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BSI Standards Publication

Electromagnetic compatibility (EMC)

Part 4-37: Testing and measurement techniques — Calibration and verification protocol for harmonic emission compliance test systems

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee GEL/210, EMC - Policy committee, to Subcommittee GEL/210/11, EMC - Standards Committee.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Electromagnetic compatibility (EMC) – Part 4-37: Testing and measurement techniques – Calibration and verification protocol for harmonic emission compliance test systems

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY (EMC) –

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FOREWORD

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IEC TR 61000-4-37, which is a Technical Report, has been prepared by subcommittee 77A: EMC-Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This publication contains attached files in the form of an xls document and a user guide. These files are intended to be used as a complement and do not form an integral part of the standard. They may be updated from time to time.

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

Enquiry draft	Report on voting
77A/907/DTR	77A/919/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.

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

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

The committee has 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- withdrawn,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.

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

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

Harmonic current analysis systems are used to measure emissions from equipment that is tested in accordance with various standards. The IEC (International Electrotechnical Commission) adopted measurement and evaluation techniques that are specified in IEC 61000-4-7, but limits, limit comparisons, certain exclusions, and test conditions for a variety of products are specified in IEC 61000-3-2 (for 16 A per phase and below) and IEC 61000–3-12 (from 16 A to 75 A per phase). This Technical Report provides test patterns for IEC 61000-3-2, but will be expanded in future editions to also include specific tests per IEC 61000-3-12 for currents above 16 A per phase. The methodology described in this Technical Report can also be expanded to provide fluctuating harmonics, along with inter-harmonics.

This Technical Report is neither intended as a type test nor as an exhaustive test of all required analyzer capabilities according to IEC 61000-3-2, IEC 61000-3-12, and IEC 61000-4-7. The primary objective is to verify on a periodic basis (for example for renewal of accreditation) that the harmonic analysis test system, consisting of a previously type tested analyzer and a suitable power source, performs correctly, and the performance of the system is not adversely affected by the system integration, nor has changed over a period of time.

The purpose of the harmonic current analysis systems is to evaluate harmonic current emissions, the power factor, and other parameters, in accordance with the requirements of the above mentioned standards. In addition to the harmonics measurement, the harmonic analyzer may have automatic limit evaluation software or firmware, data storage, additional analysis capabilities, and report generation capabilities that facilitate the process of certifying the tested products according to IEC 61000-3-2 and/or IEC 61000-3-12.

The primary purpose of this test, verification and calibration procedure in this Technical Report, is to establish methods that may be used to verify that a given harmonic analysis system measures and evaluates common harmonic current emission patterns in accordance with the requirements of the standards, and thus allows the user to perform a correct pass/fail analysis of the tested product. Additional capabilities of the analyzer or test system may also be tested using some of the tests described in this Technical Report.

The tests as summarized in Clause 4 may also be used to improve or optimize the accuracy of the harmonics measurement system. This can be done either via the r.m.s. current – if so required by using external reference equipment, and/or by adjusting the frequency response – provided the harmonics analysis system has either hardware or software adjustments to permit the parameter accuracies to be optimized.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

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1 Scope

This part of IEC 61000, which is a Technical Report, outlines a typical test procedure for harmonic analysis in systems comprising

- tests apparatus designed to comply with IEC 61000-4-7, and
- products designed to comply with IEC 61000-3-2 and/or IEC 61000-3-12.

The test procedure is intended to provide a systematic guidance suitable for use by manufacturers, end users, independent test laboratories and other bodies, for the purpose of determining the applicable compliance status within a wide range of harmonic current emissions.

The test procedure is derived from conditions observed in actual product testing and simulates closely conditions that can reasonably be expected.

The accuracy of harmonic analyzers and complete tests systems having adjustments or procedures, either hardware or software-based, may be optimized using external reference equipment of sufficient accuracy and the methodology in this Technical Report.

This Technical Report is not intended as a replacement for type testing of harmonic analyzers, nor does it check all of the parameters specified in IEC 61000-4-7, IEC 61000-3-2, and IEC 61000-3-12.

2 Normative references

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.

IEC 61000-3-2:2014, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-12, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*

IEC 61000-4-7:2002, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*
IEC 61000-4-7:2002/AMD1:2008

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*