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Climatic data for building design — Proposed system of symbols

Données climatiques pour la conception des bâtiments — Système de symboles proposé

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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6243 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 3, *Functional/user requirements and performance in building construction.*

Annexes A and B of this International Standard are for information only.

Introduction

Many types of climatological data are used to define the nature and severity of external conditions with a view to establishing building performance. This International Standard gives precise definitions, gives guidance on methods and units of measurement, and proposes letter symbols for a series of meteorological parameters used for building design, in most cases by reference to the "World Meterological Organization Guide" (WMO). It also defines a number of parameters in current usage. The different values of climatological parameters may be used in different aspects of design. The data defined in this International Standard are linked to a series of applications such as heating and ventilation design, the calculation of energy consumption, structural design, rainwater drainage and the durability of materials. This International Standard is limited to relatively simple measurements and excludes derived values such as the distributions of frequency, except when discussing illuminance.

Annex A gives letter symbols to represent climatological descriptions. This provides a system, independent of language, to express statistical quantities concisely.

Once this system has been understood and assimilated, it will provide precise designations, irrespective of the language used, and should therefore facilitate the international exchange and use of climatological data. It is proposed that the symbols be used in databases in conjunction with written descriptions in the language for the country of origin of the data. This should be of particular assistance for data that are not presented in one of the international languages. However, the usefulness of this system may only be assessed by putting it into practice.

Climatic data for building design — Proposed system of symbols

1 Scope

This International Standard defines a range of climatological data required for building design, gives guidance on methods of measurement and proposes symbols to designate them. It does not deal with suffixes or concepts combining several types of data, or values derived from basic data such as degree-days or characteristic wind speed.

The definitions and symbols given in this International Standard aim to harmonize the expression of climatological data which may be drawn on when drafting regulatory and standard documents and when definitions and symbols are required for building design and construction.

2 Air temperature

2.1 Method of measurement, unit and symbol

Air temperature should be measured in accordance with WMO Guide No. 8. It is expressed in degrees Celsius, rounded to the nearest 0,1 °C and is denoted by the symbol t.

2.2 Climatological parameters

2.2.1 The absolute maximum and minimum temperatures are the extremes recorded over a given period. They should be given with an indication of this period defined by the boundary years.

EXAMPLE

Absolute minimum temperature (1961-1990)

2.2.2 The absolute maximum and minimum for a given month are the extremes recorded for this month during a given period. They are given with an indication of the month and the period defined by the boundary years.

EXAMPLE

Absolute maximum temperature in February (1961-1990)

2.2.3 The mean annual maxima (or minima) is the mean annual maxima (or minima) calculated over 30 years.

2.2.4 The mean monthly maxima (or minima) is the mean monthly maxima (or minima) calculated over 30 years.

2.2.5 The daily mean temperature is the mean of the temperature observed at intervals of 3 h or at shorter intervals.

The approximate daily mean temperature is equal to half the sum of the maximum and minimum temperatures for the day.

Notification of the type of mean temperature (exact or approximate) should be given at the same time as the data.

2.2.6 The number of days of frost is the average number of days per year when the air temperature is below zero once or more during the day.

NOTE — The response of building materials to freezing conditions depends on both air temperatures and precipitation and is not dealt with in this International Standard.

3 Solar radiation (thermal)

3.1 Solar irradiance should be measured in accordance with WMO Guide No. 8. It is expressed in watts per square metre, the required accuracy being $\pm$ 2 W/m^2, and is designated by the symbol E_S.

3.2 Solar irradiance is the power of radiation incident upon surfaces of defined orientation and slope. It may be qualified as either direct, diffuse or total:

a) direct irradiance is that received directly from the sun;

b) diffuse irradiance is that diffused by the sky;

c) total irradiance is the sum of direct and diffuse irradiance.

3.3 Solar energy is the energy received by radiation over a well-defined period. It is expressed in joules per square metre and is designated by the symbol W_S.

Solar energy is qualified as follows:

— hourly total;

— daily total;

— monthly total;

— annual total.

For each of these, it is possible to define a specific magnitude by analogy with irradiance given in 3.2.

3.4 Averages for longer periods may be defined, for example:

— annual averages of daily totals, centred on a designated hour;

— monthly averages of daily totals, centred on a designated hour.

4 Solar radiation (light)

4.1 Natural illuminance should be measured in accordance with CIE Information No. 3. It is expressed in kilolux and designated by the symbol E_V.

4.2 The mean illuminance for a given hour on a given day of the year is the mean illuminance recorded over 1 h, centred on a designated hour and averaged over a period of at least 20 years.

The time is given in true solar time. The mean may also be stated for a particular hour during a given 10-day period or a given month.

4.3 The number of hours per year when the illuminance exceeds the given level refers to standardized levels for which the standard values are 1 klx, 2,5 klx, 5 klx, 10 klx, 25 klx and 100 klx. The number of days per year when, at a particular hour, the illuminance exceeds a given level refers to the same levels.

4.4 The mean values of illuminance at different times of the day may be expressed on a graph in which the abscissa shows months of the year, and ordinate shows the hours of the day, and on which curves are drawn for the following illuminances: 5 klx, 10 klx, 25 klx, 50 klx and 100 klx.

5 Long-wave radiation

5.1 Long-wave radiation is radiation for which the wavelengths lie between 4 μm and 100 μm and which is measured in accordance with WMO Guide No. 8. It is expressed in watts per square metre, and it is denoted by the symbol E_l.

5.2 The net long-wave radiation across a horizontal surface is considered negative in the direction from the earth to space.

5.3 The daily long-wave radiation energy is the energy brought by the radiation imparted during 1 day. It is expressed in joules per square metre and is considered negative in the direction from the earth to space.

6 Total radiation

The total radiation is the arithmetic sum of global solar irradiance and long-wave radiation.

7 Radiation balance

Radiation balance is the sum of all incoming and outgoing radiation at the earth's surface, measured on a horizontal plane.

8 Atmospheric humidity

8.1 The concept of humidity is in accordance with WMO Guide No. 8. It is generally expressed as relative humidity; i.e. the ratio of actual water vapour content to the content at saturation at the same temperature, expressed as a percentage. The required accuracy is ± 1 %.

Humidity may also be expressed as the water vapour pressure, expressed as kilopascals, and as water vapour content of the air, expressed in grams of water per kilogram of dry air.

8.2 Maximum, minimum and mean magnitudes are defined in the same way as for air temperature, and are designated by replacing the symbol t with the symbol q for humidity and g for the water vapour content.

9 Wind

9.1 Wind speed should be measured as far as possible in accordance with WMO Guide No. 8, at a height of 10 m above open, level ground. If it is measured in other types of terrain (such as towns), the height of measurement needs to be adjusted to give an effective height of 10 m.

NOTE — Where necessary, wind speed data may need to be adjusted to take account of differences in ground roughness around the measurement site.

Mean wind speed is designated by the following symbols:

$U_{h,10m}$ when the effective height of the anemometer is 10 m;

$U_{h,60m}$ when the effective height of the anemometer is 60 m;

$U_{h,nm}$ when the effective height of the anemometer is n m.

9.2 Mean speeds over different periods are considered: a mean speed over 3 s, known as the gust speed[1)] (its measurement has up to now depended on the nature of the measuring and recording instrument used), the mean speed over 10 min (or 600 s) and over 1 h (or 3 600 s).

The speed at an effective height of 10 m over 3 s is designated by:

$U_{10m/3s}$ or $U_{60m/3s}$

The speed at an effective height of 10 m over 10 min is designated by:

$U_{10m/600s}$ or U_{600s} or $U_{60m/600s}$

The speed at an effective height of 10 m over 1 h is designated by:

$U_{10m/3600s}$ or $U_{60m/3600s}$

9.3 The direction of the wind should be recorded in accordance with WMO Guide, No. 8, at 10 m above the ground, and is designated and expressed by the azimuth in degrees of arc. (The direction of the wind is that from which it blows.)

The direction of the wind is determined either for a 3-s period (the instantaneous direction) or by averaging over 600 s over 3 600 s.

9.4 The absolute maximum speed is the highest gust speed recorded over a given time interval. The speed is given together with its direction.

9.5 The return period of a stated speed for a determined type of speed is the number of years which elapse, on average, between two occurrences when the speed is exceeded. The period of observation on which the return period was based may also be indicated.

10 Rain

10.1 Rainfall should be measured in accordance with WMO Guide No. 8. It is denoted as h_r and is expressed in millimetres relating to a stated period. Accuracy shall be no less than ± 0,2 mm for amounts of less than 10 mm, and ± 2 % above that.

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1) The gust speed is sometimes called the instantaneous speed.

10.2 The following magnitudes are considered:

— average annual rainfall over 30 years;

— average rainfall during the month in question over 30 years;

— absolute maximum rainfall over a period of 10 min;

— absolute maximum rainfall over a period of 1 h;

— absolute maximum rainfall over a period of 24 h;

— absolute maximum rainfall over a period of 5 days.

10.3 The number of days and periods of days of rain where rainfall has exceeded a given total may also be considered.

10.4 The return period of a given rainfall intensity may also be considered.

11 Snow

11.1 Snow depth should be measured in accordance with WMO Guide No. 8. It is expressed in centimetres and denoted by the symbol S_h.

NOTE — ISO 3898 gives either S or S_n for the snow load. The symbol S_h for a snow depth has been adopted by analogy. However, in principle, it would be better to retain the symbol h for depth (as in rainfall) since this is the physical magnitude measured.

ISO 3898 also defines the symbol Q for loads in general so that an alternative for S_n and S_h could be Q_{sn} and Q_{sh}.

Snow mass is expressed in kilograms per square metre, with an accuracy of ± 10 %, and is denoted by the symbol S_n (see note).

In the absence of direct measurements, snow mass is deduced from snow depth and density.

11.2 The absolute maxima and the average annual and average monthly maxima of S_h and S_n are considered.

Annex A
(informative)

Letter symbols to represent climatological descriptions

A.1 Proposed system of symbols

A.1.1 General

As stated in the introduction, this annex presents a system of symbols intended to make the domination of climatological magnitudes more concise, and to allow the same denomination to be used in all languages.

The result is, for example, to translate the expression "the 30 year average of the monthly mean of the daily maximum temperature for February", as:

t_{XD}/ML02/MP30Y

Read letter by letter it gives:

Mean (M) over a period (P) of 30 years (30Y) of (/) the mean (M) monthly (L) value of the daily maximum temperature (t_{XD}) for February (02)

The usefulness of the system may only be assessed by putting it into practice. The choice of symbols has presented one difficulty, which is the need to use symbols which are used in other fields to denote other meanings. It is clearly impossible only to use letters that are not used in other fields to denote other magnitudes. The system proposed uses combinations of symbols and abbreviations to define the physical nature of each climatogical magnitude and the statistical characteristic in question. It is a more detailed system than any previously incorporated in an international standard. The letter symbols given in different parts of ISO 71 and ISO 3898 have been incorporated into the system where applicable, as well as certain symbols used in WMO Guide No. 8. As far as the other symbols are concerned, they have been chosen so as to avoid any contradiction with ISO 31 and ISO 3898. Table A.1 lists the proposed symbols, suffixes and abbreviations.

Table A.1 — List of symbols, suffixes and abbreviations

Letter	Usage category	Meaning	Clause
a	abbreviation	approximate	2.2.5
B	symbol	radiation balance	6
b	abbreviation	based on	
D	1) abbreviation	day	2.2.6 and generally
	2) suffix	day	2.2.5 and generally
d	symbol	direction	9.3
df	suffix	diffuse	3.2, 3.3, 4.1
dr	suffix	direct	3.2, 3.3, 4.1
E_l	symbol	radiation (long-wave)	5.1, 5.2
E_s	symbol	solar radiation (energy)	3.1, 3.2
E_v	symbol	solar radiation (light)	4.1, 4.2, 4.3
(E)	suffix	east	3.2, 3.3, 4.1
e	symbol	vapour pressure	for information only
f	symbol	frequency	9.7

Letter	Usage category	Meaning	Clause
G	symbol	any climatological magnitude	
g	symbol	water vapour content	for information only
gl	suffix	global	3.2, 3.3, 4.1
H	1) abbreviation	hour	4.3
	2) suffix	hour	4.2
h	symbol	height	10.2, 10.3
hor	suffix	horizontal	3.2, 3.3, 4.1
I	symbol	intensity (with suffixes r or turb)	9.1
J	symbol	number of days	10.3
L	1) abbreviation	month	2.2.2 and generally
	2) suffix	month	2.2.4 and generally
l	suffix	long-wave	5.1, 5.2
M	1) abbreviation	mean	2.2.4 and generally
	2) suffix	mean	2.2.5 and generally
N	1) abbreviation	minimum	2.2.4 and generally
	2) suffix	minimum	2.2.2 and generally
(N)	suffix	north	3.2, 3.3, 4.1
n	symbol	any number	2.2.6 and generally
P	abbreviation	period	2.2.2 and generally
P'	symbol	return period	9.5
perp	abbreviation	perpendicular	3.2, 3.3, 4.1
q	symbol	relative humidity	for information only
r	suffix	rain	10.2, 10.3, 10.4
(S)	suffix	south	3.2, 3.3, 4.1
s	suffix	solar	3.1 to 3.4
S_h	symbol	height of snow	11.2
smr	abbreviation	summer	2.2.6
S_n	symbol	snow load	11.2
styp	abbreviation	typical sequence	2.2.7
T	abbreviation	total	3.3
t	symbol	temperature	2.1 to 2.2.6
turb	suffix	turbulence	9.1
typ	abbreviation	typical	2.2.6
U	symbol	wind speed	9.1 to 9.5
v	suffix	light	4.1 to 4.3
W	symbol	energy imparted by radiation	3.3, 3.4, 5.3
(W)	suffix	west	3.2, 3.3, 4.1
wtr	abbreviation	winter	2.2.6
X	1) abbreviation	maximum	2.2.4 and generally
	2) suffix	maximum	2.2.5 and generally
Y	1) abbreviation	year	2.2.4 and generally
	2) suffix	year	2.2.5 and generally

A.1.2 Basis for the system of symbols and abbreviations

A.1.2.1 In this clause, the general symbol G is used to represent any climatological magnitude so as to make the system clearer to understand. In practical applications and in the following clauses, G is replaced by the appropriate symbol, for example t for temperature and U for wind speed.

A.1.2.2 Two types of suffixes may be added to the symbols:

a) suffixes specifying the physical definition of the quantity in question, for example:

E_{sg} for global solar radiation,

I_{turb} for turbulence intensity;

b) suffixes defining the statistical characteristic (mean, maximum, minimum, total) of the quantity in question, and its reference period, for example:

t_{XD} for the maximum daily temperature,

q_{ML} for mean monthly relative humidity.

These two types of suffixes may be used together and, if this is the case, the specification relating to the physical definition precedes that relating to statistical definition.

EXAMPLE

W_{STD} for solar energy received daily.

A.1.2.3 The same type of abbreviation as in A.1.2 b) is also used to define over a long period the statistical characteristics of a series of statistical characteristics corresponding to shorter periods. This information is given after the symbol and any suffix, and it is separated from it by an oblique line (/).

EXAMPLE

$t_{XD/ML}$ for the monthly mean of the daily maximum temperature.

A.1.2.4 When the characters allow, the central symbols and their suffixes are given in italics while the qualifying abbreviations are non-italicized as shown in table A.1. As a rule, the suffixes are written as subscript.

EXAMPLE

G_{MD}/ML 02/NP

When this is not possible (e.g. with a particular computer printer), non-italicized only are used and their suffixes are placed on the same line as the central symbols. A symbol is used to signify suffixes when it is possible to do this.

EXAMPLE

*G*vMD/ML 02/NP

A.1.2.5 The statistical definition of basic magnitudes is indicated by an initial capital letter in the suffix as follows:

G_X for maximum

G_M for the mean (NB: "M" and not "m", to avoid confusion with the abbreviation "m" meaning metre)

G_N for the minimum

G_T for the total (sum over a period)

A.1.2.6 The period over which means, extremes or totals are determined is indicated by a second capital letter in the suffix:

H for hour, D for day, L for month and Y for year

Thus

G_{HX}, G_{XD}, G_{XL} and G_{XY} for the hourly, daily, monthly and annual maximum;

G_{MH}, G_{MD}, G_{ML} and G_{MY} for the hourly, daily, monthly and annual mean;

G_{NH}, G_{ND}, G_{NL} and G_{NY} for the hourly, daily, monthly and annual minimum;

G_{TH}, G_{TD}, G_{TL}, and G_{TY}, for the hourly, daily, monthly and annual total.

Furthermore, when it is necessary to indicate a given month of the year, number from 01 to 12 is placed after the two preceding suffixes, as follows:

$G_{XL\,01}$ signifies the monthly maximum of January of the magnitude G;

$G_{ML\,07}$ signifies the monthly mean of July of the magnitude G.

A.1.2.7 The same indications are used to define the statistical characteristics over a long period of basic series; where necessary, the reference period is also added. In addition, the letter P is used for periods longer than a year as follows:

G_{MD}/XL signifies the monthly maximum of the daily mean of magnitude G;

G_{ND}/ML03 signifies the monthly mean in March of the daily minimum of magnitude G;

G_{MD}/XY signifies the annual maximum of the daily mean of magnitude G;

G_{ML}/NY1972 signifies the annual minimum in 1972 of the monthly mean of magnitude G;

G_{ML02}/MP(1961-1970) signifies the mean during the period 1961 to 1970 of the monthly mean in February of magnitude G;

G_{NL05}/XP10Y signifies the maximum over 10 years of the monthly minimum in May of magnitude G.

A.1.2.8 If indication is to be given that the value described relates to a third period different from the preceding two periods, this is done by giving a similar indication after the central symbol, while following the rule that the longest period is given at the end. Thus:

G_{MD}/ML02/NP(1951-1970) signifies the minimum in the period from 1951 to 1970 of the daily mean (monthly mean of the daily mean) in February of magnitude G.

A.1.2.9 The part of the time (or frequency) during which magnitude G exceeds (or is less than) a given value is designated by f and followed by brackets indicating the correlation of G with this value. Therefore, in its simplest form $f(G \geq n)$ signifies the frequency with which G is greater or equal to n.

If the frequency is to be associated with a given period (month, year or longer period), this specification is indicated as follows:

$f_{L01}(G \leq 5)$ signifies the frequency with which G is less than or equal to 5 in January (of a given year);

$f_{L05}(G \geq 12)$/MP(1961-1970) signifies the mean frequency with which G has been greater than or equal to 12 during the month of May over the period 1961 to 1970.

A.1.2.10 The number of days (or hours) per year (or per month) in which G exceeds (or is less than) a given value is designated by the two corresponding symbols separated by a colon and followed by a set of brackets indicating the correlation between G and the value. Thus:

D:L($G \geq n$) signifies the number of days per month in which G is greater than or equal to n;

H:Y($G \leq n$) signifies the number of hours per year in which G is less than or equal to n.

Greater detail may be added to each of the periods, thus:

D:L04($G \geq 25$)/MP(1951-1970) signifies the mean number of days during the period 1951 to 1970 in which G was greater than or equal to 25 during the month of April.

A.1.2.11 The value above (or below) which a magnitude occurs, on average, once only during a given period is indicated by a plus (or minus) sign before G, followed by a set of brackets indicating the period. Thus, in its simplest form:

+ G(1:Y) signifies the value that G exceeds once a year;

– G(1:10Y) signifies the value below which G falls only once in 10 years.

Indications of the reference periods may be added as follows:

+ G_{MD}(1:L02)/MP(1961-1970) signifies the mean over the period 1961 to 1970 of the daily mean value of G which is only exceeded once in February.

A.1.2.12 The value of magnitude G which is exceeded or not reached, on average, n days per year, or the maximum or minimum value excluding n days is denoted as in A.1.2.11. Therefore:

+ G(5D:Y) signifies the value of G which is exceeded on 5 days per year.

Other indications may be added as follows:

– G_{ND}(10D:Y)/NP(1951-1970) signifies the minimum in the period 1951 to 1970 of the daily minimum of G which is exceeded in a downward direction in 10 days per year.

A.1.2.13 The return period of a value of magnitude G (number of years elapsing, on average, between two statements that this value has been reached or exceeded) is designated by P' followed by a set of brackets specifying the values of G in question, thus:

P' ($G \geq 5$) signifies the return period of value 5 of G.

Other indications may be added, in particular concerning the period of observation over which the return period was determined. This is denoted using the letter b followed by the period. Thus:

P' ($G_{YN} \leq 20$)/b(1921-1960) signifies the return period of an annual minimum of G equal to or less than 20, determined over period 1921 to 1960.

A.2 Air temperature

A.2.1 The air temperature is designated by the symbol t.

A.2.2 The absolute maximum temperature and absolute minimum temperature is designated by t_x(1890-1980) in which 1890-1980 are the limit dates of the reference period.

A.2.3 The absolute minimum and absolute maximum temperatures for a month and a given period are designated as follows:

t_{L01}/XP(1890-1975)

t_{L01}/NP(1890-1975)

in which L is followed by the values 01, 02....12 corresponding to the month in question.

A.2.4 The mean of the annual maxima (or minima) is designated by t_{XY}/M20Y.

If the only possible period of observation is less than 20 years, the observation period is indicated, for example:

t_{xy}/M(1961-1970)

A.2.5 The mean of the monthly maxima (or minima) is designated by $t_{XL..}$/M20Y and $t_{NL..}$/M20Y in which L takes the values 01, 02,....12 corresponding to the month in question.

A.2.6 The daily mean temperature is designated by t_{MD}.

The approximate daily mean temperature is designated by t_{aMD}.

The extremes of the daily mean temperature, the annual means of the daily mean temperature and the monthly means of the daily mean temperature are expressed as follows:

extremes: t_{MD}/XP, t_{MD}/NP

annual means: t_{XD}/MY/MP(19..-....) or t_{ND}../ML..(19..-....)

monthly means: t_{XD}/ML../MP(19..-....) or t_{ND}/ML..(19..-....) in which L is followed by 01, 02, ..., 12.

A.2.7 The typical day (or standard day) for the temperature is designated by $t_{Dtyp/wtr}$ and represented by the series of eight numbers beginning with the first after midnight, for example:

$t_{Dtyp/wtr}$: −4; −5; −4; −1; +2; +4; +2; −2.

Variant: The typical winter day designated by $t_{Dtyp/wtr}$ is represented as follows:

$t_{Dtyp/wtr}$: −3; +4; 0.

For the summer, the typical day is designated by $t_{Dtyp/smr}$.

Temperatures exceeded for specific proportions of time are expressed as follows.

a) The maximum (or minimum) annual temperature except for n days is designated by $+t(n\text{D:Y})$ for the maximum and by $-t(n\text{D:Y})$ for the minimum.

b) The temperature exceeded on average once during n years (cf. A.1.2.10) is designated by $+t(1\text{:}n\text{Y})$ and $-t(1\text{:}n\text{Y})$ accordingly.

A.2.8 A typical extreme sequence for winter is designated by $t_{Styp/wtr}$ and is either shown graphically or by listing intervals of 3 h.

The number of frost days is designated by D:Y($t \leq 0$ °C).

The number of zero transitions is designated by D:Y($t \downarrow 0$ °C).

A.3 Solar radiation (energy)

A.3.1 Solar irradiance is designated by the symbol E_s.

A.3.2 Direct, diffuse or global solar irradiance is designated by:

$E_{s/dr}$, $E_{s/df}$ and $E_{s/gl}$

Direct solar irradiance on a plane perpendicular to the rays of the sun is designated by:

$E_{s/dr(perp)}$

Direct solar irradiance on a horizontal plane is designated by:

$E_{s/dr(hor)}$, $E_{s/df(hor)}$ and $E_{s/gl(hor)}$

Irradiance on a vertical plane orientated to the north, east, south or west designated by:

$E_{s/dr(N)}$, $E_{s/dr(E)}$, $E_{s/dr(S)}$, $E_{s/dr(W)}$

$E_{s/df(N)}$, $E_{s/df(E)}$, etc.

Irradiance on a vertical plane perpendicular to the azimuth d is designated by:

$E_{s/dr(d...)}$, $E_{s/df(d...)}$, $E_{s/gl(d...)}$

in which d is followed by the azimuth value in degrees of arc rounded to the nearest multiple of 10.

A.3.3 The solar energy is designated by the symbol W_s with suffixes as follows:

hourly total: W_{sTH}

daily total: W_{sTD}

monthly total: W_{sTL}

annual total: W_{sTY}

For each of these, the specific magnitudes which it is possible to define by analogy with the irradiance given in 3.2 are designated as follows:

$W_{s/dr}$, $W_{s/df}$ and $W_{s/gl}$

$W_{s/dr(perp)}$

$W_{s/dr(hor)}$, $W_{s/df(hor)}$ and $W_{s/gl(hor)}$

$W_{s/dr(N)}$, $W_{s/dr(E)}$, $W_{s/dr(S)}$, $W_{s/dr(W)}$, $W_{s/df(N)}$, etc.

$W_{s/dr(d...)}$, $W_{s/df(d...)}$, $W_{s/gl(d...)}$

The mean of the longer periods may be defined, for example, as follows:

annual mean of the daily totals: W_{sTD}/MY

monthly mean of the daily totals: W_{sTD}/ML

A.4 Solar radiation (visible)

A.4.1 Illuminance is designated by the symbol E_v

a) direct, diffuse and global illuminances are designated by $E_{v/dr}$, $E_{v/df}$ and $E_{v/gl}$;

b) illuminance on a horizontal plane is designated by $E_{v(hor)}$

c) illuminance on a vertical oriented plane is designated by

$E_{v(N)}$ $E_{v(E)}$ $E_{v(S)}$ and $E_{v(W)}$.

A.4.2 The mean illuminance for a given hour of a given day of the year is designated by:

E_{vMH}/hour/month/day/M20Y

EXAMPLE

E_{vMH}/08:00/L09/D22/M20Y = 5,2 klx

The mean for an hour during a given 10-day period or during a given month is designated, for example, as follows

E_{vMH}/08:00/L09/MD10-20/M20Y = 5,0 klx

E_{vMH}/08:00/ML09/M20Y = 5,4 klx

A.4.3 The number of hours per year when the illuminance exceeds a stated level n is designated by H:Y($E_v \geq n$).

The number of days per year when, at a particular hour, the illuminance exceeds a stated level n is designated by D:Y(E_v/H $\geq n$), for example:

D:Y(E_v/08:00 ≥ 5 klx) signifies the number of days per year from which the illuminance at 8 h is greater than 5 klx.

A.5 Long-wave radiation

A.5.1 Long-wave radiation is designated by the symbol E_l.

A.5.2 The net long-wave radiation across a horizontal surface is designated by $E_{l(hor)}$.

A.5.3 The daily long-wave radiation energy is designated by $W_{l(hor)TD}$.

A.6 Total radiation

A.6.1 The total radiation is designated by B.

A.6.2 Radiation across a horizontal plane, or radiation balance, is designated by B_{hor}.

A.7 Radiation balance

No information provided in this annex.

A.8 Atmospheric humidity

No information provided in this annex.

A.9 Wind

A.9.1 Wind speed is designated by U_{10m}, or U_{60m}.

If the measurements are made at another height n, the speeds measured are defined by U_{nm}, for example U_{20m}.

If the measurements are not made on a site having a roughness equivalent to that of level countryside, the surface roughness of the site is designated by I_{turbMY}.

A.9.2 The average speed over 3 s is designated by:

$U_{10m/3s}$, or $U_{60m/3s}$.

The average speed over 10 min is designated by:

$U_{10m/600s}$ or $U_{60m/600s}$.

The average speed over 1 h is designated by:

$U_{10m/3600s}$ or $U_{60m/3600s}$.

A.9.3 The direction of origin of the wind is designated by d (for azimuth): d_{10m} or d_{60m} depending on the height of the measurements.

The symbols $d_{10m/3s}$, or $d_{60m/3s}$ are used for the direction of the wind over 3 s (this is the instantaneous direction), symbols $d_{10m/600s}$ or $d_{60m/600s}$ over a period of 600 s, and symbols $d_{10m/3600s}$ or $d_{60m/3600s}$ over a period of 3 600 s.

A.9.4 The absolute maximum speed is designated, for example, by $U_{10m/3s}/d$.../IP(19..-..)

A.9.5 The return period n of a stated speed for a particular type of speed U is denoted by:

$P'(U \geq n)$

EXAMPLE

$P'(U_{10m/3s} \geq 40$ m/s) designates the return period of wind of 40 m/s, measured at 10 m over 3 s.

A.9.6 The daily mean is designated by U_{MD}.

The monthly mean is designated by U_{MI} 0 % L = 01, 02 ...., 12.

The annual mean is designated by U_{MY}.

A.9.7 The frequency of winds exceeding a given speed are denoted as follows:

$f(U \geq 2$ m/s)

$f(U \geq 5$ m/s)

$f(U \geq 10$ m/s)

$f(U \geq 15$ m/s)

$f(U \geq 20$ m/s)

A.10 Rain

A.10.1 No information provided in this annex.

A.10.2 The designations of magnitudes concerning rain are as follows:

average annual rainfall over 20 years: h_{rMY}

average rainfall over the month in question over 20 years: h_{rML}

absolute maximum rainfall over a period of 10 min: h_{r600s}/XP20Y

absolute maximum rainfall over a period of 1 h: h_{rH}/XP20Y

absolute maximum rainfall over a period of 24 h: h_{rD}/XP20Y

absolute maximum rainfall over a period of 5 days: h_{r5D}/XP20Y.

A.10.3 The annual or monthly number of these days or sequences recorded over a determined period is expressed as follows:

$j_Y(h \geq n)$/MP(19..-....)

or

$j_{L03}(h \geq n)$/MP(19..-....) in which L is followed by 01, 02, ..., 12 according to the month in question.

Therefore: $j_{L03}(h \geq 5$ m)/MP(1951-1970) signifies the number of days of the month of March, in which, on average, the rainfall exceeded 5 mm according to records from 1951 to 1970.

A.10.4 The return period of a given rainfall I_r is denoted as follows:

$P'(I_r \geq n)$

EXAMPLE

$P'(I_r \geq 10$mm/600s) designates the return period of rainfall of 10 mm in 600 s.

A.11 Snow

A.11.1 No information provided in this annex.

A.11.2 The absolute maxima and the average annual and monthly maxima of S_h and S_n are designated as follows:

S_h/XP20Y, S_{hXY}/MP20Y, $S_{hXL..}$/MP20Y

S_n/XP20Y, S_{nXY}/XP20Y, $S_{nXL..}$/MP2Y, in which L is followed by 01, 02 ..., 12, depending on the month in question.

Annex B
(informative)

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