



**SLOVENSKI STANDARD**  
**SIST EN IEC 60268-21:2019**

**01-oktober-2019**

---

**Elektroakustične naprave - 21. del: Akustične (izhodne) meritve (IEC 60268-21:2018)**

Sound system equipment - Part 21: Acoustical (output-based) measurements (IEC 60268-21:2018)

Elektroakustische Geräte - Teil 21: Akustische (Ausgabebasierte) Messungen (IEC 60268-21:2018)

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Équipements pour systèmes électroacoustiques - Partie 21 : Mesures acoustiques (en sortie) (IEC 60268-21:2018)

[SIST EN IEC 60268-21:2019](https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-c98262b9c9c/sist-en-iec-60268-21-2019)

[https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-](https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-c98262b9c9c/sist-en-iec-60268-21-2019)

**Ta slovenski standard je istoveten z: EN IEC 60268-21:2018**

---

**ICS:**

17.140.01	Akustična merjenja in blaženje hrupa na splošno	Acoustic measurements and noise abatement in general
33.160.01	Avdio, video in avdiovizualni sistemi na splošno	Audio, video and audiovisual systems in general

**SIST EN IEC 60268-21:2019**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 60268-21:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019>

EUROPEAN STANDARD

**EN IEC 60268-21**

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2018

ICS 33.160.01

English Version

**Sound system equipment - Part 21: Acoustical (output-based)  
measurements  
(IEC 60268-21:2018)**

Équipements pour systèmes électroacoustiques - Partie 21  
: Mesures acoustiques (en sortie)  
(IEC 60268-21:2018)

Elektroakustische Geräte - Teil 21:  
Akustische(Ausgabebasierte) Messungen  
(IEC 60268-21:2018)

This European Standard was approved by CENELEC on 2018-12-12. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**EN IEC 60268-21:2018 (E)****European foreword**

The text of document 100/2957/CDV, future edition 1 of IEC 60268-21, prepared by IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60268-21:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-09-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-12-12

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.

**iTeh STANDARD PREVIEW**  
**Endorsement notice**  
**(standards.itih.ai)**

The text of the International Standard IEC 60268-21:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60268-7:2010	NOTE	Harmonized as EN 60268-7:2011 (not modified)
IEC 62777	NOTE	Harmonized as EN 62777

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60263	-	Scales and sizes for plotting frequency characteristics and polar diagrams	-	-
IEC 60268-1	-	Sound system equipment. Part 1: General	HD 483.1 S2	-
IEC 60268-2	1987	Sound system equipment. Part 2: Explanation of general terms and calculation methods	HD 483.2 S2	1993
IEC 61094-4	-	Measurement microphones - Part 4: Specifications for working standard microphones	EN 61094-4	-
IEC 61260-1	-	Electroacoustics - Octave-band and fractional-octave-band filters - Part 1: Specifications	EN 61260-1	-
ISO 3	-	Preferred numbers - Series of preferred numbers	-	-
ISO 3741	2010	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for reverberation test rooms	EN ISO 3741	2010
ISO 3744	-	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane	EN ISO 3744	-
ISO 3745	-	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic rooms and hemi-anechoic rooms	EN ISO 3745	-
CTA 2034-A	-	Standard Method of Measurement for In-Home Loudspeakers, Consumer Technology Association (Formerly CEA)	-	-
CTA 2010-B	-	Standard Method of Measurement for Powered Subwoofers, standard by Consumer Technology Association (Formerly CEA)	-	-

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 60268-21:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019>



# INTERNATIONAL STANDARD



---

**Sound system equipment –**  
**Part 21: Acoustical (output-based) measurements**

**STANDARD PREVIEW**  
(standards.iteh.ai)

[SIST EN IEC 60268-21:2019](https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019)  
<https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 33.160.01

ISBN 978-2-8322-6176-7

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references .....	11
3 Terms, definitions and abbreviated terms .....	12
3.1 Terms and definitions.....	12
3.2 Abbreviated terms.....	12
4 Type description .....	12
5 Physical characteristics .....	12
5.1 Marking of terminals and controls .....	12
5.2 Dimensions .....	12
5.3 Mass.....	12
5.4 Connectors and cable assemblies.....	13
6 Design data .....	13
7 Conditions .....	13
7.1 Rated conditions .....	13
7.2 Climatic conditions.....	13
7.3 Normal measuring conditions .....	13
8 Test signals .....	14
8.1 General.....	14
8.2 Sinusoidal chirp .....	14
8.3 Steady-state single-tone signal .....	15
8.4 Steady-state two-tone signal.....	15
8.5 Sparse multi-tone complex.....	15
8.6 Broadband noise signal.....	16
8.7 Narrow-band noise signal .....	16
8.8 Hann-burst signal.....	16
8.9 Impulsive signal .....	17
9 Acoustical environment.....	17
9.1 General.....	17
9.2 Free-field conditions .....	17
9.3 Half-space, free-field conditions.....	17
9.4 Simulated free-field conditions .....	17
9.5 Half-space simulated free-field conditions .....	17
9.6 Diffuse sound field conditions .....	18
9.7 Target application conditions .....	18
10 Positioning of the DUT.....	18
10.1 Rated geometrical conditions .....	18
10.1.1 General .....	18
10.1.2 Reference plane and normal vector .....	18
10.1.3 Reference point.....	18
10.1.4 Reference axis .....	19
10.1.5 Orientation vector .....	19
10.1.6 Evaluation point.....	19
10.1.7 Evaluation distance .....	19



10.2	Measuring distance between DUT and microphone .....	20
10.2.1	Far-field conditions .....	20
10.2.2	Near-field conditions .....	20
10.2.3	Diffuse field conditions .....	20
10.2.4	Target application condition .....	21
11	Measurement equipment and test results .....	21
12	Accuracy of the acoustical measurement .....	21
12.1	General .....	21
12.2	Measurement uncertainty .....	21
13	Mounting of the DUT .....	22
13.1	Mounting and acoustic loading of drive units .....	22
13.2	Mounting and acoustic loading of an electro-acoustic system .....	22
14	Preconditioning .....	23
15	Rated ambient conditions .....	23
15.1	Temperature ranges .....	23
15.1.1	Performance limited temperature range .....	23
15.1.2	Damage limited temperature range .....	23
15.2	Humidity ranges .....	23
15.2.1	Relative humidity range .....	23
15.2.2	Damage limited humidity range .....	23
16	Rated frequency range .....	23
17	Input signal .....	23
17.1	Rated maximum input value .....	23
17.1.1	Condition to be specified .....	23
17.1.2	Direct measurement .....	24
17.1.3	Indirect measurement based on $SPL_{max}$ .....	25
17.2	Maximum input level .....	25
18	Sound-pressure output .....	26
18.1	Rated maximum sound pressure .....	26
18.1.1	Conditions to be specified .....	26
18.1.2	Direct measurement .....	26
18.1.3	Indirect measurement based on maximum input value .....	27
18.2	Rated maximum sound-pressure level .....	27
18.3	Short term maximum sound pressure level .....	27
18.3.1	Conditions to be specified .....	27
18.3.2	Method of measurement .....	28
18.4	Long term maximum sound pressure level .....	28
18.4.1	Conditions to be specified .....	28
18.4.2	Method of measurement .....	29
18.5	Sound pressure in a stated frequency band .....	29
18.5.1	Condition to be specified .....	29
18.5.2	Method of measurement .....	29
18.6	Sound-pressure level in a stated frequency band .....	30
18.7	Mean sound-pressure in a stated frequency range .....	30
18.7.1	Condition to be specified .....	30
18.7.2	Method of measurement .....	30
18.8	Mean sound-pressure level in a stated frequency range .....	30

19	Frequency response of the fundamental component .....	30
19.1	Transfer function .....	30
19.1.1	Conditions to be specified .....	30
19.1.2	Method of measurements .....	30
19.2	SPL frequency response .....	32
19.2.1	Conditions to be specified .....	32
19.2.2	Method of measurement .....	32
19.3	Time-varying amplitude compression of the fundamental component .....	33
19.3.1	General .....	33
19.3.2	Method of measurement .....	33
19.4	Amplitude compression at maximum input .....	33
19.4.1	Short term amplitude compression .....	33
19.4.2	Method of measurement .....	33
19.4.3	Long-term amplitude compression .....	34
19.4.4	Method of measurement .....	34
19.5	Corrections based on a free-field reference measurement .....	34
19.5.1	General .....	34
19.5.2	Correction of the measured sound pressure signal .....	34
19.5.3	Correction of the amplitude response .....	35
19.6	Effective frequency range .....	36
19.6.1	Conditions to be specified .....	36
19.6.2	Method of measurement .....	36
19.7	Internal latency .....	36
19.7.1	Conditions to be specified .....	36
19.7.2	Methods of measurement .....	36
20	Directional characteristics .....	37
20.1	General .....	37
20.2	Direct sound field in 3D space .....	37
20.2.1	Directional transfer function .....	37
20.2.2	Extrapolated far-field data .....	37
20.2.3	Parameters of the holographic sound field expansion .....	38
20.2.4	Extrapolated near-field data .....	39
20.3	Directional far field characteristics .....	39
20.3.1	Directional factor .....	39
20.3.2	Directional gain .....	41
20.3.3	Directivity factor .....	41
20.3.4	Directivity index .....	41
20.4	Acoustic output power .....	42
20.4.1	Conditions to be specified .....	42
20.4.2	Methods of measurement .....	42
20.5	Sound power level .....	44
20.6	Mean acoustic output power in a frequency band .....	44
20.6.1	Conditions to be specified .....	44
20.6.2	Method of measurement .....	44
20.7	Radiation angle .....	44
20.7.1	Conditions to be specified .....	44
20.7.2	Method of measurement .....	44

20.8	Coverage angle or angles .....	45
20.8.1	Conditions to be specified.....	45
20.8.2	Method of measurement .....	45
20.9	Mean sound pressure level in an acoustical zone.....	45
20.9.1	General .....	45
20.9.2	Method of measurement .....	45
21	Harmonic distortion.....	46
21.1	General.....	46
21.2	$N^{\text{th}}$ -order harmonic component .....	46
21.2.1	Conditions to be specified.....	46
21.2.2	Method of measurement .....	46
21.3	Total harmonic components .....	47
21.3.1	Conditions to be specified.....	47
21.3.2	Method of measurement .....	47
21.4	Total harmonic distortion.....	47
21.4.1	Conditions to be specified.....	47
21.4.2	Method of measurement .....	47
21.5	Higher-order harmonic distortion .....	48
21.5.1	Conditions to be specified.....	48
21.5.2	Method of measurement .....	48
21.6	Maximum sound pressure level limited by total harmonic distortion .....	49
21.6.1	Conditions to be specified.....	49
21.6.2	Method of measurement .....	49
21.7	$N^{\text{th}}$ -order equivalent input harmonic distortion component .....	50
21.7.1	Conditions to be specified.....	50
21.7.2	Method of measurement .....	50
21.8	Equivalent input total harmonic distortion.....	51
21.8.1	Conditions to be specified.....	51
21.8.2	Method of measurement .....	51
22	Two-tone distortion .....	52
22.1	Variation of excitation frequencies .....	52
22.2	Modulation distortion.....	52
22.2.1	Conditions to be specified.....	52
22.2.2	Method of measurement .....	52
22.3	Amplitude modulation distortion .....	53
22.3.1	Conditions to be specified.....	53
22.3.2	Method of measurement .....	54
23	Multi-tone distortion .....	54
23.1	Conditions to be specified .....	54
23.2	Method of measurement .....	55
24	Impulsive distortion.....	55
24.1	Impulsive distortion level.....	55
24.1.1	Conditions to be specified.....	55
24.1.2	Method of measurement .....	56
24.2	Maximum impulsive distortion ratio .....	56
24.2.1	Conditions to be specified.....	56
24.2.2	Method of measurement .....	56

24.3	Mean impulsive distortion level .....	57
24.3.1	Conditions to be specified.....	57
24.3.2	Method of measurement .....	57
24.4	Crest factor of impulsive distortion .....	57
24.4.1	Conditions to be specified.....	57
24.4.2	Method of measurement .....	57
25	Stray magnetic fields .....	58
25.1	General.....	58
25.2	Static component .....	58
25.2.1	Characteristic to be specified.....	58
25.2.2	Method of measurement .....	58
25.3	Dynamic components.....	59
25.3.1	Characteristics to be specified .....	59
25.3.2	Method of measurement .....	59
Annex A (informative)	Uncertainty analysis .....	60
Annex B (normative)	Transducer mounting .....	62
B.1	Standard baffle .....	62
B.2	Standard measuring enclosures.....	64
B.2.1	General .....	64
B.2.2	Type A.....	64
B.2.3	Type B.....	64
Annex C (normative)	Simulated programme signal.....	66
Annex D (informative)	Rating the maximum input and output values .....	68
Annex E (informative)	Spherical wave expansion.....	70
E.1	Coefficients of spherical wave expansion.....	70
E.2	Directional factor.....	70
E.3	Directivity factor.....	71
E.4	Acoustic output power.....	71
Annex F (informative)	Non-linearity .....	72
F.1	Equivalent harmonic input distortion.....	72
F.2	Two-tone intermodulation.....	72
F.3	Signal distortion generated in audio systems .....	73
Annex G (informative)	Stray magnetic field .....	75
Bibliography	.....	76
Figure 1	– Rated conditions used to describe the position of the DUT in the coordinate system.....	18
Figure 2	– Recommended position and orientation of the DUT .....	19
Figure 3	– Valid region of expansion of the sound pressure $p(r)$ at the observation point $r$ at the distance $r > a$ .....	39
Figure 4	– Measurement of the distortion generated by a multi-tone stimulus.....	55
Figure 5	– Measurement of impulsive distortion .....	56
Figure A.1	– Relationship between tolerance limits, corresponding acceptance intervals and the maximum permitted uncertainty of measurement, $U_{MAX}$ .....	60
Figure B.1	– Standard baffle, dimensions.....	62
Figure B.2	– Standard baffle with chamfer .....	63
Figure B.3	– Standard baffle with sub-baffle.....	63

Figure B.4 – Standard measuring enclosure type A (net volume is about 600 l) .....	64
Figure B.5 – Standard measuring enclosure type B (net volume is about 450 l) .....	65
Figure C.1 – Block diagram of test setup for generating the simulated noise signal used for testing passive loudspeaker systems comprising a network filter .....	66
Figure F.1 – Signal flow chart of the electro-acoustical system .....	72
Figure F.2 – Variation of the frequencies of the two-tone stimulus in the intermodulation measurement .....	73
Figure F.3 – Generation of the signal distortion in audio systems .....	73
Figure G.1 – Measuring apparatus for stray magnetic field .....	75
Table A.1 – Example uncertainty budget – acoustical loudspeaker evaluation .....	61
Table C.1 – Power spectrum of simulated programme signal in 1/3 octave bands rated .....	67

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[SIST EN IEC 60268-21:2019](https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019)

[https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-  
e9f8262b9c9c/sist-en-iec-60268-21-2019](https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019)

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SOUND SYSTEM EQUIPMENT –

## Part 21: Acoustical (output-based) measurements

## 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.

International Standard IEC 60268-21 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this standard is based on the following documents:

CDV	Report on voting
100/2957/CDV	100/3019/RVC

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

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

A list of all parts in the IEC 60628, published under the general title *Sound system equipment*, can be found on the IEC website.

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.

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 document using a colour printer.**

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 60268-21:2019](https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019)

<https://standards.iteh.ai/catalog/standards/sist/92202d81-7ddf-473f-a2cb-e9f8262b9c9c/sist-en-iec-60268-21-2019>