



BSI Standards Publication

Classification of environmental conditions

Part 2-9: Environmental conditions
appearing in nature — Measured shock
and vibration data — Storage,
transportation and in-use

National foreword

This British Standard is the UK implementation of EN 60721-2-9:2014. It is identical to IEC 60721-2-9:2014.

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.

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and vibration data - Storage, transportation and in-use
(IEC 60721-2-9:2014)**

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Conditions d'environnement présentes dans la nature -
Données de chocs et de vibrations mesurées - Stockage,
transport et utilisation
(CEI 60721-2-9:2014)

Klassifizierung von Umgebungsbedingungen - Teil 2-9:
Natürliche Einflüsse - Beschreibung von
Umgebungsbedingungen aus gemessenen Stoß- und
Schwingungsdaten - Lagerung, Transport und Im-Betrieb
(IEC 60721-2-9:2014)

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Foreword

The text of document 104/630/FDIS, future edition 1 of IEC 60721-2-9, 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 60721-2-9:2014.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-2 (Series)	NOTE	Harmonized as EN 60068-2 (Series).
IEC 60721-3 (Series)	NOTE	Harmonized as EN 60721-3 (Series).
IEC 60068-2-6:2007	NOTE	Harmonized as EN 60068-2-6:2008.
IEC 60721-1	NOTE	Harmonized as EN 60721-1.

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INTRODUCTION

This part of IEC 60721 is intended as part of the strategy for defining an environmental description from measured data acquired at multiple locations whilst a product is either in storage, being transported or in-use at weather or non-weather protected locations. This measured data is normally in the form of acceleration versus time records. This, in turn, will then allow appropriate severities to be chosen from the IEC 60068-2 series [1] ¹ of shock and vibration test methods. Environmental levels given in IEC 60721-3 [2] should then be applied, having been updated based upon the strategy described in this standard.

More detailed information may be obtained from specialist documentation, some of which is given in the bibliography.

¹ Numbers in square brackets refer to the Bibliography.

CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

Part 2-9: Environmental conditions appearing in nature – Measured shock and vibration data – Storage, transportation and in-use

1 Scope and object

This part of IEC 60721 is intended to be used to define the strategy for arriving at an environmental description from measured data when related to a product's life cycle.

Its object is to define fundamental properties and quantities for characterization of storage, transportation and in-use shock and vibration data as background material for the severities to which products are liable to be exposed during those phases of their lifecycle.

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.

None.

3 General

3.1 Introductory remarks

Shock and vibrations measured in storage, transportation platforms and in-use locations can vary considerably from a basic sinusoidal character to pure random, which itself may or may not be normally distributed. If it is the latter, it can be reasonably assumed that the process is a sum of normally distributed random waves of differing amplitudes mixed in a complex manner.

Rarely can a real world environment be classified purely as a sinusoidal vibration and is normally associated with a discrete excitation mechanism such as rotating machinery, aero engines, propellers and is normally mixed with an associated random vibration process. It is then necessary for the specification writer to decide whether to conduct a random vibration test only or to perform one of the mixed mode tests.

Associated with the vibration environment for each life-cycle stage is, potentially, a shock environment which may produce much higher acceleration levels in certain circumstances. Generally speaking, the frequency content for these shocks is contained within the 0 Hz to 200 Hz bandwidth for, say, transportation, assuming that the packaged product is firmly secured to the transport platform base and is not therefore 'bouncing around'. However, much higher frequencies, maybe in the kHz range, may be present in the in-use stage, again dependent upon the real world scenario.

The process described below is for a random vibration environment, since it is probably the most common form of test conducted. Any statement made therefore about the random process should be interpreted as applying to the alternative process. However, it can equally be applied to the shock environment by calculating the shock response spectrum and conducting the same process on this spectrum as for an acceleration spectral density (ASD).