SLOVENSKI STANDARD
SIST EN IEC 60721-2-2:2025

01-februar-2025

Klasifikacija okoljskih pogojev - 2-2. del: Okoljski pogoji v naravi - Padavine in veter (IEC 60721-2-2:2024)

Classification of environmental conditions - Part 2-2: Environmental conditions appearing in nature - Precipitation and wind (IEC 60721-2-2:2024)

Klassifizierung von Umgebungsbedingungen - Teil 2-2: Natürliche Umgebungsbedingungen - Niederschlag und Wind (IEC 60721-2-2:2024)

Classification des conditions d'environnement - Partie 2-2: Conditions d'environnement présentes dans la nature - Précipitations et vent (IEC 60721-2-2:2024)

Ta slovenski standard je istoveten z: **EN IEC 60721-2-2:2024**

ICS:

19.040	Preskušanje v zvezi z okoljem	Environmental testing

SIST EN IEC 60721-2-2:2025 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60721-2-2

December 2024

ICS 19.040

Supersedes EN 60721-2-2:2013

English Version

Classification of environmental conditions - Part 2-2: Environmental conditions appearing in nature - Precipitation and wind (IEC 60721-2-2:2024)

Classification des conditions d'environnement - Partie 2-2: Conditions d'environnement présentes dans la nature - Précipitations et vent (IEC 60721-2-2:2024)

Klassifizierung von Umgebungsbedingungen - Teil 2-2: Natürliche Umgebungsbedingungen - Niederschlag und Wind (IEC 60721-2-2:2024)

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CENELEC

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 104/1066/FDIS, future edition 3 of IEC 60721-2-2, prepared by TC 104 "Environmental conditions, classification and methods of test" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60721-2-2:2024.

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) 2025-12-31
•	latest date by which the national standards conflicting with the document have to be withdrawn	(dow) 2027-12-31

This document supersedes EN 60721-2-2:2013 and all of its amendments and corrigenda (if any).

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Endorsement notice

The text of the International Standard IEC 60721-2-2:2024 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60721-2-1 NOTE Approved as EN 60721-2-1

IEC 60721-2-2

Edition 3.0 2024-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Classification of environmental conditions – Part 2-2: Environmental conditions appearing in nature – Precipitation and wind

Classification des conditions d'environnement – Partie 2-2: Conditions d'environnement présentes dans la nature – Précipitations et vent

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 19.040

ISBN 978-2-8322-9873-2

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

Part 2-2: Environmental conditions appearing in nature – Precipitation and wind

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.
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IEC 60721-2-2 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 2012. This edition constitutes a technical revision.

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

a) the layout of the information provided has been re-organized;
b) the information provided has been extensively enhanced and revised;
c) new information on wind severities has been included.

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

Draft	Report on voting
104/1066/FDIS	104/1074/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.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 60721 presents fundamental properties, quantities for characterization, and a classification of environmental conditions dependent on precipitation and wind relevant to electrotechnical products. The information presented is intended to be used as background material when selecting appropriate severities of parameters related to precipitation and wind for product applications.

Precipitation encompasses all forms of hydrometeors, both liquid and solid, which are free in the atmosphere, and which reach the Earth's surface. At altitudes below the freezing level, precipitation can occur as liquid or solid particles but above this level snow or hail will predominate. For this document, the different forms of hydrometeors are addressed separately and under the more commonly referred to meteorological conditions of rain, snow and hail. Also encompassed are icing conditions but only that occurring at ground level.

This document additionally and separately addresses wind.

The majority of the information presented in this document has been assembled by the UK Met Office from published sources as well as historical and forecasting weather records. The information has been assembled and maintained for the UK Ministry of Defence for equipment design and testing purposes [1][1]. The historical meteorological data employed for this work meets World Meteorological Organization criteria for validity. However, such data are only available from a limited number of worldwide locations (typically a few hundred). Forecasting weather records, which were extensively utilized for this work, are available from a significant number of locations (typically tens of thousands) but are not necessarily verified. Whenever the latter information has been used, an appropriate strategy was adopted to remove spurious data.

[1] Numbers in square brackets refer to the Bibliography.

CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

Part 2-2: Environmental conditions appearing in nature – Precipitation and wind

1 Scope

This part of IEC 60721 presents fundamental properties, quantities for characterization, and a classification of environmental conditions dependent on precipitation and wind relevant to electrotechnical products.

The information presented within this document is intended to be used as background material when selecting appropriate severities of parameters related to precipitation and wind for product applications.

For the purpose of this document, precipitation is considered to encompass all forms of hydrometeors, both liquid and solid, which are free in the atmosphere, and which reach the Earth's surface. The different forms of hydrometeors are addressed separately and under the more commonly referred to meteorological conditions of rain, snow and hail. Whilst icing conditions are additionally considered, only that occurring at ground level, is addressed.

This document separately addresses the climatic condition of wind and provides methodologies and quantitative information to enable wind severities and frequencies to be estimated worldwide.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

4 Rain

4.1 General

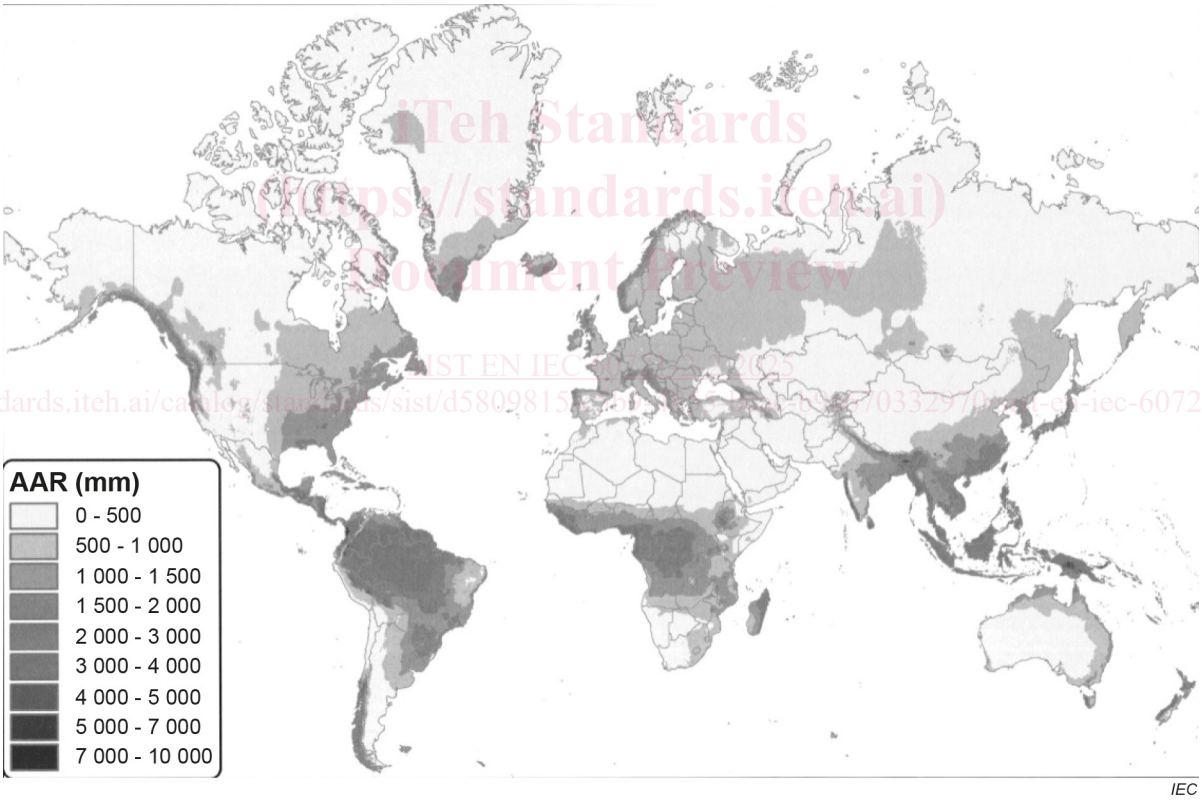
Rain is the primary focus of Clause 4 as it is the dominant meteorological condition associated with the wetting of electrotechnical products.

4.2 Global distribution of rainfall

Compared with meteorological air temperature which, at any particular time is often substantially the same (±5 °C) over relatively large regions, rainfall is a much more spatially variable climatic condition. In particular, the precipitation intensity that constitutes a near extreme value is peculiar to the highly localized area. Even a relatively short distance away, the intensity can differ by a factor of two or more. Thus, it is impracticable to relate precipitation intensity to specific geographical areas of the world, as is the case with temperature.

Precipitation intensity is defined as the rate at which precipitation falls. Although values of precipitation intensity may be considered as instantaneous rates, in practice they are averages taken over periods of one minute or longer. When using any rainfall data, it should be remembered that as the pattern of rainfall is infinitely variable both in time and space, only general information can be given by means of maps or diagrams.

For most places, readily available rainfall data are limited to observations of the rainfall catch made once daily. Where precipitation is of snow, the observations record the rainfall equivalent of that snow. The daily observations may be summarized to provide average monthly, seasonal or annual amounts. Figure 1 represents such a summary for annual amounts, based on observations from 27 075 locations worldwide over the period from 1961 to 1990.



NOTE At higher latitudes, an increasing proportion of this "rainfall" will fall as snow.

Figure 1 – Average annual rainfall (AAR) for global land areas, based on 1961 to 1990 data [1]

The fundamental requirements for precipitation to fall in significant amounts are high atmospheric moisture content and a mechanism for the uplift of air. Ascending air cools by expansion due to the decreasing atmospheric pressure with height. Given that the lower the temperature the less moisture the air can retain in vapour state, then if cooling and moisture content are sufficient, precipitation is the result. As a generalization, the wetter land regions of the world belong to one of the following three broad geographical categories:

a) Along the equator ±15° of latitude, e.g. Indonesia, equatorial Africa, and the Amazon rain forest. The high rainfall of these regions is primarily due to convection, triggered by solar heating and accentuated by the convergence of the northern hemisphere tropic's north-easterly winds and the southern hemisphere tropic's south-easterly winds along the "inter-tropical convergence zone". Here, copious moisture is provided by either rain forest or warm, tropical ocean.
b) The western side of continents in mid latitudes, e.g. UK, Western Europe, the north-western coastal fringe of North America and the south-western coastal fringe of South America (southern Chile). At these latitudes, winds blow predominantly from the west and therefore reach the western side of continents having picked up moisture over a long ocean track. The lifting mechanisms are varied and include convection and orographic uplift, but the dominant lifting mechanism is cyclonic or frontal uplift in weather disturbances that develop on, and move eastwards along, the boundary between polar and tropical air masses. In North and South America, the inland penetration of high rainfall is severely limited by the high, north-south aligned mountain chains of the American Cordillera. By contrast, the western fringe of Europe has no north-south aligned barrier of such proportion, so that moderate rainfall is able to penetrate well inland across the European plain. Iceland, the Falkland Islands, Tasmania, and the exposed west of South Island New Zealand also belong to this regime.
c) Extending poleward from the equatorial regions along the eastern seaboard of continents, e.g. Eastern Asia from India to Kamchatka, North America from the Gulf of Mexico to Quebec (including the southern extremity of Greenland), South America from southern Brazil to north-eastern Argentina, the east of South Africa and the eastern fringe of Australia. The reasons for high rainfall in these areas are complex but include the predominantly easterly moist onshore winds of tropical latitudes and, at sub-tropical latitudes, the drawing of moist summer monsoon winds of tropical ocean origin inland towards a heat-generated continental low-pressure area, as in the Indian and south-east Asian summer monsoons. Further poleward, at mid latitudes, the prevailing wind is from the west, blowing offshore; however, the eastern seaboards of both North America and Asia are favoured regions for the development of precipitation-bearing cyclonic weather systems which then move north-eastwards close to the mid-latitude coastline.

The important influence of topography on rainfall is demonstrated by the heavier rainfall in mountainous regions, particularly where a mountain range runs parallel to the coast and intercepts moisture laden winds as they blow onshore. Mountains also usually reduce rainfall downwind – the "rain-shadow" effect.

Many of the great deserts of the world lie within or close to latitudes 20° to 30° of latitude, where relatively high atmospheric pressure dominates e.g. the Sahara Desert and Saudi Arabia, the deserts of California and Arizona, the Atacama Desert in Chile, the Namibian and Kalahari Deserts of southern Africa and much of interior and western Australia. The dryness of some deserts is accentuated by the rain-shadow effect of adjacent mountain barriers (e.g. the inland deserts of California and Arizona). An additional factor in some coastal deserts is a cold ocean current offshore that suppresses convection, for example the narrow Atacama Desert of Chile is trapped between high mountains to the east and a cool ocean current offshore.

In Asia the circum-global belt of high pressure at sub-tropical latitudes is displaced by the Asian monsoon, which blows outwards from intense high pressure over Siberia in winter and blows into low pressure over southern interior Asia in summer. This effectively transfers the latitudinal desert belt by approximately 15° of latitude poleward to lie north and inland of the areas reached by the Indo-Asian monsoon e.g. the Gobi Desert of Mongolia and China.