



BSI Standards Publication

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

National foreword

This British Standard is the UK implementation of EN 61000-3-12:2011+A1:2024. It is identical to IEC 61000-3-12:2011, incorporating amendment 1:2021. It supersedes BS EN 61000-3-12:2011, which will be withdrawn on 20 March 2027.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

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

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2024
Published by BSI Standards Limited 2024

ISBN 978 0 539 05914 4

ICS 33.100.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 29 February 2012.

Amendments/corrigenda issued since publication

Date	Text affected
31 October 2013	CENELEC pages added
31 May 2024	Implementation of IEC amendment 1:2021 with CENELEC endorsement A1:2024

**Electromagnetic compatibility (EMC) -
Part 3-12: Limits -
Limits for harmonic currents produced by equipment connected to public
low-voltage systems with input current $> 16\text{ A}$ and $\leq 75\text{ A}$ per phase
(IEC 61000-3-12:2011)**

Compatibilité électromagnétique (CEM) - Elektromagnetische Verträglichkeit (EMV)

Partie 3-12: Limites -

Limites pour les courants harmoniques
produits par les appareils connectés aux
réseaux publics basse tension ayant un
courant appelé $> 16\text{ A}$ et $\leq 75\text{ A}$ par phase
(CEI 61000-3-12:2011)

-

Teil 3-12: Grenzwerte für
Oberschwingungsströme, verursacht von
Geräten und Einrichtungen mit einem
Eingangsstrom $> 16\text{ A}$ und $\leq 75\text{ A}$ je Leiter,
die zum Anschluss an öffentliche
Niederspannungsnetze vorgesehen sind.
(IEC 61000-3-12:2011)

This European Standard was approved by CENELEC on 2011-06-16. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

European foreword

The text of document 77A/740/FDIS, future edition 2 of IEC 61000-3-12, prepared by SC 77A, "Low frequency phenomena", of IEC TC 77, "Electromagnetic compatibility" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61000-3-12:2011.

The following dates are fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2012-06-16 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2014-06-16 |

This European Standard supersedes EN 61000-3-12:2005.

The significant technical changes with respect to EN 61000-3-12:2005 are listed below:

- the reference fundamental current I_1 is replaced by the reference current I_{ref} for the calculation of emission limits;
- a new table of current emission limits (Table 5) is added;
- a new annex (Annex A) is added to define test conditions for some types of equipment;
- former Annexes B (Approximate interpolation formulas) and D (Information on the PWHD factor) are deleted.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directives EMC (2004/108/EC) and RTTED (1999/5/EC).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 61000-3-12:2011 was approved by CENELEC as a European Standard without any modification.

European foreword to Amendment 1

The text of document 77A/1042/CDV, future IEC 61000-3-12/A1, prepared by SC 77A "EMC - Low frequency phenomena" of IEC/TC 77 "Electromagnetic compatibility" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61000-3-12:2011/A1:2024.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2024-12-20 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2027-03-20 document have to be withdrawn

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61000-3-12:2011/A1:2021 was approved by CENELEC as a European Standard without any modification.

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60038 - IEC standard voltages			EN 60038 -	
IEC 60050-161	1990	International Electrotechnical Vocabulary	-	-
+ A1	1997	(IEV) -		
+ A2	1998	Chapter 161: Electromagnetic compatibility		
IEC 61000-2-2 - Electromagnetic compatibility (EMC) -			EN 61000-2-2 -	
		Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems		
IEC 61000-2-4 - Electromagnetic compatibility (EMC) -			EN 61000-2-4 -	
		Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances		
IEC 61000-3-2	2018	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)	EN IEC 61000-3-2	2019
+ A1	2020		+ A1	2021
IEC 61000-4-7 - Electromagnetic compatibility (EMC) -			EN 61000-4-7 -	
		Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto		

Annex ZZ
(informative)

Coverage of Essential Requirements of EU Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers protection requirements of Annex I, Article 1(a) of the EU Directive 2004/108/EC, and essential requirements of Article 3.1(b) (emission only) of the EU Directive 1999/5/EC.

Compliance with this standard provides presumption of conformity with the specified essential requirements of the Directives concerned.

NOTE Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

CONTENTS

INTRODUCTION	2
1 Scope	3
2 Normative references	4
3 Terms and definitions	4
4 Measurement conditions	8
4.1 Determination of the reference current	8
4.2 Harmonic current measurement	8
4.2.1 General	8
4.2.2 Measurement procedure	8
4.2.3 Repeatability	8
4.2.4 Starting and stopping	9
4.2.5 Application of limits	9
4.2.6 Test report	9
4.2.7 Test observation period	9
4.3 Equipment consisting of several self-contained items	9
5 Requirements and limits for equipment	10
5.1 Control methods	10
5.2 Limits for emission	10
A1 5.3 Procedure if the reference current is less than 16 A	14 A1
6 Product documentation	14
7 Test and simulation conditions	15
7.1 General	15
7.2 Requirements for direct measurement	15
7.3 Requirements for simulation	16
7.4 General conditions for test and simulation	17
Annex A (normative) Type test conditions	19
Annex B (informative) Illustration of limits for harmonic currents	21
Annex C (informative) Equipment not complying with the requirements and limits of this standard	22
Bibliography	23
Figure 1 – Definition of the 5 th harmonic current phase angle (I_5 leads U_{p1} , $\alpha_5 > 0$)	7
Figure 2 – Definition of the 5 th harmonic current phase angle (I_5 lags U_{p1} , $\alpha_5 < 0$)	7
Figure 3 – Flowchart of the application procedure	13
Figure B.1 – Limits of the 5 th harmonic current as functions of R_{sce}	21
Table 1 – Values of the observation period	9
Table 2 – Current emission limits for equipment other than balanced three-phase equipment	12
Table 3 – Current emission limits for balanced three-phase equipment	12
Table 4 – Current emission limits for balanced three-phase equipment under specified conditions (a, b, c)	12
Table 5 – Current emission limits for balanced three-phase equipment under specified conditions (d, e, f)	13

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 the 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).

This International Standard is a Product Family Standard.

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

1 Scope

This part of IEC 61000 deals with the limitation of harmonic currents injected into the public supply system. The limits given in this International Standard are applicable to electrical and electronic equipment with a rated input current exceeding 16 A and up to and including 75 A per phase, intended to be connected to public low-voltage $\square_{A1}$ AC $\square_{A1}$ distribution systems of the following types:

- nominal voltage up to 240 V, single-phase, two or three wires;
- nominal voltage up to 690 V, three-phase, three or four wires;
- nominal frequency 50 Hz or 60 Hz.

Other distribution systems are excluded. The limits given in this edition apply to equipment when connected to 230/400 V, 50 Hz systems. See also Clause 5.

NOTE 1 The limits for the other systems will be added in a future edition of this standard.

NOTE 2 Equipment with a rated input current exceeding 75 A per phase should be considered in the harmonic current requirements for installations. See IEC/TR 61000-3-6 $\square_{A1}$ and IEC/TR 61000-3-14. $\square_{A1}$

This standard applies to equipment intended to be connected to low-voltage systems interfacing with the public supply at the low-voltage level. It does not apply to equipment intended to be connected only to private low-voltage systems interfacing with the public supply only at the medium- or high-voltage level.

NOTE 3 The scope of this standard is limited to equipment connected to public low voltage systems because emissions from equipment installed in private low voltage systems can be controlled in aggregate at the MV point of common coupling using procedures defined in IEC/TR 61000-3-6 and/or by means of contractual agreements between the distribution network operator and the customer. It is expected that operators of private systems will manage the EMC environment in a manner that ensures compliance with the provisions given in IEC/TR 61000-3-6 and/or the contractual agreements.

NOTE 4 If the equipment is intended to be connected only to private systems, the manufacturer should make this very clear in the product documentation.

NOTE 5 Professional equipment with input current ≤ 16 A per phase and that does not comply with the requirements and limits of standard IEC 61000-3-2 may be permitted to be connected to certain types of low voltage supplies, in the same way as equipment with input current >16 A per phase and that does not comply with the requirements and limits of the present standard (see Annex C).

NOTE 6 The limits in this standard are not applicable to stand-alone harmonic filters.

This standard defines:

- a) requirements and emission limits for equipment;
- b) methods for type tests and simulations.

Tests according to this International Standard are type tests of complete pieces of equipment.

Conformity with this standard can also be determined by validated simulations.