BS EN 60068-2-57:2013

BSI Standards Publication

Environmental testing

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

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National foreword

This British Standard is the UK implementation of EN 60068-2-57:2013. It is identical to IEC 60068-2-57:2013. It supersedes BS EN 60068-2-57:2000 and BS EN 60068-2-59:1993, which will be withdrawn on 30 May 2016.

The UK participation in its preparation was entrusted to Technical Committee GEL/104, Environmental conditions, classification and testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English version

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

(IEC 60068-2-57:2013)

Essais d'environnement - Partie 2-57: Essais - Essai Ff: Vibrations - Méthode par accélérogrammes et sinusoïdes modulées (CEI 60068-2-57:2013)

Umgebungseinflüsse - Teil 2-57: Prüfungen - Prüfung Ff: Schwingen - Zeitlaufverfahren und Sinusimpulse (IEC 60068-2-57:2013)

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CENELEC

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

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Foreword

The text of document 104/595/FDIS, future edition 3 of IEC 60068-2-57, prepared by IEC TC 104 "Environmental conditions, classification and methods of test" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60068-2-57:2013.

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)	2014-02-28
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-05-30

This document supersedes EN 60068-2-57:2000 and EN 60068-2-59:1993.

EN 60068-2-57:2013 includes the following significant technical changes with respect to EN 60068-2-57:2000 and EN 60068-2-59:1993:

– editorially combines EN 60068-2-57 and EN 60068-2-59;

– the title has been modified to include a sine beat method.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60068-2-57:2013 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 60068-2-59:1990	NOTE	Harmonised as EN 60068-2-59:1993 (not modified).
IEC 60068-2-81	NOTE	Harmonised as EN 60068-2-81.
ISO/IEC 17025	NOTE	Harmonised as EN ISO/IEC 17025.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

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

Publication	Year	Title	EN/HD	Year
IEC 60068	Series	Environmental testing	EN 60068	Series
IEC 60068-1	-	Environmental testing - Part 1: General and guidance	EN 60068-1	-
IEC 60068-2-6	2007	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	2008
IEC 60068-2-47	2005	Environmental testing - Part 2-47: Tests - Mounting of specimens for vibration, impact and similar dynamic tests	EN 60068-2-47	2005
IEC 60068-2-64	2008	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance	EN 60068-2-64	2008
IEC 60068-3-3	1991	Environmental testing - Part 3: Guidance - Seismic test methods for equipments	EN 60068-3-3	1993
IEC 60068-3-8	-	Environmental testing - Part 3-8: Supporting documentation and guidance - Selecting amongst vibration tests	EN 60068-3-8	-

CONTENTS

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.

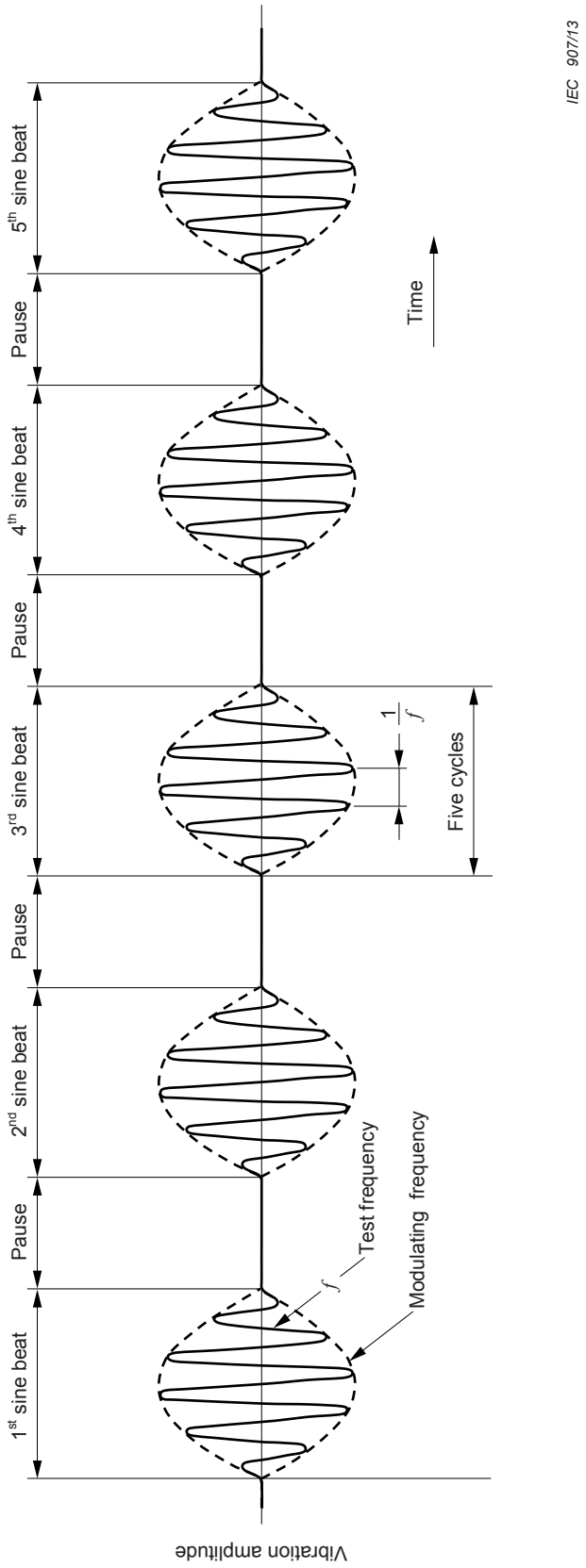

Figure 1 – Sequence of five sine beats with five cycles

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]