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**Higrotermalne karakteristike stavb – Računanje in predstavitev klimatskih podatkov – 6. del: Vsota temperaturnih razlik (dnevne stopinje) (ISO/DIS 15927-6:2004)**

**(istoveten prEN ISO 15927-6:2004)**

Hygrothermal performance of buildings - Calculation and presentation of climatic data - Part 6: Accumulated temperature differences (degree days) (ISO/DIS 15927-6:2004)

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November 2004

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ICS

English version

**Hygrothermal performance of buildings - Calculation and presentation of climatic data - Part 6: Accumulated temperature differences (degree days) (ISO/DIS 15927-6:2004)**

Performance hygrothermique des bâtiments - Calcul et présentation des données climatiques - Partie 6: Différences accumulées de la température (en degrés par jour) (ISO/DIS 15927-6:2004)

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (prEN ISO 15927-6:2004) has been prepared by Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS, in collaboration with Technical Committee ISO/TC 163 "Thermal insulation".

This document is currently submitted to the parallel Enquiry.

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## Hygrothermal performance of buildings — Calculation and presentation of climatic data —

### Part 6: Accumulated temperature differences (degree days)

*Performance hygrothermique des bâtiments — Calcul et présentation des données climatiques —*

*Partie 6: Différences accumulées de la température (en degrés par jour)*

ICS 07.060; 91.120.10

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## Foreword

ISO 15927-6 was prepared by Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, in cooperation with Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 2, *Calculation methods*.

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15927 consists of the following parts, under the general title *Hygrothermal performance of buildings — Calculation and presentation of climatic data*:

- *Part 1: Monthly means of single meteorological elements*
- *Part 2: Hourly data for design cooling load*
- *Part 3: Calculation of a driving rain index for vertical surfaces from hourly wind and rain data*
- *Part 4: Hourly data for assessing the annual energy for heating and cooling*
- *Part 5: Data for design heat load for space heating*
- *Part 6: Accumulated temperature differences (degree days)*



## Introduction

Accumulated temperature differences are a relatively simple form of climatic data, useful as an index of climate severity as it affects energy use for space heating.

Calculation or estimation of accumulated temperature differences reflects the point at which buildings begin to need heating to maintain the required internal temperatures. In common with all methods, this standard uses the concept of a *base temperature*. This is the external temperature below which heating plant is assumed to come into operation. For some purposes, such as development of energy policy the need is for a single base temperature that can be taken to represent an average value for the whole built stock and overall climate. For other purposes, it is better to determine a base temperature appropriate to an individual building and time of year.

This standard meets these needs by including both exact and approximate methods of determining accumulated temperature differences, to both standard and variable base temperatures. The methods include the possibility of a threshold temperature (e.g. a daily mean air temperature higher than the base temperature, above which accumulated temperature differences are not counted). This approach is found in certain national methods of computation. It is, however, considered to be less flexible than the methods given in this standard, in which accumulated temperature differences are assessed for a base temperature appropriate to the thermal performance of the building (taking account of other climatic conditions such as solar irradiation).

Accumulated temperature differences computed and presented in accordance with this standard are a measure of climatic severity as it affects the energy used for the space heating of buildings. The data may be used for the following purposes:

- a) monitoring the amount of energy used by heating plant, and thus its efficiency (the *energy management* use);
- b) predicting and/or comparing the relative energy performance of space heating in buildings at the design stage (the *energy modelling* use); and
- c) predicting the economic consequences of different levels of energy efficiency (e.g. through thermal insulation), for the building stock as a whole or for different classes of building (the *energy policy* use).

Energy management (purpose a)) requires new accumulated temperature difference data at regular intervals, such as meteorological station or zone data, calculated to standard base temperatures, published for each month of the heating season, as soon as these can be computed from verified meteorological observations.

Energy modelling and energy policy (purposes b) and c)), require meteorological station, zone or mapped data collected over many years (possibly giving extremes as well as mean values), to typify the severity of the climate of a locality, area or region. For purpose b), accumulated temperature differences are best suited to modelling the energy performance of relatively small buildings with simple heating systems and controls, using “steady-state” thermal analysis. Modelling the performance of larger or more complex buildings may require more extensive climatological data sets, such as full or short ‘test reference years’, which are outside the scope of this standard.

In principle the equations in this standard could be reversed to deal with accumulated temperature differences for assessing energy use in cooling or air-conditioning buildings (“cooling degree-hours” or “cooling degree-days”). However, as the air conditioning demand depends as much on solar gain and external humidity as temperature, the results will not be a reliable index of energy demand.

# Hygrothermal performance of buildings — Calculation and presentation of climatic data — Part 6: Accumulated temperature differences (degree days)

## 1 Scope

This standard specifies the definition, method of computation and method of presentation of data on accumulated temperature differences, used for assessing the energy used for space heating in buildings. These are normally expressed in degree-hours or degree-days, and such data are often referred to simply as “heating degree-hours” or “heating degree-days”.

The standard includes approximate methods for calculating accumulated temperature differences based on hourly or daily mean temperatures and for estimating monthly values to any base temperature, for use when data computed directly from meteorological air temperature records are not available.

In some countries a threshold temperature different from the base temperature is used. This standard allows for this, but it is assumed that for many uses the threshold and base temperatures will be equal.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 6243, *Climatic data for building design – Proposed system of symbols*

World Meteorological Organization: *Guide to Meteorological Instruments and Methods of Observation*. 6<sup>th</sup> Edition, WMO - No.8 1996

## 3 Terms and definitions

### 3.1 Definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1.1

##### **hourly temperature difference**

difference between a specified base temperature and the external air temperature during a given hour, when the difference is positive, otherwise zero

#### 3.1.2

##### **daily temperature difference**

difference between a specified base temperature and the mean external air temperature during a given day, when the difference is positive, otherwise zero

**3.1.3****accumulated hourly temperature difference**

sum of all positive hourly temperature differences over a given period, e.g. day, month, season, year

**3.1.4****accumulated daily temperature difference**

sum of all positive daily temperature differences over a given period, e.g. day, month, season, year

**3.1.5****base temperature**

any conventional temperature, for instance the internal design temperature less decrements due to internal and solar gains

**3.1.6****threshold temperature**

external temperature below which heating becomes necessary, which can be lower than, but is usually equal to the base temperature

**3.1.7****daily maximum and daily minimum temperatures**

maximum and minimum dry-bulb temperatures during a day (01:00 h to 24:00 h), which may be taken either as the highest and lowest hourly mean temperatures, or as the recorded extremes on a maximum/minimum thermometer

**3.1.8****hourly temperature**

average of instantaneous air temperatures during an hour or, in the absence of continuous measurements, the air temperature measured at a particular moment (e.g. on the hour)

**3.1.9****daily mean temperature**

average of the hourly mean temperatures over a day or, if that is not available, the arithmetic mean of the daily maximum and minimum temperatures

NOTE See 4.3.

**3.1.10****monthly mean temperature**

long-term average of daily mean temperatures for a particular month (e.g. over a period of at least 10 years)

**3.1.11****standard deviation of hourly mean temperature**

standard deviation of hourly mean temperatures about the monthly mean temperature, based on long-term data

**3.1.12****standard deviation of daily mean temperature**

standard deviation of daily mean temperatures about the monthly mean temperature, based on long-term data

**3.1.13****reference altitude**

altitude above mean sea level to which accumulated hourly or daily temperature difference data refer