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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.