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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST HD 478.2.2 S1:2003](https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a9b638000587/sist-hd-478-2-2-s1-2003)

[https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-
a9b638000587/sist-hd-478-2-2-s1-2003](https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a9b638000587/sist-hd-478-2-2-s1-2003)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST HD 478.2.2 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a9b638000587/sist-hd-478-2-2-s1-2003>

UDC: 621.3:620.193

KEY WORDS: Environmental conditions; climate; precipitation and wind

CLASSIFICATION OF ENVIRONMENTAL CONDITIONS
PART 2: ENVIRONMENTAL CONDITIONS APPEARING IN NATURE
PRECIPITATION AND WIND

Classification des conditions
d'environnement
Deuxième partie: Conditions
d'environnement présentes
dans la nature
Précipitations et vent

Klassifizierung von
Umweltbedingungen
Teil 2: Natürliche
Einflüsse
Niederschlag und Wind

BODY OF THE HD

The Harmonization Document consists of:

- IEC 721-2-2 (1988) ed 1 IEC/TC 75, not appended

This Harmonization Document was approved by CENELEC on 1989-12-05.

The English and French versions of this Harmonization Document are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level by or before 1990-03-01

to publish their new harmonized national standard by or before 1990-09-01

to withdraw all conflicting national standards by or before 1990-09-01.

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC Central Secretariat.

The CENELEC National Committees are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

© Copyright reserved to all CENELEC members

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST HD 478.2.2 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a9b638000587/sist-hd-478-2-2-s1-2003>

NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC
721-2-2

Première édition
First edition
1988

Classification des conditions d'environnement

Deuxième partie:

Conditions d'environnement présentes
dans la nature – Précipitations et vent

iTeh STANDARD PREVIEW

(standards.iteh.ai)
Classification of environmental conditions

Part 2: IEC HD 478.2.2 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/0d807114-27c6-495a-bd9c-a9b058000587/sist-11478-2-2-s1-2003>

**Environmental conditions appearing
in nature – Precipitation and wind**

© CEI 1988 Droits de reproduction réservés — Copyright — all rights reserved

Aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'éditeur.

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 the publisher.

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembe Genève, Suisse



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

L

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

| | Page |
|--------------------------------|------|
| FOREWORD | 5 |
| PREFACE | 5 |
| Clause | |
| 1. Scope | 7 |
| 2. Object | 7 |
| 3. General | 7 |
| 3.1 Precipitation | 7 |
| 3.2 Wind | 9 |
| 4. Characteristics | 9 |
| 4.1 Rain | 9 |
| 4.2 Hail | 11 |
| 4.3 Snow | 13 |
| 4.4 Wind | 13 |
| 5. Classification | 13 |
| 5.1 Normal rain | 15 |
| 5.2 Driving rain | 15 |
| 5.3 Formation of ice | 15 |
| 5.4 Hail | 17 |
| 5.5 Snow load | 17 |
| 5.6 Drifting snow | 17 |
| 5.7 Wind force | 19 |
| FIGURES | 20 |

SIST HD 478.2.2 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a9b638000587/sist-hd-478-2-2-s1-2003>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CLASSIFICATION OF ENVIRONMENTAL CONDITIONS

Part 2: Environmental conditions appearing in nature
Precipitation and wind

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by IEC Technical Committee No. 75: Classification of Environmental Conditions.

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

SIST HD 478.2.2 S1:2003

| | |
|---|------------------|
| https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a9b638000587/sist-hd-478-2-2-s1-2003 | |
| Six Months' Rule | Report on Voting |
| 75(CO)41 | 75(CO)46 |

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

It should be noted that this standard forms one part of a series intended to deal with the following subjects:

- Classification of Environmental Parameters and Their Severities (Publication 721-1).
- Environmental Conditions appearing in Nature (Publication 721-2).
- Classification of Groups of Environmental Parameters and Their Severities (Publication 721-3).

The following IEC publications are quoted in this standard:

- Publication No. 721-1 (1981): Classification of environmental conditions, Part 1: Classification of environmental parameters and their severities.
- 721-3: Part 3: Classification of groups of environmental parameters and their severities.

CLASSIFICATION OF ENVIRONMENTAL CONDITIONS

Part 2: Environmental conditions appearing in nature Precipitation and wind

1. Scope

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

It is intended to be used as background material when selecting appropriate severities of parameters related to precipitation and wind for product applications.

When selecting severities of parameters related to precipitation and wind for product application, the values given in IEC Publication 721-1 should be applied.

2. Object

To define the characteristics of precipitation and wind as background for the severities to which products are liable to be exposed during transportation, storage and use.

3. General

The atmosphere of the earth is in permanent motion. It is locally heated, cooled and moistened. The resulting gradients in density create high and low pressure areas. The equalizing winds do not blow directly from high to low pressure areas, but are deflected by Coriolis force due to the rotation of the earth.

SIST HD 478.2.2 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/0d802244-27c6-495a-bdc9-a985800587/sist-hd-478-2-2-s1-2003>

The continuous horizontal movement may cause slow upward motion over wide areas, or surface heating may give more localised updrafts in thermals. The air cannot maintain its water content in vaporous form if the reduction of pressure and temperature is sufficient, and precipitation may form. As an example, an air mass of 20°C temperature is able to contain water in a quantity of 17.3 g/m³ in vaporous form. If it cools down to 0°C the maximum water content is only 4.8 g/m³.

3.1 Precipitation

The specific kind of precipitation, rain, hail or snow, is a result of complicated processes in the clouds. The temperature in a cloud varies in the vertical direction. The level at which a temperature of 0°C occurs is referred to as the freezing level. Above the freezing level, the temperature is below 0°C, and below this level it is above 0°C.

In a cloud above the freezing level, supercooled water droplets exist generally in the temperature range of 0°C to -13°C, but in exceptional cases the temperature may reach -50°C.

Formation of raindrops or ice crystals depends on various conditions, for instance vertical air currents, temperature distribution, and the resulting course of droplets or ice crystals within the cloud.

If, on their way down, the droplets or ice crystals pass through layers where the temperature turns positive and remains positive, they will turn into drops and reach the ground as rain. They may continue growing on their way down, dependent on conditions. The velocity

increases with the diameter of the drops (see Figure 1, page 20). At a drop size of 5 mm to 6 mm and a corresponding velocity of 9 m/s, these large drops break up into smaller drops which in turn may grow on their way further down. The result is that the drop size distribution has an upper limit of 5 mm to 6 mm.

These raindrops may pass through layers of temperature inversion in the atmosphere where the temperature again drops below zero. This causes the drops to freeze into hailstones and reach the ground in that form. Alternatively, they may remain supercooled water droplets until they hit a surface and cause icing because they freeze immediately when they hit that surface. Another possible process is that rising air streams may lift the drops to higher regions of sub-zero temperature, thus causing freezing to occur. These hailstones may grow further by rime formation on their surface. A succession of freezing and thawing processes is possible and the hailstones may reach considerable size. The largest recorded size is 140 mm (Coffeyville, Kansas, 3rd September 1970). However, hailstone diameters of this magnitude are very exceptional.

If the temperature remains below zero throughout their descent, the ice crystals remain in a solid state and reach the ground as snow. Dependent on conditions, the crystals may grow into a large number of different but regular shapes, and form snowflakes. They may attain a diameter of 1 cm, but are very light.

3.2 Wind

The global wind systems of the atmosphere are functions of the high temperatures in the equatorial zone and the low temperatures in the polar zones, in combination with the effect of the rotation of the earth. It is wind close to the ground which is relevant for products during transportation, storage and use, whereas for certain applications well above ground consideration has to be given to wind conditions at such heights. The wind in the lower part of the atmosphere is dependent on possible local heating due to solar radiation and on the shape of the ground surface including possible buildings and other obstacles.

The effect of these local conditions is the occurrence of thermal eddies and mechanical eddies due to friction and wind shear. In daytime, the flow of air near the surface of the earth is a combination of the two, but during the night primarily only mechanical eddies exist.

The impact of these eddies on surface winds gives rise to wind gusts. The frequency of these gusts is random, but corresponds generally to time intervals of the order of a few seconds.

Wind speeds may be very high in atmospheric storms, for instance hurricanes and tornadoes. At ground level gust speeds exceeding 80 m/s have been recorded in the hurricane areas of the tropics and subtropics, and speeds of 125 m/s are possible in tornadoes though the probability of these speeds is very small.

4. Characteristics

4.1 Rain

Rain is characterized by the following physical parameters:

- rain intensity measured in millimetres per hour (as the height accumulated on a horizontal surface without drain),
- drop size distribution,
- falling velocity distribution,
- raindrop temperature.