

Nuclear power plants — Electrical equipment of the safety system — Qualification

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The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the CEI IEC title page, page ii, pages 1 to 19 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 April 1999

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Amendments issued since publication

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**Nuclear power plants –
Electrical equipment of the safety system –
Qualification**



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1 Scope and object

This International Standard is applicable to electrical equipment of safety systems used in nuclear power plants, including components or equipment of any interface whose failure could adversely affect the performance of the safety system. It is also applicable to non-electrical interfaces associated with a safety function.

This standard describes successively the general qualification process, the qualification procedures and methods to be used and the associated documentation.

It is the primary role of qualification to ensure that, for each type of safety-related equipment, the design and the manufacturing processes are such that there is a high degree of confidence that future equipment of the same type will perform as required.

This standard also gives preferential methods in various configurations, as well as severity levels to be used in the qualification sequence.

These qualification requirements, when met, will provide adequate verification that the equipment of the safety systems is designed to perform its function.

It should be taken into account that there exist different categories of qualification according to the task and the location of the equipment. Where qualification is required by other IEC standards or recommendations for nuclear power plants other than those described in this standard, the use of the general guidance provided in this standard is recommended.

The qualification methods described here should be used for the initial qualification of the equipment and for maintaining qualification preservation following modifications.

Other qualification rules for specific electrical equipment or test methods may exist elsewhere and should be used to supplement this standard.

The references and methods for determining equipment design life are not directly covered by this standard.

The manufacturers and users of equipment for safety systems are required to provide evidence that such equipment will meet or exceed its performance requirements throughout its installed life. This requires the establishment of different quality assurance programmes at various levels: design, qualification, production quality control, installation, maintenance and periodic testing. This standard deals only with the qualification aspects.

The other steps in the quality assurance programme require strict control to ensure that subsequent equipment of the same type matches that which was qualified, and that is suitably applied, installed, maintained and periodically tested.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing — Part 1: General and guidance*.

IEC 60068-2 (all parts), *Environmental testing — Part 2: Tests*.

IEC 60068-2-1:1990, *Environmental testing — Part 2: Tests — Tests A: Cold*.

IEC 60068-2-2:1974, *Environmental testing — Part 2: Tests — Tests B: Dry heat*.

IEC 60068-2-3:1969, *Environmental testing — Part 2: Tests — Test Ca: Damp heat, steady state*.

IEC 60068-2-6:1995, *Environmental testing — Part 2: Tests — Test Fc: Vibration (sinusoidal)*.

IEC 60068-2-11:1981, *Environmental testing — Part 2: Tests — Test Ka: Salt mist*.

IEC 60068-2-14:1984, *Environmental testing — Part 2: Tests — Test N: Change of temperature*.

IEC 60068-2-18:1989, *Environmental testing — Part 2: Tests — Test R and guidance: Water*.

IEC 60068-2-27:1987, *Environmental testing — Part 2: Tests — Test Ea and guidance: Shock*.

IEC 60068-2-28:1990, *Environmental testing — Part 2: Tests — Guidance for damp heat tests*.

IEC 60068-2-29:1987, *Environmental testing — Part 2: Tests — Test Eb and guidance: Bump*.

IEC 60068-2-30:1980, *Environmental testing — Part 2: Tests — Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)*.

IEC 60068-2-31:1969, *Environmental testing — Part 2: Tests — Test Ec: Drop and topple, primarily for equipment-type specimens*.

IEC 60068-2-32:1975, *Environmental testing — Part 2: Tests — Test Ed: Free fall (Procedure 1)*.

IEC 60068-2-34:1973, *Environmental testing — Part 2: Tests — Test Fd: Random vibration wide band — General requirements*.

IEC 60068-2-52:1996, *Environmental testing — Part 2: Tests — Test Kb: Salt mist, cyclic (sodium chloride solution)*.

IEC 60068-2-57:1989, *Environmental testing — Part 2: Tests — Test Ff: Vibration — Time history method*.

IEC 60068-2-75:1997, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer test*.

IEC 60068-3 (all parts), *Environmental testing — Part 3: Background information*.

IEC 60068-3-3:1991, *Environmental testing — Part 3: Guidance — Seismic test methods for equipment*.

IEC 60068-5-1:1991, *Environmental testing — Part 5: Guide to drafting of test methods — General principles*.

IEC 60085:1984, *Thermal evaluation and classification of electrical insulation*.

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*.

IEC 60544-2:1991, *Guide for determining the effects of ionizing radiation on insulating materials — Part 2: Procedures for irradiation and test*.

IEC 60557:1982, *IEC terminology in the nuclear reactor field*.

IEC 60980:1989, *Recommended practices for seismic qualification of electrical equipment of the safety system for nuclear generating stations*.

IEC 61000-4 (all parts), *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques*.

IEC 61298-2:1995, *Process measurement and control devices — General methods and procedures for evaluating performance — Part 2: Tests under reference conditions*.

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1 ageing (natural)

change with the passage of time of physical, chemical or electrical properties of a component or equipment under design range operating conditions, which may result in degradation of significant performance characteristics

3.2 accelerated ageing

accelerated process designed to simulate an advanced life condition in a short period of time. It is the process of subjecting an equipment or a component to stress conditions in accordance with known measurable physical or chemical laws of degradation in order to render its physical and electrical properties similar to those it would have at an advanced age operating under expected operational conditions

3.3 auditable data

technical information which is documented and organized in a readily understandable and traceable manner that permits independent auditing of the inferences or conclusions based on the information

3.4 components

items from which the equipment is assembled (for example resistors, capacitors, wires, connectors, transistors, tubes, switches, springs, etc.)