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IEC/TR 61000-3-7

Edition 2.0 2008-02

TECHNICAL REPORT

BASIC EMC PUBLICATION

**Electromagnetic compatibility (EMC) –
Part 3-7: Limits – Assessment of emission limits for the connection of
fluctuating installations to MV, HV and EHV power systems**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE
CODE PRIX

XB

ICS 33.100.10

ISBN 2-8318-9606-1

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 3-7: Limits – Assessment of emission limits for the connection of fluctuating installations to MV, HV and EHV power systems

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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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC/TR 61000-3-7, which is a technical report, has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This Technical Report forms Part 3-7 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107 [17].¹

This second edition cancels and replaces the first edition published in 1996 and constitutes a technical revision.

¹ Figures in square brackets refer to the bibliography.

This new edition is significantly more streamlined than the original technical report (Edition 1), and reflects the experiences gained in the application of the first edition. This technical report has also been harmonised with IEC/TR 61000-3-6 [18] and IEC/TR 61000-3-13 [19].

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

| | |
|---------------|------------------|
| Enquiry draft | Report on voting |
| 77A/576/DTR | 77A/615/RVC |

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

A list of all parts of the IEC 61000 series, under the general title *Electromagnetic compatibility (EMC)*, can be found on the IEC website.

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.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

IEC 61000 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 product committees)

Part 4: Testing and measurement techniques

Measurement techniques
Testing techniques

Part 5: Installation and mitigation guidelines

Installation guidelines
Mitigation methods and devices

Part 6: Generic standards

Part 9: Miscellaneous

Each part is further subdivided into several parts 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: IEC 61000-6-1).

ACKNOWLEDGMENT

In 2002, the IEC subcommittee 77A made a request to CIGRE Study Committee C4 and CIRED Study Committee S2, to organize an appropriate technical forum (joint working group) whose scope was to prepare, among other tasks, the revision of the Technical Report IEC 61000-3-7 concerning emission limits for the connection of fluctuating installations to public supply systems at MV, HV and EHV.

To this effect, Joint Working Group CIGRE C4.103/ CIRED entitled "*Emission Limits for Disturbing Installations*" was appointed in 2003. Some previous work produced by CIGRE JWG C4.07-CIRED has been used as an input to the revision, in particular the planning levels and associated indices, along with the experience since the technical report IEC 61000-3-7 was initially published in 1996.

Subsequent endorsement of the document by IEC was the responsibility of SC 77A.

It may also be worthwhile mentioning that another CIGRE Working Group is currently preparing a Technical Report for reviewing the flicker measurement results available internationally along with the flicker propagation characteristics in systems and the related objectives (flicker levels).

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 3-7: Limits – Assessment of emission limits for the connection of fluctuating installations to MV, HV and EHV power systems

1 Scope

This part of IEC 61000 provides guidance on principles which can be used as the basis for determining the requirements for the connection of fluctuating installations to MV, HV and EHV public power systems (LV installations are covered in other IEC documents). For the purposes of this report, a fluctuating installation means an installation (which may be a load or a generator) that produces voltage flicker and / or rapid voltage changes. The primary objective is to provide guidance to system operators or owners on engineering practices which will facilitate the provision of adequate service quality for all connected customers. In addressing installations, this document is not intended to replace equipment standards for emission limits.

This report addresses the allocation of the capacity of the system to absorb disturbances. It does not address how to mitigate disturbances, nor does it address how the capacity of the system can be increased.

Since the guidelines outlined in this report are necessarily based on certain simplifying assumptions, there is no guarantee that this approach will always provide the optimum solution for all flicker situations. The recommended approach should be used with flexibility and engineering judgment as far as engineering is concerned, when applying the given assessment procedures in full or in part.

The system operator or owner is responsible for specifying requirements for the connection of fluctuating installations to the system. The fluctuating installation is to be understood as the customer's complete installation (i.e. including fluctuating and non fluctuating parts).

Problems related to voltage fluctuations fall into two basic categories:

- Flicker effect from light sources as a result of voltage fluctuations;
- Rapid voltage changes even within the normal operational voltage tolerances are considered as a disturbing phenomenon.

The report gives guidance for the coordination of the flicker emissions between different voltage levels in order to meet the compatibility levels at the point of utilisation. This report primarily focuses on controlling or limiting flicker, but a clause is included to address the limitation of rapid voltage changes.

NOTE The boundaries between the various voltage levels may be different for different countries (see IEC 601-01-28) [16]. This report uses the following terms for system voltage:

- low voltage (LV) refers to $U_n \leq 1 \text{ kV}$;
- medium voltage (MV) refers to $1 \text{ kV} < U_n \leq 35 \text{ kV}$;
- high voltage (HV) refers to $35 \text{ kV} < U_n \leq 230 \text{ kV}$;
- extra high voltage (EHV) refers to $230 \text{ kV} < U_n$.

In the context of this report, the function of the system is more important than its nominal voltage. For example, a HV system used for distribution may be given a "planning level" which is situated between those of MV and HV systems.

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