

INTERNATIONAL STANDARD

**Classification of environmental conditions -
Part 3-5: Classification of groups of environmental parameters and their
severities - Ground vehicle installations**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2026 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	2
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 General	5
5 Classification of groups of environmental parameters and their severities	6
5.1 General	6
5.2 Climatic conditions (K)	6
5.3 Special climatic conditions (Z)	9
5.4 Biological conditions (B)	10
5.5 Chemically active substances (C)	10
5.6 Mechanically active substances (S)	11
5.7 Contaminating fluids (F)	12
5.8 Mechanical conditions (M)	12
Bibliography	16
Figure 1 – Stationary vibration, sinusoidal	14
Figure 2 – Stationary vibration, random	14
Figure 3 – Non-stationary shock conditions	15
Table 1 – Classification of climatic conditions	8
Table 2 – Classification of special climatic conditions	10
Table 3 – Classification of biological conditions	10
Table 4 – Classification of chemically active substances	11
Table 5 – Classification of mechanically active substances	11
Table 6 – Classification of contaminating fluids	12
Table 7 – Classification of mechanical conditions	13

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Classification of environmental conditions -
Part 3-5: Classification of groups of environmental parameters
and their severities - Ground vehicle installations**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60721-3-5 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

This third edition cancels and replaces the second edition, published in 1997. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) most classes have been replaced by completely new classes based on the use of additional information obtained from referenced Technical Reports;
- b) Table 1 through to Table 7 have been reviewed and updated;
- c) the content of Annex A and Annex B has either been incorporated into the main body of the document or deleted.

The text of this International Standard is based on the following documents:

Draft	Report on voting
104/1138/FDIS	104/1146/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60721 series, published under the general title *Classification of environmental conditions*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

1 Scope

This part of IEC 60721 classifies the groups of environmental parameters and their severities to which a product, not forming part of the vehicle, is subjected when installed on or in a ground vehicle. Such products are for example radios, communication systems, fare meters, flow meters for liquids transported by the vehicle, for example milk, petroleum products, etc. Vehicles where products can be permanently or temporarily installed include

- road vehicles: passenger cars, commercial vehicles, special vehicles, towing vehicles, trailers, mopeds, motorcycles,
- rail vehicles: trains, trams,
- tracked vehicles: excavators, cranes, rubber tracked vehicles,
- overland vehicles: four-wheel drive cars, tractors, snow scooters,
- handling and storage vehicles: fork-lift trucks (manual and robot), luggage transporters, and
- self-propelled machinery: diggers, harvesters.

Although this document is not intended for products forming part of the vehicles, the environmental condition classification can also be used for some exchangeable parts, installed in a similar way and in the same locations of the vehicle as products which do not form part of the vehicle. Only severe conditions which can be harmful to products are included.

Conditions of storage, transportation and handling are given in IEC 60721-3-1 and IEC 60721-3-2. Classification of storage and transportation environmental conditions are given in other subparts of the IEC 60721-3 series.

Accidental incidents are not included, but it can be important to take their occurrence into account for products vital to the safety of the ground vehicle.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60721-1, *Classification of environmental conditions - Part 1: Environmental parameters and their severities*

Bibliography

IEC 60068-2-74, *Environmental testing - Part 2: Tests - Test Xc: Fluid contamination*

IEC 60721-2-1, *Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity*

IEC 60721-2-2, *Classification of environmental conditions - Part 2-2: Environmental conditions appearing in nature - Precipitation and wind*

IEC 60721-2-3, *Classification of environmental conditions - Part 2-3: Environmental conditions appearing in nature - Air pressure*

IEC 60721-2-4, *Classification of environmental conditions - Part 2-4: Environmental conditions appearing in nature - Solar radiation and temperature*

IEC 60721-2-5, *Classification of environmental conditions - Part 2-5: Environmental conditions appearing in nature - Section 5: Dust, sand, salt mist*

IEC 60721-3 (all parts), *Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities*

IEC 60721-3-0, *Classification of environmental conditions - Part 3-0: Classification of groups of environmental parameters and their severities - Introduction*

IEC 60721-3-1, *Classification of environmental conditions - Part 3-1 Classification of groups of environmental parameters and their severities - Storage*

IEC 60721-3-2, *Classification of environmental conditions - Part 3-2: Classification of groups of environmental parameters and their severities - Transportation and Handling*

IEC 60721-3-5:1985, *Classification of environmental conditions - Part 3-5: Classification of groups of environmental parameters and their severities - Ground vehicle installations*¹

IEC 60721-3-5:1997, *Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 5: Ground vehicle installations*

IEC TR 62130, *Climatic field data including validation*

IEC TR 62131-3, *Environmental conditions - Vibration and shock of electrotechnical equipment - Part 3: Equipment transported in rail vehicles*

IEC TR 62131-4, *Environmental conditions - Vibration and shock of electrotechnical equipment - Part 4: Equipment transported in road vehicles*

IEC TR 62131-5, *Environmental conditions - Vibration and shock of electrotechnical equipment - Part 5: Equipment during storage and handling*

IEC TR 62131-8, *Environmental conditions - Vibration and shock of electrotechnical equipment - Part 8: Transported by ship*

ISO 9223, *Corrosion of metals and alloys*

¹ This publication has been withdrawn.