



# SLOVENSKI STANDARD

## SIST EN 60268-5:1999

01-april-1999

---

### Sound system equipment -- Part 5: Loudspeakers (IEC 60268-5:1989 + A1:1993)

Sound system equipment -- Part 5: Loudspeakers

Elektroakustische Geräte -- Teil 5: Lautsprecher

Equipements pour systèmes électroacoustiques -- Partie 5: Haut-parleurs

Ta slovenski standard je istoveten z: EN 60268-5:1996

[SIST EN 60268-5:1999](https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999)

<https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999>

#### **ICS:**

33.160.50	Pribor	Accessories
-----------	--------	-------------

**SIST EN 60268-5:1999**

**en**

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

SIST EN 60268-5:1999

<https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 60268-5**

August 1996

UDC 621.396.7:621.395.6  
ICS 17.140.50; 33.160.50

Supersedes HD 483.5 S2:1994

Descriptors: Sound system equipment, loudspeaker, characteristic, specification, measuring method

English version

**Sound system equipment  
Part 5: Loudspeakers  
(IEC 268-5:1989 + A1:1993)**

Equipements pour systèmes  
électroacoustiques  
Partie 5: Haut-parleurs  
(CEI 268-5:1989 + A1:1993)

Elektroakustische Geräte  
Teil 5: Lautsprecher  
(IEC 268-5:1989 + A1:1993)

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

SIST EN 60268-5:1999

<https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999>

This European Standard was approved by CENELEC on 1996-07-02. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CENELEC**

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

### Foreword

The text of the International Standard IEC 268-5:1989 and its amendment 1:1993, prepared by TC 84 (transformed into SC 100C, Equipment and systems in the field of audio, video and audiovisual engineering, of IEC TC 100, Audio, video and multimedia systems and equipment), was approved by CENELEC as HD 483.5 S2 on 1994-07-05.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60268-5 on 1996-07-02.

The following date was 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) 1997-04-01

Annexes designated "normative" are part of the body of the standard.

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

### Endorsement notice

The text of the International Standard IEC 268-5:1989 and its amendment 1:1993 was approved by CENELEC as a European Standard without any modification.

SIST EN 60268-5:1999

<https://standards.iteh.ai/catalog/standards/sist/927ab248-718e-4555-a15c-8090f4d1021c/sist-en-60268-5-1999>



**Annex ZA (normative)****Normative references to international publications  
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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 50(151)	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices	-	-
IEC 65 (mod)	1985	Safety requirements for mains operated electronic and related apparatus for household and similar general use	EN 60065 <sup>1)</sup> + corr. November 1993	1993 1993
IEC 225 <sup>2)</sup>	1966	Octave, half-octave and third-octave band filters intended for the analysis of sounds and vibrations	-	-
IEC 263	1982	Scales and sizes for plotting frequency characteristics and polar diagrams	-	-
IEC 268-1	1985	Sound system equipment Part 1: General	HD 483.1 S2 <sup>3)</sup>	1989
IEC 268-2	1987	Part 2: Explanation of general terms and calculation methods	HD 483.2 S2 <sup>4)</sup>	1993
IEC 268-11	1987	Part 11: Application of connectors for the interconnection of sound system components	HD 483.11 S3 <sup>5)</sup>	1993
IEC 268-12	1987	Part 12: Application of connectors for broadcast and similar use	EN 60268-12 <sup>6)</sup>	1995

1) EN 60065 includes A1:1987 + A2:1989 + A3:1992 to IEC 65.

2) IEC 225 is superseded by IEC 1260:1995, which is harmonized as EN 61260:1995.

3) HD 483.1 S2 includes A1:1988 to IEC 268-1.

4) HD 483.2 S2 includes A1:1991 to IEC 268-2.

5) HD 483.11 S3 includes A1:1989 + A2:1991 to IEC 268-11.

6) EN 60268-12 includes A1:1991 to IEC 268-12.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 268-14	1980	Part 14: Circular and elliptical loudspeakers; outer frame diameters and mounting dimensions	-	-
IEC 651	1979	Sound level meters	EN 60651	1994
ISO 3741	1988	Acoustics - Determination of sound power levels of noise sources - Precision methods for board-band sources in reverberation rooms	-	-
ISO 3743	1976	Acoustics - Determination of sound power levels of noise sources - Engineering methods for special reverberation test rooms	-	-
ISO 3744	1981	Acoustics - Determination of sound power levels of noise sources - Engineering methods for free-field conditions over a reflecting plane	-	-
ISO 3745	1977	Acoustics - Determination of sound power levels of noise sources - Precision methods for anechoic and semi-anechoic rooms	-	-

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

SIST EN 60268-5:1999

<https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999>

NORME  
INTERNATIONALE

**CEI  
IEC  
268-5**

INTERNATIONAL  
STANDARD

Deuxième édition  
Second edition  
1989-07

---

---

**Equipements pour systèmes électroacoustiques**

**Cinquième partie:**

**Haut-parleurs**

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

**Sound system equipment**

SIST EN 60268-5:1999

[https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-](https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999)

**Part 5:** 8090f4d1021e/sist-en-60268-5-1999

**Loudspeakers**



Numéro de référence  
Reference number  
CEI/IEC 268-5: 1989

## CONTENTS

	Page
FOREWORD .....	9
PREFACE .....	9
 Clause	
1. Scope .....	13
2. Object .....	13

## SECTION ONE – GENERAL

3. Conditions .....	13
3.1 General conditions .....	13
3.2 Conditions for the measurement .....	15
4. Test signals .....	15
4.1 Sinusoidal signal .....	15
4.2 Broadband noise signal .....	17
4.3 Narrow band noise signal .....	17
5. Acoustical environment .....	17
5.1 Free-field conditions .....	17
5.2 Half space free-field conditions .....	17
5.3 Diffuse sound field conditions .....	17
6. Unwanted acoustical and electrical noise .....	19
7. Positioning of loudspeaker and measuring microphone .....	19
7.1 Measuring distance under free-field and half space free-field conditions .....	19
7.2 Positioning of loudspeaker in diffuse field conditions .....	21
8. Measuring equipment .....	21
9. Accuracy of acoustical measurement .....	21
10. Mounting of loudspeakers .....	21
10.1 Mounting and acoustic loading of drive units .....	21
10.2 Mounting and acoustic loading of a loudspeaker system .....	23
11. Standard baffle .....	23
12. Preconditioning .....	23

## SECTION TWO – CHARACTERISTICS TO BE SPECIFIED AND THE RELEVANT METHODS OF MEASUREMENT

13. Type description .....	25
13.1 Loudspeaker drive units .....	25
13.2 Loudspeaker system .....	25
14. Marking of terminals and controls .....	25



Clause	Page
15. Reference plane, reference point and reference axis	25
15.1 Reference plane	25
15.2 Reference point	25
15.3 Reference axis	27
16. Impedance and derivative characteristics	27
16.1 Rated impedance	27
16.2 Impedance curve	27
16.3 Total $Q$ -factor ( $Q_t$ )	27
16.4 Equivalent air volume of a loudspeaker drive unit compliance ( $V_{as}$ )	29
17. Input voltage	31
17.1 Short term maximum input voltage	31
17.2 Long term maximum input voltage	31
17.3 Rated sinusoidal voltage	33
17.4 Rated noise voltage	33
18. Input electrical power	35
18.1 Short term maximum power	35
18.2 Long term maximum power	37
18.3 Rated sinusoidal power	37
18.4 Rated noise power	37
19. Frequency characteristics	37
19.1 Rated frequency range	37
19.2 Resonance frequency	37
19.3 Tuning frequency of a bass reflex or passive radiator loudspeaker system	39
20. Sound pressure under free-field and half space free-field conditions	39
20.1 Sound pressure in a stated frequency band	39
20.2 Sound pressure level in a stated frequency band	39
20.3 Characteristic sensitivity in a stated frequency band	41
20.4 Characteristic sensitivity level in a stated frequency band	41
20.5 Mean sound pressure in a stated frequency band	41
20.6 Mean sound pressure level in a stated frequency band	41
21. Response under free-field and half space free-field conditions	41
21.1 Frequency response	41
21.2 Effective frequency range	43
21.3 Transfer function	43
22. Output power (acoustic power)	43
22.1 Acoustic power in a frequency band	43
22.2 Mean acoustic power in a frequency band	47
22.3 Efficiency in a frequency band	47
22.4 Mean efficiency in a frequency band	47
23. Directional characteristics	47
23.1 Directional response pattern	47

Clause		Page
23.2	Radiation angle . . . . .	49
23.3	Directivity index . . . . .	51
24.	Amplitude non-linearity . . . . .	51
24.1	Introduction . . . . .	51
24.2	Total harmonic distortion . . . . .	53
24.3	Harmonic distortion of the $n^{th}$ order . . . . .	53
24.4	Characteristic harmonic distortion . . . . .	55
24.5	Total noise distortion . . . . .	55
24.6	Noise distortion of the $n^{th}$ order . . . . .	57
24.7	Characteristic noise distortion . . . . .	59
24.8	Modulation distortion of the $n^{th}$ order . . . . .	59
24.9	Characteristic modulation distortion of the $n^{th}$ order . . . . .	61
24.10	Difference frequency distortion . . . . .	61
24.11	Noise intermodulation distortion . . . . .	61

### SECTION THREE – OTHER CHARACTERISTICS AND CLASSIFICATION

25.	Rated ambient conditions . . . . .	63
26.	Interfering stray field . . . . .	63
27.	Physical characteristics . . . . .	65
27.1	Dimensions . . . . .	65
27.2	Weight . . . . .	65
27.3	Cable assemblies . . . . .	65
28.	Design data . . . . .	65
29.	Classification of the characteristics to be specified . . . . .	65
FIGURES	. . . . .	68

STANDARD PREVIEW

(standards.itech.ai)

SIST EN 60268-5:1999

<https://standards.itech.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SOUND SYSTEM EQUIPMENT

## Part 5: Loudspeakers

## FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.
- 4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

## iTeh STANDARD PREVIEW

## PREFACE

(standards.iteh.ai)

This standard has been prepared by IEC Technical Committee No. 84: Equipment and systems in the field of audio, video and audiovisual engineering.

This second edition replaces the first edition of IEC Publication 268-5 and its first supplement (Publication 268-5A (1980)).

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

Six Months' Rule	Report on Voting
84(CO)35	84(CO)46

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

The following IEC publications are quoted in this standard:

- Publications Nos. 50 (151) (1978): International Electrotechnical Vocabulary (IEV), Chapter 151: Electrical and magnetic devices.
- 65 (1985): Safety requirements for mains operated electronic and related apparatus for household and similar general use.
- 225 (1982): Octave, half-octave and third-octave band filters intended for the analysis of sounds and vibrations.
- 263 (1982): Scales and sizes for plotting frequency characteristics and polar diagrams.
- 268-1 (1985): Sound system equipment, Part 1: General.
- 268-2 (1987): Part 2: Explanation of general terms and calculation methods.
- 268-11 (1987): Part 11: Application of connectors for the interconnection of sound system components.
- 268-12 (1987): Part 12: Application of connectors for broadcast and similar use.

268-14 (1980): Part 14: Circular and elliptical loudspeakers; outer frame diameters and mounting dimensions.

651 (1979): Sound level meters.

ISO Standards quoted:

3741 (1988): Acoustics – Determination of sound power levels of noise sources – Precision methods for broad-band sources in reverberation rooms.

3743 (1976): Acoustics – Determination of sound power levels of noise sources – Engineering methods for special reverberation test rooms.

3744 (1981): Acoustics – Determination of sound power levels of noise sources – Engineering methods for free-field conditions over a reflecting plane.

3745 (1977): Acoustics – Determination of sound power levels of noise sources – Precision methods for anechoic and semi-anechoic rooms.

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

SIST EN 60268-5:1999

<https://standards.iteh.ai/catalog/standards/sist/927ab248-728e-4555-a15c-8090f4d1021e/sist-en-60268-5-1999>

## SOUND SYSTEM EQUIPMENT

### Part 5: Loudspeakers

#### 1. Scope

This standard applies to sound system loudspeakers, treated as entirely passive elements. Loudspeakers with built-in amplifiers are excluded.

*Note.* – The term “loudspeaker” used in this standard relates to loudspeaker drive units themselves and also to loudspeaker systems which comprise one or more loudspeaker drive units provided with a baffle, enclosure or horn and such relevant devices as built-in cross-over filters, transformers and any other passive element.

#### 2. Object

The purpose of this standard is to give the characteristics to be specified and the relevant methods of measurement for loudspeakers using sinusoidal or specified noise signals.

The methods of measurement given in this standard are those which are seen to be most directly related to the characteristics.

SIST EN 60268-5:1999

*Notes 1.* – If equivalent results can be obtained using other methods of measurement, details of the methods used should be presented with the results.

2. – The following items are under consideration:

- loudspeakers with built-in amplifiers;
- measurements under conditions other than free-field, half space free-field and diffuse field;
- measurements with signals other than sinusoidal or noise.

## SECTION ONE – GENERAL

#### 3. Conditions

##### 3.1 General conditions

This standard is to be used in conjunction with the following standards:

- IEC 268-1 (1985): Sound system equipment, Part 1: General.
- IEC 268-2 (1987): Part 2: Explanation of general terms and calculation methods.
- ISO 3741 (1988): Acoustics – Determination of sound power levels of noise sources – Precision methods for broad-band sources in reverberation rooms.