SLOVENSKI STANDARD
SIST HD 483.3 S2:1999

01-julij-1999

Sound system equipment - Part 3: Amplifiers (IEC 60268-3:1988 + A2:1991)

Sound system equipment -- Part 3: Amplifiers

Elektroakustische Geräte -- Teil 3: Verstärker

Equipements pour systèmes électroacoustiques -- Partie 3: Amplificateurs

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33.160.10 Ojaļ evalniki Amplifiers

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Descriptors: Sound system equipment, amplifier, characteristic, measuring method

ENGLISH VERSION

Sound system equipment - Part 3: Amplifiers
(IEC 268-3:1988 + A1:1990 + A2:1991)

Equipements pour systèmes électroacoustiques
Troisième partie: Amplificateurs
(CEI 268-3:1988 +A1:1990 + A2:1991)

Elektroakustische Geräte
Teil 3: Verstärker
(IEC 268-3:1988 + A1:1990 + A2:1991)

This Harmonization Document was approved by CENELEC on 1992-06-16. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

Up-to-date lists and bibliographical references concerning national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

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 CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 268-3:1988 and its amendments 1:1990 and 2:1991 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as Harmonization Document.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as HD 483.3 S2 on 16 June 1992.

The following dates were fixed:

- latest date of announcement of the HD at national level	(doa)	1992-12-01
- latest date of publication of a harmonized national standard	(dop)	1993-06-01
- latest date of withdrawal of conflicting national standards	(dow)	1993-06-01

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.

For products which have complied with HD 483.3 S1:1990 before 1993-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1998-06-01.

ENDORSEMENT NOTICE

The text of the International Standard IEC 268-3:1988 and its amendments 1:1990 and 2:1991 was approved by CENELEC as a Harmonization Document without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

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

IEC Publication	Date	Title	EN/HD	Date
65, mod	1985	Safety requirements for mains operated electronic and related apparatus for household and similar general use	HD 195 S6	1989
68	Series	Basic Safety Publication - Environmental testing	HD 323	Series
98	1987	Analogue audio disk records and reproducing equipment	HD 337 S3	1989
268-1	1985	Sound system equipment - Part 1: General	HD 483.1 S1*	1988
268-2	1987	Part 2: Explanation of general terms and calculation methods	HD 483.2 S1	1989
268-5	1972	Part 5: Loudspeakers	-	-
268-15	1987	Part 15: Preferred matching values for the interconnection of sound system components	HD 483.15 S1*	1989
417	1973	Graphical symbols for use on equipment Index, survey and compilation of the single sheets	HD 243 S1*	1975
581	-	High fidelity audio equipment and systems; Minimum performance requirements	-	-

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* HD 483.1 S1 is superseded by HD 483.1 S2:1989 based on IEC 268-1:1985 + A1:1988

* HD 483.15 S1 is superseded by HD 483.15 S3:1991, which is based on IEC 268-15:1987 + A1:1989 + A2:1990

* HD 243 S1 is superseded by HD 243 S9:1991, which includes supplements A:1974 up to J:1990 to IEC 417

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Equipements pour systèmes électroacoustiques

Troisième partie: Amplificateurs

Sound system equipment

Part 3: Amplifiers

Publication
268-3: 1988

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SOUND SYSTEM EQUIPMENT

Part 3: Amplifiers

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.

PREFACE

This standard has been prepared by IEC Technical Committee No. 84: Equipment and Systems in the Field of Audio, Video and Audiovisual Engineering (formerly Sub-Committee 29B: Audio Engineering).

This second edition replaces the first edition of IEC Publication 268-3 (1969), as well as its Amendment No. 1 (1978), its first supplement: IEC Publication 268-3A (1970), its second supplement: IEC Publication 268-3B (1977) and its third supplement: IEC Publication 268-3C (1978).

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

Six Months' Rule	Reports on Voting
29B(CO)116 84(CO)21	84(CO)5 84(CO)38

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

The following IEC publications are quoted in this standard:

Publications Nos. 65 (1985): Safety requirements for mains operated electronic and related apparatus for household and similar general use.
68: Basic environmental testing procedures.
98 (1987): Analogue audio disk records and reproducing equipment.
268-1 (1985): Sound system equipment, Part 1: General.
268-2 (1987): Part 2: Explanation of general terms and calculation methods.
268-5 (1972): Part 5: Loudspeakers.
268-15 (1987): Part 15: Preferred matching values for the interconnection of sound system components.
417 (1973): Graphical symbols for use on equipment. Index, survey and compilation of the single sheets.
581: High fidelity audio equipment and systems; Minimum performance requirements.

SOUND SYSTEM EQUIPMENT

Part 3: Amplifiers

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1. Scope

This standard applies to amplifiers which form part of a sound system for professional and household applications.

2. Object

The purpose of this standard is to give recommendations relative to the characteristics to be specified and the relevant measuring methods for amplifiers.

In general, the methods of measurement recommended are those which are seen to be the most directly related to the definitions. This does not exclude the use of other methods which will give equivalent results.

Rated conditions and standard test conditions as specified hereafter have been adopted as conditions for specifications and measurements.

3. Conditions

3.1 *Conditions for specifications and measurements*

3.1.1 *General conditions*

This standard shall be used in conjunction with:

- IEC Publication 268-1 (1985): Sound system equipment, Part 1: General, and
- IEC Publication 268-2 (1987): Sound system equipment, Part 2: Explanation of general terms and calculation methods.

3.2 *Rated conditions and standard test conditions*

3.2.1 *Introduction*

For convenience in specifying how amplifiers shall be set up for measurement, certain sets of conditions are defined in this standard under the titles of rated conditions and standard test conditions, respectively.

A full explanation of the term "rated" is given in IEC Publication 268-2.

The rated conditions used in this part are:

- rated power supply voltage;
- rated source impedance;
- rated source e.m.f.;
- rated load impedance;
- rated total harmonic distortion, or rated (distortion-limited) output voltage or power;
- rated mechanical and climatic conditions.

Notes 1. – Total harmonic distortion and (distortion-limited) output voltage or power are interdependent. Both cannot be taken as rated conditions simultaneously because normally a given sample amplifier produces less than rated total harmonic distortion at rated output voltage or power.

2. – If the power supply frequency is critical, it also represents a rated condition.

To obtain the correct conditions for measurements, the values for the above-mentioned rated conditions shall be taken from the manufacturer's specification. These values themselves are not subject to measurement but they constitute the basis for measuring the other characteristics.

Methods of measurement for these other characteristics are given in this standard and the manufacturer is either required or permitted (see Clause 31) to state "rated values" for these characteristics in the specification of the equipment. These include:

– rated voltage gain;
– rated distortion limited output voltage or power (when not adopted as a rated condition);

– rated signal-to-noise ratio;
– rated equivalent noise source e.m.f.

3.2.2 *Rated conditions*

An amplifier, considered as a four-terminal network with regard to a specified pair of input terminals and a specified pair of output terminals, shall be understood to be working under rated conditions when the following conditions are fulfilled:

a) the amplifier is connected to rated power supply;

b) the source e.m.f. is connected in series with the rated source impedance to the input terminals;

c) the output terminals are terminated with the rated load impedance;

d) the terminals not used are terminated as specified;

e) the source e.m.f. is adjusted to a sinusoidal voltage equal to the rated source e.m.f. at an appropriate frequency. Unless there is a special reason to the contrary, this frequency shall be the standard reference frequency of 1 000 Hz according to IEC Publication 268-1, Clause 3: "Frequencies of measurement".
Such a reason could be that the standard reference frequency is outside or near the limit of the effective frequency range of the amplifier;

f) the volume control, if any, is set to such a position that the rated distortion-limited output voltage appears at the output terminals;

g) the tone controls, if any, are set to a specified position to give the specified frequency response, generally the flat frequency response;

h) the balance control(s), if any, is (are) set to the central position;

i) the rated mechanical and climatic conditions according to IEC Publication 268-1 are complied with.

Amplifiers for which the rated distortion-limited output power exceeds the rated temperature-limited output power will be subject to overheating when operated under rated conditions for an extended period of time. For these amplifiers, rated conditions shall be maintained for no longer than can be tolerated by the amplifier.

3.2.3 *Standard test conditions*

These are obtained by bringing the amplifier under rated conditions (see Sub-clause 3.2.2) and then reducing the source e.m.f. to a level of −10 dB referred to the rated source e.m.f.

Note. – The signal frequency is 1 000 Hz, unless there is a special reason to the contrary (see Sub-clause 3.2.2, Item *e)*).

3.2.4 *Influence of the power supply*

When specifying the characteristics of an amplifier, rated power supply voltage shall be assumed. If, however, the manufacturer claims power supply voltage tolerances exceeding ±10%, then the characteristics to be specified shall also be stated for the upper and lower limits of these tolerances (see Clause 9).

If variations of the frequency of the power supply within the tolerances specified by the manufacturer have any significant influence on the characteristics to be specified, then those characteristics shall also be stated for the upper and lower limits of the claimed frequency tolerances.

If harmonics in the a.c. power supply and ripple in the d.c. power supply within the limits specified by the manufacturer have any significant influence on the characteristics to be specified, then those characteristics shall also be stated for the upper limit of the claimed tolerances of harmonics or ripple.

3.3 *Other conditions*

If supplementary data of the amplifier are presented, applying to other than the rated or standard test conditions, for example at different frequencies or at different settings of controls, then the conditions shall be fully defined in the presentation. These conditions shall, if possible, be chosen according to the recommendations made in the relevant clauses of this standard.

The procedure for supplementary measurements may be derived from the measurement procedure given for the standard conditions. If special precautions have to be taken, then these shall be indicated together with the measurement procedure involved.

4. Classes of operation

Class A – In which the current in each active device supplying the load current is greater than zero throughout each cycle of the signal for all values of load current up to and including the value determined by the rated output power or voltage and the rated load impedance.

Class B – In which the current in each active device supplying the load current is equal to zero for exactly one-half of each cycle of load current.

Note. – In common usage, the term Class B is extended to the case where current flows for slightly more than one half-cycle.

Class AB – In which the current in at least one of the active devices supplying the load current is zero for some part of each cycle of load current for some range of values of load current not exceeding the value defined by the rated output power or voltage and the rated load impedance.

Note. – At sufficiently low signal levels, a Class AB amplifier usually operates in Class A.

Class D – In which the current in each active device supplying the load is switched from zero to a maximum value by a carrier signal, modulation of which conveys the useful signal.

Note. – Other classes of operation have been commercialized but no formal definitions of such classes have been submitted for standardization.

SECTION ONE — GENERAL

5. Rated source impedance

If the rated source impedance according to Sub-clause 17.1 is not stated by the manufacturer, the appropriate impedance specified in IEC Publication 268-15 shall be adopted as the rated source impedance.

6. Interchangeable parts

For type measurements, interchangeable parts shall have the mean characteristics specified for these parts.

For measurements on a particular sample, the interchangeable parts supplied with that amplifier shall be used.

7. Automatic controls

The amplifier may contain automatic control circuits such as limiters, compressors, expanders and electronic fader circuits.

These circuits make certain characteristics of the amplifier dependent either on a signal passing through the amplifier itself or on an external control signal.

When measuring the characteristics of such an amplifier, the automatic control circuits shall be disabled, except when measuring the characteristics of these controls.

8. Special instructions for operation

The manufacturer may have a special procedure for putting the amplifier into operation when starting from cold or after a short interruption of operation. He may also have specified particular precautions to be taken when performing switching manipulations under operation or other information with respect to normal or abnormal operating conditions.

These specified procedures shall be followed and any information given with respect to operation shall be taken into account in the preliminary and testing procedures.

9. Power supply

Measurements shall be made with the amplifier connected to rated power supply. Care shall be taken to maintain the power supply voltage at the rated value during the measurement.

Additional measurements may be made at the upper and lower limits claimed as tolerable for the power supply voltage, the power supply frequency and the a.c. power supply harmonics or the d.c. power supply ripple (see Sub-clause 3.2.4).

Warning – The power supply voltage tolerances specified by the manufacturer shall not be exceeded.

10. **Position of the volume controls**

If a characteristic is measured at only one position of the volume control, the control shall be at the position corresponding to rated conditions (see Sub-clause 3.2.2), unless a maximum or minimum position of the control is inherent in the characteristic to be measured.

If the characteristic is to be measured for several settings of the volume control, then the position for rated conditions shall be included, other preferred settings being maximum, and −3 dB, −6 dB, −10 dB, −20 dB and −40 dB with respect to the setting for rated conditions.

Volume controls belonging to channels not being measured shall, if possible, be put in the minimum position, unless otherwise stated.

11. **Series of measurements**

If a series of measurements is made, the amplifier should preferably be maintained under standard test conditions in the periods between measurements.

If the amplifier has to be put out of operation for a short period between measurements, then investigation shall be made with respect to any procedure stated by the manufacturer for restoring operation and such procedure, if any, shall be followed.

If the amplifier has to be put out of operation for an extended period between measurements, then the further measurements shall be initiated after pre-conditioning according to Clause 12.

12. **Pre-conditioning for measurements**

Before beginning measurements on an amplifier, it shall be operated under approximately standard test conditions for a period of 1 h, or as specified by the manufacturer.

Before operating the amplifier the manufacturer's instructions concerning initial operation should be studied.

The amplifier is then brought under standard test conditions as given in Sub-clause 3.2.3. Due to internal heating the output voltage may subsequently vary with time. Unless excessive, this effect is ignored during the pre-conditioning period. When the pre-conditioning period is over, the amplifier shall be brought under rated conditions or standard test conditions, as required.

13. **Variable consumption apparatus**

Sound system equipment shall be considered as variable consumption apparatus when it contains one or more power amplifiers operating in the Class AB or Class B modes, in which the d.c. power supply for the output stages is either electronically stabilized by means of series control elements or has no stabilization.

Notes 1. – Where the d.c. supply is stabilized by shunt control elements, the power consumption is usually, if not always, substantially constant. The apparatus, however, behaves in some respects as a variable consumption apparatus, and in particular the text of Sub-clause 19.4 still applies.

2. – For safety testing purposes only, a different definition is given in IEC Publication 65.