Solar Radiation from Sunshine Hours (Angstrom–Prescott)

Monthly average daily solar radiation on a horizontal surface from measured sunshine hours by the Angstrom–Prescott relation, with day length and clearness index.

Input parameters

Unit system: SI

Parameter	Value	Unit
Latitude (north positive, south negative)	17.400	°
Day of the year (1 = 1 January, 365 = 31 December)	105.00	
Average daily hours of bright sunshine	9.5000	h
Angstrom coefficient a (climate dependent)	0.30000	
Angstrom coefficient b (climate dependent)	0.45000	
Declination formula	Cooper (1969), as in the textbook examples	

Calculated results

Parameter	Value	Unit
Declination	9.4149	°
Maximum possible sunshine (day length)	12.397	h
Sunshine fraction	76.631	%
Extraterrestrial radiation	38.032	MJ/m²
Estimated radiation on a horizontal surface	24.524	MJ/m²
Monthly clearness index	0.64484	

Notes for this case

• Use the mean day of the month for monthly averages (17 January, 16 February, 16 March, 15 April, 15 May, 11 June, 17 July, 16 August, 15 September, 15 October, 14 November, 10 December). The coefficients a and b depend on climate and should come from a station with similar weather.

Formula and method

$$\frac{\bar{H}}{\bar{H}_o} = a + b\frac{\bar{n}}{\bar{N}}$$

$$\bar{N} = \frac{2}{15}\cos^{-1}(-\tan\phi\tan\delta)$$

Variables

ϕ	Latitude (north positive, south negative)	rad
n	Day of the year (1 = 1 January, 365 = 31 December)	-
$\bar{n}$	Average daily hours of bright sunshine	s
a	Angstrom coefficient a (climate dependent)	-
b	Angstrom coefficient b (climate dependent)	-
δ formula	Declination formula	-
δ	Declination	rad
$\bar{N}$	Maximum possible sunshine (day length)	s
$\bar{n}/\bar{N}$	Sunshine fraction	-

$\bar{H}_o$	Extraterrestrial radiation	J/m²
$\bar{H}$	Estimated radiation on a horizontal surface	J/m²
$\bar{K}_T$	Monthly clearness index	-

Method and standards

Angstrom–Prescott regression of radiation on sunshine fraction.

Assumptions and limits

- Monthly averages only; individual days scatter widely.

Report details

Report reference	FCC-31TE-DKKV (the same inputs always give the same reference)
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Calculator	Solar Radiation from Sunshine Hours (Angstrom–Prescott)
Method last reviewed	17 November 2026
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/environmental/solar-thermal/sunshine-hours-solar-radiation-angstrom

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.