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Sončna energija - Slovar (ISO/DIS 9488:2020)

Solar energy - Vocabulary (ISO/DIS 9488:2020)

Sonnenenergie - Vokabular (ISO/DIS 9488:2020)

Énergie solaire - Vocabulaire (ISO/DIS 9488:2020)

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Solar energy — Vocabulary

Énergie solaire — Vocabulaire

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 180, Solar energy.

This second edition cancels and replaces the first edition (ISO 9488:1999), which has been technically revised.

The main changes compared to the previous edition are as follows:

— update of definitions

— addition of several new terms, according to the development of new standards for solar thermal technology in the past two decades.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Solar energy — Vocabulary

1 Scope

This International Standard defines basic terms relating to solar energy.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Terms for solar geometry

3.1.1
aphelion
<of Earth> point in the Earth's orbit at which it is furthest from the sun

Note 1 to entry: At the aphelion, the Earth is approximately 152 X 10^6 km from the Sun.

3.1.2
perihelion
<of Earth> point in the Earth's orbit at which it is closest to the sun

Note 1 to entry: At the perihelion, the Earth is approximately 147 x 10^6 km from the sun.

3.1.3
solar declination
δ
angle subtended between the Earth-sun line and the plane of the equator (north positive)

Note 1 to entry: The solar declination is zero on equinox dates, varying between +23.45 ° (June 22) and -23.45 ° (December 22).

3.1.4
solar azimuth angle
solar azimuth
γ_S
projected angle between a straight line from the apparent position of the sun to the point of observation and due north, measured clockwise, using the projections on the local horizontal plane

Note 1 to entry: This is the same definition as the one of the geographical azimuth. It is valid over the whole globe.

3.1.5
zenith
point vertically above the observer

3.1.6
solar zenith angle
θ_z
angular distance of the sun from the vertical

3.1.7
solar altitude angle
solar elevation angle
h
complement of the solar zenith angle

$$h = 90° - \theta_z$$

3.1.8
solar hour angle
ω
angle between the sun projection on the equatorial plane at a given time and the sun projection on the same plane at solar noon

Note 1 to entry: The solar hour angle changes by approximately 360° within 24 h (approximately 15° per hour). This angle is negative for morning hours and positive for afternoon hours, i.e. ω (in degrees) ≈ 15 (Hr-12) where Hr is the solar time in hours.

3.1.9
solar noon
local time of day at which the sun crosses the observer's meridian.

3.1.10
solar time
hour of the day as determined by the apparent angular motion of the sun across the sky, with solar noon as the reference point for 12:00 h

Note 1 to entry: Solar time = standard time + 4 (L_{st} - L_{loc}) + E, where L_{st} is the longitude of the standard meridian for the local time zone, L_{loc} is the longitude of the location in question and E is the equation of time, which takes into account the perturbations in the Earth's rate of rotation around the sun that affect the time at which the sun crosses the observer's meridian. The correction 4 (L_{st} - L_{loc}) + E is expressed in minutes. An additional correction is needed if the standard time is a daylight saving time.

3.1.11
angle of incidence
incidence angle
θ
angle between the line joining the centre of the solar disc to a point on an irradiated surface and the outward normal to the irradiated surface

3.1.12
solar tracker
sun tracker
power-driven or manually operated movable support which may be employed to keep a device oriented with respect to the sun

3.1.13
equatorial tracker
sun-following device having an axis of rotation parallel to the Earth's axis

Note 1 to entry: The parameters of motion are the hour angle and the declination of the sun.

3.1.14
altazimuth tracker
sun-following device which uses the solar elevation angle and the azimuth angle of the sun as coordinates of movement

3.1.15
sun-path diagram
graphic representation of solar altitude versus solar azimuth, showing the position of the Sun as a function of time for various dates of the year

Note 1 to entry: If solar time is used, the diagram is valid for all locations of the same latitude.

3.1.16
heliodon
solar-angle simulator for conducting shading assessments on buildings or collector arrays, usually having a model table which tilts for the latitude and rotates for the hour of day, and a lamp to represent the sun, mounted at some distance away on a vertical rail, allowing adjustment for declination

3.1.17
solarscope
device similar to a heliodon, but having a fixed horizontal model table and a light source movable to any solar altitude and azimuth

3.2 Radiation terms and quantities

3.2.1
radiation
transfer of energy in the form of electromagnetic waves

[SOURCE: WMO R0260]

Note 1 to entry: *Radiation* can also be used to refer to multiple quantities used to describe the process called radiation. For example, *radiation* could mean *energy* or *irradiance*.

[SOURCE: WMO CIMO Guide, 2017]

3.2.2
radiant energy
quantity of energy transferred by radiation

[SOURCE: WMO R0200]

3.2.3
radiant flux
radiation flux
flux of radiation [SOURCE: WMO R0230]
Φ
power emitted, transferred or received in the form of radiation

[SOURCE: ISO 31-6]

3.2.4
radiance
radiant power emitted, transmitted, reflected or received by a given surface, per unit solid angle per unit projected area.

Note 1 to entry: Radiance is expressed in watts per square metre per steradian ($W \cdot m^{-2} \cdot sr^{-1}$).

3.2.5
irradiance
G
Quotient of the radiant flux incident on the surface and the area of that surface, or the rate at which radiant energy is incident on a surface, per unit area of that surface

Note 1 to entry: Irradiance is expressed in watts per square metre ($W \cdot m^{-2}$).

3.2.6
irradiation
DEPRECATED: insolation
H
incident energy per unit area of a surface, found by integration of irradiance over a specified time interval.

3.2.7
radiant exitance
M
at a point on a surface, the radiant flux leaving the element of the surface, divided by the area of that element

[SOURCE: ISO 31-6]

Note 1 to entry: Formerly called radiant emittance.

Note 2 to entry: The radiant energy may leave the surface by emission, reflection and/or transmission.

3.2.8
ultraviolet radiation
electromagnetic radiation of wavelength in the range of 10 nm to 400 nm

Note 1 to entry: UVA radiation has a wave-length range of 315 nm to 400 nm; UVB radiation has a wavelength range of 280 nm to 315 nm; UVC radiation (wavelength range 280 nm to X-rays) cannot be detected by solar energy technologies.

3.2.9
visible radiation
light
electromagnetic radiation of wavelengths causing visual sensations for humans

Note 1 to entry: Visible radiation is generally accepted to be within the wavelength band of 380 nm to 780 nm

3.2.10
infrared radiation
electromagnetic radiation of wavelengths longer than those of visible radiation and shorter than about 1 mm

3.2.11
shortwave radiation
radiation of wavelength shorter than 3 µm but longer than 280 nm

3.2.12
longwave radiation
radiation of wavelength greater than 3 µm, typically originating from sources at terrestrial temperatures

Note 1 to entry: Examples of sources of longwave radiation are clouds, atmosphere, ground and terrestrial objects.

Note 2 to entry: Sometimes is called *thermal radiation*.

3.2.13
solar radiation
DEPRECATED: shortwave radiation
DEPRECATED: insolation
radiation emitted by the sun

3.2.14
solar energy
energy emitted by the sun in the form of electromagnetic energy

Note 1 to entry: Solar energy is primarily in the wavelength region from 0,3 µm to 3,0 µm.

Note 2 to entry: Solar energy is generally understood to mean any energy made available by the capture and conversion of solar radiation.

3.2.15
solar flux
radiant flux originating from the sun

3.2.16
solar spectrum
distribution by wavelength (or frequency) of electromagnetic radiation emitted from the sun

3.2.17
direct radiation
direct solar radiation
beam radiation
beam solar radiation
radiation incident on a given plane, and originating from a small solid angle centred on the sun's disk

Note 1 to entry: In general, direct solar radiation is measured by instruments with field-of-view angles of up to 6°. Therefore, a part of the scattered radiation around the sun's disk (*circumsolar radiation*) is included, as the solar disk itself has a field-of-view angle of about 0,5°.

Note 2 to entry: Direct radiation is usually measured at normal incidence.

Note 3 to entry: Approximately from 97 to 99% of the direct solar radiation received at the ground is contained within the wavelength range from 0,3 µm to 3 µm [SOURCE: Reference [1]].

Note 4 to entry: Further details on *circumsolar radiation and its role for direct radiation* are provided in *circumsolar radiation, circumsolar irradiance, circumsolar contribution, sunshape* and *direct solar irradiance*.

3.2.18
circumsolar radiation
radiation scattered by the atmosphere so that it appears to originate from an area of the sky immediately adjacent to the sun

Note 1 to entry: Circumsolar radiation causes the solar aureole.

Note 2 to entry: Further details on *circumsolar radiation and its role for direct radiation* are provided in *circumsolar irradiance, circumsolar contribution, sunshape* and *direct solar irradiance*

3.2.19
circumsolar irradiance
quotient of the radiant flux of the circumsolar radiation on a given plane receiver surface to the area of that surface

Note 1 to entry: If the receiver plane is perpendicular to the axis of the solid angle, the circumsolar irradiance is called circumsolar normal irradiance. Circumsolar irradiance is usually measured at normal incidence.

3.2.20
circumsolar contribution
contribution of a specific portion of the circumsolar normal irradiance to the direct normal irradiance. The circumsolar contribution refers to a specific ring-shaped angular region described by an inner and the outer angular distance from the centre of the sun.

Note 1 to entry: If the inner angle describing this angular region is the half-angle of the sun disk the circumsolar contribution is also called *circumsolar ratio*.

Note 2 to entry: Depending on the circumsolar irradiance measurement instrument or the solar technology involved, different wavelength ranges are included. In order to describe circumsolar irradiance correctly, the wavelength range or the spectral response of the instrument or the involved technology has to be specified.

3.2.21
sunshape
azimuthal average radiance profile as a function of the angular distance from the centre of the sun, normalized to 1 at the centre of the sun and considering the wavelength range of shortwave radiation.

3.2.22
hemispherical radiation
hemispherical solar radiation
solar radiation received by a plane surface from a solid angle of 2π sr

Note 1 to entry: The tilt angle and the azimuth of the surface should be specified, e.g. horizontal.

Note 2 to entry: Hemispherical solar radiation is composed of direct solar radiation and diffuse solar radiation (solar energy scattered in the atmosphere as well as solar radiation reflected by the ground).

Note 3 to entry: Solar engineers commonly use the term *global radiation* in place of *hemispherical radiation*. This use is a source of confusion if the referenced surface is not horizontal (see *global radiation).*

Note 4 to entry: Approximately 97 % to 99 % of the hemispherical solar radiation incident at the Earth's surface is contained within the wavelength range from 0,3 µm to 3 µm [SOURCE: Reference [1]].

3.2.23
global radiation
global solar radiation
hemispherical solar radiation received by a horizontal plane

Note 1 to entry: Approximately 97 % to 99 % of the global solar radiation incident at the Earth's surface is contained within the wavelength range from 0,3 µm to 3 µm [SOURCE: Reference [1]].

Note 2 to entry: Solar engineers commonly use the term *global radiation* in place of *hemispherical radiation*. This use is a source of confusion if the referenced surface is not horizontal (see *hemispherical radiation).*

3.2.24
diffuse radiation
diffuse solar radiation
hemispherical solar radiation minus direct solar radiation

Note 1 to entry: For the purposes of solar energy technology, diffuse radiation includes solar radiation scattered in the atmosphere as well as solar radiation reflected by the ground, depending on the tilt angle of the receiver surface.

Note 2 to entry: The tilt angle and the azimuth of the receiver surface should be specified, e.g. horizontal.

3.2.25
atmospheric radiation
DEPRECATED: shortwave sky radiation
longwave radiation emitted by and propagated through the atmosphere

[SOURCE: WMO A2940]

3.2.26
extraterrestrial solar radiation
solar radiation received at the limit of the Earth's atmosphere

[SOURCE: WMO E1370]