

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Environmental testing –
Part 2-57: Tests – Test Ff: Vibration – Time-history and sine-beat method**

**Essais d'environnement –
Partie 2-57: Essais – Essai Ff: Vibrations – Méthode par accélérogrammes et
sinusoïdes modulées**



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

X

ICS 19.040

ISBN 978-2-83220-745-1

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	8
4 Test requirements and associated parameters.....	15
4.1 General.....	15
4.2 Requirements for testing	15
4.3 Vibration response investigation.....	16
4.3.1 General	16
4.3.2 Basic motion.....	16
4.3.3 Transverse motion.....	16
4.3.4 Rotational motion	16
4.3.5 Measuring points	16
4.3.6 Vibration amplitude tolerances.....	17
4.3.7 Frequency tolerances	17
4.3.8 Sweeping	17
4.3.9 Damping ratio.....	17
4.4 Time-history testing.....	18
4.4.1 Basic motion.....	18
4.4.2 Transverse motion.....	18
4.4.3 Rotational motion	18
4.4.4 Tolerance zone for the required response spectrum	18
4.4.5 Frequency range	19
4.5 Sine-beat testing	19
4.5.1 General description	19
4.5.2 Vibration amplitude tolerances.....	19
4.5.3 Test frequency tolerances	19
4.5.4 Transverse motion.....	19
4.6 Mounting	20
5 Severities	20
5.1 General.....	20
5.2 Time history	20
5.3 Test frequency range.....	21
5.4 Required response spectrum.....	21
5.5 Number and duration of time-histories	21
5.5.1 Number of time histories.....	21
5.5.2 Time-history duration.....	21
5.5.3 Duration of the strong part of the time history	22
5.5.4 Number of high stress cycles.....	22
5.6 Sine-beat test level.....	23
5.6.1 General	23
5.6.2 Test frequency determination	29
5.6.3 Sine-beat test wave	29
5.6.4 Number of cycles in the sine beat.....	29
5.6.5 Modulating frequency	30

5.6.6	Number of sine beats.....	31
5.6.7	High-stress low-cycle fatigue effects.....	31
6	Preconditioning	31
7	Initial measurements	31
8	Testing	31
8.1	General	31
8.2	Vibration response investigation	31
8.3	Time-history testing	32
8.4	Sine-beat testing	32
8.5	Multi-axis testing	32
8.5.1	General	32
8.5.2	Single axis testing	32
8.5.3	Biaxial testing	32
8.5.4	Triaxial testing	32
9	Intermediate measurements	33
10	Recovery	33
11	Final measurements	33
12	Information to be given in the relevant specification.....	33
13	Information to be given in the test report	34
	Annex A (informative) Guidance for time-history and sine-beat methods	35
	Bibliography.....	41
	Figure 1 – Sequence of five sine beats with five cycles	7
	Figure 2 – Number of cycles per sine beat	13
	Figure 3 – Typical time history	14
	Figure 4 – Typical logarithmic plot of a required response spectrum, test response spectrum and tolerance zone	14
	Figure 5 – Typical response of an oscillator excited by a specific time history during a test	22
	Figure 6 – Recommended test level with crossover frequency at 0,8 Hz	24
	Figure 7 – Recommended test level with crossover frequency at 1,6 Hz	26
	Figure 8 – Recommended test level with crossover frequency at 8 Hz	28
	Figure 9 – Amplification factors of different sine beats, continuous sine and a typical natural time-history	30
	Figure A.1 – Recommended shape of a required response spectrum in generalized form	37
	Figure A.2 – Standardized presentation of matched sine beats of acceleration, velocity and displacement (five cycles within the sine beat of acceleration)	40
	Table 1 – Comparison of tolerances	15
	Table 2 – Recommended test frequency ranges.....	21
	Table 3 – Recommended test levels with a crossover frequency of 0,8 Hz (see Figure 6)	23
	Table 4 – Recommended test levels with a crossover frequency of 1,6 Hz (see Figure 7)	25
	Table 5 – Recommended test levels with a crossover frequency of 8 Hz (see Figure 8)	27

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ENVIRONMENTAL TESTING –**Part 2-57: Tests – Test Ff: Vibration –
Time-history and sine-beat method****FOREWORD**

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International Standard IEC 60068-2-57 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

This third edition cancels and replaces the second edition, published in 1999. It also replaces IEC 60068-2-59:1990, which will be withdrawn.

This edition includes only minor technical changes with respect to the previous edition:

- editorially combines IEC 60068-2-57 and IEC 60068-2-59;
- the title has been modified to include a sine beat method.

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

FDIS	Report on voting
104/595/FDIS	104/612/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 2.

A list of all the parts in the IEC 60068 series, published under the general title *Environmental testing*, can be found on the IEC website.

This standard is to be used in conjunction with IEC 60068-1.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

INTRODUCTION

This part of IEC 60068 details methods for testing components, equipment and other electrotechnical products (hereinafter referred to as “specimens”) which in service can be subjected to random or oscillating type dynamic forces of short duration, typical examples of which are the stresses induced in equipment as a result of earthquakes, explosions and certain phases of transportation, or by transient, short time vibration in machinery.

The characteristics of these forces and the damping of the specimen may be such that the vibration response of the specimen will not reach a steady-state condition.

The time-history test consists, after any preliminary vibration response investigation with sinusoidal or random vibration, in subjecting the specimen to a vibration (acceleration, velocity or displacement) the time history being specified by a response spectrum with characteristics simulating the effects of the dynamic forces.

A time history may be developed or obtained from

- a natural event (natural time history),
 - a random sample
 - a synthesized signal
- } artificial time history.

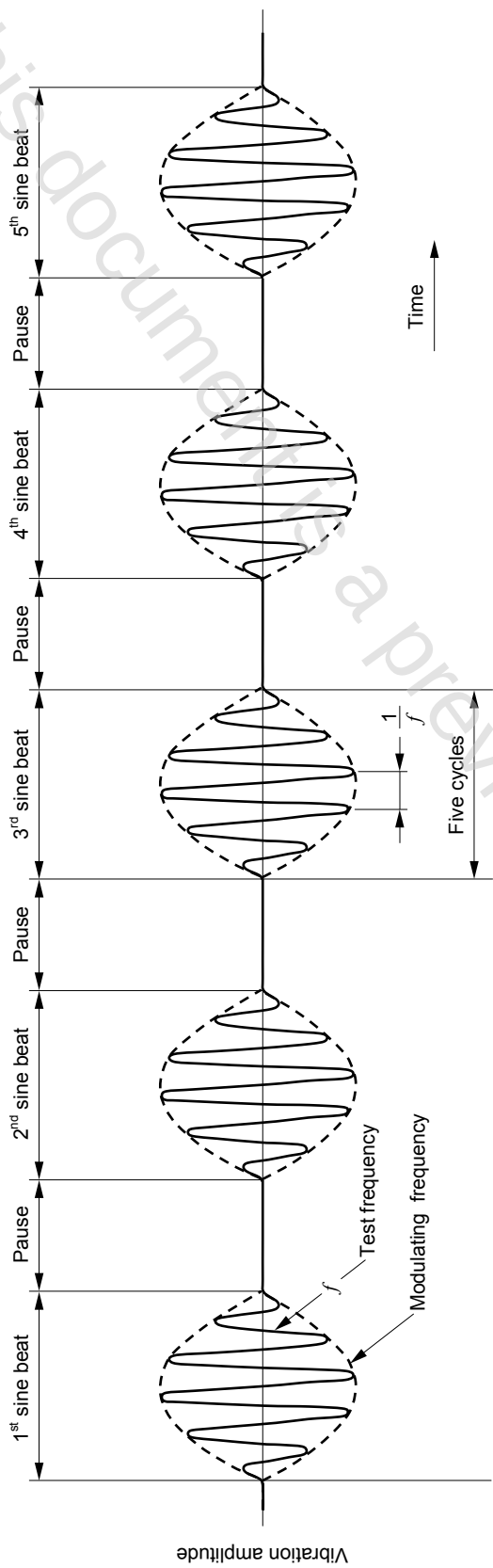
In general, to adapt to the required testing severity, some modification is necessary.

The use of a time history allows a single test wave to envelop a broadband response spectrum.

It is possible for all the modes of the structure in the excitation axis (or axes) to be excited at the same time and consequently the stresses derived from the combined effects of the coupled modes are generally taken into account.

In the sine beat test, the specimen is excited at fixed frequencies with a preset number of sine beats (see Figure 1). These fixed test frequencies are predetermined test frequencies, or critical frequencies identified by means of a sinusoidal vibration test (IEC 60068-2-6), or both. Pauses are provided between the individual sine beats in order to allow decay of the free response of the specimen.

In Clause 12 specification writers will find a list of details to be considered for inclusion in specifications and, in Annex A, guidance giving necessary extra information.



IEC 907/13

Figure 1 – Sequence of five sine beats with five cycles

ENVIRONMENTAL TESTING –

Part 2-57: Tests – Test Ff: Vibration – Time-history and sine-beat method

1 Scope

This part of IEC 60068 provides a standard procedure for determining, by the time-history and sine-beat methods, the ability of a specimen to withstand specified severities of transient vibration.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068 (all parts), *Environmental testing*

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-47:2005, *Environmental testing – Part 2-47: Tests – Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-2-64:2008, *Environmental testing – Part 2-64: Tests – Vibration, broadband random and guidance*

IEC 60068-3-3:1991, *Environmental testing – Part 3: Guidance – Seismic test methods for equipments*

IEC 60068-3-8, *Environmental testing – Part 3-8: Supporting documentation and guidance – Selecting amongst vibration tests*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Some of the following terms can be found in ISO 2041, IEC 60068-1 or in IEC 60068-2-6. Where, for the convenience of the reader, a definition from one of those sources is included here, it is indicated.

3.1

critical frequency

frequency at which

- malfunctioning and/or deterioration of performance of the specimen which are dependent on vibration are exhibited, and/or
- mechanical resonances and/or other response effects occur, for example chatter

[SOURCE: IEC 60068-2-6:2007, definition 3.9]