# INTERNATIONAL STANDARD

# IEC 60268-3

Third edition 2000-08

# Sound system equipment -

Part 3: Amplifiers

Equipements pour systèmes électroacoustiques -

Partie 3: Amplificateurs

© IEC 2000 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission3, rue de Varembé Geneva, SwitzerlandTelefax: +41 22 919 0300e-mail: inmail@iec.chIEC web site http://www.iec.ch

\_\_\_\_



Commission Electrotechnique Internationale International Electrotechnical Commission Международная Электротехническая Комиссия



XA

For price, see current catalogue

- 2 -

60268-3 © IEC:2000(E)

# CONTENTS

				Page
FO	REWC	)RD		5
Clau	use			
1	Scop	e		7
2	Norm	ative re	ferences	7
3	Cond	itions		8
	3.1	Rated	conditions and standard measuring conditions	8
		3.1.1	Introduction	
		3.1.2	Rated conditions	8
		3.1.3	Standard measuring conditions	9
	3.2	Other of	conditions	9
4	Class	ses of o	peration	9
5	Interd	changea	ible parts	10
6	Autor	natic co	ntrols	10
7	Powe	er supply	۷	10
8		•••	ne volume controls	
9			ning for measurements	
10			asurements	
11			sumption apparatus	
12		•		
13		-	vironment	
14	Char	acteristi	cs to be specified, and their methods of measurement	12
	14.1		supply characteristics	
			Characteristics to be specified	
			Method of measurement	
	14.2		nce of (long-term) power supply voltage variations	
			Characteristic to be specified	
			Methods of measurement	
	14.3		nce of power supply frequency variations	
			Characteristics to be specified	
			Methods of measurement	
	14.4		nce of power supply harmonics and ripple	
			Characteristics to be specified Methods of measurement	
	14.5		haracteristics	
	14.5	•	Rated source impedance, characteristic to be specified	
			Input impedance	
			Rated source e.m.f., characteristic to be specified	
			Minimum source e.m.f. for rated distortion-limited output voltage	
	14.6		characteristics	
		•	Rated load impedance, characteristic to be specified	
			Output source impedance	
			Output voltage and power (distortion-limited)	

60268-3 © IEC:2000(E)

## Clause

	14.6.4 F	Regulation	. 20
	14.6.5 (	Overload restoring time	. 20
14.7	Limiting	characteristics	. 20
	14.7.1 (	Overload source e.m.f	. 20
	14.7.2 \$	Short-term maximum output voltage and power	. 21
	14.7.3 L	ong-term maximum output voltage and power	. 22
	14.7.4	Femperature-limited output power	. 23
14.8	Characte	eristics of protection circuits	. 23
	14.8.1 I	ntroduction	. 23
		Protection against potentially damaging combinations of output voltage and current	. 24
	14.8.3 (	Characteristics of d.c. offset protection circuits	. 25
14.9	Sustaini	ng-time for rated (distortion-limited) output voltage or power	. 26
	14.9.1 l	ntroduction	. 26
	14.9.2 (	Characteristic to be specified	. 27
	14.9.3 N	Method of measurement	. 27
14.10	Gain		. 28
	14.10.1	Voltage gain and e.m.f. gain	. 28
	14.10.2	Maximum e.m.f. gain	. 28
	14.10.3	Attenuation characteristic of the volume control	. 28
	14.10.4	Attenuation characteristic of balance controls for	
		multi-channel equipment	. 29
14.11	Respo	nse	. 29
	14.11.1	Gain-frequency response	. 29
	14.11.2	Gain-limited effective frequency range	. 30
	14.11.3	Distortion-limited effective frequency range	. 30
	14.11.4	Phase-frequency response	. 30
14.12	2 Amplit	ude non-linearity	. 31
	14.12.1	Introduction	. 31
	14.12.2	Rated total harmonic distortion	. 31
	14.12.3	Total harmonic distortion under standard measuring conditions	. 31
	14.12.4	Total harmonic distortion as a function of amplitude and frequency	. 32
	14.12.5	Harmonic distortion of the <i>n</i> th order under standard	
		measuring conditions	. 32
	14.12.6	Harmonic distortion of the <i>n</i> th order as a function of amplitude and frequency	
		Modulation distortion of the <i>n</i> th order	
	14.12.8	Difference-frequency distortion of the <i>n</i> th order	. 35
	14.12.9	Dynamic intermodulation distortion (DIM)	. 37
	14.12.10	) Total difference frequency distortion	. 38
	14.12.11	Weighted total harmonic distortion	. 40
14.13	Noise		. 40
	14.13.1	Characteristic to be specified	. 40
	14.13.2	Method of measurement	. 41
14.14	Hum		. 41
	14.14.1	Introduction	. 41
	14.14.2	Characteristics to be specified	. 41
	14.14.3	Method of measurement	. 42

#### Page

- 4 -

Clause Pa	ge
14.15 Balanced inputs and outputs	42
14.15.1 Balance of the input	42
14.15.2 Overload (distortion-limited) peak-to-peak common-mode input voltage4	43
14.15.3 Balance of the output	44
14.16 Cross-talk and separation in multi-channel amplifiers	45
14.16.1 Characteristics to be specified	45
14.16.2 Method of measurement	45
14.17 Gain and phase differences between channels in multi-channel amplifiers	46
14.17.1 Gain difference	46
14.17.2 Phase difference	47
14.18 Dimensions and mass, characteristics to be specified	47
Annex A (informative) Balanced interfaces	53
Bibliography	
	54
Figure 1 – Arrangements for measuring input impedance	48
Figure 2 – Oscillogram when measuring overload restoring time	49
Figure 3 – Protection against potentially damaging combinations of output voltage	
and current	50
Figure 4 – Arrangement for combining two input signals	51
Figure 5 – Frequency spectrum below 30 kHz of the signal for measuring dynamic intermodulation distortion	51
Figure 6 – Arrangement for measuring the balance of a balanced input	
Figure 7 – Arrangement for measuring the internal impedance balance of a	52
balanced output	52
Figure 8 – Arrangement for measuring the voltage symmetry of a balanced output	52
Table 1 – Different rated total harmonic distortion and rated distortion-limited   output power specifications for the same amplifier	27
Table 2 – Distortion components due to dynamic intermodulation distortion falling   in the frequency range up to 20 kHz	37

60268-3 © IEC:2000(E)

- 5 -

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

### SOUND SYSTEM EQUIPMENT -

#### Part 3: Amplifiers

#### FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60268-3 has been prepared by subcommittee 100C: Audio, video and multimedia subsystems and equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 1988, amendment 1 (1990) and amendment 2 (1991), and constitutes a technical revision.

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

FDIS	Report on voting	
100C/147/FDIS	100C/165/RVD	

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

This part of IEC 60268 shall be used in conjunction with IEC 60268-1 (1985) and IEC 60268-2 (1987).

- 6 -

60268-3 © IEC:2000(E)

Annex A is for information only.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

A bilingual version of this standard may be issued at a later date.

60268-3 © IEC:2000(E)

- 7 -

## SOUND SYSTEM EQUIPMENT -

### Part 3: Amplifiers

#### 1 Scope

This part of IEC 60268 applies to analogue amplifiers, and the analogue parts of analogue/digital amplifiers, which form part of a sound system for professional or household applications. It specifies the characteristics which should be included in specifications of amplifiers and the corresponding methods of measurement.

NOTE The methods of measurement for digital amplifiers and similar equipment are given in IEC 61606. [6] 1)

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

In general, the methods are based on the simplest measuring equipment which can provide useful results. This does not exclude the use of more complex equipment which can give higher accuracy and/or allow automatic measurement and recording of results.

Rated conditions and standard measuring conditions are specified in order to allow measurements to be reliably repeated.

#### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60268. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60268 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60065:1998, Audio, video and similar electronic apparatus – Safety requirements

IEC 60268-1:1985, Sound system equipment – Part 1: General

IEC 60268-2:1987, Sound system equipment – Part 2: Explanation of general terms and calculation methods Amendment 1 (1991)

IEC 60417-1:1998, Graphical symbols for use on equipment – Part 1: Overview and application

IEC 61000-4-17:1999, Electromagnetic Compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on d.c. input power port immunity test – Basic EMC Publication

IEC 61000-4-29, Electromagnetic Compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interrruptions and voltage variations on d.c. input power ports, immunity tests – Basic EMC Publication <sup>2</sup>)

<sup>&</sup>lt;sup>1)</sup> Numbers in square brackets refer to the bibliography.

<sup>&</sup>lt;sup>2)</sup> To be published.

IEC 61938:1996, Audio, video and audiovisual systems – Interconnections and matching values – Preferred matching values of analogue signals

- 8 -