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Fukt- och värmetekniska egenskaper hos byggnader Klimatdata
Del 3: Beräkning av slagregnsindex för vertikala ytor från timbaserade vind- och regndata (ISO 15927-3:2009)

Hygrothermal performance of buildings – Calculation and presentation of climatic data –
Part 3: Calculation of a driving rain index for vertical surfaces from hourly wind and rain data
(ISO 15927-3:2009)

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EUROPEAN STANDARD

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English Version

Hygrothermal performance of buildings - Calculation and presentation of climatic data - Part 3: Calculation of a driving rain index for vertical surfaces from hourly wind and rain data (ISO 15927-3:2009)

Performance hygrothermique des bâtiments - Calcul et présentation des données climatiques - Partie 3: Calcul d'un indice de pluie battante pour surfaces verticales à partir de données horaires de vent et de pluie (ISO 15927-3:2009)

Wärme- und feuchteschutztechnisches Verhalten von Gebäuden - Berechnung und Darstellung von Klimadaten - Teil 3: Berechnung des Schlagregenindexes für senkrechte Oberflächen aus stündlichen Wind- und Regendaten (ISO 15927-3:2009)

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EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN ISO 15927-3:2009) has been prepared by Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment" in collaboration with Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by September 2009.

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Introduction

This part of ISO 15927 specifies two procedures for analysing data derived from hourly observations of wind and rainfall so as to provide an estimate in terms of both an annual average and short-term spells of the quantity of water likely to impact on a wall of any given orientation.

The first method, which uses hourly observations of wind and rainfall, is based closely on BS 8104 [1], which originated from a long series of measurements of driving rain on buildings in a wide range of locations within the UK. As such, the method applies to climates similar to those in the UK; in other regions, with very different climates, it is recommended that confirmation of its applicability be obtained by measurements of driving rain on representative buildings.

Where hourly observations of wind and rain are not available, the second procedure, based on the present weather code for rain and average wind speeds can be used.

In all cases, especially in mountainous areas, it is important that direct measurements of the rain impacting on building façades be made wherever possible.

Rain penetration around the edges of doors and windows or similar cracks in building façades depends on shorter periods of heavy rain and strong winds.

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

Part 3: Calculation of a driving rain index for vertical surfaces from hourly wind and rain data

1 Scope

This part of ISO 15927 specifies two procedures for providing an estimate of the quantity of water likely to impact on a wall of any given orientation. It takes account of topography, local sheltering and the type of building and wall.

The first method, given in Clause 3 and based on coincident hourly rainfall and wind data, defines a means of calculating

— the annual average index, which influences the moisture content of an absorbent surface, such as masonry, and

— the spell index, which influences the likelihood of rain penetration through masonry and joints in other walling systems.

The second method, given in Clause 4 and based on average wind data and a qualitative recording of the presence and intensity of rain (the present weather code for rain), defines a means of calculating the spell length during which an absorbent material such as masonry is moistened, which has a 10 % probability of being exceeded in any year (commonly referred to as having a mean return period of 10 years).

A comparison between the two methods is given in informative Annex D.

Procedures are given to correct the results of both methods for topography, local sheltering and the type of building and wall.

The methods included in this part of ISO 15927 do not apply in

a) mountainous areas with sheer cliffs or deep gorges,

b) areas in which more than 25 % of the annual rainfall comes from severe convective storms,

c) areas and periods when a significant proportion of precipitation is made up of snow or hail.

2 Terms, definitions, symbols and units

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

2.1 Definitions

2.1.1
spell
period, or sequence of periods, of wind-driven rain on a vertical surface of given orientation

NOTE Further information about spells is given in Annex B.

2.1.2
airfield hourly index
quantity of driving rain that would occur on a vertical wall of given orientation per square metre of wall during 1 h at a height of 10 m above ground level in the middle of an airfield, at the geographical location of the wall

2.1.3
airfield annual index
airfield index for a given wall orientation totalled over one year

2.1.4
airfield spell index
airfield index for a given wall orientation totalled over the worst spell likely to occur in any three-year period

2.1.5
wall annual index
quantity of wind-driven rain per square metre at a point on a wall of given orientation, based on the airfield annual index and corrections for roughness, topography, obstruction and wall factors

2.1.6
wall spell index
quantity of wind-driven rain per square metre at a point on a given wall, based on the airfield spell index and corrections for roughness, topography, obstruction and wall factors

2.1.7
line of sight
horizontal view away from the wall, over a sector spanning about 25° either side of the normal to the wall

2.1.8
terrain roughness category
classification of the surface roughness upwind in terms of the average height and spacing of obstructions such as buildings, trees or hedges

2.1.9
roughness coefficient
factor that allows for the modification of the wind speed by the roughness of the terrain upwind of a wall

2.1.10
topography coefficient
factor that allows for the effect of local topography on the wind speed

2.1.11
obstruction factor
factor that relates to shelter from the very local environment and allows for obstructions such as buildings, fences and trees close to, and upwind of, the wall

2.1.12
wall factor
ratio of the quantity of water hitting a wall to the quantity passing through an equivalent unobstructed space, allowing for the characteristics of the wall

2.1.13
wall orientation
angle between north and line normal to a wall

2.1.14
convective storm
heavy precipitation in the form of showers or thunderstorms generally lasting less than 1 h

2.1.15
reference spell
period during which a wall oriented in any given direction is moistened, having a 10 % probability of being exceeded in any year

2.1.16
present weather code
numerical code used by meteorological observers to assess the weather conditions at the time of an observation

NOTE Present weather codes are given in the WMO Guide [2].

2.1.17
half day
twelve-hour period including the hours from 07:00 to 18:00 or from 19:00 to 06:00

2.2 Symbols and units

Symbol	Quantity	Unit
C_{R}	roughness coefficient	—
C_{T}	topography coefficient	—
D	hourly mean wind direction from north	°
H	effective height of feature	m
I_{A}	airfield annual index	l/m^2
I_{S}	airfield spell index	l/m^2
I_{WA}	wall annual index	l/m^2
I_{WS}	wall spell index	l/m^2
K_{R}	terrain factor	—
L	length	m
N	number of years of available data	—
O	obstruction factor	—
r	hourly rainfall total	mm
v	hourly mean wind speed	m/s
W	wall factor	—
x	horizontal distance	m
z	height above ground	m
z_0	roughness length	m
z_{min}	minimum height	m
Θ	wall orientation relative to north	°