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Electromagnetic compatibility (EMC) - Part 6-5: Generic standards – Immunity for power station and substation environments

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) -

Part 6-5: Generic standards – Immunity for power station and substation environments

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense. en Standards PREVIEW
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The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

IEC 61000-6-5, which is a technical specification, has been prepared by technical committee 77: Electromagnetic compatibility.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
77/227/CDV	77/232/RVC

Full information on the voting for the approval of this technical specification 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 3.

Annexes A and B are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- transformed into an International Standard;
- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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INTRODUCTION

IEC 61000 series is published in separate parts, according to the following structure:

Part 1: General

General considerations (introduction, fundamental principles) Definitions, terminology

Part 2: Environment

Description of the environment Classification of the environment Compatibility levels

Part 3: Limits

Emission limits

Immunity limits (in so far as they do not fall under the responsibility of the product committees)

Part 4: Testing and measurement techniques

Measurement techniques STANDARD PREVIEW Testing techniques (standards.iteh.ai)

Part 5: Installation and mitigation guidelines

Installation guidelines https://standards.iteh.ai/catalog/standards/sist/55e19ab2-a0c9-4b52-8eab-Mitigation methods and devices43193cd/sist-ts-iec-ts-61000-6-5-2004

Part 6: Generic standards

Part 9: Miscellaneous

Each part is further subdivided into sections which are to be published either as International Standards or as technical specifications or technical reports, some of which have already been published as sections. Others will be published with the part number followed by a dash and a second number identifying the subdivision (example: 61000-6-1).

These standards, specifications and reports will be published in chronological order and numbered accordingly.

This technical specification deals with the electromagnetic compatibility (EMC) of apparatus used by Electricity Utilities in the generation, transmission and distribution of electricity and related telecommunication systems. It is intended to assist Electricity Utilities in the procurement of electronic equipment and systems.

Several EMC product standards have been published by technical committees dealing with different application areas relevant for Electricity Utilities: switchgear and controlgear (TC 17), power system control and associated communications (TC 57), industrial-process measurement and control – system aspects (SC 65A), measuring relays and protection equipment (TC 95), etc. The requirements specified in these product standards represent only a part of the electromagnetic environment typical of power stations and substations.

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Likewise, the generic immunity standard for industrial environments prepared by IEC and CENELEC is considered by the Electricity Utilities to be not sufficient to cover the relevant electromagnetic phenomena of the electrical plants and to give detailed acceptance criteria for testing apparatus.

In the past, the different Utilities have prepared their own specifications. Unfortunately, these specifications are not homogeneous; therefore the equipment manufacturers may have to apply different tests or test levels, with consequent increase of the costs of the equipment.

Based on a common action among many Utilities, in 1994 the UNIPEDE set up a Task Force within the Standardisation Specific Committee with the task to define unified EMC requirements for automation and control apparatus used in power stations and substations.

As a result of this activity, the UNIPEDE Guide "Automation and control apparatus for generating stations and substations – Electromagnetic Compatibility – Immunity Requirements", was published in 1995 with the reference code 23005Ren9523.

This technical specification is based on the UNIPEDE Guide above, and is intended to be considered as **a supplement to the Generic Immunity Standards**, with additional tests and acceptance criteria relevant to the special environmental conditions encountered in power stations and substations. This technical specification should be considered as a basic document for the preparation or revision of any EMC standard refering to specific products used by Electrical Utilities in power stations and substations.

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ELECTROMAGNETIC COMPATIBILITY (EMC) -

Part 6-5: Generic standards – Immunity for power station and substation environments

1 Scope

This technical specification sets immunity requirements for apparatus intended for use by Electricity Utilities in the generation, transmission and distribution of electricity and related telecommunication systems.

The locations covered are the power stations and the substations where apparatus of Electricity Utilities are installed.

Immunity requirements are given for the frequency range 0 Hz to 400 GHz, but only in respect of electromagnetic phenomena for which detailed test procedures, test instrumentation and test set-up are given in existing IEC basic standards.

The immunity requirements are suitable for satisfying the particular needs related to the functions and tasks of equipment and systems, for which reliable operation is required under actual electromagnetic conditions; in this respect, this technical specification establishes performance criteria for the different functional requirements.

Standards.iteh.ai) Different requirements are given for equipment to be installed in power stations and substations. In special cases, situations will arise where the level of electromagnetic disturbances may exceed the levels specified in this technical specification; in these instances, special mitigation measures should be adopted ads/sist/55e19ab2-a0c9-4b52-8eab-9c7e043193cd/sist-ts-iec-ts-61000-6-5-2004

Non-electronic high voltage and power equipment (primary system) are excluded from the scope of this technical specification.

This technical specification does not specify safety requirements for equipment, such as protection against shock, insulation co-ordination and related dielectric tests. Nevertheless, these tests are considered as a precondition to the immunity tests.

Emission requirements are not within the scope of this technical specification and are covered by relevant product or product-family standards (e.g. IEC 60439-1, IEC 60870-2-1, etc.). Where no dedicated product or product-family standard exists, the generic standard IEC 61000-6-4 applies.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61000. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However parties to agreements based on this part of IEC 61000 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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IEC 60050(161), International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility

IEC 61000-4-1, Electromagnetic compatibility (EMC) – Part 4-1: Testing and measurement techniques – Overview of 61000-4 series

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test*

IEC 61000-4-3, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test

IEC 61000-4-4, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 6: Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 8: Power frequency magnetic field immunity test

IEC 61000-4-11, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 11: Voltage dips, short interruptions and voltage variations immunity tests

IEC 61000-4-12, Electromagnetic compatibility (EMC) R Part 4: Testing and measurement techniques – Section 12: Oscillatory waves immunity test

IEC 61000-4-16, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 16: Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz SIST-TS IEC/TS 61000-6-5:2004

https://standards.iteh.ai/catalog/standards/sist/55e19ab2-a0c9-4b52-8eab-

IEC 61000-4-17, *Electromagnetic*4*compatibilitycc*(*EMC*))0–6-*Part*)44: Testing and measurement techniques – Section 17: Ripple on d.c. input power port immunity test

IEC 61000-4-29, Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests

IEC 61000-6-4, Electromagnetic compatibility (EMC) – Part 6: Generic standards – Section 4: Emission standard for industrial environments

CISPR 24, Information technology equipment – Immunity characteristics – Limits and methods of measurement

3 General

The apparatus of the Electricity Utilities are installed and implemented within power stations and substations according to the rules given by the manufacturers. It is essential that these apparatus operate according to the specified performances when exposed to the variety of electromagnetic phenomena, conducted and radiated, typical of these installations.

A survey of these electromagnetic phenomena is given in the IEC 61000-2 series and in IEC 61000-4-1. Additional information on the typical sources and causes of electromagnetic disturbances is given in annex A. Typical values of electromagnetic phenomena observed in high voltage substations and power stations can be found in the bibliography.

The immunity specifications are given on a port-by-port basis, and selected according to the location, with differentiated levels based on the experienced result of reliable operation of the equipment concerned.

Guidance for compliance documentation is given in clause 9 in order to make easier the presentation of the test results by the manufacturers and their acceptance by the Electricity Utilities.

4 Definitions

The definitions related to EMC and to relevant electromagnetic phenomena may be found in IEC 60050(161) and in other IEC publications.

For the purpose of this technical specification, the following definitions apply.

4.1 https://standards.iteh.ai/catalog/standards/sist/55e19ab2-a0c9-4b52-8eabapparatus 9c7e043193cd/sist-ts-iec-ts-61000-6-5-2004

finished product with an intrinsic function for final user

NOTE "Apparatus" is defined as covering all electrical and electronic apparatus and equipment which contain electrical and/or electronic components.

4.2

system

several items of apparatus combined to fulfil a specific task as a single functional unit

4.3

installation

several combined items of apparatus or systems put together at a given place to fulfil a specific task

4.4

port

particular interface of the specified apparatus with the external electromagnetic environment (see figure 1)



Figure 1 – Ports of the apparatus

4.5

enclosure port

physical boundary of the apparatus through which electromagnetic fields may radiate or impinge on

4.6

cable port

port at which a conductor or a cable is connected to the apparatus (power, signal and functional earth port)

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4.6.1 power port

port for the power supplied to or from an apparatus 00-6-5:2004

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9c7e043193cd/sist-ts-iec-ts-61000-6-5-2004

4.6.1.1

power supply input, ps in

- for apparatus assembled in one cabinet: the cabinet power port is considered as the power port of any assembled part;
- for peripheral units assembled in one cabinet: the peripheral units of the apparatus may be powered by the apparatus or by an external source

4.6.1.2

power supply output, ps out

output from apparatus, e.g. power converters