ISO 21348 information is provided courtesy of Space Environment Technologies
spacenvironment@spacenvironment.net http://SpaceWx.com

ISO 21348 Definitions of Solar Irradiance Spectral Categories

Spectral category	Spectral sub-category	Wavelength range (nm)	Wavelength range (SI prefixes from Table 2)	Notes
Total Solar Irradiance				full-disk, 1 ua solar irradiance integrated across all wavelengths
Gamma-rays		0.00001 ≤ λ < 0.001	10 fm ≤ λ < 1 pm	
X-rays		0.001 ≤ λ < 0.1	1 pm ≤ λ < 0.10 nm	Hard X-rays
	XUV	0.1 ≤ λ < 10	0.10 nm ≤ λ < 10 nm	Soft X-rays
Ultraviolet	UV	100 ≤ λ < 400	100 nm ≤ λ < 400 nm	Ultraviolet
	VUV	10 ≤ λ < 200	10 nm ≤ λ < 200 nm	Vacuum Ultraviolet
	EUV	10 ≤ λ < 121	10 nm ≤ λ < 121 nm	Extreme Ultraviolet
	H Lyman-α	121 ≤ λ < 122	121 nm ≤ λ < 122 nm	Hydrogen Lyman-alpha
	FUV	122 ≤ λ < 200	122 nm ≤ λ < 200 nm	Far Ultraviolet
	UVC	100 ≤ λ < 280	100 nm ≤ λ < 280 nm	Ultraviolet C
	MUV	200 ≤ λ < 300	200 nm ≤ λ < 300 nm	Middle Ultraviolet
	UVB	280 ≤ λ < 315	280 nm ≤ λ < 315 nm	Ultraviolet B
	NUV	300 ≤ λ < 400	300 nm ≤ λ < 400 nm	Near Ultraviolet
	UVA	315 ≤ λ < 400	315 nm ≤ λ < 400 nm	Ultraviolet A
Visible	VIS	380 ≤ λ < 760	380 nm ≤ λ < 760 nm	optical
		360 ≤ λ < 450	360 nm ≤ λ < 450 nm	purple
		450 ≤ λ < 500	450 nm ≤ λ < 500 nm	blue
		500 ≤ λ < 570	500 nm ≤ λ < 570 nm	green
		570 ≤ λ < 591	570 nm ≤ λ < 591 nm	yellow
		591 ≤ λ < 610	591 nm ≤ λ < 610 nm	orange
		610 ≤ λ < 760	610 nm ≤ λ < 760 nm	red
Infrared	IR	760 ≤ λ < 1 000 000	760 nm ≤ λ < 1.00 mm	
	IR-A	760 ≤ λ < 1 400	760 nm ≤ λ < 1.40 mm	Near Infrared
	IR-B	1 400 ≤ λ < 3 000	1.40 mm ≤ λ < 3.00 mm	Middle Infrared
	IR-C	3 000 ≤ λ < 1 000 000	3.00 mm ≤ λ < 1.00 mm	Far infrared
Microwave		1 000 000 ≤ λ < 15 000 000	1.00 mm ≤ λ < 15.00 mm	
	W	3.00×10^{6} ≤ λ < 5.35×10^{6}	3.00 mm ≤ λ < 5.35 mm	(100.0 ≥ ν > 56.0) GHz
	V	5.35×10^{6} ≤ λ < 6.52×10^{6}	5.35 mm ≤ λ < 6.52 mm	(56.0 ≥ ν > 46.0) GHz
	Q	6.52×10^{6} ≤ λ < 8.33×10^{6}	6.52 mm ≤ λ < 8.33 mm	(46.0 ≥ ν > 36.0) GHz
	K	8.33×10^{6} ≤ λ < 2.75×10^{7}	8.33 mm ≤ λ < 27.5 mm	(36.00 ≥ ν > 10.90) GHz
	X	2.75×10^{7} ≤ λ < 5.77×10^{7}	27.50 mm ≤ λ < 57.70 mm	(10.90 ≥ ν > 5.20) GHz
	C	4.84×10^{7} ≤ λ < 7.69×10^{7}	48.40 mm ≤ λ < 76.90 mm	(6.20 ≥ ν > 3.90) GHz
	S	5.77×10^{7} ≤ λ < 1.93×10^{8}	57.70 mm ≤ λ < 193.00 mm	(5.20 ≥ ν > 1.55) GHz
	L	1.93×10^{8} ≤ λ < 7.69×10^{8}	193.00 mm ≤ λ < 769.00 mm	(1.550 ≥ ν > 0.390) GHz
	P	7.69×10^{8} ≤ λ < 1.33×10^{9}	769.00 mm ≤ λ < 1.33 m	(0.390 ≥ ν > 0.225) GHz
Radio		100 000 ≤ λ < 100 000 000 000	0.10 mm ≤ λ < 100 m	measurements: (1 000 000 ≤ λ < 10 000 000 000) nm
	EHF	1.00×10^{6} ≤ λ < 1.00×10^{7}	1.00 mm ≤ λ < 10.00 mm	Extremely High Frequency (300 ≥ ν > 30) GHz
	SHF	1.00×10^{7} ≤ λ < 1.00×10^{8}	10.00 mm ≤ λ < 100.00 mm	Super-High Frequency (30 ≥ ν > 3) Ghz
	UHF	1.00×10^{8} ≤ λ < 1.00×10^{9}	100.00 mm ≤ λ < 1.00 m	Ultra-High Frequency (3000 ≥ ν > 300) MHz
	VHF	1.00×10^{9} ≤ λ < 1.00×10^{10}	1.00 m ≤ λ < 10.00 m	Very-High Frequency (300 ≥ ν > 30) MHz
	HF	1.00×10^{10} ≤ λ < 1.00×10^{11}	10.00 m ≤ λ < 100.00 m	High Frequency (30 ≥ ν > 3) MHz

ISO 21348 Process for Determining Solar Irradiances Compliance Criteria

Rationale

The compliance criteria for this standard consist of activities that are common to solar irradiance product types (section 5) and solar irradiance spectral categories (section 6). These criteria specify a compliance process for the determination of solar irradiances that includes the reporting, documenting, publishing, and archiving of solar irradiance products.

Reporting

Solar irradiances shall be reported in SI units, W m^{-2} and solar spectral irradiances shall be reported in SI units, W m^{-3}. The conversion to other appropriate conventional units such as W m^{-2} nm^{-1} can be additionally applied. The reported irradiances shall be described as to whether or not they are corrected to 1 ua. It is recommended, though not required, that reported irradiances are corrected to 1 ua. If applicable, the wavelength bins (spectral sampling) and spectral resolution (bandpass) shall be reported for solar irradiance products.

Documenting

The method of determining solar irradiances shall be documented and, as appropriate, shall include data collection, retrieval, processing, calibration, validation, verification, accuracy, and precision methodology and/or algorithms, as well as archiving information.

Measurements. For measurements, including spacecraft observations, rocket experiment data sets, and ground-based observations (including balloons), a description of the responsible agent or institution and the instrumentation used to collect and retrieve the irradiances shall be provided. The data processing algorithms, the instrument calibration techniques and heritage, the method of determining accuracy and precision, the validation and verification methodology, as well as the archival processes shall be documented.

Reference spectra. For reference spectra, including the mean of spectra over several solar cycles or spectra for a variety of solar activity conditions, the rationale for specifying a spectrum as a reference shall be described. The measurement set(s) used to derive the reference spectrum, the method of resolving discrepancies between multiple data sets, the data processing algorithms, the method of determining accuracy and precision, the validation and verification methodology, as well as the archival processes shall be documented.

Empirical models. For empirical models, including those based on one or many space- or ground-based measurement sets, or for hybrid models, a description of the rationale for developing the model, its areas of application, and the rationale for selecting proxies shall be described. The measurement data sets used in the derivation, the mathematical formulation of the model, the method of resolving discrepancies between multiple data sets, the derivation algorithms, the method of determining accuracy and precision, the validation and verification methodology, as well as the archival processes shall be documented.

Theoretical models. For theoretical or first-principles models of solar processes, a description of the physical principles that are used as the basis of the model, the rationale for developing the model, and its areas of application shall be described. The numerical algorithms that produce solar irradiances, the mathematical formulation of the model, the method of determining accuracy and precision, the validation and verification methodology, as well as the archival processes shall be documented.

Solar irradiance proxies. For solar irradiance proxies, a description of the rationale for developing the proxy and its areas of application shall be described. Where appropriate, the data sets used in the derivation, the mathematical formulation of the proxy, the method of resolving discrepancies between multiple data sets, the derivation algorithms, the method of determining accuracy and precision, the validation and verification methodology, as well as the archival processes shall be documented.

Publishing

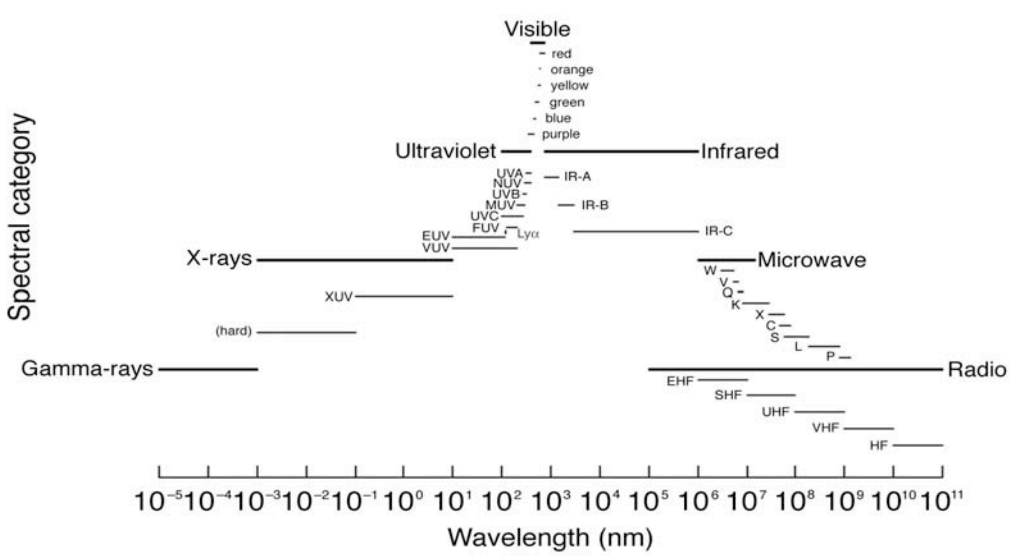
The documented solar irradiance product shall be published in an internationally-accessible journal which uses scientific or discipline-area peer review in the publication process. For any irradiance product, the published article may point to a permanent electronic archival location where the archived measurements, spectra, models, or proxies can be found, accessed, or recreated by an international community.

Archiving

The documented and published solar irradiance product shall be archived in a method consistent with any contemporary technology that ensures long-term international accessibility.

Certification

Certification of compliance with this standard shall be achieved by complying with the criteria listed in section 7. Self-declaration of compliance in an archival publication as part of section 7.4 can be accomplished by using the statement "The process used for determining solar irradiances reported herein is compliant with ISO International Standard 21348: Space Environment (Natural and Artificial) – Process for determining solar irradiances." The type designation (section 5) and the solar irradiance spectral category (section 6) shall be identified along with the self-declaration of compliance.



Solar irradiance spectral categories from gamma-rays through radio wavelengths.