
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2020-09-11

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

As stated in the nuclear safety directive 2009/71/EURATOM, Chapter 1, Article 2, item 2, Member States are not prevented from taking more stringent safety measures in the subject-matter covered by the Directive, in compliance with Community law. In a similar manner, this European standard does not prevent Member States from taking more stringent nuclear safety and/or security measures in the subject-matter covered by this standard.

Endorsement notice

The text of the International Standard IEC/IEEE 60780-323:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-2-6	NOTE	Harmonized as EN 60068-2-6.
IEC 60068-2-11	NOTE	Harmonized as EN 60068-2-11.
IEC 60068-2-14	NOTE	Harmonized as EN 60068-2-14.
IEC 60068-2-27	NOTE	Harmonized as EN 60068-2-27.
IEC 60068-2-30	NOTE	Harmonized as EN 60068-2-30.
IEC 60068-2-57	NOTE	Harmonized as EN 60068-2-57.
IEC 60068-3-3	NOTE	Harmonized as EN 60068-3-3.
IEC 60216-1	NOTE	Harmonized as EN 60216-1.
IEC 60216-2	NOTE	Harmonized as EN 60216-2.
IEC 60529	NOTE	Harmonized as EN 60529.
IEC 60544-2	NOTE	Harmonized as EN 60544-2.
IEC 60811-412	NOTE	Harmonized as EN 60811-412.
IEC 61000-4 Series	NOTE	Harmonized as EN 61000-4 Series.

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.

Publication	Year	Title	EN/HD	Year
IEC 60980	-	Recommended practices for seismic qualification of electrical equipment of the safety system for nuclear generating stations	-	-
IEEE Std 344™	2013	IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations	-	-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Nuclear facilities – Electrical equipment important to safety – Qualification

Installations nucléaires – Équipements électriques importants pour la sûreté – Qualification

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NUCLEAR FACILITIES – ELECTRICAL EQUIPMENT IMPORTANT TO SAFETY – QUALIFICATION

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.

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2) The formal decisions of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees. The formal decisions of IEEE on technical matters, once consensus within IEEE Societies and Standards Coordinating Committees has been reached, is determined by a balanced ballot of materially interested parties who indicate interest in reviewing the proposed standard. Final approval of the IEEE standards document is given by the IEEE Standards Association (IEEE-SA) Standards Board.

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8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that implementation of this IEC/IEEE Publication may require use of material covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. IEC or IEEE shall not be held responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patent Claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

International Standard IEC/IEEE 60780-323 has been prepared by subcommittee 45A: Instrumentation, control and electrical systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation, in cooperation with the Nuclear Power Engineering Committee of the Power & Energy Society of the IEEE, under the IEC/IEEE Dual Logo Agreement between IEC and IEEE.

This publication is published as an IEC/IEEE Dual Logo standard.

NOTE A list of IEEE participants can be found at the following URL:
http://standards.ieee.org/downloads/60780/60780-323-2016/60780-323-2016_wg-participants.pdf

This new edition cancels and replaces the first edition of IEC 60780, published in 1998. It constitutes a technical revision. It also supersedes IEEE Std 323-2003.

The main technical changes with regard to IEC 60780:1998 are as follows:

- to harmonize in a unique standard qualification practices formerly given by IEC 60780:1998 and IEEE Std 323-2003 on initial qualification,
- to take into account the need to reassess and extend the qualified life of electrical equipment regarding projects to extend the operating life of nuclear facilities.

This revision incorporates current practices and lessons learned from the implementation of previous versions of this standard by the nuclear industry.

Several issues are clarified or changed in this revision:

- This standard defines the methods for equipment qualification when it is desired to qualify equipment for the applications in the environments to which it may be exposed. This standard is generally utilized for qualification of all electrical equipment important to safety in accordance with IAEA terminology. The documentation and test requirements are, however, more rigorous for equipment located in a harsh environment.
- The test margins have been updated to better identify the parameters that achieve test margin on design basis event profiles.
- An important concept in equipment qualification is the recognition that significant degradation could be caused by ageing mechanisms occurring from the environments during the service life, and therefore equipment important to safety should be brought to the end of qualified life (operating ageing) prior to imposing design basis event simulations. Previous versions recognised that the period of time for which acceptable performance was demonstrated is the qualified life. The qualified life does not include the time during or after the accident conditions for which qualification is demonstrated (mission time). The concept of qualified life continues in this revision. This revision also recognises that the condition of the equipment for which acceptable performance was demonstrated is the qualified condition. Thus, new license renewal and life extension options are available by ensuring that qualified equipment continues to remain in a qualified condition.

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

FDIS	Report on voting
45A/1058/FDIS	45A/1075/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.

International standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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 the Standard

This standard is applicable to electrical equipment important to safety and its interfaces that are necessary to perform a safety function, or whose failure could adversely affect the safety functions of other equipment.

Electrical equipment in nuclear facilities shall meet its safety functional requirements throughout its installed life. This is accomplished by a thorough programme of quality assurance, design control, quality control, qualification, production, transportation, storage, installation, maintenance, periodic testing, and surveillance. This IEC/IEEE standard specifically focuses on qualification.

Other aspects, relating to quality assurance, reliability, selection and use of electronic devices, design and modification of digital systems including V&V activities are not part of this standard.

Industry research in the area of equipment qualification and decades of its application have greatly benefited this standard. Future activities of the working group to update this standard will consider the following:

– Experience and knowledge gained by using condition monitoring techniques,

– Knowledge gained on ageing mechanisms and kinetics,

– Significance of refinements in ageing mechanisms, equipment sealing, interfaces, extrapolation, similarity, test sequence and parameters (such as ramp rates, time duration, timing of spray initiation and its duration), and qualification documentation.

It is intended that the Standard be used by operators of NPPs (utilities), systems evaluators, equipment manufacturers, test facilities, qualification laboratories and by licensors.

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

IEC 61513 is a first level IEC SC 45A document and gives guidance applicable to I&C at system level.

These documents are supplemented by guidance on functional classification (IEC 61226), hardware design (IEC 60987), software (IEC 60880 and IEC 62138), selection and use of HDL programmed integrated circuit (IEC 62566) and requirements in order to reduce the possibility and limit the impact of common cause failure of category A functions (IEC 62340).

IEC/IEEE 60780-323 is a second level IEC SC 45A document which focuses on environmental qualification of electrical equipment important to safety.

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

c) Recommendations and limitations regarding the application of this standard

This dual logo standard applies to all electrical equipment important to safety in accordance with IAEA terminology including Class 1E equipment in accordance with the IEEE classification scheme and Classes 1, 2 and 3 in accordance with IEC 61226 classification scheme.

For equipment that needs to be qualified for design extension conditions, including severe accident conditions, this international standard shall be applied after a new DBE profile covering these conditions has been fully defined. Conservatism taken into account to define this severe accident profile should nevertheless be adapted.

To ensure that the 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.