



DPC: 24 / 30487619 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 02 September 2024

Origin: International

Latest date for receipt of comments: 16 October 2024

Project No. 2024/00460

Responsible committee: CPL/34 Lamps and Related Equipment

Interested committees:

Title: BS EN IEC 63158-1 Equipment for general lighting purposes - Temporal light artefacts

Part 1: Objective test method for short term flicker severity

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
 - ii) affects other national standard(s)
 - iii) requires additional national guidance or information
-

**WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD.
THIS DRAFT IS NOT CURRENT BEYOND 16 October 2024**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <http://standardsdevelopment.bsigroup.com>

Responsible Committee Secretary: **Mr Simon Bounds (BSI)**Direct tel: **0208 996 7281**E-mail: simon.bounds@bsigroup.com

Full document details: 24/30487619 DC

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



34/1219/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 63158-1 ED1

DATE OF CIRCULATION:

2024-08-23

CLOSING DATE FOR COMMENTS:

2024-11-15

SUPERSEDES DOCUMENTS:

34/1126/NP, 34/1166/RVN

IEC TC 34 : LIGHTING

SECRETARIAT:

United Kingdom

SECRETARY:

Mr Petar Luzajic

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Equipment for general lighting purposes – Temporal light artefacts - Part 1: Objective test method for short term flicker severity

NOTE FROM TC/SC OFFICERS:

Copyright © 2024 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

CONTENTS

1	FOREWORD.....	5
2	INTRODUCTION.....	7
3	1 Scope.....	8
4	2 Normative references	8
5	3 Terms, definitions, abbreviated terms and symbols	9
6	3.1 Terms and definitions.....	9
7	3.2 Abbreviated terms.....	10
8	3.3 Symbols.....	11
9	4 Limits	12
10	5 Test set-up	12
11	5.1 General.....	13
12	5.2 Test voltage	14
13	5.3 Optical test environment	14
14	5.4 Light sensor and amplifier	15
15	5.5 Signals to be measured	15
16	5.6 Signal processing	16
17	5.6.1 Anti-aliasing filter.....	16
18	5.6.2 Signal resolution.....	16
19	5.7 Conditions during testing	16
20	6 Method of Measurement	16
21	6.1 General.....	16
22	6.2 Measuring the intrinsic flicker performance	18
23	6.3 Testing the flicker immunity against voltage fluctuations	19
24	6.4 Dimmer compatibility testing	19
25	6.5 Controlgear testing	20
26	7 Measurement Uncertainty	20
27	8 Test report.....	20
28	Annex A (Normative) Voltage fluctuation disturbance signal.....	22
29	A.1 General.....	22
30	A.2 Mains signal parameters	25
31	A.3 Disturbance signal parameters and test levels	25
32	Annex B (informative) Specification of the light flickermeter	28
33	B.1 Voltage flickermeter modifications.....	28
34	B.2 Specification of the light flickermeter	28
35	B.2.1 General	28
36	B.2.2 Block a: illuminance adapter	29
37	B.2.3 Block b: weighting filters	29
38	B.2.4 Block c: squaring multiplier, sliding mean filter and scaling	30
39	B.2.5 Block d: statistical analysis	31
40	B.3 Verification of the light flickermeter	31
41	Annex C (informative) Uncertainty considerations	34
42	C.1 General.....	34
43	C.2 General symbols	34
44	C.3 Measurand.....	34

47	C.4	Influence quantities	34
48	C.5	Uncertainty budget.....	36
49	Annex D (informative)	Verification	38
50	D.1	Verification Procedure.....	38
51	D.1.1	General	38
52	D.1.2	Light flickermeter verification with incandescent lamp	38
53	D.1.3	Mains voltage parameters without modulation	38
54	D.1.3.1	Nominal voltage level	38
55	D.1.3.2	Mains frequency	39
56	D.1.4	Voltage fluctuation level.....	39
57	D.1.5	Light sensor and amplifier.....	39
58	D.1.6	Test environment.....	40
59	D.1.7	Light flicker noise	40
60	Annex E (informative)	Examples of test results of lighting equipment	41
61	E.1	Test without voltage fluctuations (P_{st}^{LM})	41
62	E.2	Test with (intentional) voltage fluctuations ($P_{st}^{LM}(I)$)	41
63	E.3	Test under dimming conditions.....	45
64	Annex F (informative)	Guidance for P_{st}^{LM} testing based on test type.....	47
65	Bibliography.....		48
66			
67	Figure 1	Block diagram voltage fluctuation immunity test	14
68	Figure 2 – Measuring P_{st}^{LM}		19
69	Figure 3 – Measuring $P_{st}^{LM}(I)$		19
70	Figure 4 – Dimmer compatibility testing		20
71	Figure 5 – Controlgear testing.....		20
72	Figure A.1 – Approach for mains voltage fluctuations		23
73	Figure A.2 – Illustration of the mains test signal including a rectangular modulated		
74	voltage fluctuation (see Equation A.1).....		24
75	Figure A.3 – Example of a recorded mains voltage fluctuation and illuminance signal		
76	of a 60 W incandescent lamp		27
77	Figure B.1 –Structure of the IEC 61000-4-15 flickermeter that uses voltage as input.....		28
78	Figure B.2 – Structure of the light flickermeter based on a modified voltage flickermeter		29
79	Figure B.3 – Flickermeter response to different waveshapes.....		32
80	Figure B.4 – Plot of P_{st}^{LM} as function of frequency, for sine waves with 30% modulation		
81	depth		32
82	Figure E.1 – Graphical $P_{st}^{LM}(I)$ results for three EUTs with rectangular modulation at		
83	five frequencies ($P_{st}^V = 1$).....		42
84	Figure E.2 – EUT1: recorded signals (no mains voltage modulation)		43
85	Figure E.3 – EUT1: recorded signals (with modulation) $d = 0,407$ % at 13,5 Hz ($P_{st}^V = 1$).....		44
86	Figure E.4 – EUT2: relative illuminance – Mains voltage modulation $d = 0,407$ % at		
87	13,5 Hz ($P_{st}^V = 1$)		45

88	Figure E.5 – EUT3: relative illuminance – Mains voltage modulation $d = 0,407\%$ at	
89	13,5 Hz ($P_{st}^V = 1$)	45
90	Figure E.6 – Graphical $P_{st}^{LM}(C)$ results for four EUTs under dimming conditions	46
91		
92	Table 1 – Limits for P_{st}^{LM}	12
93	Table 2 – Guidance for P_{st}^{LM} testing	18
94	Table A.1 – Voltage fluctuations – Test specification of voltage fluctuations applied at	
95	input AC mains 120/230 V and 50/60 Hz	26
96	Table B.1 – Test specification of illuminance fluctuations for lightmeter classifier	31
97	Table C.1 – Influence quantities and their recommended tolerances	35
98	Table C.2 – Uncertainty budget of the voltage fluctuation immunity test	37
99	Table E.1 – Numerical results P_{st}^{LM} calculations for three EUTs without voltage	
100	modulation	41
101	Table E.2 – Numerical results $P_{st}^{LM}(I)$ calculations for three EUTs with voltage	
102	modulation	41
103	Table E.3 – Numerical results $P_{st}^{LM}(C)$ calculations for four EUTs under dimming	
104	conditions	46
105	Table F.1 – Guidance for P_{st}^{LM} testing based on test conditions	47
106		
107		

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**EQUIPMENT FOR GENERAL LIGHTING PURPOSES –
Temporal light artefacts - Part 1: Objective test method for
short term flicker severity****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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants, or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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 document using a colour printer.

160

161

INTRODUCTION

The fast rate at which solid state light (SSL) sources can change their intensity is one of the main drivers behind the revolution in the lighting world and applications of lighting. Linked to the fast rate of the intensity change is a direct transfer of the modulation of the driving current, both intended and unintended, to a modulation of the luminous output. This light modulation can give rise to changes in the perception of the environment and can have a large influence on the judgment of the light quality. Moreover, excessive visible modulation of light can lead to a decrease in performance, increased fatigue as well as health problems like epileptic seizures and migraine episodes [17][18]¹.

The term "flicker", which has a measure called short-term flicker severity with a symbol P_{st}^{LM} , refers to light variation that may be directly perceived by an observer. (CIE TN 006:2016 [26]). Lighting products that show unacceptable flicker are considered as poor-quality lighting.

This document provides a method for measuring the intrinsic flicker of lighting equipment based on IEC TR 61547-1, CIE TN 012 and CIE TR 249 as well as testing the immunity of lighting equipment against mains voltage fluctuations caused by electrical apparatus connected to the mains at levels that are allowed through IEC 61000-3-3. It also specifies limits.

¹ Numbers in square brackets refer to the Bibliography.

EQUIPMENT FOR GENERAL LIGHTING PURPOSES – Temporal light artefacts - Part 1: Objective test method for short term flicker severity

1 Scope

This document describes an objective light flicker test method and limits, which can be applied for the following purposes:

- measuring the intrinsic performance of all lighting equipment without the application of voltage fluctuations in terms of light output flicker metric P_{st}^{LM} ; during this measurement, the lighting equipment is supplied with a stable mains;
- testing the immunity performance of lighting equipment against (unintentional) voltage fluctuation disturbance on the AC mains in terms of light output flicker metric $P_{st}^{LM}(I)$; during this test a set of defined voltage fluctuations are applied to the AC mains and the immunity of the lighting equipment to the disturbance is determined;
- testing the dimmer compatibility of lighting equipment with an external dimmer without the application of voltage fluctuations in terms of light output flicker metric $P_{st}^{LM}(C)$; during this measurement, the lighting equipment is supplied with a stable main.

The immunity performance of lighting equipment against intentional voltage fluctuations on the AC mains arising from mains signalling or controls is not in the scope of this document.

NOTE 1 IEC 61000-4-13:2015 [24] provides guidance regarding test levels and frequencies for mains signalling.

Temporal changes in the colour of light (chromatic flicker) are not considered in this test.

This method can be applied to lighting equipment which is within the scope of IEC technical committee 34, such as lamps and luminaires, intended for connection to public low voltage system. Independent auxiliaries such as drivers can also be tested by application of a representative light source to that auxiliary.

The objective light output flicker test method and voltage fluctuation immunity test method described in this document are based on the IEC 61000-3-3 standard for voltage fluctuation limits and the flicker meter standard IEC 61000-4-15.

The objective light output flicker test method described in this document can be applied to assess flicker of lighting equipment that is powered from any type of source, AC mains, DC mains, battery fed or fed through an external light level regulator. The specific voltage fluctuation immunity test method described in this document applies to lighting equipment rated for 120 V AC and 230 V AC, 50 Hz and 60 Hz.

NOTE 2 The principle of the method can be applied for other nominal voltages and frequency ratings.

2 Normative references

The following documents are referred to in the text in such a way that some or all their content constitutes requirements 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 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*

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

224 CIE S 025/E:2015, *Test Method for LED Lamps, LED Luminaires and LED Modules*

225 CIE TN 012:2021, *Technical Note - Guidance on the Measurement of Temporal Light*
226 *Modulation of Light Sources and Lighting Systems*

227 CIE TR 249:2022, *Technical Report – Visual Aspects of Time-Modulated Lighting Systems*

228 CIE 121:1996, CIE Technical Report – *The Photometry and Goniophotometry of Luminaires*

229 **3 Terms, definitions, abbreviated terms and symbols**

230 **3.1 Terms and definitions**

231 For the purposes of this document, the terms and definitions given in IEC 61000-3-3 and
232 IEC 61000-4-15 and the following apply.

233 ISO and IEC maintain terminological databases for use in standardization at the following
234 addresses:

- 235 • IEC Electropedia: available at <http://www.electropedia.org/>
- 236 • ISO Online browsing platform: available at <http://www.iso.org/obp>

237 **3.1.1** 238 **flicker**

239 perception of visual unsteadiness induced by a light stimulus the luminance or spectral
240 distribution of which fluctuates with time, for a static observer in a static environment

241 Note 1 to entry: The fluctuations of the light stimulus with time include periodic and non-periodic fluctuations and
242 can be induced by the source itself, the power source or other influencing factors.

243 Note 2 to entry: Flicker is a type of temporal light artefact.

244 Note 3 to entry: A static observer and a static environment are minimal requirements for the detection of flicker, but
245 they are not limiting. This means that flicker can also be detected by a non-static observer or in a non-static
246 environment

247 [SOURCE: IEC 60050-845:2020, 845-22-092, modified; note 2 and 3 added]

248 **3.1.2** 249 **flickermeter**

250 instrument designed to measure any quantity representative of flicker

251 [SOURCE: IEC 60050-614:2016, 614-01-30]

252 **3.1.3** 253 **voltage flickermeter**

254 instrument which is designed to measure any quantity representative of flicker resulting from
255 mains voltage fluctuations

256 Note 1 to entry: Specifications of the voltage flickermeter can be found in IEC 61000-4-15.

3.1.4**illuminance**

quotient of the luminous flux $d\Phi_v$ incident on an element of the surface containing the point, by the area dA of that element

$$E_v = \frac{d\Phi_v}{dA} = \int_{2\pi \text{ sr}} L_v \cdot \cos\theta \cdot d\Omega$$

Note 1 to entry: Illuminance is expressed in lx or $\text{lm} \cdot \text{m}^{-2}$.

[SOURCE: IEC 60050-845:1987, 845-01-38]

Note 2 Equivalent definition. Integral, taken over the hemisphere visible from the given point, of the expression $L_v \cdot \cos\theta \cdot d\Omega$ where L_v is the luminance at the given point in the various directions of the incident elementary beams of solid angle $d\Omega$, and θ is the angle between any of these beams and the normal to the surface at the given point.

3.1.5**light flickermeter**

instrument designed to measure flicker resulting from temporal changes in the light output in an objective way.

Note 1 to entry: The light flickermeter is based on the IEC 61000-4-15 specifications.

Note 2 to entry: Differences between voltage flickermeter and light flickermeter can be found in Annex B.

3.1.6**threshold of flicker irritability**

maximum value of a fluctuation of luminance or of spectral distribution which gives rise to a flicker tolerated without discomfort by a specified sample of the population.

[SOURCE: IEC 60050-161:1990, 161-08-16]

3.1.7**short-term flicker indicator**

P_{st}

measure of flicker evaluated over a specified time interval of a relatively short duration.

Note 1 to entry: The duration is typically 10 min, in accordance with IEC 61000-4-15.

Note 2 to entry: The alternative term short term flicker severity used in IEC 61000-3-3 and IEC 61000-4-15.

[SOURCE: IEC 60050-161:1990, 161-08-18, modified – Note 2 has been added.]

3.2 Abbreviated terms

AC	alternating current
CFL	compact fluorescent lamp
CIE	Commission Internationale de l'Éclairage
cpm	changes per minute
DC	direct current
EUT	equipment under test
EMC	electromagnetic compatibility
Hz	hertz
IEEE	Institute of Electrical and Electronics Engineers
kHz	kilohertz
LED	light emitting diode

297	ms	millisecond
298	RMS	root mean square
299	SSL	solid state lighting
300	V	volt
301	W	watt
302	3.3	Symbols
303	α	multiplication factor
304	C_A	gain of the light amplifier
305	d	relative voltage change
306	d_E	relative change of the rectangular modulation of the illuminance
307	d_r	relative change of the 100 Hz-illuminance ripple
308	ΔL	instantaneous total light variation after a voltage fluctuation
309	Δu	instantaneous total voltage variation after a voltage fluctuation
310	ΔU	total voltage variation of the half-period RMS value after a voltage fluctuation
311	f	mains frequency (50 Hz or 60 Hz)
312	f_m	modulation frequency
313	L	light
314	m	modulation index
315	%	percent
316	pp	percentage point
317	P_{inst}	instantaneous flicker sensation
318	P_{st}	short-term flicker indicator
319	$P_{\text{st}}^{\text{LM}}$	flicker metric of the light output of an EUT without the application of voltage
320		fluctuations and measured with a light flickermeter
321	$P_{\text{st}}^{\text{LM}}(\text{I})$	flicker metric of the light output of an EUT with the application of voltage fluctuations
322		and measured with a light flickermeter, the letter I stands for immunity
323	$P_{\text{st}}^{\text{LM}}(\text{C})$	flicker metric of the light output of the combination of a light source and an external
324		dimmer measured with a light flickermeter, the letter C stands for compatibility
325	P_{st}^{V}	flicker metric of the supply voltage measured with a voltage flickermeter
326	$P_{\text{st}}^{\text{V}}(\text{N})$	flicker metric of the noise level from an unmodulated supply voltage measured with a
327		voltage flickermeter
328	s	complex Laplace variable
329	$\hat{u}$	amplitude of the mains voltage
330	$u(t)$	mains voltage signal
331	$u_E(t)$	output voltage of the light sensor amplifier
332	T_m	modulation period
333	T_{test}	period of time over which the illuminance is measured during application of the
334		voltage fluctuation
335	U	half-period RMS-value

4 Limits

The limits for P_{st}^{LM} for indoor and outdoor lighting applications are as given in Table 1.

Table 1 – Limits for P_{st}^{LM}

Application area	P_{st}^{LM}
Indoor	≤ 1
Outdoor	≤ 1

When the measured P_{st}^{LM} level is equal to 1, it means that in 50 % of the cases flicker is experienced and in 50 % of the cases no flicker is experienced by an average observer. If the value is lower than 1 then flicker is not normally observed. If the value is higher than 1 then flicker is normally observed.

In the case where voltage fluctuations are applied ($P_{st}^V = 1$), the results can be interpreted as follows.

$P_{st}^{LM} = 1$, the flicker produced by the EUT and experienced by an average observer is equal to that of a 60 W incandescent lamp.

$P_{st}^{LM} < 1$, the flicker produced by the EUT and experienced by an average observer is a better flicker than that of a 60 W incandescent lamp.

$P_{st}^{LM} > 1$, the flicker produced by the EUT and experienced by an average observer is a worse flicker than that of a 60 W incandescent lamp.

5 Test set-up

The laboratory requirements as specified in Clause 4 of CIE S 025: E 2015 (for LED light sources) and CIE 121:1996 (for all other light sources) apply for this document.

5.1 General

The block diagram of the test setup is shown in

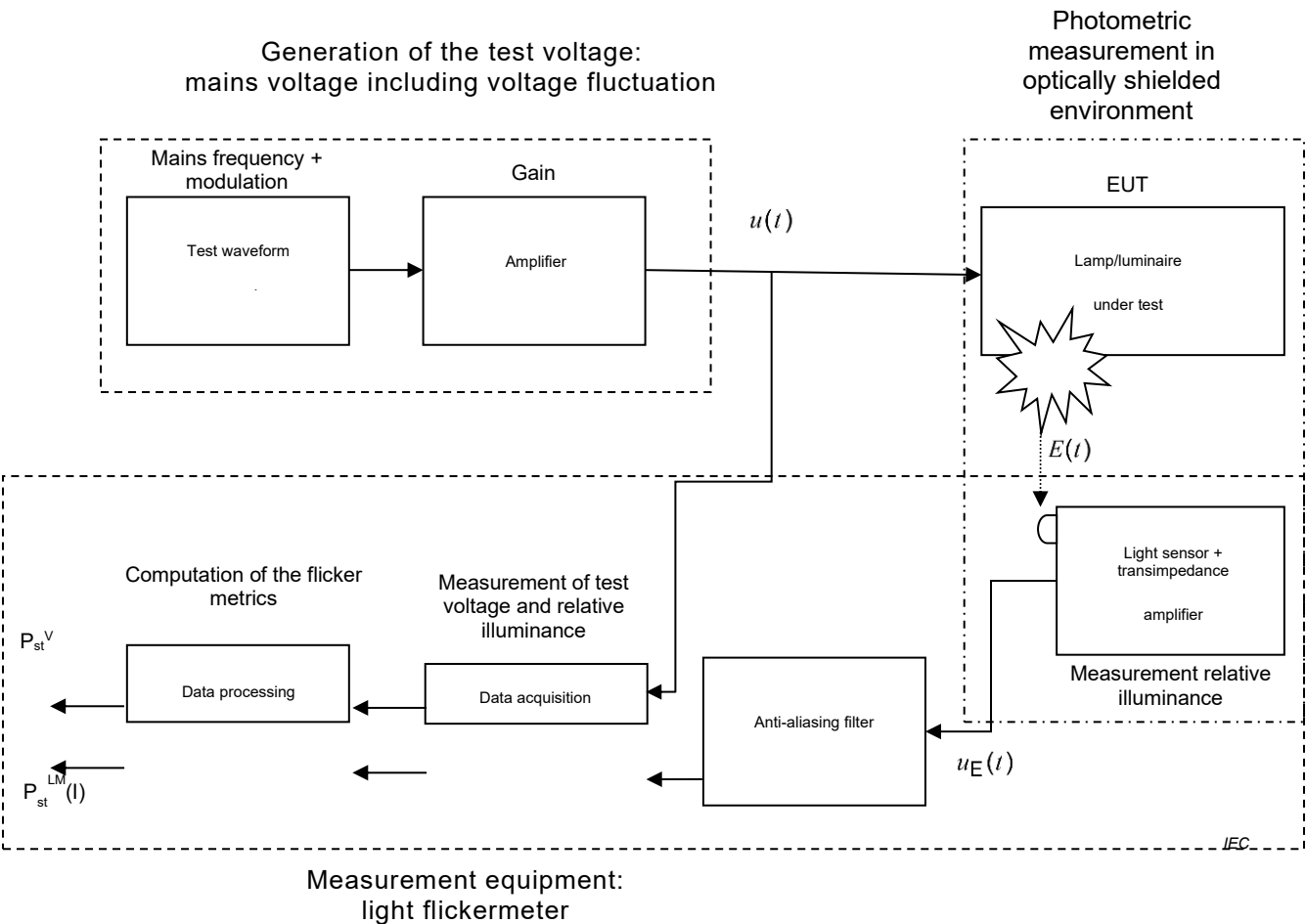


Figure 1. There are three parts in the setup:

- a) generation of the test voltage,
- b) application of the test voltage to the EUT and photometric measurement of the EUT in an optically shielded environment,
- c) processing of the measured optical waveform and calculation of the flicker measure P_{st}^{LM} from the measured data.

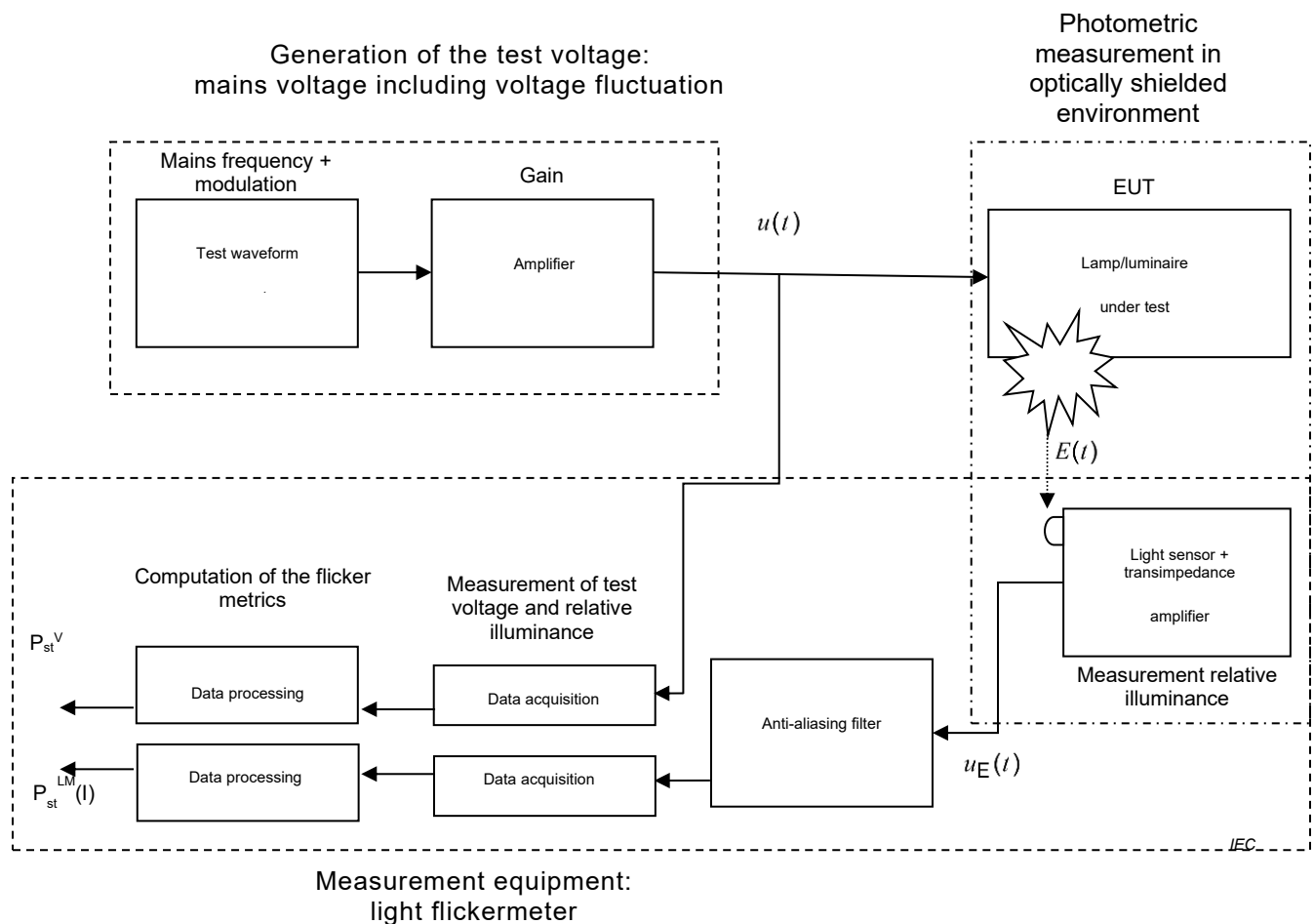


Figure 1 Block diagram voltage fluctuation immunity test

Note that the same setup is used to measure the intrinsic flicker performance of a lighting equipment, P_{st}^{LM} , except that no modulation is applied in Part a).

More details of the equipment properties are described below. For measurement setup example, Clause 6 in CIE TN 012 can be used.

5.2 Test voltage

The test voltage can be synthesized using a waveform generator and an amplifier. This may be implemented also by using a separate waveform generator for the modulating signal that is applied to a generator that generates the 50/60 Hz mains signal.

For test voltage without voltage fluctuations, IEC 61000-3-2 A.2 apply for this document but with a tolerance of $\pm 0.5\%$. Care shall be taken that no other disturbing signals are present (see A.2 for mains signal parameters and Annex D for the verification).

5.3 Optical test environment

The light output of the EUT is measured for processing by the light flickermeter. There is no need for measuring the absolute value. Only the relative light output is determined.

The EUT and the light sensor are located in an optically shielded environment to avoid disturbances from light sources other than the EUT.