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BSI Standards Publication

Electromagnetic compatibility (EMC)

Part 4-38: Testing and measurement techniques — Test, verification and calibration protocol for voltage fluctuation and flicker 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 product standards.

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

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Electromagnetic compatibility (EMC) – Part 4-38: Testing and measurement techniques – Test, verification and calibration protocol for voltage fluctuation and flicker compliance test systems

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-38: Testing and measurement techniques – Test, verification and calibration protocol for voltage fluctuation and flicker compliance test systems

FOREWORD

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IEC 61000-4-38, which is a technical report, has been prepared by subcommittee 77A: EMC – Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms Part 4-38 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

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

Enquiry draft	Report on voting
77A/881/DTR	77A/898/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- withdrawn,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.

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INTRODUCTION

Flicker measurement systems are used to measure voltage fluctuations from equipment that is tested in accordance with IEC 61000-3-3 and/or IEC 61000-3-11 standards. The IEC adopted measurement and evaluation techniques that are specified in IEC 61000-4-15, but limits, limit comparisons, certain exclusions, and test conditions for a variety of products are specified in IEC 61000-3-3 (for 16 A/phase and below) and IEC 61000-3-11 (up to 75 A/phase).

This TR specifies recommended methods and acceptability criteria for performance verification of test systems designed to measure voltage fluctuations and flicker in accordance with IEC 61000-3-3 and IEC 61000-3-11.

A typical IEC 61000-3-3 and IEC 61000-3-11 compliance test system includes not only the flicker meter, but also a suitable power source and a test impedance. The reference impedance, per IEC TR 60725, is used for IEC 61000-3-3 tests, while the Z_{test} as specified in IEC 61000-3-11 is used for higher power products. This TR therefore also includes a method to verify that the impedance, according to IEC TR 60725 or the Z_{test} specification, is within reasonable tolerances and that the power source does not contribute more to the measured flicker levels as is permitted in IEC 61000-3-3 and IEC 61000-311.

This protocol is neither intended as a type test nor as an exhaustive test of all required flicker meter capabilities according to IEC 61000-4-15. The primary objective is to verify, on a periodic basis, that the flicker test system, consisting of a previously type tested analyzer, a suitable power source and impedance unit, performs correctly, and that the system performance is not adversely affected by the system integration or by deterioration of one of the system components. For example this TR can be one of the methods to achieve accreditation of a test laboratory or facility.

NOTE To characterize individual system components, both digital volt meters 1 and 2 (DVM-1 and DVM-2) in Figure B.1 are needed, and care is taken that DVM-2 measures the exact same voltage point that the flicker meter uses as its input. For previously calibrated systems undergoing a periodic verification, the measurement of current will generally suffice and the use of DVM-2 is not mandatory.

The purpose of the flicker test system is to evaluate voltage fluctuations that may be caused by the tested equipment when this equipment will be connected to the public electricity supply. The flicker test system 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 61000-3-3 and/or IEC 61000-3-11.

The primary purpose of the test, verification, and calibration protocol in this technical report is to establish methods that may be used to verify that a given flicker test system measures and evaluates common voltage fluctuations in accordance with the standards and thus allows the user to perform a correct pass/fail analysis of the tested product. Additional capabilities, such as the data storage, reporting, or analysis functions of the analyzer or test system may also be tested using some of the tests described in this protocol.

The methodology used in this protocol consists of applying a known load to the flicker test system. This known load is modulated on/off, simulating an electrical product with varying power demand, which in turn causes voltage fluctuations. Thus, not only is the flicker meter tested, but also the power source that has to accommodate the varying power level and the reference impedance or the Z_{test} as specified in IEC 61000-3-3 or IEC 61000-3-11 is tested.

The tests as summarized in Table 2 and Clause 10 may also be used to calibrate or adjust the flicker test system, including adjustments to the test impedance and/or power source. This calibration can be done by means of comparing the generated voltage fluctuations, verified by using external reference equipment if so required, with the values reported by the system. This calibration includes the response of the power source and the impedance that are part of the test system.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-38: Testing and measurement techniques – Test, verification and calibration protocol for voltage fluctuation and flicker compliance test systems

1 Scope

This part of IEC 61000, which is a Technical Report, defines a test protocol for flicker test systems designed to perform compliance tests in accordance with IEC 61000-3-3 and IEC 61000-3-11. It is intended to provide test system manufacturers and testing laboratories with systematic methods to determine if the flicker test system meets the IEC design specifications for a wide range of voltage fluctuations and fluctuation frequencies, as specified in IEC 61000-4-15:2010, Table 5, that have been observed in product testing.

This protocol is intended to be compatible with related standards, in particular with any requirements set forth by listing organizations or measurement standards of the IEC. Meeting the criteria defined herein should not be construed as a waiver of any other relevant performance or safety requirements.

The main purpose of this technical report is to provide guidance and methods for periodic calibration and verification of systems consisting of previously type tested equipment. For complete flicker test systems that exhibit deviations of less than 5 % from the specifications of this protocol, it can be assumed that individual components are performing properly and separate calibration of individual system components is therefore not necessary.

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 60050-161, *International Electrotechnical Vocabulary – Part 161: Electromagnetic compatibility*

IEC TR 60725, *Consideration of reference impedances and public supply network impedances for use in determining the disturbance characteristics of electrical equipment having a rated current ≤ 75 A per phase*

IEC 61000-3-3:2013, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection*

IEC 61000-3-11, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤75 A per phase and subject to conditional connection.*

IEC 61000-4-15:2010, *Electromagnetic compatibility (EMC) – Part 4-15: Testing and measurement techniques – Flickermeter – Functional and design specifications*

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